Topic on

“A Technical and Project Review of the 10 Airport Core Projects and their Influence on Current Developments”

Presented by Raymond Wong

City University of Hong Kong
The need of a new Airport

The full capacity of Kai Tak Airport was at 25,000,000 passenger per year and 320 aircraft daily
The need of a new Airport

Passenger handling capacity 1980 – 7,000,000  
(10 -12% growth) 1991 – 19,000,000  
2003 – 48,000,000

Air cargo handling capacity 1980 – 260,000 tons  
(11 -14% growth) 1991 – 855,000 tons  
2003 – 3,500,000 tons

Other issues – rapid expansion in China cargo handling with an average growth of 16% after 1990.
Development Background

Replacement of the Kai Tak Airport was discussed in early 1970s. Various sites were examined and Chek Lap Kok emerged as the preferred location.

A master plan was drawn up in 1982, but was shelved in 1983 because of the world economic situation and resulted to a drop in air traffic growth forecast.

The plans were revived in 1987 following strong growth in Kai Tak’s passenger and cargo traffic. Alternative sites were again reviewed and final studies were carried out on Chek Lap Kok and a site in the western harbour near Lamma Island.
Development Background

Finally CLK was given the go-ahead in 1989 as part of a comprehensive Port & Airport Development Strategy (PADS) which also included other major port development concerns.

In 1991, PADS was distilled into an Airport Core Programme (ACP) which included all the transport and other infrastructure required to open the new airport at CLK.

China gave the ACP formal support in late 1991 through a Sino-British Memorandum of Understanding and a Consultative Committee on the new airport and related projects was set up to oversee and coordinate the detailed aspect of the programme including concerns on public involvement.
Managing the New Airport Programme

A statutory body known as the Provisional Airport Authority (PAA) was formed in 1990 responsible for the detail planning and implementation of the related works for the replacement the old airport with a new.

PAA was affirmed as the Airport Authority (AA) in late 1995 whose mandate was to define and promote all aspects of the new airport and the related developments.

Upon the completion of the programme, AA would also responsible for the operation of the new facility.
Organization of the Airport Authority

At the top of the hierarchy was the AA Broad which was responsible for all the strategic and corporate decisions. On a day-to-day basis, decisions are made by the Chief Executive Officer with the help of directors from seven key divisions.

**Airport Management Division** – for airport operations and the coordination of the Kai Tak relocation program.

**Corporate Development Division** – in charge of the promotion of the new airport and the maintenance of good community relations.

**Human Resources & Admin Division**
Finance & Commercial Division – oversees the financial and expenditure of AA, provides supportive business services and ensure the design of the new airport gives the maximum commercial value.

Legal & Secretarial Division – provision of legal advice across the entire range of the AA’s activities and control over the registration and safe custody of corporate documentations.

Planning & Coordination Division – formulation of AA’s long term development strategy (traffic forecast, expansion phasing, operation research and analysis etc.)

Project Division – supervise the design & construction of the new airport and to coordinate the ACP as a whole.
To make the construction of the new airport and the associated infrastructure more effective in terms of management, construction and coordination, the involved works were subdivided into 10 Airport Core Projects for implementation, which include:

1. New Airport at Chek Lap Kok
2. Tung Chung New Town
3. North Lantau Expressway
4. Airport Railway
5. Lantau Fixed Crossing
6. Route 3 (Kwai Tsing Section)
7. West Kowloon Reclamation
8. West Kowloon Expressway
9. Western Harbour Crossing
10. Central Reclamation
Location of Airport Core Projects
Airport Core Projects – approx. costs

1. Airport – $65B, including formation of the airport island ($22B) and the construction of the Terminal Building ($15B)

2. Tung Chung New Town – $6B

3. North Lantau Expressway – $10B

4. Airport Railway – $28B

5. Lantau Fixed Crossing – $12B, including the construction of the Tsing Ma Bridge ($7.2B), Ma Wan Viaduct and Kap Shui Mun Bridge ($1.6B).
Airport Core Projects – approx. costs

6. Route 3 (Kwai Tsing Section) – $10B, including the construction of the Cheung Tsing Tunnel ($0.8B) and a 6.5km elevated expressway ($2.2B)

7. West Kowloon Reclamation – $6B

8. West Kowloon Expressway – $8B

9. Western Harbour Crossing – $6B

10. Central Reclamation – $4B

Total costs for the Airport Core Project around $155B as in 1997 price
## Airport Core Projects – Contracts

<table>
<thead>
<tr>
<th>Contract Title</th>
<th>Contract Commencement Date</th>
<th>Contractor/ Awarded Contract Sum (ACP Portion Only) (Money of the Day)</th>
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<tbody>
<tr>
<td><strong>New Airport at Chek Lap Kok (Airport Authority Hong Kong)</strong></td>
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<tr>
<td>1. Automated People Mover System (Contract No. C350)</td>
<td>March 1994</td>
<td>New Hong Kong Airport People Mover System Joint Venture $321.00 M</td>
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<tr>
<td>2. Baggage Handling System (Contract No. C360)</td>
<td>March 1994</td>
<td>Swire Engineering Services Ltd. $640.00 M</td>
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<tr>
<td>3. Construction of a Power Sub-station at Chek Lap Kok (Contract No. C531)</td>
<td>October 1994</td>
<td>Gold Banner Construction and Development Ltd. $48.50 M</td>
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<tr>
<td>5. Airfield Tunnels (Contract No. C430)</td>
<td>November 1994</td>
<td>Downer - McAlpine - Paul Y Joint Venture $665.60 M</td>
</tr>
<tr>
<td>7. Terminal Building - Building Services (Contract No. C320)</td>
<td>January 1995</td>
<td>AEH Joint Venture $1,880.00 M</td>
</tr>
<tr>
<td>Project Description</td>
<td>Date</td>
<td>Contractor/Partner</td>
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<tr>
<td>Tung Chung Development - Phase I</td>
<td>18 July 1994</td>
<td>Shui On - China Harbour Joint Venture</td>
</tr>
<tr>
<td>Station (Contract No. NL 2/93)</td>
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<tr>
<td>3. Construction of Divisional Fire Station with ambulance facilities in Tung</td>
<td>28 September 1995</td>
<td>Techoy Construction Company</td>
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<tr>
<td>Chung, Lantau Island (Contract No. SS D331)</td>
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<tr>
<td>4. Construction of North Lantau Development Phase I District Police Station in</td>
<td>12 October 1995</td>
<td>Woon Lee Construction Co., Ltd.</td>
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<tr>
<td>Tung Chung (Contract No. SS C395)</td>
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<tr>
<td>5. Lift and Dumbwater Installation for North Lantau Development Phase I District</td>
<td>12 October 1995</td>
<td>Kone Elevator (HK) Ltd.</td>
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<tr>
<td>Police Station in Tung Chung (Contract No. LF D366)</td>
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<tr>
<td>6. North Lantau Refuse Transfer Station (Contract No. EP/SP/20/94)</td>
<td>1 April 1996</td>
<td>Ecoserve Ltd.</td>
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<tr>
<td>North Lantau Expressway</td>
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<tr>
<td>1. North Lantau Expressway - Tai Ho Section (Contract No. HY/91/07)</td>
<td>8 June 1992</td>
<td>Lantau Expressway Joint Venture</td>
</tr>
<tr>
<td>2. North Lantau Expressway - Yam O Section (Contract No. HY/91/08)</td>
<td>14 September 1992</td>
<td>Aoki Corporation/Franki</td>
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<td></td>
<td></td>
<td>Contractors Ltd./Tobishima Corporation</td>
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<td></td>
<td>Joint Venture</td>
</tr>
<tr>
<td>3. North Lantau Expressway - Tung Chung Section (Contract No. HY/92/05)</td>
<td>27 September 1993</td>
<td>China State - Leighton - Hochtief</td>
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<td></td>
<td>Joint Venture</td>
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<tr>
<td>Lantau Link*</td>
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<tr>
<td>1. Lantau Link - Tsing Ma Bridge (Contract No. HY/91/18)</td>
<td>25 May 1992</td>
<td>Anglo Japanese Construction Joint Venture</td>
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ACPs – Example of Contracts Breakdown

Airport Railway were sub-divided into more than 40 main contracts for implementation, these include:

(501) – Hong Kong Station and associated tunnels
(501A) – Central Subway
(502) – Western Immersed Tube Tunnel
(503B) – Kowloon South Tunnels & Ancillary Building
(503C) – Kowloon Station
(505) – Tai Kok Tsui (Olympic) Station
(508) – Lai King Station and Tunnels
(509) – Kwai Chung Park Viaduct
Airport Railway contracts (continue)

(510) – Rambler Channel Bridge
(511C) – Tsing Yi Station
(512) – Tsing Yi Tunnels and Viaducts
(514) – East Lantau Tunnels
(516) – Tung Chung Station and Tunnels
(518) – Siu Ho Wan Depot
(520) – Trackwork
(544-580) – Electrical and Mechanical Works

As well as other associated portions entrusted to other ACPs contracts or Govt. Departments for implementation. (e.g. CLK Station as part of the Ground Transportation Centre under the Terminal Building)
New Airport at Chek Lap Kok
Formation of the Airport Platform from the original Chek Lap Kok Island
Formation of the Airport Platform - land fill
Layout of the Airport Platform
Early stage of the Airport Terminal Building construction – foundation and sub-structure
Construction of the Terminal superstructure
Modulated roof for the Terminal Building
Position the modulated roof onto the Terminal structure by 500 ton capacity mobile crane.
Position the modulated roof onto the Terminal structure (entrance concourse) by crane and slide-on rail
Installation of the Glass Wall
Construction of the Air Bridge
Finishing up the Terminal Interior
Paving work for the runway
Paving for the apron area
The new Airport close to its completion in 1998
Other facilities in the New Airport
Ground Transportation Centre
Other facilities owned by the Government
Air Cargo Facilities – Asian Air Terminal (left) and Super-Terminal No. 1
HKAEO Aircraft Maintenance Depot
Other private development – Cathy City
Tung Chung New Town

Major Contracts

1. Tung Chung Development Phase I - Infrastructure ($0.5 bn)

2. North Lantau Sewage Treatment Facilities ($0.2 bn)
Original plan for the Tung Chung New Town
Layout of Tung Chung New Town in 2004

[Map of Tung Chung New Town showing various locations and pathways.]
Tung Chung at its early stage in 1995
Formation of the Tung Chung New Town
Tung Chung as seen in 1996
Tung Chung taking shape as in 1997
North Lantau Expressway

Major Contracts
1. NLE – Yam O Section ($1.35 bn)
2. NLE – Tai Ho Section ($3.5 bn)
3. NLE – Tung Chung Section ($0.97 bn)

All contracts under Highways Department
Original Coastline of North Lantau (section between Yam O and Tai Ho)
North Lantau Expressway – formation by cutting and land filling
North Lantau Expressway – land formation by sand filling
North Lantau Expressway – forming the seawall
Construction of a bridge section at Shum Shiu Kok
Construction of a bridge section at Shum Shiu Kok
Construction of a section of culvert near Tai Ho
North Lantau Expressway – formation of the Yam O Section
Junction Point to Penny Bay (Disney Land) at Yam O
Tai Ho Section and the Depot Facilities of the Tung Chung Line
Expressway as seen near the Toll Plaza of the Lantau Fixed Crossing
The completed Expressway at Yam O and Tai Ho
Lantau Fixed Crossing

Major Contracts

1. Tsing Ma Bridge ($7.15 bn)

2. Kap Shui Mun Bridge and Ma Wan Viaduct ($1.65 bn)

3. Toll Plaza and associated roadworks ($0.3 bn)

Majority of the contracts under Highways Department
The 1377m span
Tsing Ma Bridge
The Tsing Ma Bridge

Ma Wan side

Cable anchor

Main span

Tsing Yi side

Side span and approach bridge
Water Channel between Tsing Yi and Ma Wan as in 1995
Formation on Tsing Yi side – construction of the bridge tower and the anchor for the suspension cable
The approach concourse on the Tsing Yi side
Approach section leading to the main span
Construction of the bridge tower
Formation work on the Ma Wan side as seen in 1995
Forming the cable anchor on the Ma Wan formed land
The approach section on the Ma Wan side
Erection of the side spans on Tsing Yi and Ma Wan using installation of prefabricated components in an in-situ manner.
Connecting the steel wire to the ground anchor
Forming the suspension cable
Compaction and final encasing of the main cable
Suspension cable supported onto the tower head by the saddle
Hoisting and erecting the modulated bridge deck onto the suspension cable
Hoisting gantry using strand jack for the lifting of the deck module onto the suspension cable.
Exterior and interior view inside the bridge deck
The Ma Wan Viaduct – the linking section between the Tsing Ma and Kap Shui Mun Bridge
Construction detail of the Ma Wan Viaduct
Kap Shui Mun Bridge – a 430m cable-stayed bridge
Hoisting and erecting of the modulated bridge deck
Forming the approach section of the KSM Bridge on the Lantau side.
Forming the approach section of the KSM Bridge using incremental launching method
Route 3 – Kwai Tsing Section

Major Contracts

1. Cheung Ching Tunnel and associated roadworks ($0.85 bn)

2. Kwai Chung Viaduct ($2.2 bn)

Contracts under Highways Department
Route 3, Tsing Kwai Section at Kwai Chung
Approach section of Route 3 heading to the Rambler Channel
This section of Route 3 is mainly composing of 4-lane 2-way elevated roadway, averaged 35m span and 15m above ground.
Forming the deck of elevated bridge using precast beam by launching machine (section along Kwai Chung & Kwai Tai Road)
Detail set-up of the launching machine on top of the portal frame
Elevated track of the Airport Railway running along Route 3 at Kwai Chung Road

Launching machine for installing the precast girder section of the elevated track
Viaduct section before crossing the Rambler Channel
(using precast box-section segment instead of U-beams)
Viaduct section formed using in-situ method with deck formwork supported by falsework
The completed Route 3 between Mei Foo and Lai King as seen from the Container Terminals.
West Kowloon Reclamation
West Kowloon at Yaumatei/Shamshuipo at the early stage of reclamation
Gradual progress of Reclamation at Yaumatei
Gradual progress
of Reclamation
at Yaumatei
Reclamation at Cheung Sha Wan – relocation of the Fish Markets
Government docks and private-owned shipyards being relocated during the reclamation process.
Commencement of roadwork and other infrastructure facilities after reclamation completed in 1996
South-most tip of West Kowloon Reclamation – connection to the harbour crossing tunnels
Reclamation at Stonecutter Island to form land for Container Terminal No. 5 to 8
Container Terminal No. 5 to 8 put into operation in early 1997
West Kowloon in 2001
West Kowloon Reclamation as seen in 2004
West Kowloon Expressway

Major Contracts
1. WKE, North Section ($1.25 bn)
2. WKE, South Section ($0.96 bn)

Contracts under Highways Department
West Kowloon Expressway comprising:
1. North Section – Elevated, 2.7 km
2. South Section – On-grade, 1.5 km
West Kowloon Expressway – construction of Mei Foo Interchange
Construction of the elevated expressway using precast box-girder by portal gantry
West Kowloon Expressway at Tai Kok Tsui near Olympus Station
Layout of WKE South Section showing the YMT Interchange
YMT Interchange & other new developments
Western Harbour Crossing

West Kowloon Expressway as seen after its opening in early 1998
Western Harbour Crossing

Franchised under BOT
Casting yard for the forming of the submerge tunnel tubes at Shek O Quarry
Casting the submerge tunnel tubes
Delivery of the Submerge-tube by floating-out from the casting yard (dry dock)
Transport the submerge-tube by barges and place them onto pre-arranged position.
Connecting the submerge-tube to the tunnel approach
Forming the tunnel approach using cut-and-cover arrangement
Layout of the Immersed Tunnel and the Tunnel Concourse
Tunnel sections
The tunnel approach and connection arrangement at Sai Ying Poon side
Associated roadwork forming the entrance concourse to the Western Harbour Crossing at Sai Ying Poon side
Associated roadwork for the Western Harbour Crossing at Sai Ying Poon
Western Harbour Crossing at the West Kowloon entrance
Central Reclamation

Phase I Engineering Works ($1.7 bn)
Early stage of the reclamation work in 1994
Construction of new ferry piers to replace the old that were still servicing central to Jordon Road and outlying islands
Reclamation carried out in a looped manner to allow servicing facilities to be replaced at the latest stage.
Gradual completion of the reclamation for handing over for commencement of other facilities
Associated works – sewage diversion and the construction of a slip road (future Centra/Wanchai By-pass)
Viewing the area in 2002 from the IFC 2 Tower
Taking shape of the new land formed by the Central Reclamation
Developments in the Central Reclamation
Airport Railway
The 32km Airport Railway and Tung Chung Line owned by MTR
Hong Kong Station
of the
Airport Railway
Cut-and-Cover Tunnel for the Airport Railway in the newly Reclaimed Land in Central
Aerial view of the Central Reclamation seeing the Railway Alignment going into the Harbour Crossing Tunnel
Landing point of the Airport Railway at West Kowloon Reclamation
Construction of the Kowloon Station and the cut-and-cover tunnel of the Airport Railway at its early stage in 1995
Cut-and-cover tunnel of the Airport Railway near the Kowloon Station
Kowloon Station as seen in 1998, the station provide vast land resources to fund the Airport Railway projects as well as for the future development of the West Kowloon
Airport Railway – Lai King Station and Viaducts
Airport Railway crossing the Rambler Channel heading to the Tsing Yi Station
Airport Railway – Viaduct and Track in Kwai Chung
Airport Railway – Tsing Yi Tunnel and Viaduct
Airport Railway – Track inside Tsing Ma and Kap Shui Mun Bridge
Airport Railway – portal of East Lantau Tunnel linking between Kap Shui Mun Bridge and the North Lantau Expressway coastline
Track along the coastline of North Lantau Expressway
Financial sources for the Airport Railway projects – the International Financial Centre and other property development along the line
Financial sources for the Airport Railway projects – property development in Tsing Yi and Tung Chung
How the Airport Core Projects benefit the overall development of Hong Kong?

The new airport and the associated projects were part of the overall development of Hong Kong under the Territorial Development Strategy (TDS) as released by the Planning Department in early 1990. TDS is the blue print for future developments, which covers also detail planning framework for railway, highway, port facilities, land use, urban renewal and other sustainable development in a strategic manner.
How the Airport Core Projects benefit the overall development of Hong Kong?

Below are some highlights of the benefits that the ACPs undermined

New Airport – Besides meeting the air transport need in the coming decades, it also helps Hong Kong to become the major transportation hub within the Eastern part of Asia. The land formed in vicinity of the new airport also provides opportunity for some strategic developments such as trade and exhibition services.

Tung Chung New Town & North Lantau Expressway – It established the first population centre in Lantau Island. Besides fulfilling the policy of new town development as part of the town planning scheme, it also provides a base to support the overall development of Lantau in a long run.
Highlights of the benefits of ACPs (continue)

Airport Railway and Lantau Fixed Crossing – Besides providing the basic transportation link to the new airport, Tung Chung new town and the possible future expansion along the north coastline of Lantau, the railway and roadway also integrated into the overall transportation network of Hong Kong in particular in support of the development of the NW New Territories and meeting the rapidly expanding cross-boundary traffic demand.

Route 3 (Tsing Kwai Section) and Western Harbour Crossing – As the former portion of the truck road development, the project integrated with the Country Park Section 2 years later to form the 30 km Route 3 truck route that links efficiently the metro area into the northern part of New Territory. WHC also provided the 3rd harbour crossing tunnel linking the already saturated EHC and CHT.
Highlights of the benefits of ACPs (continue)

West Kowloon Reclamation and Expressway – produce 340 hectares of land as an important resource to support future urban development (new land supply, thinning out, replacement of aged facilities, restructuring opportunity of tightly developed metro areas etc)

Central Reclamation – provide precious land supply to densely occupied Central district, served as an important planning phase to enhance the future transportation network (Island North Expressway, Wanchai-Central Bypass, North Island Line and Shatin-Central Line etc) and greening (Leisure Area, harbour Promenade and public space) of the northern part of Hong Kong Island.
Any uncertain?

Hong Kong has experienced unprecedented drift in economical and social structure, the blueprint as set in the 90’s may not meet the needs and new conditions as faced today. These factors mainly include:

1. Economical restructure happened in HK since the end of 1990s
2. Rapid growth of China’s economic in all aspects
3. The rapid development of HK’s neighbourhood
4. And ………

This issue will be discussed in more detail in the coming seminar meeting
Thanks for coming.

See you in the next Seminar Session