

# **A Review on the Recent Large Scale Infrastructure Projects in Hong Kong**

**By Raymond Wong**

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**Raymond Wong was the invited speaker for the Event**

# Part I

A general understand and Review of  
the scope and nature of  
Infrastructure Developments in  
Hong Kong

# General Classification of Infrastructure Development/Projects

1. Transportation facilities including highway and railway projects
2. Port and Airport development projects
3. Land formation projects
4. New Town development projects
5. Environmental and Sewage projects
6. general urban facilities including water and power supply



# Chronological milestones of HK's Infrastructure Development after WWII

1945 – 60

- Basically completion of a paved single lane 2-way roadway network encircling the area of New Territories with limited linkage into the Metro-area
- Development of the first Satellite Town of Tsuen Wan

# Chronological milestones (continue)

1960 - 70

- Opening of the 1st Lion Rock Tunnel (1967)
- Opening of a West-east run Highway system on the northern part of Kowloon Peninsula (Lung Cheung Rd)
- Completion of the Western Yaumatei/Mong Kok and Admiralty/Wanchai Reclamation
- Opening of other linking roadway to newly developed areas such as Kwun Tong, Chai Wan and Kwai Chung

# Chronological milestones (continue)

- 1970 - 80
- Opening of the Cross Harbor Tunnel linking HK Island and Kowloon (1972)
  - Completion of Container Terminals No. 1 – 4 (throughout the 70s)
  - Opening of the 1<sup>st</sup> Tsing Yi Bridge and gradual development of the Island (74)
  - Development of the New Town of Tuen Mun and Shatin the opening of the Tuen Mun Highway (78)
  - Opening of the 2<sup>nd</sup> Lion Road Tunnel (78)
  - Opening of the MTR Island, Kwun Tong and Tsuen Wan Lines (late 70s)

# Formation of the Shatin New Town in the late 1970s







Shatin in 2000

# Chronological milestones (continue)

- 1980 – 90
- Opening of the East Kowloon Highway (1981)
  - Electrification of the dual-track KCR East Rail (83)
  - Opening of the Tolo Harbor Highway (85)
  - Opening of the Light Rail System in the Tuen Mun/Yuen Long Corridor (88)
  - Development of the Tuen Mun/Yuen Long and Tai Po/Fanling/sheung Shui Corridor, and the Tseung Kwan O New Town (throughout 80s)



# Formation of Tuen Mun New Town in the early 1980s







Development along  
Tuen Mun-Yuen  
Long Corridor







Formation of Tai Po  
New Town in the early  
1980s and an aerial  
view of the district as  
seen in 2000



## Tolo Harbour Highways in late 1990s





# Chronological milestones (continue)

- 1980 – 90 • Opening of the East Kowloon Highway (1981)
- Electrification of the dual-track KCR East Rail (83)
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- Development of the Tuen Mun/Yuen Long and Fanling/sheung Shui Corridor, and the Tseung Kwan O New Town (throughout 80s)

# Chronological milestones (continue)

- 1980 – 90
- Opening of the Eastern Harbor Crossing (1989)
  - Opening of the 1<sup>st</sup> section of West Kowloon Corridor between Lai Chi Kok and Mong Kok (88)
  - Opening of the Island Eastern Corridor (89)
  - Opening of the latter phase of MTR Lines (Island Line in 1982, Island Line linking to Kwun Tong Line through Eastern Harbor Crossing in 1989)

# Chronological milestones (continue)

- 1990 – 95 • Opening of a series of road tunnels including Tseung Kwan O (90), Shing Mun (90) & Tate's Cairn (91) tunnels
- Opening of the Kwun Tong Bypass (92)
- Opening of the final phase of the New Territories Circular Road (94)
- Reclamation for the Hung Hom Bay, Central/Wanchai, and West Kowloon Reclamation (mid 90)
- Commencement of the New Airport and the related core projects

# Chronological milestones (continue)

- 1995 – • Opening of the Lantau Link (Tsing ma /Kap Shui Mun Bridge) and the North Lantau Expressway (1997)
- 2000 • Opening of the Western Harbor Crossing & West Kowloon Expressway (97)
- Completion of Container Terminal 5 – 8 (98)
- Development of Tung Chung New Town (98)
- Opening of Chek Lap Kok Airport (98)
- Opening of the MTR Tung Chung Line and Airport Railway (98)
- Opening of the Route 3 including the Ting Kau Bridge and Tai Lam Tunnel (98)

# Chronological milestones (continue)

2000  
onward

- Opening of the MTR Tseung Kwan O Extension (2002)
- Opening of the KCR West Rail (03)
- Opening of the KCR East Rail Extension – Ma On Shan Line (04)
- Opening of the KCR East Rail Extension – Hung Hom to Tsim Sha Tsui (04)
- Completion of Container Terminal No. 9 (04)

# Infrastructure Development in general aims to achieve the following basic objectives

1. Provide new lands for the required developments.
2. Provide a land structure with the basic physical constituents able to support or accommodate the provision of the required facilities, quality living of the inhabitants and the sustainability/development of all essential social or economical functions.
3. Provide the transportation linkage within or outside the territory for the efficient operation of various functions.
4. Provide the hardcore facilities to achieve the objectives



# Specific objectives for Hong Kong's development (as stipulated by the Planning Department in the Territorial Development Strategies and its revision visioned toward 2030)

1. Enhance HK as an international city and a region centre for business, finance, information, tourism and manufacturing.
2. Ensure provision to satisfy land use and infrastructure needs arising from various strategized sectors.
3. Conserve and enhance significant landscape, ecological attributes and heritage features.
4. Enhance and protect quality of overall environment

# Specific objectives for Hong Kong's development

5. Provide framework to develop a multi-choice, high capacity, environmentally acceptable transport system for efficient and safe movement of passengers & goods.
6. Able to be implemented by public and private sectors to cater for resources and market demand. In addition to the revised objects for 2030, it further reiterates
7. Provide a good quality living environment through
  - conserving natural landscape,
  - preserving cultural heritage,
  - enhancing townscape
  - regenerating old urban areas
  - meeting various housing and community needs
8. Strengthen link with Mainland to cope with growth.

# Major Infrastructure Development projects since 1990

1. Airport Core Projects
2. Strategic/General highway projects
3. Strategic railway projects
4. Strategic Sewage Disposal Scheme (SSDS)/  
Harbour Area Treatment Scheme (HATS)

# Constituents of the Airport Core Projects

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

# Major Highway projects completed since 90s

1. Tsuen Wan/Shatin Connection (Route 5, including Shing Mun Tunnel, 1990)
2. Kwun Tong Bypass (1991)
3. Yuen Long Highway, including Au Tau Interchange (1991 – 1994)
4. Improvement/Widening of Tuen Mun Highway (1996)
5. Hiram Highway (1993 – 2001)
6. Island North Shore Highway, Chai Wan to Kennedy Town including Eastern Corridor (1988 – 1997)
7. Route 3 (Country Park Section, including Tai Lam Tunnel (1998)
8. Tsing Yi North Coastal Road (2001)

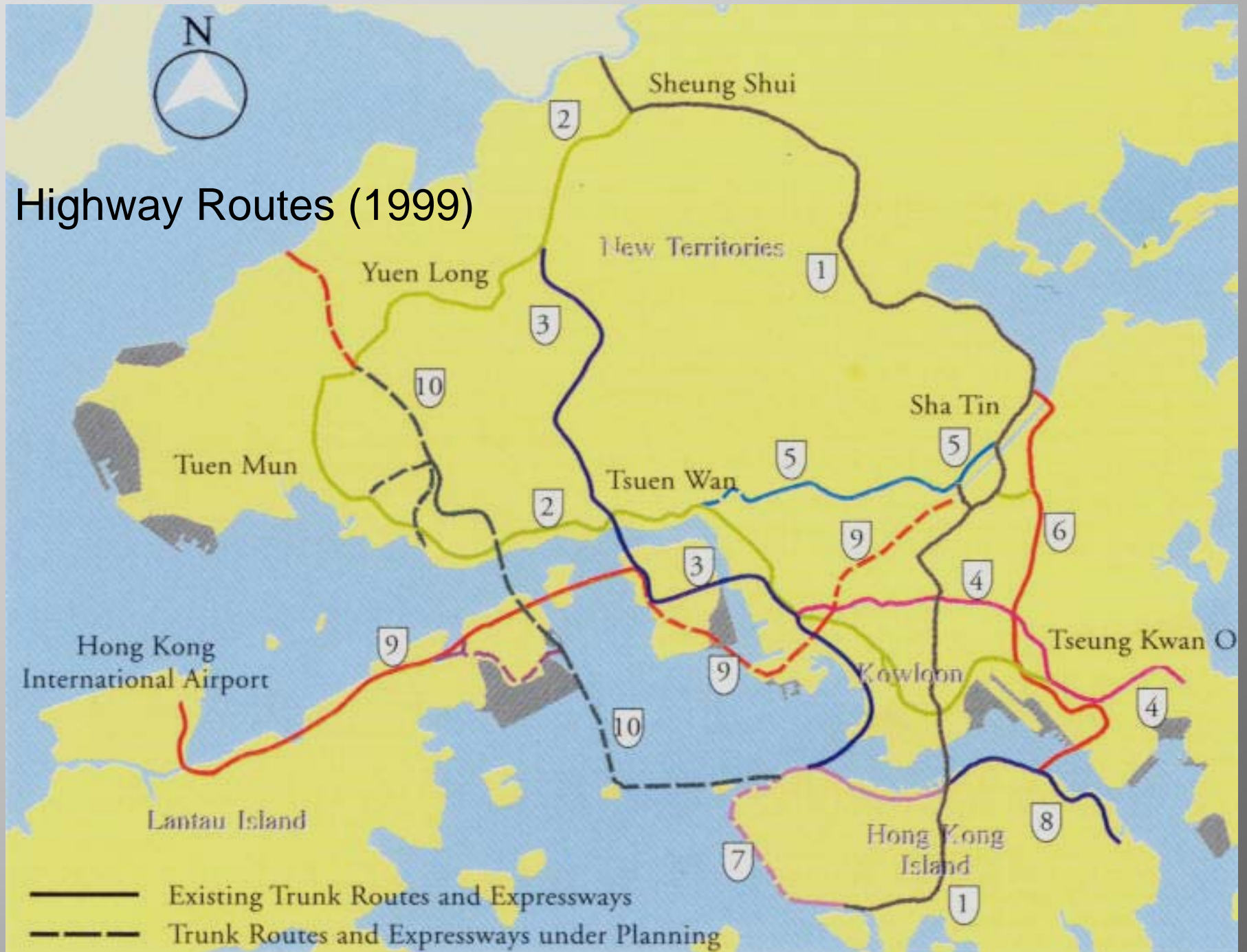


# Major Highway Systems (Highway Strategic Network)





## Highway Routes (1999)



# Major New Highway projects (to be completed before 2008)

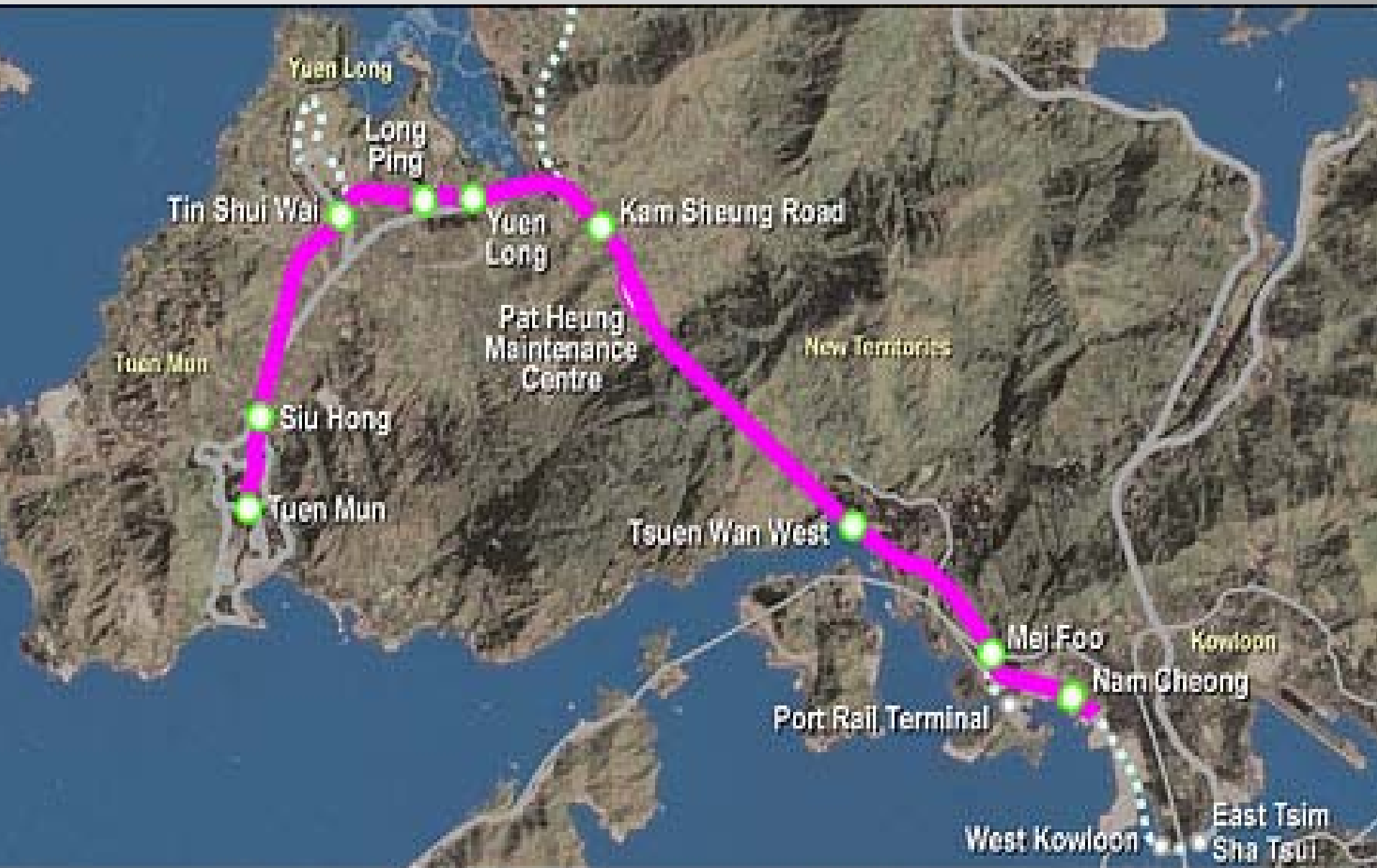
1. Deep Bay Link and Shenzhen Western Corridor (early 2006)
2. Route 9, Tsing Yi to Shatin, including the Stonecutter Bridge, 2007)
3. Route 10, North Lantau to Yuen Long, including the Tsing Lung Bridge, 2008)



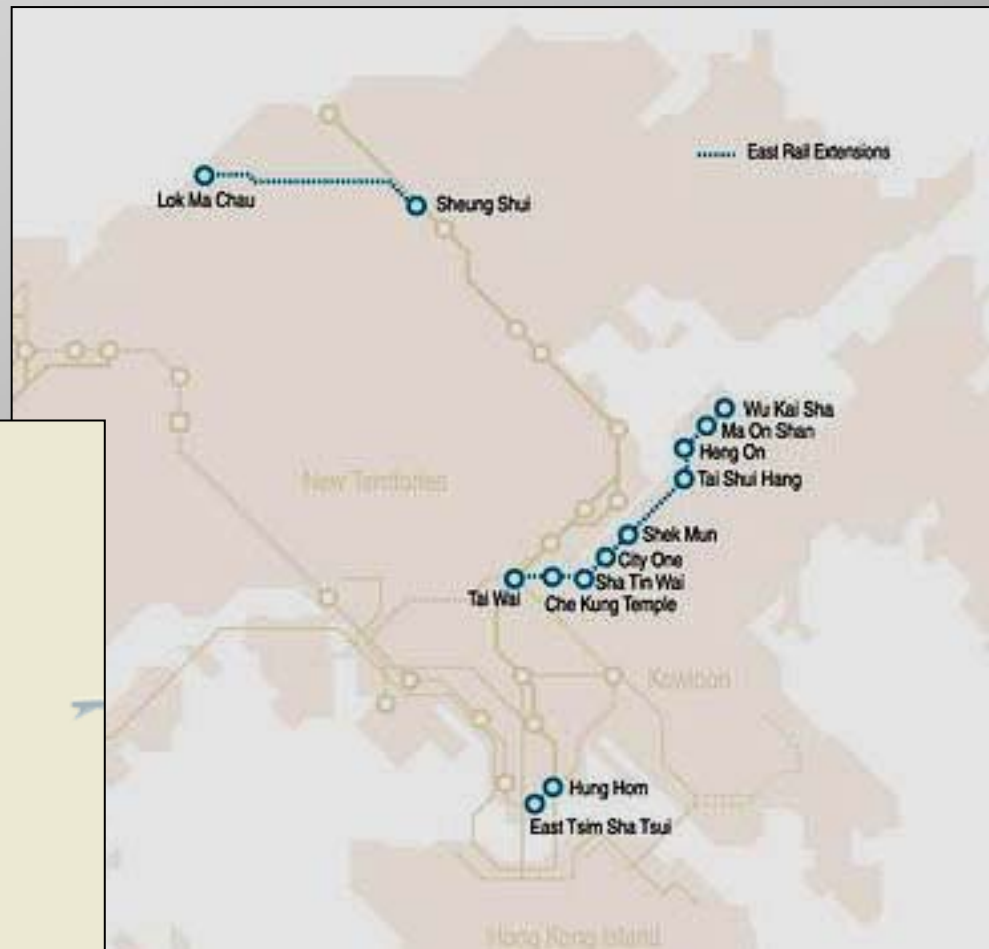
# Major Recent Railway Projects

1. MTR Quarry Bay Congestion Relief project (1997 – 2001)
2. MTR Tseung Kwan O Extension (1998 – 2002)
3. KCR West Rail (1998 – 2003)
4. KCR East Rail Extension – Ma On Shan line (1999 – 2004)
5. KCR East Rail Extension – Tsim Sha Tsui Extension ( 2001 – 2004)
6. KCR Lok Ma Chau Spur Line (2002 - 2006)
7. KCR Shatin to Central Link (\$32B, 2004 - 2009)

# Alignment and Stations of the KRC West Rail



# Soon to be completed KRC Railway projects



# Future Railway Networks according to the Railway Development Strategy 2000

Five major Lines are proposed as a strategic development to enhance the existing railway systems

1. Shatin to Central Link – linking Tai Wai Diamond Hill, Kowloon City, Hung Hom, Wanchai to Central
2. Kowloon Southern Link – linking East Rail and West Rail at south between TST Station & Nam Chong Station (West Rail)
3. Northern Link – linking the East Rail and West Rail of KCR at the north between Sheung Shui to Pat Sheung
4. Regional Express Link – provide a non-stop railway link between the city and the border at Lo Wu
5. Island Line Extension – an extension at the north shore of the existing Island Line to relief the existing line traffic
6. Port Rail Line – an extension from the East Rail to enhance cross boundary freight services



- Alignment of the
1. Island Line
  2. Shatin to Central Link
  3. Kowloon Southern Link



# Alignment of the Northern Link and Regional Express Line



# Infrastructure Projects of other natures

1. HK Convention & Exhibition Centre (1994 – 1997)
2. Large-scale sewage works such as Strategic Sewage Disposal Scheme (SSDS)/Harbour Area Treatment Scheme (HATS) (1998 – 2003)
3. Water Supply project (e.g. construction of a 13km aquaduct from Lai Chi Kok to Tai Po for the laying of a series of water mains (1997 – 2000))
4. Storm water and flood control
5. Container Terminal – CT No. 5 to 8 (1994 – 1997)
6. Container Terminal – CT No. 9 (2000 – 2004)
7. Disney Theme Park (2000 – 2007)

# Procuring Agents for Infrastructure Projects

1. Highway Department – highway, bridges and large-scale roadwork
2. Civil Engineering Department – land formation, reclamation, port and marine works, environment improvement works
3. Territory Development Department – Airport Core Projects, New Town Development, other assignment projects similar to CE Dept.
4. Drainage Services Department – Flood control, large-scale drainage and SSDS/HATS projects
5. Water Supplies Department – large-scale water supply/distribution works (e.g. aquaduct)



# Procuring Agents for Infrastructure Projects

6. Mass Transit Railway Corporation – all railway works managed/operated by the MTRC
7. Kowloon Canton Railway Corporation – all railway works managed/operated by the KCRC
8. Airport Authority – projects related to the – construction of the new airport in Chek Lap Kok
9. Other Franchised Organizations (in BOT projects), for example:
  - Tate's Cairn Tunnel
  - Eastern Harbour Crossing
  - Western Harbour Crossing
  - Tai Lam Tunnel

## Part II a

Detail understand of some major  
Infrastructure Developments –

Airport Core Projects

# Airport Core Projects 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

# New Airport at Chek Lap Kok

Formation of the  
Airport Platform  
from the original  
Chek Lap Kok Island





Early stage of the Airport Terminal  
Building construction –  
foundation and sub-structure

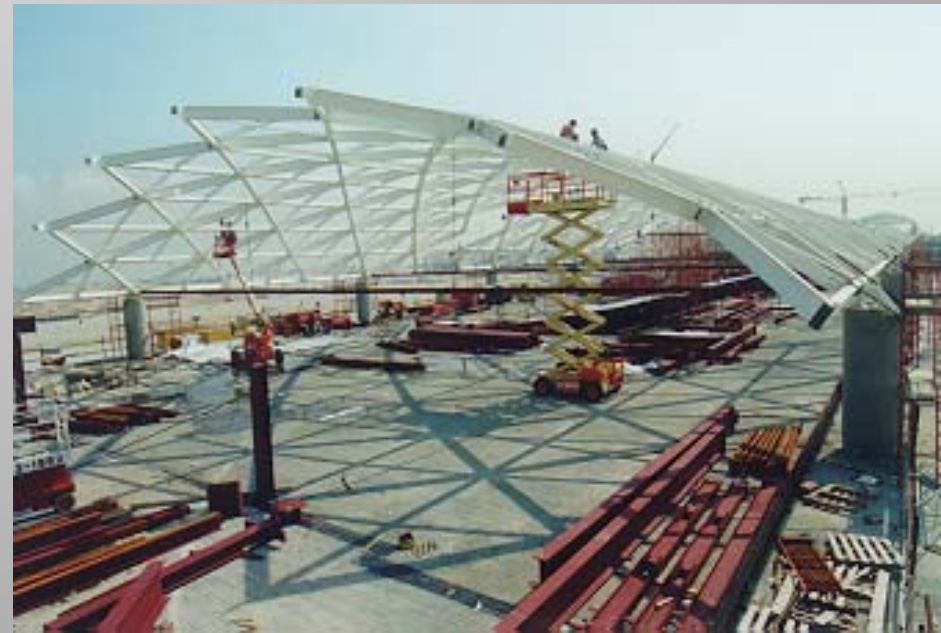


# Construction of the Terminal superstructure





# Modulated roof for the Terminal Building







Position the modulated roof  
onto the Terminal structure



## Installation of the Glass Wall





## Construction of the Air Bridge



## Finishing up the Terminal Interior





The new Airport  
close to its  
completion



Other facilities in the New Airport



## Ground Transportation Centre





Post Office  
Air Mail Centre

## Other facilities owned by the Government





Air Cargo Facilities –  
Asian Air Terminal (left)  
and Super-Terminal No. 1





HKAEO Aircraft  
Maintenance Depot



Tung Chung New Town

## Formation of the Tung Chung New Town





Tung Chung taking  
shape as in 1997



# North Lantau Expressway



Original Coastline of  
North Lantau  
(section between  
Yam O and Tai Ho)



# North Lantau Expressway – formation of the Yam O Section





Slip Road to  
Penny Bay (Disney  
Land) at Yam O





# Tai Ho Section and the Depot Facilities of the Tung Chung Line





Toll Plaza of the  
Expressway at  
Kap Shui Mun  
entrance





# Lantau Fixed Crossing



The 1377m span  
Tsing Ma Bridge

# The Tsing Ma Bridge

Ma Wan side

Tsing Yi side



Cable anchor

Main span

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







Forming the  
suspension cable





Suspension cable  
supported onto the tower  
head by the saddle





Hoisting and erecting the  
modulated bridge deck  
onto the suspension cable

Location of





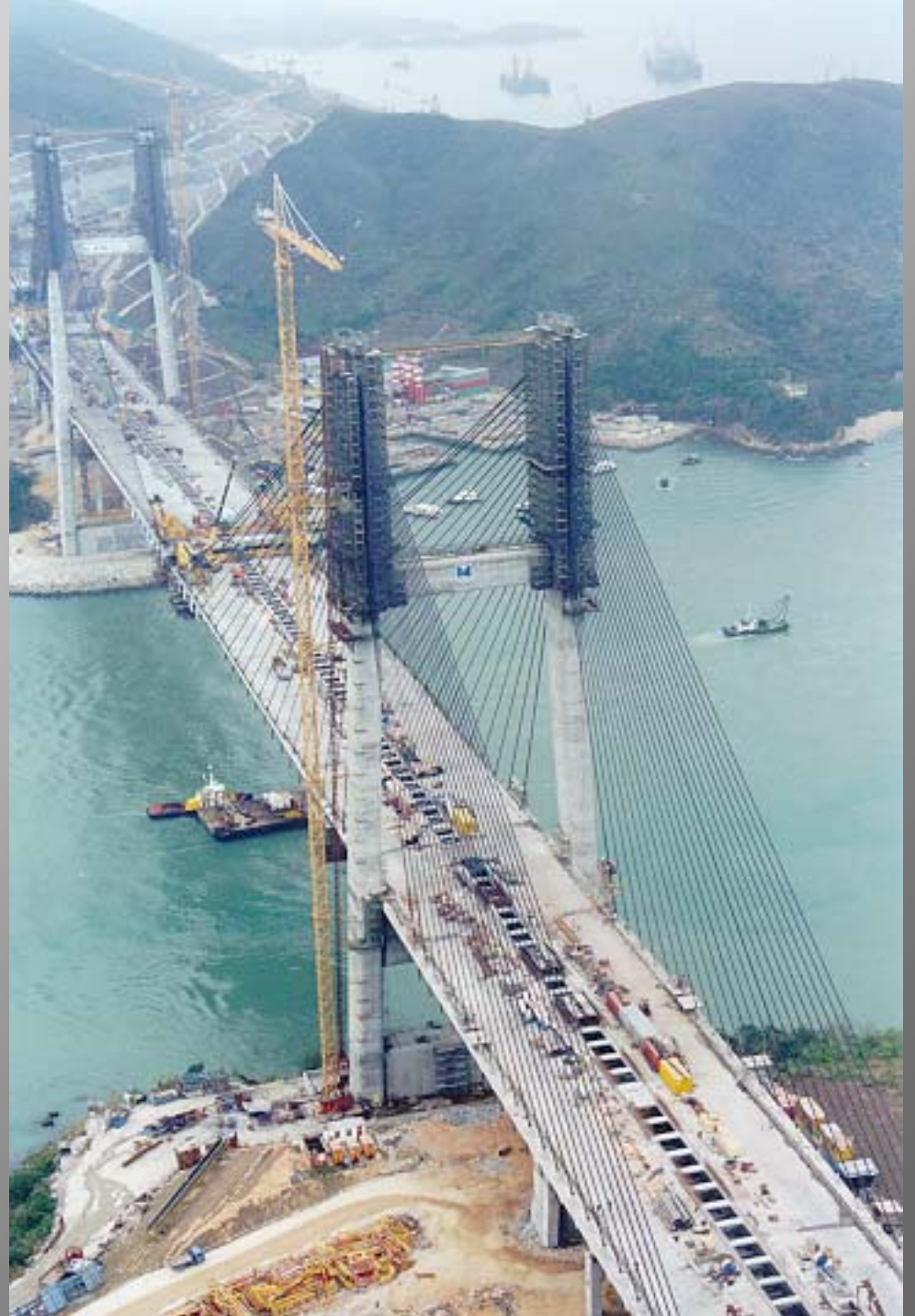
# Exterior and interior view inside the bridge deck



# The Ma Wan Viaduct – the linking section between the Tsing Ma and Kap Shui Mun Bridge



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

# Route 3 – Kwai Tsing Section

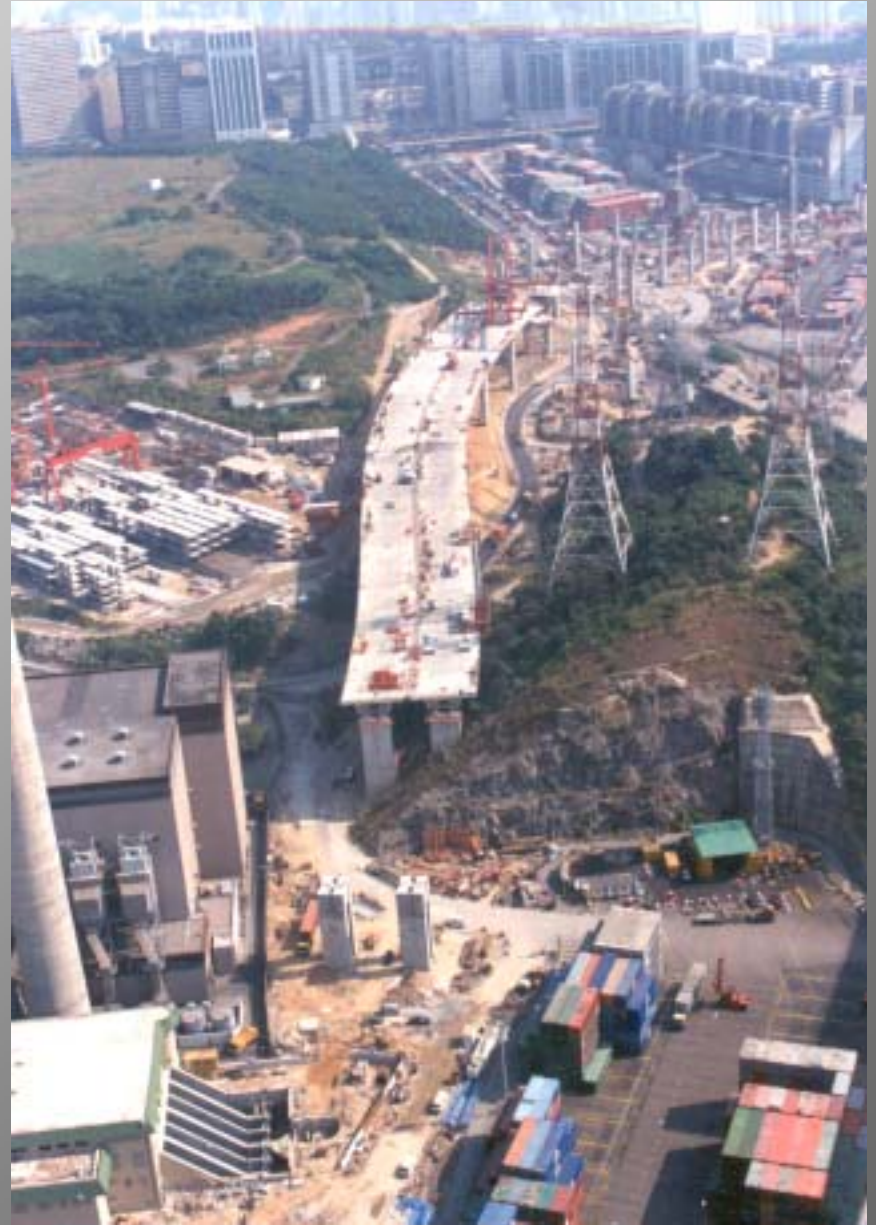


Route 3,  
Tsing Kwai  
Section at  
Kwai Chung





# 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)



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

# West Kowloon Reclamation



# West Kowloon at Yaumatei/Shamshuipo at the early stage of reclamation





# 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 2002





# West Kowloon Expressway

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





West Kowloon  
Expressway at  
Tai Kok Tsui  
near Olympus Station





Construction of the  
elevated expressway  
using precast box-  
girder by portal gantry



# Western Harbour Crossing





Casting yard for the forming of the submerge tunnel tubes at Shek O Quarry



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





The tunnel approach  
and connection  
arrangement at Sai  
Ying Poon side

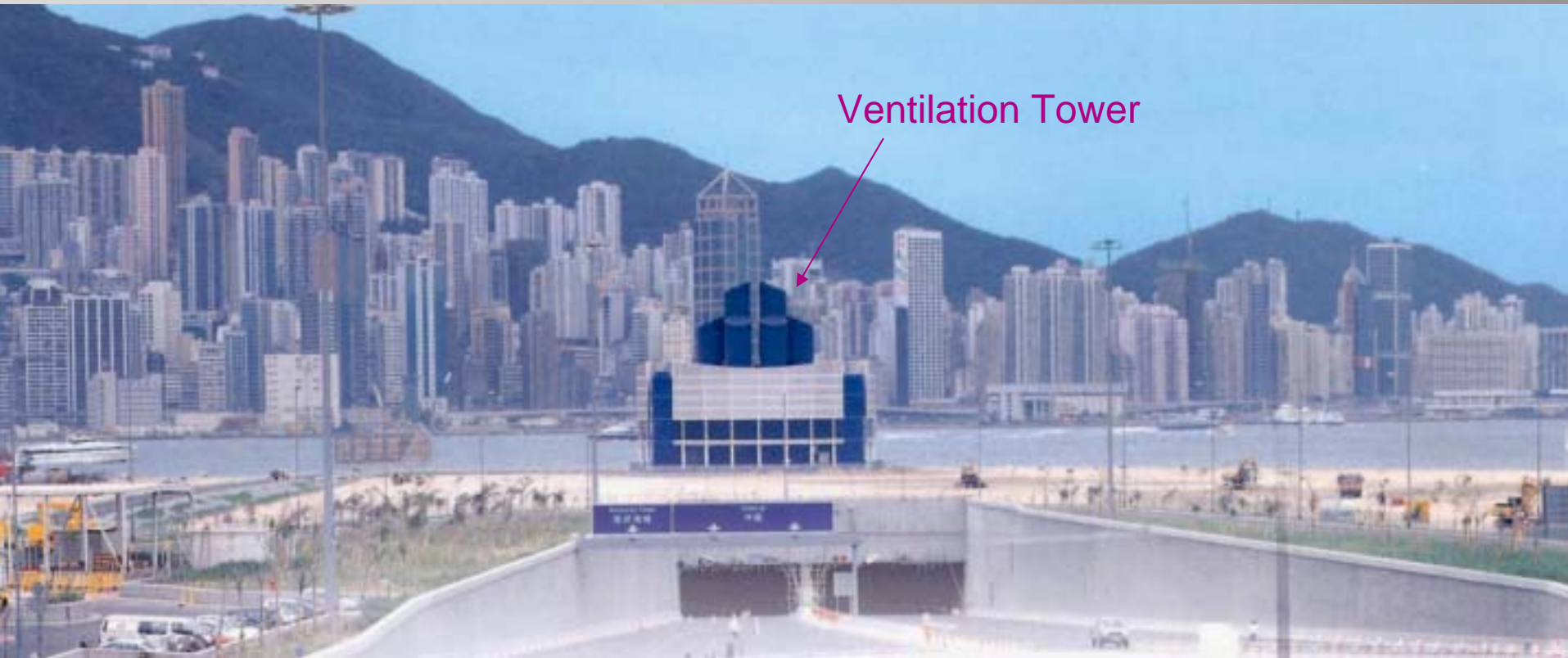




Associated roadwork forming the entrance concourse to the Western Harbour Crossing at Sai Ying Poon side



# Western Harbour Crossing at the West Kowloon entrance



Ventilation Tower

# Central Reclamation



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

Servicing ferry piers





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 Tower 2





# 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





# Financial sources for the Airport Railway projects – the International Financial Centre





Construction of the  
Kowloon Station and  
the cut-and-cover  
tunnel of the Airport  
Railway at its early  
stage in 1995





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  
crossing the Rambler  
Channel heading to  
the Tsing Yi Station





## Part II b

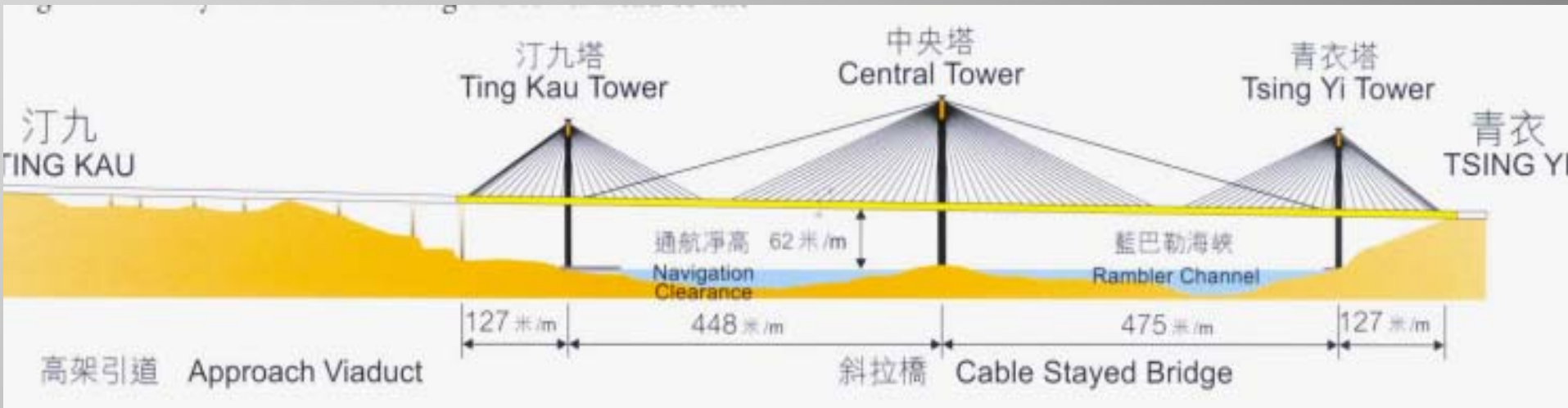
Detail understand of some major  
Infrastructure Developments –

Highway projects

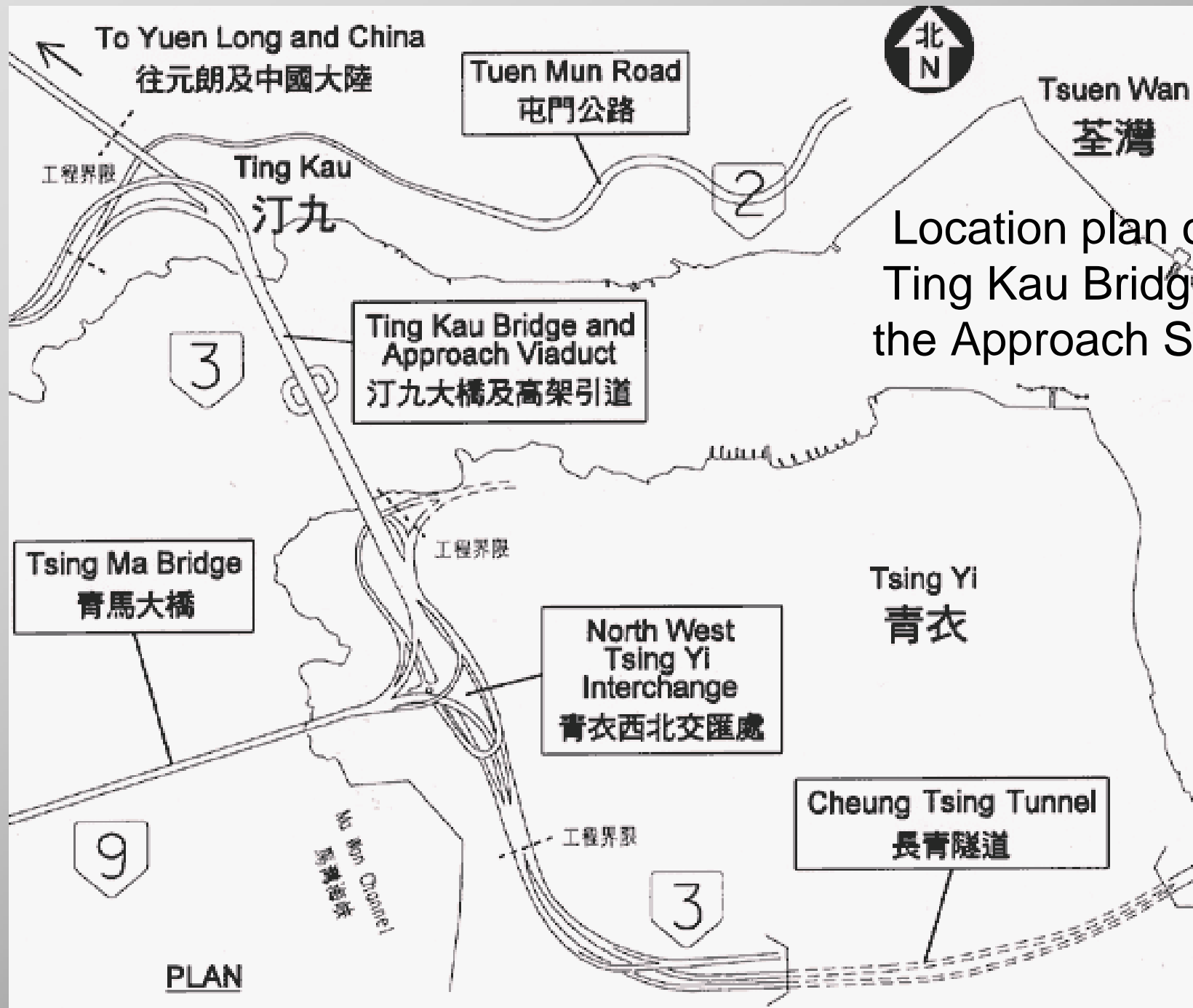
# Route 3, Country Park Section

## Ting Kau Bridge

# Elevation of the Ting Kau Bridge and the Approach Section on Ting Kau side







Location plan of the  
Ting Kau Bridge and  
the Approach Section



Ting Kau Bridge is a cable-stay bridge in 3 spans

Overall view of the Ting Kau Bridge at her opening in 1998



# Construction of the bridge towers





Tower head for the  
anchoring of the  
stay cables



Tower head

Detail of the tower head with  
the stay cables in position

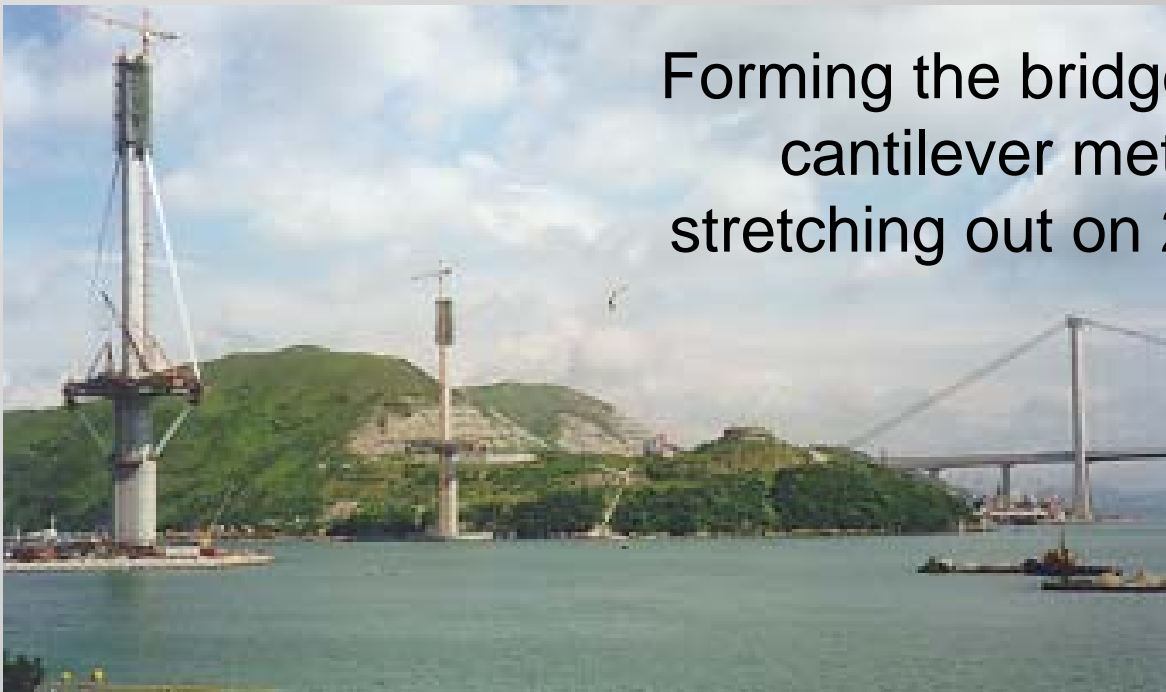


# Forming of the bridge deck, placing of





Forming the bridge deck using balanced cantilever method with the span stretching out on 2 sides from the tower



Final joining of the  
bridge deck

Bridge approach on Ting Kau side



# Route 3, Country Park Section

## Works at Ting Kau area



The bridge approach on Ting Kau side



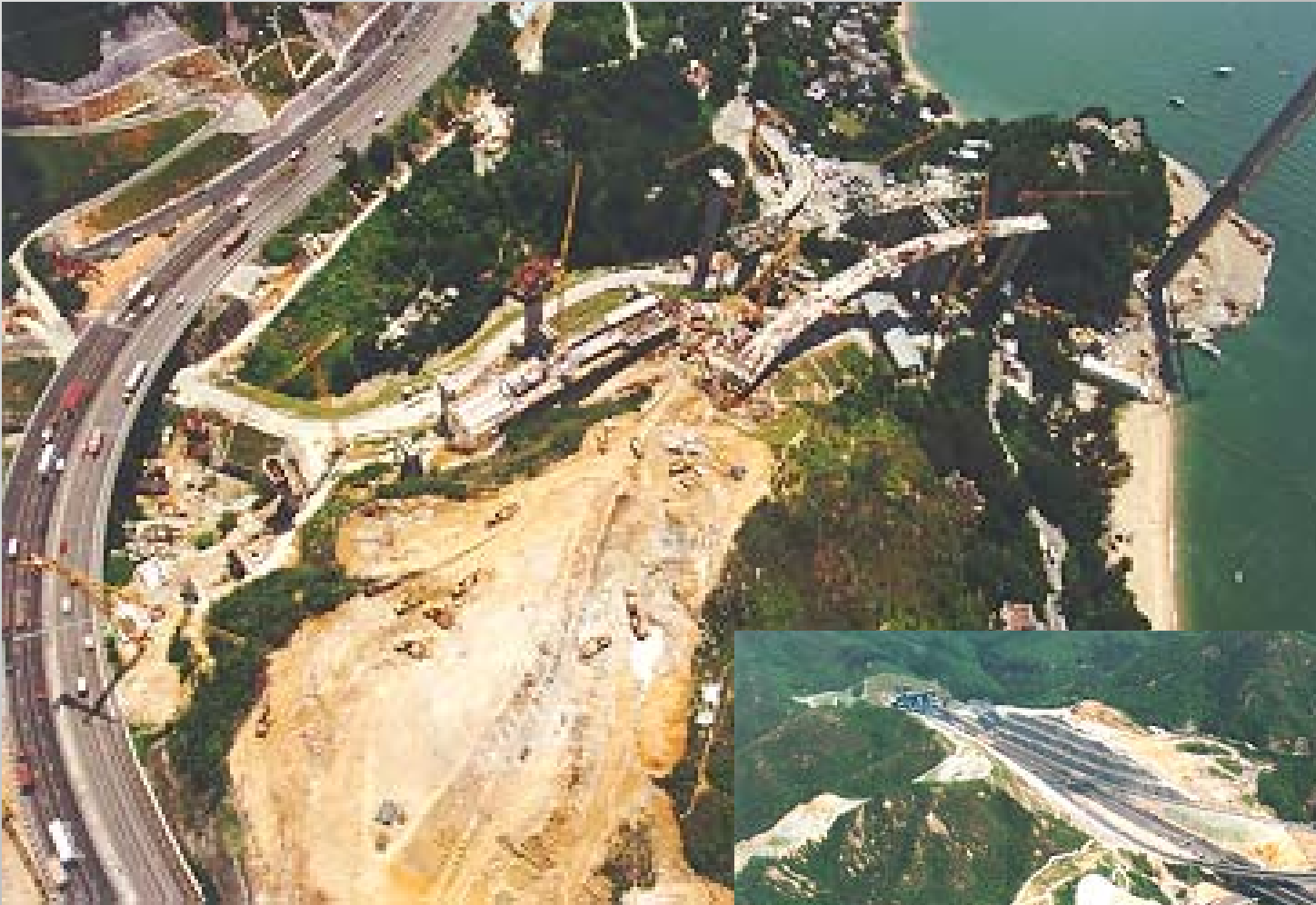
Tuen Mun Highway

Construction of the  
approach bridge  
(650m in the form  
of viaduct)





# Aerial view of the approach and the slip road heading TK Bridge

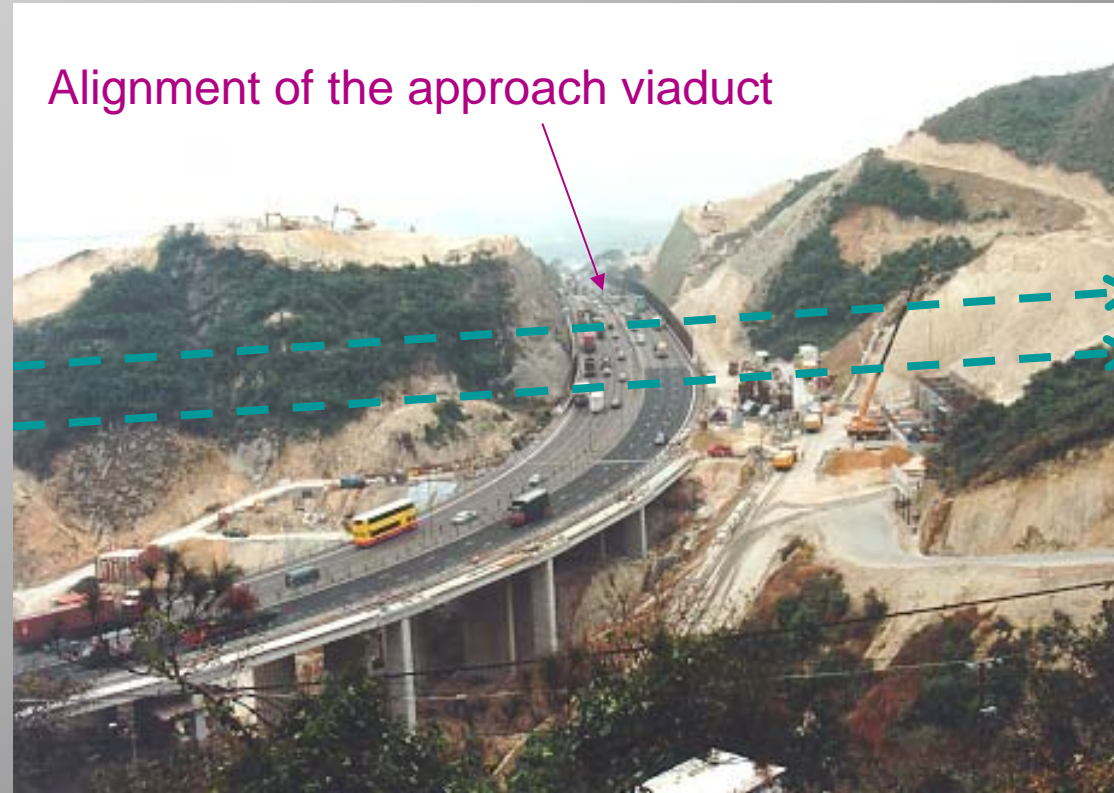




Construction of the  
approach viaduct  
using balanced  
cantilever method  
(traveling form)



# Crossing over of the approach viaduct onto Tuen Mun Highway



Section between  
Ting Kau and Tai  
Lam Tunnel – 600m  
roadway cutting  
through a 70m-high  
rocky hill

----- Original rock  
profile





# Rock cutting process



Conveyor system  
for rock disposal



# Route 3, Country Park Section

## Tai Lam Tunnel

Connection of the Tai  
Lam Tunnel -  
Tunnel portal on Ting  
Kau side (South)





Tunnel constructed  
using drill-and-blast  
method



Forming the tunnel lining and interior fitting out at the final stage



# Route 3, Country Park Section

## Works at Kam Tin area



## North Section of Route 3 at Kam Tin



## Route 3 at Au Tau Interchange



# Forming the interchange using precast launching system

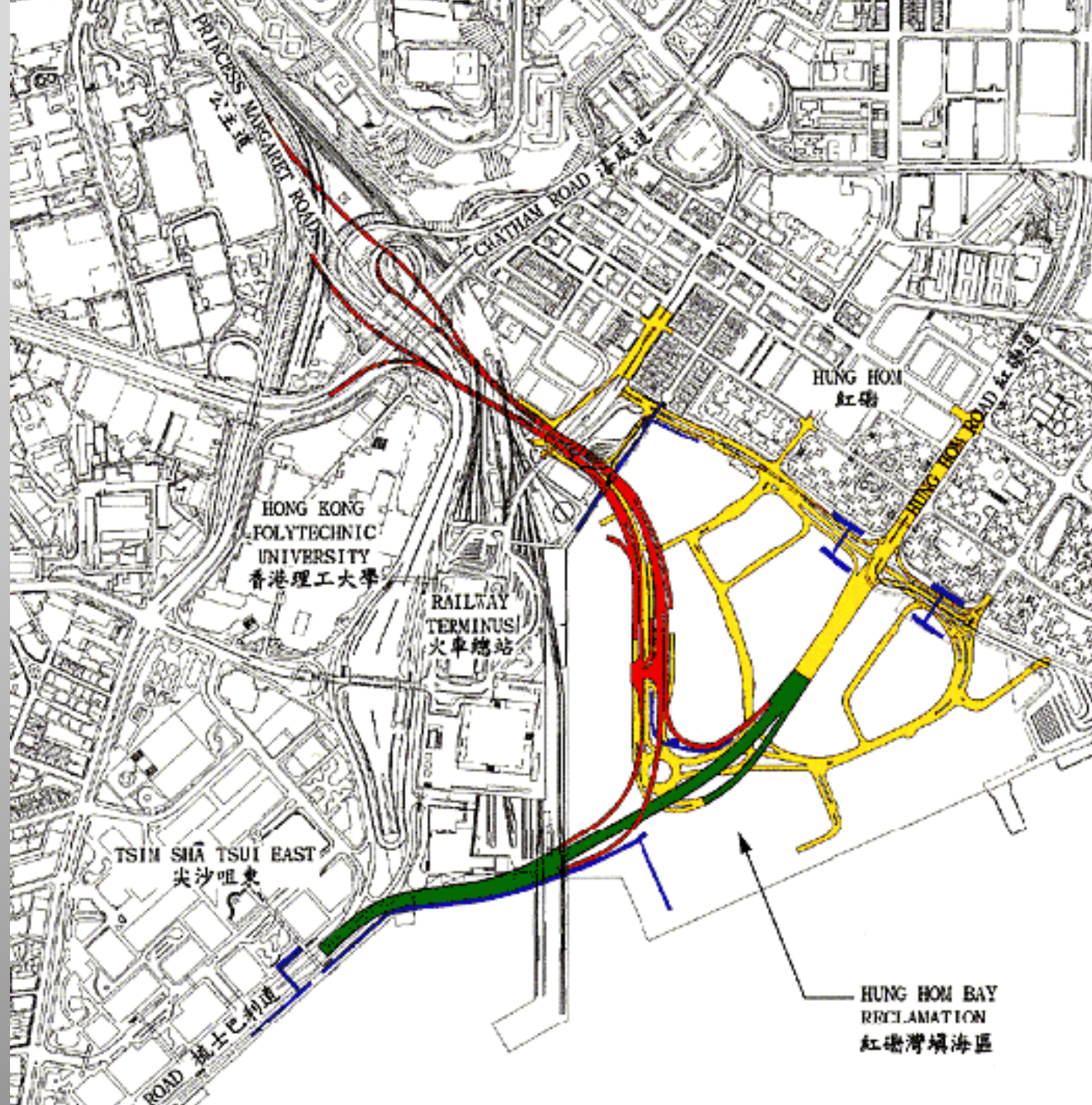




Location of

Hung Hom By-pass

Layout of the  
Hung Hom By-  
pass routing



Erection of the  
elevated roadway  
using precast  
box-girder by a  
launching gantry





Standard box-girder  
segment for forming  
the bridge deck



Placing the segment  
onto the column head  
for onward erection



# Holding down and tensioning of the segment







A section of viaduct  
passing over sea water  
near the Mail Centre



# Viaduct near the Mail Centre





Work at servicing  
traffice – slip junction  
to Gascoigne Road





Working very close to  
servicing railway track –  
forming the junction to  
Prince Margaret Road



Work over very busy  
servicing roadway at junction  
of Hong Chong Road and  
Chatham Road





Work over very busy  
servicing roadway at  
junction of Hong  
Chong Road and  
Chatham Road





Location of

Tsing Yi North Coastal Road

三號幹線 / 汀九橋  
ROUTE 3 / TING KAU BRIDGE

青衣北岸公路  
TSING YI NORTH COASTAL ROAD

担杆山路  
TAM KON SHAN ROAD

牛角灣  
NGAU KOK NAN

油柑頭  
YAU KAM TAU

後梅道  
CHEUNG SHUE TAU

行人隧道  
PEDESTRIAN SUBWAYS

分區控制中心  
SUB-CONTROL CENTRE

長安屋苑  
CHEUNG AN ESTATE

青荃路  
TSING TSUEN ROAD

青荃山交匯處  
TAM KON SHAN INTERCHANGE

青馬公路  
TSING MA HIGHWAY

長青隧道  
CHEUNG TSING TUNNEL

青馬大橋  
LANTAU LINK / TSING MA BRIDGE

北  
N

LEGEND

- 行車道  
CARRIAGEWAY
- 高架橋  
VIADUCT
- 連繫路或接駁道  
SLIP ROAD / LINK ROAD
- 隔音屏障  
NOISE BARRIER
- 半圍式隔音屏障  
NOISE SEMI-ENCLOSURE
- 青馬管制區  
TMC4
- 隧道出口

Overview of the  
construction at  
the early stage  
in 2000





The road system at its completion in early 2002

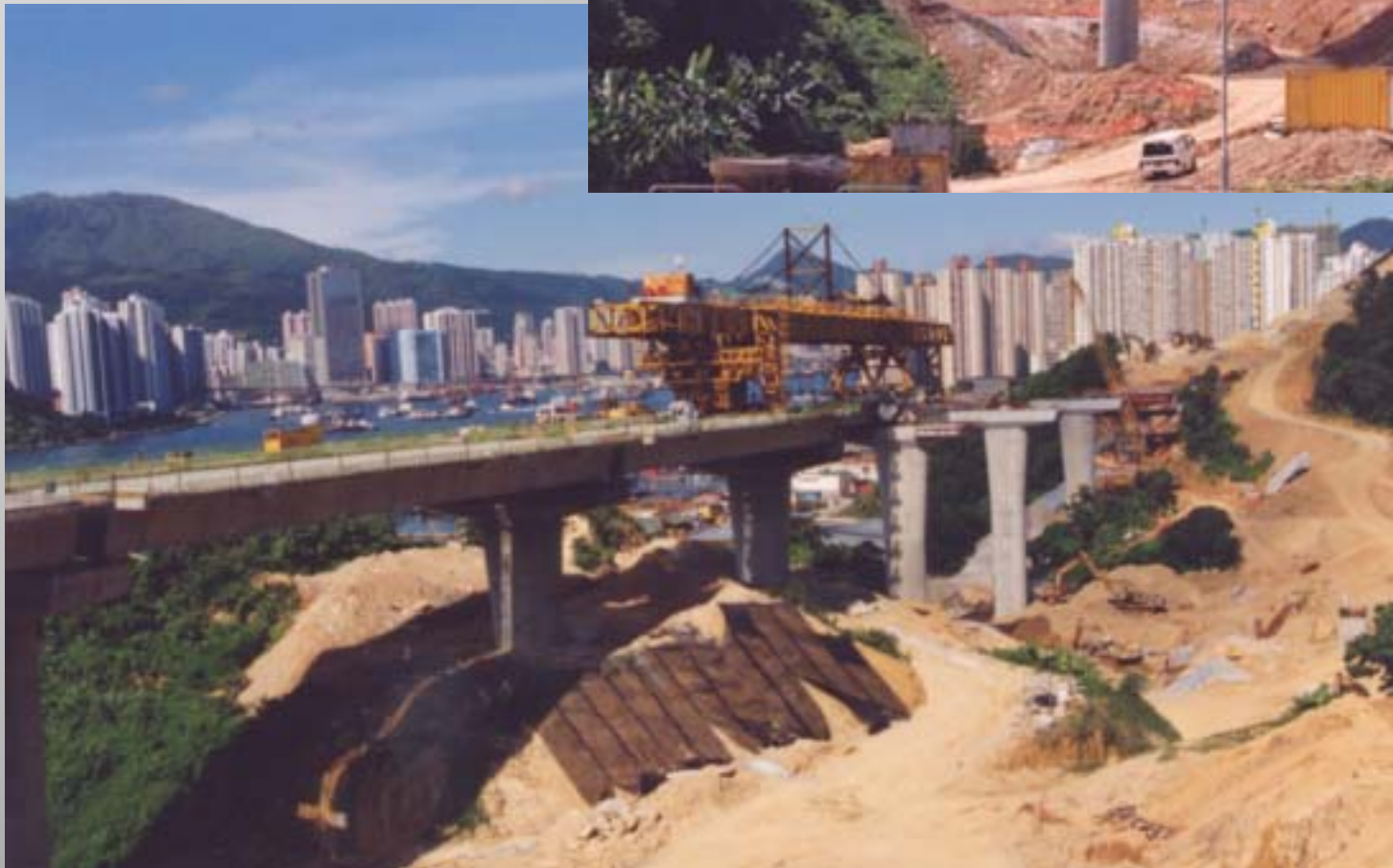


Formation to  
cut into the  
slope for the  
construction of  
the piers for  
the elevation  
road deck





Forming the  
elevated road deck  
using box girders  
and install by  
launching machine





# Detail of the launching machine and the operation system



# Improvements to Island Eastern Corridor section between North Point Interchange and Sai Wan Ho



Forming of bored pile  
on sea along existing  
elevated roadway of the  
Eastern Corridor





# Formation of bored piles (1.5m) using reverse circulation drill (RCD)





Associated work – relocation  
of an existing pier and  
replacing it by a new one





## Construction of the pier column





Using precast beam  
to form the deck



Deck detail before  
placing the  
concrete topping



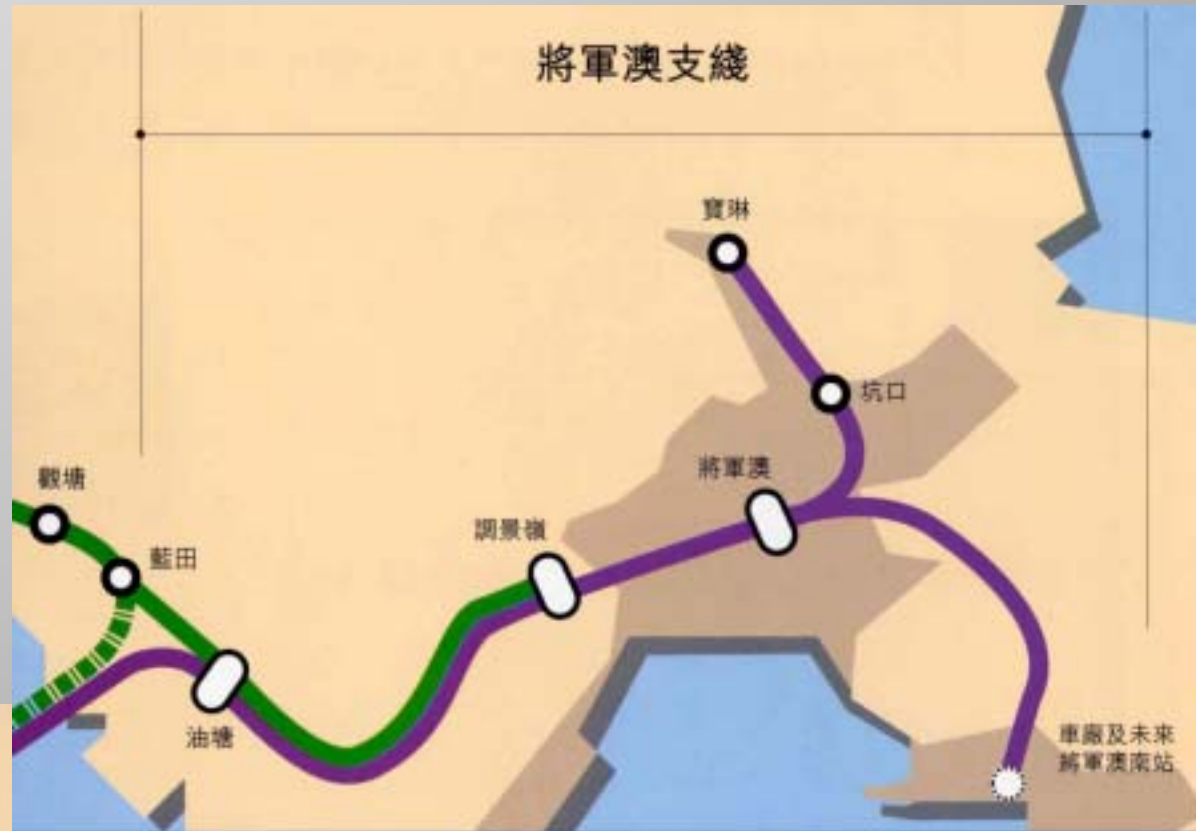
## Part II c

Detail understand of some major  
Infrastructure Developments –  
Railway Projects



# MTR Tseung Kwai O Line (TKE)

# Layout of the MTR Tseung Kwan O Line



Tseung Kwai O Line –

Formation of the Yau Tong Station



Aerial view showing the overall layout of the Yau Tong Station and its vicinity



Yau Tong Station  
as seen in the  
construction stage





Approach tunnel  
merging into the slip  
section of the Eastern  
Harbour Crossing





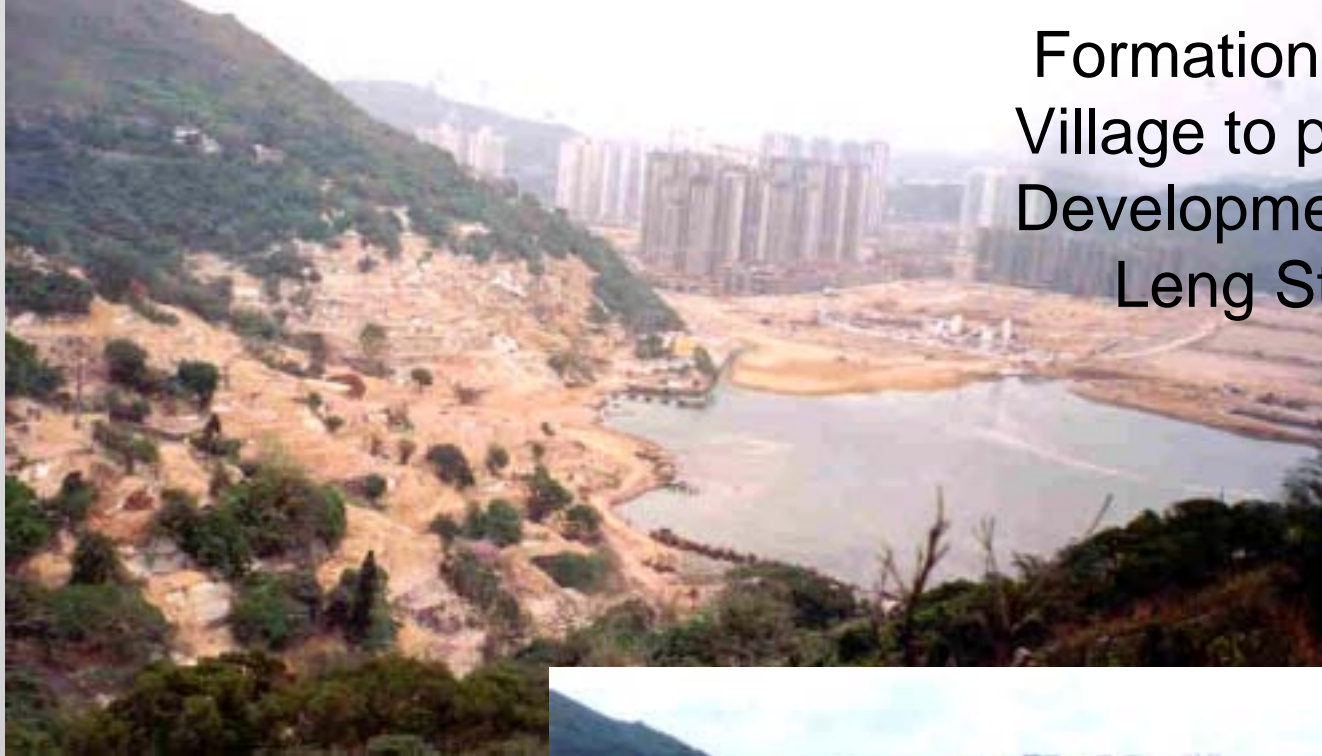
# Cutting through a rock slope to form the approach tunnel between the Yau Tong Station and Eastern Harbour Crossing



Tseung Kwai O Line –

Formation of the Tiu Keng Leng Station

# Formation of Tiu Keng Leng Village to provide land for the Development of the Tiu Keng Leng Station Complex





Cutting a 450m x 60m  
x 30m deep trough into  
solid rock to form the  
buried structure of  
Tiu Keng Leng Station





The Station and its vicinity as seen in early 2002



Tseung Kwai O Line –

Formation of the Tseung Kwai O Station



Tseung Kwan O  
Station located on  
new land formed  
by reclamation





# Construction of the Tseung Kwan O Station



Tseung Kwai O Line –

Formation of the Hang Hau Station



Layout of the Hang Hau Station as seen in early 1999





The buried station structure was formed using a top-down and bottom-up mixed construction approach



Tseung Kwai O Line –

Formation of the Po Lam Station



Po Lam Station is the only station that built at-grade. The photo shown the early stage of station work





Gradual completion of the  
station's superstructure

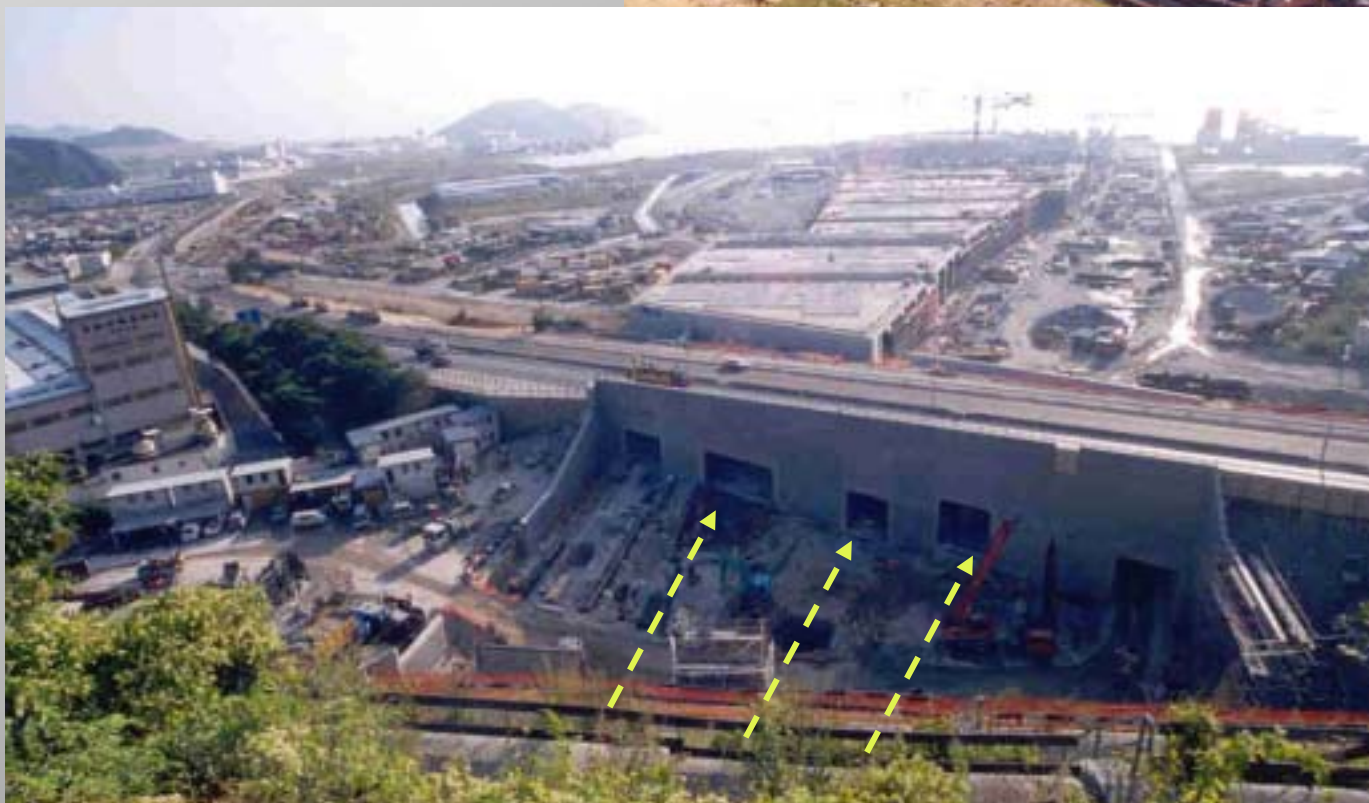


Tseung Kwai O Line –

Maintenance Depot of the TKE Line



MTR Tseung Kwan O Depot – residential development will be provided on top of the depot podium at a later stage



Rail track for  
MTR train  
entering the  
depot

Close up of the depot  
podium and the train  
maintenance depot  
underneath



# Tunnels in the Tseung Kwai O Line

There are 2 forms of tunnels being built:

## 1. Drill-and-blast tunnel

- tunnel between Lam Tin and Yau Tong Station (1.2 km)
- Black Hill Tunnel between Yau Tong and Tiu Keng Leng Station (2.2 km)
- Pak shing Kok Tunnel between Tseung Kwan O Station and the Depot (2.0 km)

## 2. Cut-and-cover tunnel

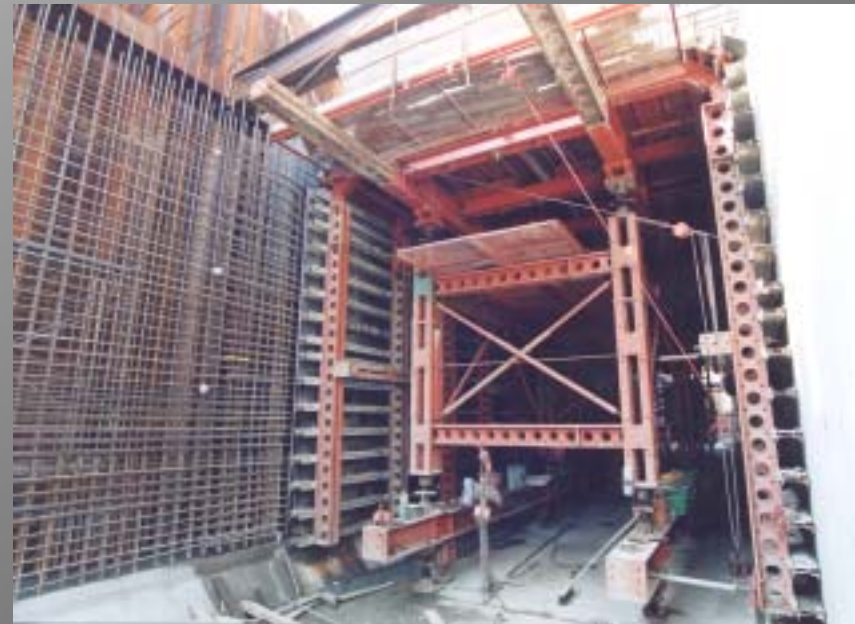


# Tseung Kwai O Line – Cut-and-Cover Tunnels

Cut-and-cover  
tunnel between  
Tseung Kwan O  
and Hang Hau  
Station



Typical formwork arrangement (tunnel form) for the construction of the tunnel tubes





Some difficult situations in constructing the cut-and-cover tunnel – working in the reclaimed land very close to culvert and seawall





Some difficult situations in constructing the cut-and-cover tunnel – double decked tunnel and tunnel junctions





Some difficult situations in constructing the cut-and-cover tunnel – tunnel crossing servicing roadway





# Tseung Kwai O Line – Drill-and-Blast Tunnels

Tunnel portal  
provision at the  
Yau Tong Tunnel



# Traveling formwork for the forming of the tunnel lining





Laying of membrane sheeting to waterproofing the tunnel interior before placing the lining



# KCR West Rail

(please refer to separate Powerpoint  
for West Rail Construction)

# KCR East Rail Extensions – Tsim Sha Tsui Extension



Tsim Sha Tsui Extension alignment running basically alongside the Salisbury Road at the coast of TST East





Track within covered tunnel coming from the  
KCR Kowloon Station at Hung Hom





Tunnel work  
outside Mail  
Centre of  
the Post Office





# Cut-and-cover tunnel between Kowloon and Tsim Sha Tsui Station





# Tsim Sha Tsui Station



# KCR East Rail Extensions – Ma On Shan Line



## Alignment of the KCR Ma On Shan Line



Ma On Shan Line  
joining East Rail  
at Tai Wai Station



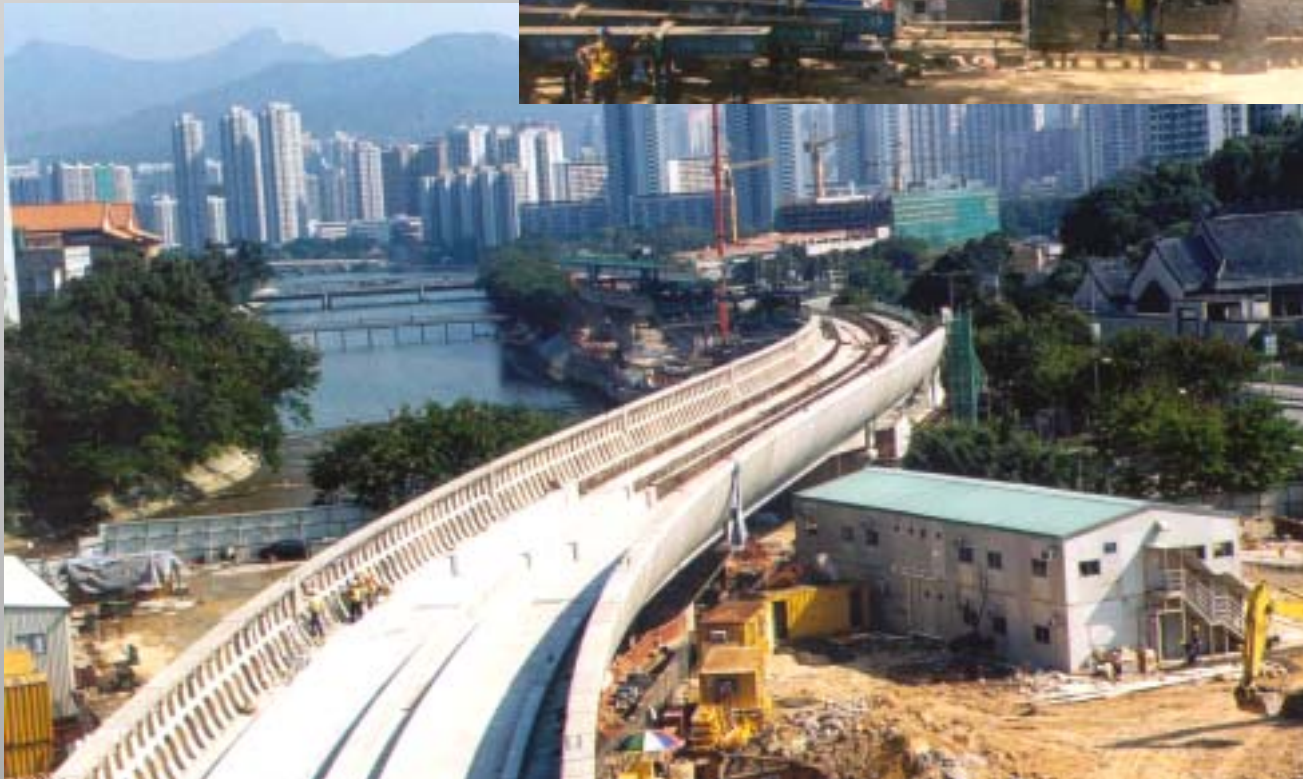


# Service Depot of the MOS Line located in Tai Wai





The first section  
of viaduct running  
from Tai Wai  
northbound along  
Shing Mun River



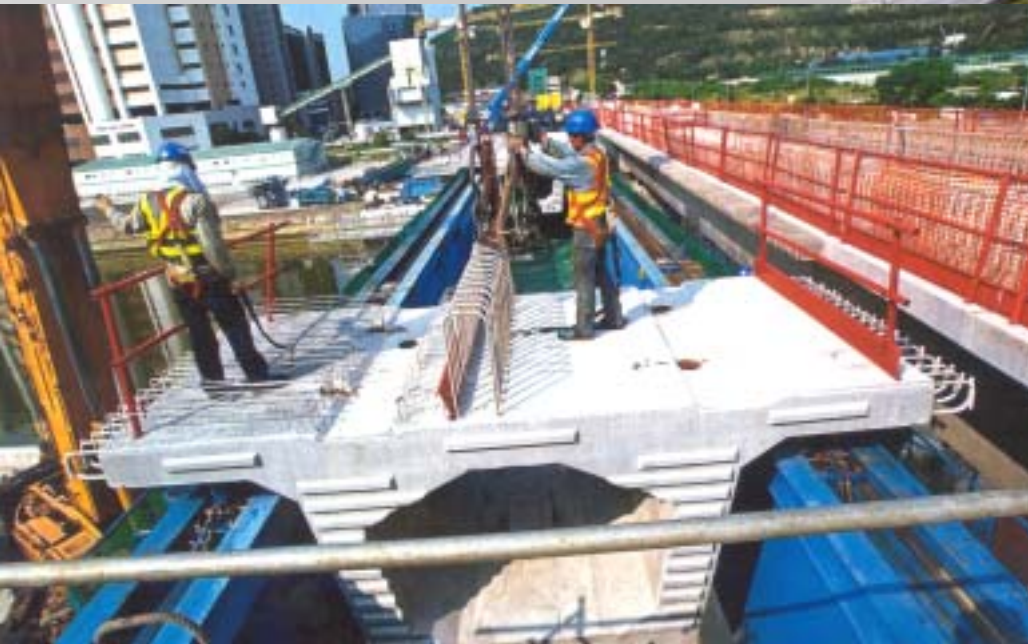


Construction of  
viaduct at Tai Shui  
Hang crossing a  
busy highway





Installing the box-girder viaduct using a gantry type launching machine





Forming the piers and portal beams for the supporting of the viaduct





## Laying of track



# Important Internet Reference

1. Homepage of Raymond Wong  
<http://personal.cityu.edu.hk/~bswmwong/>
2. Homepage of Highway Department  
<http://www.hyd.gov.hk/major/index.htm>
3. Homepage of KCRC  
<http://www.kcrc.com/chi/corporate/project/index.asp>
4. Homepage of Civil Engg. Department  
<http://www.info.gov.hk/ced/eng/index.htm>
5. Homepage of Territory Development Dept.  
<http://www.info.gov.hk/tdd/>