Shatin to Central Link (SCL)
Cross Harbour Section

Hong Kong Construction Association
20 November 2009
History of Shatin to Central Link (SCL)

- Railway Development Strategy 2000 (RDS-2000) confirmed the policy objective of railways to form the backbone of the public transport system

- Recommended in RDS-2000 for priority implementation with a target completion in 2011

- MTRCL & KCRC were invited to submit proposals to Government for its implementation in 2001

- KCRC was awarded the project in 2002 – design carried out but affected in 2004 because of impending merger

- One of the 10 priority projects in 2007-2008 Policy Address

- Government invited MTRCL to continue with SCL planning and design in March 2008

- Government entrusted to MTRCL SCL design and site investigation works with Government funding

Source: LegCo Paper No. CB(1)1036/07-08(03) on 27 March 2008
Alignment

Tai Wai to Hung Hom Section

Hung Hom to Admiralty Section
East West Corridor:  
• Ma On Shan Line 
• SCL (Tai Wai to Hung Hom Section) 
• West Rail Line

North South Corridor:  
• East Rail Line 
• SCL (Hung Hom to Admiralty Section)
Current Programme for SCL

Shatin to Central Link Gazetted 2009

Commencement of Construction 2010

Completion of Tai Wai to Hung Hom Section 2015

Completion of Hung Hom to Admiralty Section 2019
SCL Cross Harbour Section

- Shatin to Central Link (SCL) needs to cross the harbour
- Construction of Cross Harbour Section may require reclamation
- The need for Compliance with Protection of Harbour Ordinance (PHO)
- Overriding Public Need Test
  - To establish that there is an overriding public need
  - To demonstrate that there is no reasonable alternative
  - To demonstrate that the proposed reclamation is minimum
Overriding Public Needs for SCL
Overriding Public Needs

To Relieve Congestion on Existing Rail Lines

SCL will redistribute railway passenger flow to relieve congestion within existing railway lines, some of which will be over desirable capacity in near future.
Overriding Public Needs

To Support Cross Boundary Integration

SCL has immense significance to support HK’s growing cross-boundary economic activities and social integration with Mainland China.
Overriding Public Needs

To Relieve Congestion of Cross Harbour Tunnel

SCL will be safe, reliable and environmentally-friendly.

SCL will reduce road-based traffic and alleviate traffic at the Cross Harbour Tunnel.
Overriding Public Needs

To Relieve Traffic Congestion in Hong Kong

SCL will create the opportunity to relieve traffic congestion in Kowloon and on Hong Kong Island by providing an alternative transport choice.
Overriding Public Needs

To Mitigate Deterioration of Road-side Air Quality

SCL is a sustainable solution to mitigate deterioration of road-side air quality on HK Island and Kowloon.
Benefits to the Community

Social & Economic Benefits

- Employment opportunities during SCL construction – 11,000 jobs created
- Enhanced employment opportunities in areas along alignment – commercial / tourism related
- Passenger time savings worth HK$4.1 billion/year
- To catalyze rejuvenation of old urban districts
Benefits to the Community

To Minimize Protracted Disruption to the Community

SCL will have to interface with Central – Wan Chai Bypass and other major planned projects along north shore of Hong Kong Island.

Source: Highways Department
There is an overriding public need
‘No Reclamation’ Options
‘No Reclamation’ Options – Cross Harbour Bridge

**Characteristics**

- Bridge piers in the harbour are regarded as reclamation
- Bridge deck should be high enough to allow passage of vessels
- Require extensive approaches at both ends. Approach ramps would extend almost to Admiralty Station.

**Implications**

- Require extensive land resumption for bridge piers and foundations
- Long approach ramps would cut off harbourfront
- Interchanges not practical
- Visual impact of Victoria Harbour

**NOT A REASONABLE OPTION**
‘No Reclamations’ Options – Tunnel in Mixed Ground Under the Harbour

Diameter Dictated by:
- structure gauge
- ventilation

Vertical Alignment:
- minimum ground cover to maintain ground stability
- desirable cover: 2 diameters
- geological conditions

Can only be constructed by tunnel boring machine (TBM)

Minimum 1~2 diameter of tunnel

approx. 10m diameter

air duct
Due to vertical alignment constraints, tunnels have to pass through mixed ground, i.e. through soft and rock strata.

**Implications:**
- requires frequent (daily) intervention for maintenance & repair of cutterhead due to serious wearing in mixed ground
- interventions require work under pressure to maintain face stability

**Problems:**
- required to work under pressure > 50 pounds per square inch (psi)
‘No Reclamation’ Options – Tunnel in Mixed Ground Under the Harbour

Problems:
- Factories and Industrial Undertakings Ordinance (Cap.59M) allows working up to maximum pressure of 50 psi
- All bored tunnel options will require regular intervention for maintenance and repair work in excess of 50 psi

Conclusions:
- Risk to health, life and project too high to be acceptable

NOT A REASONABLE OPTION
‘No Reclamation’ Options – Tunnel Deep in Rock

**Characteristics:**
Alignment will be significantly lowered

**Implications:**
- East Rail would need to be depressed from north of Mong Kok East Station
- Interchange at Hung Hom and Exhibition Station either not practical or inconvenient
- Cannot provide required level of service

**NOT A REASONABLE OPTION**
There is no reasonable alternative
Other Options
Cross Harbour Section – Other Options

Other Options:
- Immersed tube tunnel
- Cut-and-cover Tunnel
- Combination of the above

Previous cross harbour tunnels have been constructed by immersed tube tunnel with cut-and-cover sections at each landfall.

Proven method

Immersed Tube Tunnel - Installation of Pre-cast Units into Trench in Seabed

(1) Trench dredging

(2) Lower immersed tube units

(3) Backfilling

Lay barge
Alignment constraints

1. Hung Hom Interchange Station (horizontal & vertical constraints)
2. Cross Harbour Tunnel (CHT)
3. Central – Wan Chai Bypass (CWB)
4. Causeway Bay Typhoon Shelter (CBTS)
5. Typical Vertical Constraints
6. Operational Requirements
7. Hung Hom Bypass & Fender Piles
8. Seawall
9. Freight Pier
10. Fairway
11. Buoy
12. Gas Main
13. Breakwater
14. CHT Portal & Existing Seawall
15. Buildings & Infrastructure Projects
Works near Hung Hom Landfall

- Temporary working platform and cofferdam (about 1 ha)
Works near Hung Hom Landfall

- Demolition and reinstatement of Hung Hom Bypass fender piles
Works near Hung Hom Landfall

- Demolition and reinstatement of Hung Hom Freight Pier
Immersed Tube Tunnel

Typical Cross Section above Seabed

Typical Cross Section at Deeper Section of IMT
Works in Causeway Bay Typhoon Shelter (CBTS)

- Coordination with Central – Wan Chai Bypass (CWB)
- Cut-and-cover tunnel
- Temporary demolition and reinstatement of breakwater
- Temporary demolition and reprovisioning of Royal HK Yacht Club (RHKYC) jetties
CWB Works in CBTS
Temporary Reclamation Phasing

STAGE 1
INDICATIVE DURATION: 14 MONTHS
CBTS
TEMPORARY RECLAMATION AREA TS1 (E): 0.7ha
TEMPORARY RECLAMATION AREA TS4: 1.1ha
EX-PEWA
TEMPORARY RECLAMATION AREA TPCWARE: 0.7ha

STAGE 2
INDICATIVE DURATION: 22 MONTHS
CBTS
TEMPORARY RECLAMATION AREA TS2: 0.8ha
TEMPORARY RECLAMATION AREA TS4: 1.1ha
EX-PEWA
TEMPORARY RECLAMATION AREA TPCWARE: 0.7ha

STAGE 3
INDICATIVE DURATION: 24 MONTHS
CBTS
TEMPORARY RECLAMATION AREA TS3 (W) & TS3 (E): 3.7ha
EX-PEWA
TEMPORARY RECLAMATION AREA TPCWARE: 0.8ha
TEMPORARY RECLAMATION AREA WEST OF EX-PEWA: 0.4ha

STAGE 4
INDICATIVE DURATION: 14 MONTHS
CBTS
TEMPORARY RECLAMATION AREA TS3 (N): 3.0ha
EX-PEWA
TEMPORARY RECLAMATION AREA TPCWARE: 0.8ha
TEMPORARY RECLAMATION AREA WEST OF EX-PEWA: 0.4ha
CWB Works in CBTS
Mooring Reprovisioning

Causeway Bay Typhoon Shelter
Private Mooring Area
(about 4.4 ha, about 150 vessels)
RHKYC Mooring Area
(about 3 ha, about 150 vessels)
Anchorage Area
(about 2.6 ha, about 200 vessels)

Note: vessels counting carried out in April 2008
Immersed Tube Tunnel – Alignment Options

Easterly Alignment
- Option 1A
- Option 1B
- Option 1C
- Option 1D

Westerly Alignment
- Option 2

SCL below CWB
SCL above CWB
SCL across CWB
## Immersed Tube Tunnel – Alignment Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Permanent Reclamation</th>
<th>Construction Complexity &amp; Risk</th>
<th>Additional Temporary Reclamation</th>
<th>Duration of Works in CBTS</th>
<th>Disturbance</th>
<th>Alignment</th>
<th>Cross Platform Interchange at Exhibition Station</th>
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<tr>
<td>1A</td>
<td>Nil</td>
<td>High</td>
<td>0.6 ha</td>
<td>+ 3 years</td>
<td>prolonged occupation of moorings</td>
<td>longer</td>
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<td>1B</td>
<td>to be determined</td>
<td>Medium</td>
<td>2 ha</td>
<td></td>
<td>Delay to CWB</td>
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<td>OK</td>
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<tr>
<td>1C</td>
<td>Nil</td>
<td>Medium</td>
<td>2 ha</td>
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<td></td>
<td></td>
<td>Not OK</td>
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<tr>
<td>1D</td>
<td>additional 6.7 ha for CWB</td>
<td>Medium</td>
<td>0.6 ha</td>
<td>+ 1.5 years</td>
<td>limited mooring affected</td>
<td>shortest</td>
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<tr>
<td>2</td>
<td>Nil</td>
<td>Low</td>
<td>2.2 ha</td>
<td></td>
<td></td>
<td></td>
<td>OK</td>
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Construction Sequence for Westerly Alignment

Legend:
- **completed tunnel**
- **tunnel construction**
- **extent of temporary reclamation**
- **tunnel structure**

*to be constructed together with CWB*

*to be completed after CWB construction*
Summary

- There is an overriding public need for SCL
- There is no reasonable ‘no reclamation’ option
- The Westerly Alignment is the preferred alignment option
Thank You