Land Transport in Hong Kong: Rail Infrastructure and Effective Road Use
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1. Introduction

How to Solve the Congestion Problem? Just to Build More Roads?

- To effectively manage road use, reduce congestion and promote safety;
- Travel Demand Management

- Supply in Road Infrastructure;
- Supply in Rail Infrastructure;
1. Introduction

- Ways to further improve the connectivity of the railway system within Hong Kong and across the boundary to the Mainland so as to achieve the planning goal of setting railway as the backbone of passenger transport in 2030.

- Road congestion persistently remains the most debatable issue. Is this the right time to change the mindset of building more roads to support increasing travel demand? Is it time the right to switch to travel demand management?

- Road works and road incidents contribute significantly to traffic congestion. Are there ways to further improve the road use efficiency?
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2. Road Infrastructure in HK

2.1 Existing Highways Network
2. Road Infrastructure in HK

2.2 Future Planned Highways Network
2. Road Infrastructure in HK

2.3 Future Planned Highways Network

Road Network in PRD

- Shenzhen and Zhongshan Link
- Hong Kong-Zhuhai-Macao Bridge Main Bridge
- Guang-Zhan Expressway
- Western Coastal Expressway
- Outporting Expressways from Pearl River Delta
- Guang-Zhu Expressway
- Jiang-Zhu Expressway
- Jiangmen Expressway
- Guangzhou Expressway
- Shenzhen and Zhongshan Link
- Hong Kong-Zhuhai-Macao Bridge Main Bridge
- Guangzhou-Hong Kong-Zhuhai-Macao Bridge Main Bridge
- Guangdong-Macao Bridge Main Bridge
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3. Rail Infrastructure in HK

3.1 Railway Integration Strategies

Hong Kong has made urban rail the core mode of the transport network.\(^1\)

- “There should be a balanced network of public transport services with emphasis on more and better use of the efficient mass carriers, ie buses and trains, supplemented by the other modes providing complementary services”.

- “The continued development and use of the metro should be encouraged, optimizing as far as possible their advantages as an off-street, less polluting, relatively accident-free and high capacity carrier”.

- “Despite the advent of more rail links franchised buses will remain a major passenger carrier. They offer schedules services at relatively cheap fares and are the main mode of public transport in areas not served by railways”.

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3. Rail Infrastructure in HK

3.2 Type of Passenger Railway Corridors

High Speed Rail
- An alternative to short-haul flying.
- Convenient, fast, clean, and comfortable.
- Speed > 200 / 300km/hr

Intercity Rail
- Serve demand between cities
- Speed ~ 120/160km/hr

Urban Metro
- Exclusive grade-separated guideway
- Capacity for future growth and special events
- No negative impact on highway capacity
- Speed ~ 80 / 100km/hr

LRT
- A metropolitan electric railway characterized by its ability to adapt to its built environment
- Speed < 80 km/hr
3. Rail Infrastructure in HK

3.3 Position of Hong Kong

Hong Kong at the heart of the Pearl River Delta (PRD)

One of the most economically dynamic areas in China

Source: THB, Hong Kong
3. Rail Infrastructure in HK

3.3 Position of Hong Kong

Close ties with Shenzhen, Guangdong and the Pan-PRD
3. Rail Infrastructure in HK

3.3 Position of Hong Kong

PRD Development Trends

Source: Guangdong Province Commission of Population and Family Planning
3.4 Cross Boundary Traffic

Hong Kong - Very Busy Cross Boundary Traffic

Daily Vehicular Traffic
- 1998 - 26,800
- 2008 - 42,000

Annual Passenger Traffic on Land
- 1998 - 77 million
- 2008 - 162.8 million
- 2016 - may hit 250 million
3. Rail Infrastructure in HK

3.4 Cross Boundary Traffic

New Cross Boundary Infrastructure for Better Connectivity

- Guangzhou–Shenzhen–Hong Kong Express Rail Link
- Hong Kong–Shenzhen Airport Rail Link
- Hong Kong–Zhuhai–Macao Bridge
3. Rail Infrastructure in HK

3.5 Railway Development to Serve PRD Region

- National high speed rail network of 12,000 km
- Expansion of existing intercity rail network by 17,000 km
3. Rail Infrastructure in HK

3.5 Railway Development to Serve PRD Region

Guangdong Province – Intercity Rail Lines

Source: HKMTRC
3. Rail Infrastructure in HK

3.5 Railway Development to Serve PRD Region

Guangdong Province – Intercity Rail Lines

Legend
- Blue: Existing Intercity Rail Lines
- Red: Planned High Speed Rail

Source: HKMTRC
3. Rail Infrastructure in HK

3.5 Railway Development to Serve PRD Region

PRD Planned Railway Network – Intercity Rail in Guangdong Province

Source: HKMTRC
3. Rail Infrastructure in HK

3.6 Railway Development in HK

Hong Kong Existing Railway Network

No. of Lines: 11
Total Length: 212km

Source: HKMTRC
3. Rail Infrastructure in HK

3.6 Railway Development in HK

Railway Network in 2020

Source: HKMTRC
3. Rail Infrastructure in HK

3.7 Future Committed Railway Lines

- West Island Line (WIL):
- South Island Line (East) (SIL(East))
- Shatin to Central Link (SCL)
- Kwun Tong Line Extension (KTE)
- Hong Kong Section of Guangzhou–Shenzhen–Hong Kong Express Rail Link (XRL)
3. Rail Infrastructure in HK

3.7 Future Committed Railway Lines

- West Island Line (WIL)
- South Island Line East (SIL (East))
- Shatin to Central Link (SCL)
- Kowloon Line Extension (KLE)
- Hong Kong Express Rail Link (XRL) - Hong Kong Section of Guangzhou / Shenzhen
West Island Line (WIL)

- WIL is an underground extension of the existing MTR Island Line from Sheung Wan to Kennedy Town (Approximately 3 km)
- 3 underground stations at Sai Ying Pun, The University of Hong Kong and Kennedy Town
- Target Completion Date: Year 2014

Source: HKMTRC
3. Rail Infrastructure in HK

3.7 Future Committed Railway Lines

South Island Line East (SIL (East))

- SIL (East)’s alignment (Approximately 7 km) is from Admiralty to South Horizons and Admiralty will be an interchange station with existing MTR lines and the future Shatin to Central Link.
- Stations include Admiralty, Ocean Park, Wong Chuk Hang, Lei Tung and South Horizons
- Target Completion Date: Year 2015
SCL extends (1) the existing Ma On Shan Line from Tai Wai to the West Rail Line via East Kowloon to form the “East West Corridor” and (2) extends the existing East Rail Line across the harbour to Wan Chai North and Central to form the “North South Corridor”. The length of total alignment is approximately 17km.

Construction of the SCL is expected to start in 2012. The Tai Wai to Hung Hom Section is expected to be completed in 2018 while the Hung Hom to Admiralty Section will have to interface with other infrastructure projects, including Wan Chai Development Phase II and Central–Wan Chai Bypass, and is expected to be completed in 2020.
3. Rail Infrastructure in HK

3.7 Future Committed Railway Lines

Kowloon Line Extension (KLE)

- KLE extends from the existing overrun tunnel of Yau Ma Tei Station, the line will run along Gascoigne Road cross Wylie Road and reach Ho Man Tin Station at the site of the ex-Valley Road Estate. It will then run through Chatham Road North via Wuhu Street and Tak Man Street, and extend to Whampoa Station at Tak On Street.
- There are two additional stations include Ho Man Tin and Whampoa with the length about 2.6km.
- Target Completion Date: Year 2015

Source: HKMTRC
3. Rail Infrastructure in HK

3.7 Future Committed Railway Lines

Hong Kong Express Rail Link (XRL) – Hong Kong Section of Guangzhou / Shenzhen

- The HK section of XRL runs from West Kowloon in Hong Kong to the boundary of Hong Kong and Shenzhen. The Express Rail Link will connect with the 16,000-km National High-speed Railway Network and will enhance Hong Kong's role as the southern gateway to the Mainland.
- The length of the alignment in HK section is approximately 26km
- Target Completion Date: Year 2015

Source: HKMTRC
3. Rail Infrastructure in HK

3.8 Railway Lines Planned but Not Yet Approved / Gazetted

- South Island Line (West) (SIL(West))
- North Hong Kong Island Line (NIL)
- Northern Link (NOL)
- Port Rail Line (PRL)
- Hong Kong–Shenzhen Western Express Line (WEL)
3. Rail Infrastructure in HK

3.8 Railway Lines Planned but Not Yet Approved / Gazzetted

To Shenzhen Airport

- South Island Line (West) (SIL(West))
- North HK Island Line (NIL)
- Northern Link (NOL)
- Hong Kong-Shenzhen Western Express Line (WEL)
South Island Line (West) (SIL(West))

- SIL(West), is a 15-kilometre long medium capacity railway to extend railway service to the Southern District.
- The proposed SIL(West) will run between the University of West Island Line and Wong Chuk Hang with three intermediate stations at Cyberport, Wah Fu Estate and Aberdeen.
- SIL(West) will be kept under review and will be considered further taking into account any new proposed development in the Western District and Wah Fu.
3. Rail Infrastructure in HK

3.8 Railway Lines Planned but Not Yet Approved / Gazetted

North HK Island Line (NIL)

- NIL is an extension of the existing Tung Chung Line (TCL) along the north shore of Hong Kong Island to run through onto the eastern half of the existing Island Line (ISL) at Fortress Hill Station.
- NIL can relieve the Causeway Bay section of ISL and the Nathan Road section of Tsuen Wan Line (TWL) by redistributing the cross-harbour trips to TCL and TKOL.
- With a reduction in the forecast employment in the Central Reclamation due to changes in land use assumptions since the Second Railway Development Study, and the anticipated opening of SCL ahead of the NIL, which would share some of the cross-harbour trips and relieve the Nathan Road section of TWL, it has been decided in early 2003 that the completion of NIL would be deferred to beyond 2016.
Northern Link (NOL)

- NOL will run between the existing West Rail Line at Kam Sheung Road and the Lok Ma Chau Terminus of the existing East Rail Line. It will intersect with the East Rail Line at a new station at Chau Tau of San Tin, where passengers can interchange with the East Rail Line.
- It will provide domestic passenger service at the northern part of the New Territories and cross-boundary passenger services for the western part of the HKSAR.
- The Government is reviewing the project in light of the development of those New Development Areas in the Northeast New Territories to ensure the NOL will be properly integrated with the new developments.

Source: HKMTRC
PRL was a proposed new freight rail connection from Lo Wu to a new port rail terminal at Kwai Chung.

The Government has decided not to pursue the PRL due to the continued decline of rail freight volume, as announced in the Legislative Council (LegCo). As such, the use of rail for freight transport or cross-boundary goods is no longer a policy objective.
Hong Kong–Shenzhen Western Express Line (WEL)

- WEL will be a multi-function cross-boundary railway, linking the western part of Hong Kong and Shenzhen, including the two airports.
### 3. Rail Infrastructure in HK

#### 3.8 Summary of Rail Projects

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3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

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<td>• Rail Link between Shatin / Tai Wai and West Kowloon / Tsuen Wan</td>
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<td>• Tuen Mun to Tsuen Wan Rail Link</td>
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<td>• Extension or bifurcation of Ma On Shan Link to Sai Kung / Tseung Kwan O</td>
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<td>• Extension of Island Line to Siu Sai Wan</td>
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<td>• Outer Western Corridor – new corridor linking Hong Kong Island – Lantau – NWNT</td>
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3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

1. Further Extension of Rail service through the Hong Kong-Zhuhai-Macao Bridge (lower deck) to link up HKIA to Macau / Zuhai Airports
2. Shatin to Tsuen Wan Link (STTWL)
3. Tuen Mun to Tsuen Wan Link (TMTWL)
4. Siu Sai Wan Extension from Island Line (SSWE)
5. Outer Western Corridor (OWC) - linking HK Island - Lantau - NWNT
6. Rail Extension of Ma On Shan Link to Tseung Kwan O Link (MOSTKOL)
Can we further extend Rail service through the Hong Kong–Zhuhai–Macao Bridge (lower deck) to link up Hong Kong International Airport to Macau / Zhuhai Airports

- Railway line connects the HK–Shenzhen Airport Railway Link to link up HK International Airport
- It with connect Shenzhen Airport and Macau Airport and thus enhance the connectivity between the three airports.
- By doing that it can expand complementary development and mutual co-operation among the three airports
Should we construct Shatin / Tai Wai and Tsuen Wan Link (STTWL)?

- STTWL aims at connecting Shatin and Tsuen Wan Districts directly through rail line.

- There could be two possible options, one linking Shatin / Tai Wai and Tsuen Wan directly and another linking Shatin / Tai Wai and Tsuen Wan via Kwai Chung.
3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

Should we construct Tuen Mun to Tsuen Wan Link (TMTWL)?

- TMTWL has been long discussed and a study report has been conducted and issued in Feb-2011 by Tuen Mun and Tsuen Wan District Councils.
- The study conducted by the consultant appointed by two district councils has identified the benefits of Tsuen Wan–Tuen Wan Line in driving regional economic and landuse development, as well as forming a Sham Tseng, Gold Coast and Sam Shing Bay leisure tourism corridor.
- The Kong Kong Government has included this line into the "Railway Development Strategy 2000" review project, which has indicated that this idea may become one of the future planning project. The completion of this line will be able to form a complete circle line for the Hong Kong–Kowloon–NT railway system.
3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

Should we extend Island Line to Siu Sai Wan (SSWE)?

SSWE can extend the current Island Line to Siu Sai Wan. Siu Sai Wan was a proposed station of the MTR of Hong Kong. Plan was revealed in 2001 to extend the Island Line to Siu Sai Wan on the eastern end of the Hong Kong Island, after many calls from the Eastern District Board (later District Council) since 1991.

Although the population size in Siu Sai Wan is large enough to support a station, the alignment of the existing Island Line makes it difficult to extend the line from the terminus Chai Wan Station.

Such an extension would require a U-shaped tunnel passing through the Pottinger Peak. An alternative plan was to build a Y-shaped branch from Heng Fa Chuen. The plan was later shelved, despite continued calls from the District Council.
Should we review the Outer Western Corridor (OWC) – linking HK Island – Lantau – NWNT?

- OWC connects the Western District (Tuen Mun), Lantau Island and can intersect with the Island Line.
- It was discussed and has been put into long term railway strategy. The viability will depend on future development levels at Lantau.
Should we extend the Ma On Shan Link to Tseung Kwan O Link (MOSTKOL)

- MOSTKOL can extend the current Ma On Shan link to serve the Sai Kung District. It can be considered as a tourist line to serve the HK East coastal corridor.
- It can intersect with the TKO Line at Hang Hau Station or Tseung Kwan O Station, where passengers can interchange with the TKO Line.
- Due to the terrain constraints and the current limited demand, elevated LRT or monorail can be considered.
3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

Rail Extension of Ma On Shan Link to Tseung Kwan O Link (MOSTKOL)

Monorail Advantages:
- Smaller footprint
- Lighter structure
- Less obstruction of sunlight – more environmentally friendly
3. Rail Infrastructure in HK

3.9 Potential Railway Lines for Further Discussion

Rail Extension of Ma On Shan Link to Tseung Kwan O Link (MOSTKOL)

- Reduced structural requirement
- No overhead powerlines
- Elegant construction
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4. Effectively Manage Road Use

4.1 ITS Framework in HK

Source: ITS Strategic Review (TD)
4. Effectively Manage Road Use

4.2 Recent Developments in ITS

- In recent years, the Transport Department (TD) has been promoting the development of Intelligent Transport Systems (ITS) and conducting research and development of Transport Information System in Hong Kong.

- Apart from gradually installing Variable Message Signs (VMS), it also posts closed-circuit television (CCTV) snapshots of traffic conditions on the Internet, so as to provide information on real-time traffic conditions.

- TD also installed cross-harbour journey time indicators at various locations in Hong Kong Island and the Kowloon side; mounted VMSs on Tuen Mun Road, Tolo Highway and Fanling Highway (the relevant works are scheduled for completion in 2014); and planned to erect speed map panels at five locations in the New Territories to indicate traffic conditions ahead with graphic images (the relevant works are scheduled for completion in early 2012).
The government will continue to explore new channels to disseminate real-time traffic information to help the public make informed choices in travelling routes and transport modes based on the latest traffic conditions, thus reducing and alleviating traffic congestion.

The TD planned to install and mount VMSs at various ingresses of Central – Wan Chai Bypass for operation upon completion of the bypass.

The TD operates a total of 41 CCTV cameras on the Hong Kong Island, 20 of which are mainly used for incident management and the other 21 monitoring of traffic conditions of major roads. These 21 cameras provide images for the snapshot website except when they are used for incident management (during which they are adjusted to film certain locations and unable to provide traffic conditions of major roads).

To increase the number of real-time traffic images available to the public and avoid service disruption due to incident management, the TD has secured the necessary fund for installing 31 separate CCTV cameras dedicated for providing traffic images for the snapshot website. The installation works were scheduled for completion in the latter half of 2010. By then, the 31 dedicated cameras has replaced the 21 cameras also used for incident management for disseminating information to the public.
The TD has been disseminating special traffic news to the public via the media such as the television and radio. In recent years, the TD strives to release via its homepage special traffic news, CCTV snapshots, the estimated time of the cross-harbour journey from the Hong Kong Island to Kowloon and the speed map indicating the traffic speed of major roads.

Also, the TD has explored new channels for message dissemination, including offering the PDA version of the above online services and providing mobile service operators with traffic information such as CCTV snapshots and special traffic news for their dissemination to clients.
4. Effectively Manage Road Use

4.3 ITS Achievements in HK

- Area Traffic Control
- Traveler Information
- Traffic Control & Surveillance
- Autotoll
- Octopus
- Traffic Enforcement
- Control Centre
- Incident Management

ITS Framework in HK

Source: ITS Strategic Review (TD)
The ATC System is a computerised system that integrates the control and operation of traffic signals within a district. Since the 1970's, the Transport Department has been expanding the coverage of the ATC systems to all urban areas and new towns in the New Territories. The systems provide better co-ordination of traffic lights at road intersections to help motorists and pedestrians cross roads and junctions safely and efficiently. At present, there are about 1763 signalized junctions in the territory of which 1644 are under ATC, with 308 CCTV cameras to monitor the traffic conditions at these junctions.
There are mainly two types of Traveler Information Systems in HK: Pre-trip and En-route Traveler Information Systems.

Regarding the Pre-trip Travel Information System, Closed Circuit Television (CCTV) cameras are installed at strategic locations in Hong Kong to allow the Transport Department to monitor traffic condition and take remedial actions in case of emergency. Starting from 1999, images of traffic condition at 43 strategic locations captured by the CCTV cameras have been broadcasted to the public via the Internet. Majority of the public welcome the service. The number of CCTV images has been increased to 140 by stages.

The current version of Traffic Speed Map (TSM) was launched on Transport Department's homepage in 2010 to provide the deduced traffic speed of main roads in Hong Kong, Kowloon and New Territories (South). Apart from deduced traffic speed, the TSM includes the cross harbour journey time information provided by the Journey Time Indication System and snapshot images collected from the Transport Department's surveillance cameras. The traffic speed data in the TSM is updated every 5 minutes.

Also, the Driving Route Search Service (pilot version) was launched on Transport Department's homepage in 2009 to provide the best route search (in terms of shortest travel time, lowest toll or shortest distance) for the drivers’ reference to plan their routes.
Regarding the En-route Travel Information System, the Journey Time Indication System (JTIS) on Hong Kong Island was commissioned in 2003 to provide the estimated journey time to exit of respective tunnels from Hong Kong Island to Kowloon. The JTIS assists motorists to make an informed route choice to cross the harbour before arriving at the critical diversion points by referring to the journey time information of different cross harbour routes provided by the journey time indicators. A survey conducted in 2006 revealed that the JTIS was welcomed by the public. The Transport Department expanded the JTIS to Kowloon and Eastern District in 2010 to provide motorists with more journey time information to cross the harbour.

The displayed digits on the journey time indicators are shown in three colours for different traffic conditions: Red represents congested traffic, Amber represents slow traffic and Green represents smooth traffic. The JTIS operates on a 24-hour basis and the displayed times are refreshed every two minutes.
The first extensive traffic control and surveillance systems (TCSS) project in Hong Kong was probably the Tsing Ma Control Area which links Route 3 and Route 9 in Hong Kong and connects the mainland with the Chek Lap Kok Airport at Lantau Island. The comprehensive TCSS facilities include CCTV cameras, automatic vehicle detection, lane control signals, variable message signs, etc. for efficient and effective traffic and incident management. Traffic Control and Surveillance Systems have been expanded in the recent years to include the Shenzhen Western Corridor and the Tsing Sha Control Area.

A more systematic TCSS design on all new strategic roads was required since then. TCSS were also deployed in all tunnels in Hong Kong. The Transport Department has carried out the Strategic Road Network (SRN) TCSS Preliminary Project Feasibility Study with the aim to establish the standard TCS facilities on highways.
4. Effectively Manage Road Use

4.3 ITS Achievements in HK

Autotoll

- The first Automatic Toll Collection System was introduced in Hong Kong in 1993 at the Cross Harbour Tunnel to provide alternative payment method to the public. The system was then extended to all road tunnels and the Tsing Ma Control Area. At present, there are about 240,000 subscribers. 50% of the vehicles passing through the tunnels and Tsing Ma Control Area are the system's users.

- Its ETC system provides maximum convenience to motorists by allowing toll collection process to be automated in such a way that motorists do not have to stop and pay cash at a tollbooth. Currently, ETC is available in all of the 10 toll roads/tunnels, involving 320,000 daily transactions.
Launched in September 1997, Octopus is a contactless smart card system jointly developed by the major public transport operators in Hong Kong. It has become very popular and can be used on most of the transport services in Hong Kong including railways, buses, minibuses, coaches, ferries, car parks and parking meters. Today, over 20 million cards have been issued and the number of daily transactions is over 11 million.
4. Effectively Manage Road Use

4.3 ITS Achievements in HK

Traffic Enforcement

- Red light cameras and speed enforcement cameras were introduced in Hong Kong in 1993 and 1999 respectively as trials and the systems have been upgraded to use digital type cameras in 2003. For the speed enforcement cameras, the system has been expanded in 2004 with the introduction of digital type cameras. By the end of 2010, there will be a total of 155 sites with most advanced digital system in operation. A Phase 2 expansion programme is now being implemented. Upon completion of the Phase 2 Project scheduled in the first quarter of 2011, there will be a total of 120 locations with new digital type speed enforcement camera housings installed in the territory.

- Review on effectiveness of the red light camera systems revealed that the number of red light jumping cases at these sites was substantially reduced by about 43% to 55%. For speed enforcement camera system, it was also found that there was a 50% reduction in the number of vehicles in excess of speed limit by 15 kilometers per hour, and a 40% reduction in the number of traffic accidents involving injuries.
The Traffic Control Centre (TCC), which has been operating since early 2004, provides accommodation for the Emergency Transport Co-ordination Centre, the Area Traffic Control systems in the New Territories, the traffic monitoring system for Tsing Ma/Tsing Sha Control Area and the Traffic Control and Surveillance System for Shenzhen Bay Bridge.

TCC will closely monitor the traffic and public transport situation. If there is any emergency incident, TCC will disseminate real-time traffic and public transport news, and coordinate with police, public transport and tunnel operators, other government departments and parties concerned to alleviate the traffic and public transport services impact.
In May 2000, TD established the Emergency Transport Coordination Centre (ETCC) to coordinate emergency traffic and transport incidents and minimise the impact, delay and inconvenience caused by incidents to the public on a 24-hour basis throughout the year.

Whilst the ETCC provides an effective and efficient response to all traffic and transport incidents, the majority of the processes are still manual in nature. A study of “Feasibility Study on Deploying Advanced Technologies in Incident Management” was conducted and finished in 2010. A number of enhancements are suggested in the Study, primarily by means of computerized systems to facilitate greater automation of incident handling processes and better coordination of multiple concurrent incidents.
4. Effectively Manage Road Use

4.4 Next Steps for Consideration in ITS

What else can be done?
Should the application of Real Time Passenger Information for Buses be extended to more bus stops?
4. Effectively Manage Road Use

4.4 Next Steps for Consideration in ITS

**Should Other Technology Options for Real Time Passenger Information be used in HK?**

- Dedicated Short Range Communication (DSRC); and
- Vehicle Positioning System (VPS).
4. Effectively Manage Road Use

4.4 Next Steps for Consideration in ITS

**Shall we also use Octopus for Paying Toll?**

**Stop–and–Pay” Solution** – Vehicles are required to stop at unmanned tollbooth to pay the toll fee.

Core Equipments:
- i) Tollbooth Console located in the tollbooth to control the process.
- ii) Octopus readers (3 for each toll lane) mounted on the side of the tollbooth for vehicles of different heights.
- *iii) Vehicle Classification System for identifying vehicle types in order to apply different fees and to provide vehicle flow records for TD.
- *iv) Vehicle Enforcement System to capture and process violation information for payment collection.

Remarks: *if the above solution is placed at manned tollbooth, iii) and iv) are not required.*

**Automatic “Free–flow” Solution** – Vehicles are not required to stop at unmanned tollbooth to pay the toll fee.

Core Equipments:
- Tollbooth Console located in the tollbooth to control process.
- On Board Unit (OBU) that has a contactless card slot that can read/write an Octopus Card.
- Infrared Beacon on the side of the tollbooth to handle on one side the communication with OBU and on the other side an interface to the Tollbooth Console.
- Octopus Unit linked to Tollbooth Console to control Octopus payment transaction (similar to a Octopus Reader but without antenna).
- Vehicle Detection System for detecting approaching vehicles.
- Vehicle Classification System for identifying vehicle types in order to apply different fees and to provide vehicle flow records for TD.
- Vehicle Enforcement System to capture and process violation information for payment collection.
Can we consider way-finding / Parking Guidance System in HK?

4. Effectively Manage Road Use

4.4 Next Steps for Consideration in ITS
Parking Guidance Systems (PGS) could be provided through private sector participation to supply relevant parking information via media and communication systems or roadside electronic information signs, to enable motorists to avoid areas where parking facilities are already full. A well-interconnected and occupancy-controlled PGS can direct drivers to the next available car park or parking space. PGS can reduce the amount of traffic on the road network and help mitigate environmental impact. Strategically, the system can be used to spread demand or adjust the demand on existing parking facilities. In emergency situations, a PGS can be operated as part of a contingency plan for traffic diversion and control of emergency service vehicles.

As a long term initiative, real-time or near real time parking information can be disseminated to the public through mass media or through the 3rd Generation Mobile Phone service as a private sector initiative. It is anticipated that the system will develop and become mature with increasing popularity. It will enable road users to make more informed choices such as changing travel mode or trip destinations to avoid areas where parking facilities are already full.

Parking technology such as sensor for parking bay monitoring could be adopted to give real time information on bay occupancy and help guiding vehicles inside the car park to the nearest available bay. A new concept of ITS – parking reservation system – can aid travellers in securing a parking space either prior to or during their trip. It could provide real time monitoring of parking availability and estimate of anticipated demand.
4. Effectively Manage Road Use

4.5 Road Works / Road Pavement

How to minimize the road opening works?

Roads in Hong Kong serve dual purposes. They provide passageway for vehicular and pedestrian traffic as well as underground space for the 13 utility undertakings currently in operation.

- 94,000 km utility services under 2,067 km of roads
- 3,100 km gas pipe
- 7,000 km sewer
- 3,000 km street lighting cable
- 7,200 km watermains
- 25,000 km electric cables
- 49,000 km telecom cables

Therefore on average there are 47 km underground services laid in each km of road and are much more in the urban areas. The number of excavation permits issued was over 22,000.

Disruption to traffic and inconvenience to the public caused by road excavation works has long been a subject of public concern. The main mechanism to minimize the disruption is through restriction, coordination and monitoring.
How to minimize the need for Excavation by using Utility Tunnel?

- The structure built above the earth and underground containing more than two sorts of public utilities, and its facilities including drainage, ventilation, lighting, communication, electricity, and relevant systems of surveillance and detection. A utility tunnel is a subterranean space for wires, conduits, pipes, and other conveyances used in the delivery of utilities with enough room for a human to enter.

- A common utility duct, sometimes called a common utility conduit, is any structure – above, on, or below ground – that carries more than two types of public utility lines.

- Can utility tunnel be implemented in some busy roads to minimize the need for road opening?
How to minimize the Disturbance Caused by Road Works / Road Pavement?

- Rollpave is a thin,rollable surface with a thickness of approx. 3 cm. Using induction, the surface can be adhered in place and removed from the bottom layer very quickly. This road surface is intended for quick maintenance/replacement/overlaying of road layers on paving that provides sufficient support.

- The road surface is also interesting for open and dense surfaces on civil engineering structures and for emergency repairs that need to be carried out quickly (no cooling-off time needed).
4. Effectively Manage Road Use

4.6 Asset Management

Should Traffic Control / Management and Highways Maintenance for public roads be contracted out using the above management mode?

- The Tsing Ma Control Area (TMCA) is an integrated expressway system linking the new Airport to Kowloon Peninsula and the North West New Territories. It comprises the Kwai Chung Viaduct, Rambler Channel Bridge, Cheung Ching Tunnel, Ting Kau Bridge, the Lantau Link (consisting of Tsing Ma Bridge, Ma Wan Viaduct, and Kap Shui Mun Bridge), and part of the North Lantau Expressway (up to Yam O Interchange). The TMCA has a total length of 17 km and its total construction cost is $21 billion in money of the day (MOD) prices.

- The TMCA is scheduled for opening on 21 May 1997. The management, operation, and maintenance (MOM) of the TMCA was contracted out to a private operator.
## 4. Effectively Manage Road Use

### 4.6 Asset Management

#### Asset Management – Performance Indicators of TMCA

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Pledged target</th>
<th>Percentage of achieving the target in 2009 (%)</th>
<th>Percentage of achieving the target in 2010 (%)</th>
<th>Target in 2011 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Respond to traffic accident/vehicle breakdown from the tunnel tube, expressway and bridges</td>
<td>Within 5 minutes</td>
<td>99.7</td>
<td>99.77</td>
<td>98</td>
</tr>
<tr>
<td>2</td>
<td>Remove breakdown vehicle/obstacle from the tunnel tube, expressway and bridges</td>
<td>Within 12 minutes</td>
<td>99.66</td>
<td>99.7</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>Inform users of traffic obstruction inside Tsing Ma Control Area through the Variable Message Signs</td>
<td>Within 2 minutes</td>
<td>100</td>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>Inform users of traffic obstruction inside Cheung Tsing Tunnel through Public Address and the Broadcasting Systems</td>
<td>Within 5 minutes</td>
<td>100</td>
<td>100</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>Keep the average carbon monoxide (CO) concentration level inside the tunnel at all times</td>
<td>Below 100ppm</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>Keep visibility inside the tunnel at all times</td>
<td>Below an extinction coefficient of 0.005/m</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>Reply to public complaint</td>
<td>Within 7 working days</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
4. Effectively Manage Road Use

4.6 Asset Management

- The Asset management concept can be applied to manage the roads by district and also can be applied to manage all road tunnels.

- E.g. : (i) Tsing Ma Control Area, (ii) Tsing Sha Control Area, (iii) NT East, (iv) NT West, (v) Kowloon East, (vi) Kowloon West, (vii) HK Island and (viii) Road Tunnels.
4. Effectively Manage Road Use

4.7 Tram Service

Existing Situation

- World’s largest double-deck tram fleet and unique double-deck metric system;
- Network: 6 routes, 6 terminal stations, 29.5km line length, 118 stops with operating kilometrage over 6 million km per annum;
- A mass transit system with 230,000 trips per day (84,000,000 per year) representing an important public transport mode on HK island;
- Functions as an essential service complementary to other transport means;
- Greenest and cheapest transport mode in Hong Kong (*lowest carbon footprint to reduce emission of CO2 and help alleviate the global warming*).
4. Effectively Manage Road Use

4.7 Tram Service

- Can the extension of tram usage to help alleviate environmental problems in Hong Kong?
- How to upgrade the Tram services to be in line with the world’s norm?
- How to improve the quality of passengers services?
- Shall we promote the utilization of green transport?
- How to catch up with essential improvement works?
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1. Is “railway as backbone of passenger transport” still a good policy to pursue? If yes, what else should be done to better realize this policy?

2. How can we further improve the railway connectivity within Hong Kong and across the boundary to the Mainland, in particular to the PRD region?

3. How can we further improve the road use efficiency so as to relieve the traffic congestion? Is road charging a final solution?
5. Summary

- All discussed aspects are conceptual and pointing to the direction of transport infrastructure development;
- All potential proposals discussed if adopted should improve the level of service of our transport infrastructure, and
- All potential proposals discussed will require further detailed studies for implementation if accepted by Government.

For Further Discussion:

1. Rail infrastructure:
   - Should we further extend Rail service through the (lower deck) Hong Kong–Zhuhai–Macao Bridge to link up Hong Kong International Airport to Macau / Zhuhai Airports?
   - Should we construct rail Link between Shatin / Tai Wai and West Kowloon / Tsuen Wan
   - Should we construct Tuen Mun to Tsuen Wan Rail Link?
   - Should we extend Ma On Shan Link to Sai Kung / Tseung Kwan O by means of monorail?
   - Should we extend Island Line to Siu Sai Wan?
   - Should we review Outer Western Corridor – new corridor linking Hong Kong Island – Lantau – NWNT?
5. Summary

For Further Discussion (con’t):

(2) Effectively Manage Road Use:

- Should the application of Real Time Passenger Information for Buses be extended to more bus stops?
- Shall we also use Octopus for paying toll?
- Can we consider way-finding / Parking Guidance System in HK?
- How to minimize the need for road excavation and disturbance caused by road works?
  Are Utility Tunnel / Rollpave technologies be applicable to Hong Kong?
- Can the concept of asset management by means of MOM contracts for different districts and tunnels be implemented?
- How to improve Tram Services?

(3) Travel Demand Management:

- Electronic Road Pricing?