

This subject paper is intended to be a research paper delving into different views and analyses from various sources. The views and analyses as contained in this paper are intended to stimulate public discussion and input to the planning process of the "HK2030 Study" and do not necessarily represent the views of the HKSARG.

## **WORKING PAPER NO. 47**

# **TRANSPORT ASSESSMENT FOR THE STAGE 4 DEVELOPMENT SCENARIOS**

### **PURPOSE**

1. The purpose of this paper is to summarize the transport assessments for the Stage 4 Development Scenarios and the transport infrastructure requirements.

### **BACKGROUND**

2. Stage 3 of the Study had formulated two development options, namely the Consolidation and Decentralisation Options, with matched strategic transport infrastructure development programme for consultation. The Stage 4 of the Study has finalized a preferred development option, taking into account comments received and extracting the more desirable elements from the previous options to form the Reference Scenario. A set of "What If" Scenarios has also been developed to cater for possible changes in population and economic growth, but for transport infrastructure requirement assessment, only the High Population and High Economic Growth Scenario (HPGS) is worth for testing. A series of transport assessments has been carried out to examine if the transport infrastructure development programme as recommended in Stage 3 can satisfy the travel demand of the preferred development scenarios.
3. The Stage 4 transport assessment has also incorporated the latest plans and reports published by the Mainland authorities that have implications on the assessment of cross-boundary transport infrastructure. They include "The National Eleventh Five Year Plan (11th FYP)", the "Plan for the Coordinated Development of the Pearl River Delta (PRD) Township (珠江三角洲城鎮群協調發展規劃)", "The Medium and Long Term Railways Network Plan (中長期鐵路網規劃)", "Thematic Planning Study on the Comprehensive Transport System of the Pan-PRD Region (泛珠三角區域綜合交通運輸體系合作專規劃)" and "Planning Principles on Road and Waterborne Transport Infrastructures under the Pan-PRD Regional Co-operation (泛珠三角區域合作公路水路交通基礎設施規劃綱要)", etc.

4. This paper summarizes the major input assumptions of the Stage 4 transport assessments, the future cross-boundary and domestic transport demands and the recommended transport network for the design years 2010, 2020 and 2030.

## MAJOR INPUT ASSUMPTIONS

### Socio-economic Development of Guangdong

5. Within the Guangdong Province, the PRD Region is the most active zone that has strong interaction with Hong Kong. PRD Region covers 9 municipal cities<sup>1</sup> with a total area of approximately 41,600 km<sup>2</sup>. Four of them are located on the east bank and the rest on the west bank. Among them, Guangzhou and Shenzhen account for the lion share of both the population and Gross Domestic Product (GDP), and are the main growth engines of the PRD Region. Both cities have export-oriented economic structure and their foreign direct investment (FDI) account for half of the PRD Region. Dongguan is another city in the PRD with close relationship with Hong Kong. Being located to the north of Hong Kong and Shenzhen, it is one of the prime factory bases supporting the production and manufacturing industry of Hong Kong. Products are normally transported to Hong Kong for export. Similar to Shenzhen, it also generates a high proportion of cross-boundary vehicle and passenger trips. Its future development will focus on more investment on hi-tech and electronic information and continue to be the major production and manufacturing base. Based on the development plans of the cities in the PRD, the future economic growth of the east bank is assumed to be ahead of the west bank.
6. Nevertheless, upon completion of the Hong Kong-Zhuhai-Macao Bridge (HZMB) and transport infrastructure along the west coast of the PRD, the differences in development between the two sides will diminish as the socio-economic integration between the two sides has strengthened. According to the “Plan for the Coordinated Development of the PRD Township (珠江三角洲城鎮群協調發展規劃)” endorsed by the Guangdong People’s Congress in January 2005, the future spatial pattern of the PRD Region will be in the form of “One Spine, Three Axes and Five Corridors (一脊、三帶、五軸)” with Hong Kong, Shenzhen and Guangzhou being the regional centers. As planned, this multi-centered, consolidated development pattern will provide a driving force for development along the spine, axes and corridors of the PRD Region and boost economic growth.
7. For the Guangdong planning data, reference has been made to the current “港珠澳大橋工程可行性研究” and supplemented by the “香港與珠江西岸交通聯系研究”. Both studies provide updated population and GDP projections for cities in the Guangdong Province ([Annex 1](#)).

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<sup>1</sup> The 9 municipal cities are Guangzhou, Shenzhen, Dongguan, Zhongshan, Zhuhai, Foshan, Jiangmen, parts of Huizhou (i.e. urban district of Huizhou, Huiyang County, Huidong County and Bolou County) and parts of Zhaoqing (i.e. urban district of Zhaoqing, Gaoyao and Shiui).

## Mainland Transport Infrastructure Plans

8. The most important input assumption for cross-boundary traffic projection is the Mainland infrastructure development plans. The State government embarked huge amount of money in the development of transport infrastructure in the National 9th FYP (1996-2000) and 10th FYP (2001-2005). For example, Mainland had completed 240,000km highways and 5,600km railways in 1996-2000 and 250,000km highways and 6,500km railways in 2001-2005. The National 11th FYP proposes to actively enhance and improve transport infrastructure to support and drive economic development with emphasis on building trans-regional railway network and strengthening inter-provincial highways corridors. For the cross-boundary transport assessment, we have incorporated three levels of highways and railway networks, with different levels of details, namely national, regional and local levels.

### **National Expressway and Railway Plans**

9. The National railway network basically follows the “Eight Criss, Eight Cross (八縱八橫)” development pattern ([Plan 1](#)). According to the National 11th FYP, emphasis has been put on the construction of the “Four Verticals, Four Horizontals (四縱四橫)”<sup>2</sup> passenger rail lines to link up major cities ([Plan 2](#)), providing high speed and high standard rail services. Among them, the Jing-Guang-Shen Passenger Rail Line (京廣深客運專線) and Hang-Fu-Shen Passenger Rail Line (杭福深客運專線) can link up with Hong Kong via the proposed Guangzhou-Shenzhen-Hong Kong Express Rail Link (ERL).
10. The National expressways will basically be built in accordance with the National Expressway Network Plan (國家高速公路網規劃) put forward by the Ministry of Communications ([Plan 3](#)) in 2004. Fourteen key expressways will be constructed in the next five years. Among them, the proposed “Beijing-Hong Kong/Macao” Capital Line will provide a direct connection between Hong Kong and Beijing.

### **Pan-PRD Expressway and Railway Plans**

11. The State Government has also placed much emphasis on regional planning to achieve synergic efficiency. The signing up of Pan-PRD Regional Co-operation Framework Agreement in June 2004 marked the regional co-operation, including infrastructure development, commerce and trade, tourism, agriculture and environmental protection etc., among nine Provinces<sup>3</sup> and two Special Administrative Regions of Hong Kong and Macao.

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<sup>2</sup> “Four Verticals” are (1) Beijing-Shanghai; (2) Beijing-Wuhan-Guangzhou-Shenzhen; (3) Beijing-Shenyang-Harbin(Dalian); and (4) Hangzhou-Ningbo-Shenzhen. “Four Horizontals” are (1) Xuzhou-Zhenzhou-Lanzhou; (2) Hangzhou-Nanchang-Changsha; (3) Qingdao-Shojazhuang-Taiyuan; and (4) Nanjing-Wuhan-Chongqing-Chengdu.

<sup>3</sup> The nine Provinces include Guangdong, Fujian, Juangxi, Guangxi, Guizhou, Hainan, Hunan, Sichuan and Yunan.

12. The Guangdong Development and Reform Commission has taken the lead to commission the “Thematic Planning Study on the Comprehensive Transport System of the Pan-PRD Region (泛珠三角區域綜合交通運輸體系合作專規劃)” to provide guiding principles for infrastructure development within the Pan-PRD Region. The proposed transport network follows a development framework of “One Core, Two Sectors, Three Rings and Five Axes (一核二扇三圈五軸線)”<sup>4</sup>. Hong Kong, Guangzhou, Shenzhen, Zhuhai and Macao, will become the core of the transportation system in the Region radiating to the neighbouring cities and provinces. On this basis, a comprehensive expressway and railway network in the form of “Seven Rays, Six Verticals, Five Horizontals (七射、六縱、五橫)” has been proposed with an aim to achieve seamless interchange for passenger transport and seamless convergence for cargo transport in the Region.

### ***Guangdong Province Expressway and Railway Plans***

13. Guangdong Province, being immediately adjacent to Hong Kong, has the closest economic relationship with Hong Kong. According to the “Expressway Network Plan of Guangdong Province (2004-2030)(廣東省高速公路網規劃)” and the “Planning Proposal for Railway Construction in Guangdong Province (廣東省鐵路建設規劃建議)” completed by the Guangdong Provincial Transportation Department and the Guangdong Development and Reform Commission in 2004 respectively, twelve separate outbound expressways and railways are planned to be built in the next twenty years. The expressway corridors will follow a framework of “Nine Verticals, Five Horizontals and Two Circles (九縱五橫兩環)”. Both network layouts are illustrated in [Plans 4](#) and [5](#) and their key features are summarized in [Annexes 2](#) and [3](#).
14. As at end 2006, the Guangdong Province had a total mileage of about 115,600km highways, of which about 3,340km were expressways, with a highway density of 64.83 km/100 sq.km. The total mileage of railway was about 1,883km. According to the Guangdong 11th FYP, its total mileage of highways will reach 140,000km by 2010, incorporating about 5,000km expressways and targeting to achieve a highway density of about 78km/100sq.km. The total mileage of railways in operation will be about 2,900km coupled with a total of 300 km mass transit railway lines.

### ***PRD Rapid Transit System (RTS)***

15. Apart from the development of express passenger rail lines, Mainland governments also put emphasis on the construction of inter-city rapid transit systems (RTS) to facilitate

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<sup>4</sup> One core is formed by Hong Kong, Guangzhou, Shenzhen, Zhuhai and Macao; two sectors refer to coordination of two transportation systems that serve development radiating from the core to internal cities as well as to international cities; three rings refer to development of a ring area covering the coastal provinces including Guangdong, Fujian, Guangxi, Hainan to support port development, a city group ring covering Hunan, Guizhou and Jiangxi to raise their development potential and the last ring to cover Yunnan, Jiangxi and Hainan to support development between this region with ASEAN countries; five axes refer to axes starting from the core to Fujian and Yangtze River Delta Economic Zones, to Guangxi, Guizhou and Sichuan, to Guangxi, Yunnan and Thailand and the Jingjiu Line (京九線) and JingGuang (京廣線) Line.

people movements among cities within a region. According to the “PRD RTS Network Planning (2005-2020)( 珠三角城際軌道網絡規劃)” endorsed by the National Development and Reform Commission in 2005, the network consists of a centre at Guangzhou with two main axes linking Guangzhou with Zhuhai and Shenzhen and some feeder lines covering other cities in the PRD (**Plan 6**). The RTS is designed to provide multi-station services and efficient interchange with other public transport modes, such as city mass transit railway and buses. All major cities within the PRD will be linked up and by 2020, the total mileage of the PRD RTS will reach 600km. For the transport assessment, the speed of the proposed RTS is assumed in the range of 100km/hr to 200km/hr with a charging rate of \$0.6/km.

### ***Mass Transit Railway System in Shenzhen, Dongguan and Guangzhou***

16. Apart from the regional railway network, Shenzhen, Dongguan and Guangzhou also have plans to construct and expand their Mass Transit Railway systems (**Plans 7, 8 and 9**), which serve the local commuters within individual city.
17. In Shenzhen, two mass transit railway lines, Lines no.1 and 4 of total length 21.8km are in operation since December 2004. Line no.1 runs between Shijiezhichuang (世界之窗) and Lowu (羅湖) while Line no.4 links up Shaoniangong (少年宮) with Fumin (福民) with an extension to Huanggang (皇崗) control point recently completed and started operation by mid 2007. The construction work for the extension of Lines no.1 (about 23.3 km) and 4 (about 16 km), and new Lines no.2 (about 14.4 km), 3 (33 km), and 11 (about 38.2 km) has already commenced. They will provide additional 140km line services by 2010.
18. Dongguan do not have any mass transit railway system. They are planning to have a metro system of 4 service lines, having interchanges with ERL, the PRD RTS, Guangzhou metro lines and Shenzhen metro lines. It will also have access to Huizhou and Guangzhou East. The proposed metro system will have a total length of about 195km. In Dongguan’s 11th FYP, they are planning to complete a length of 39km.
19. In Guangzhou, two Metro Lines, Lines no. 1 and 2 of total length 36.6 km are in operation since 1997 and 2003 respectively. Line no.1 runs between the Guangzhou East Station (廣州東站) and Xiliang (西朗) whereas Line no. 2 runs between Sanyuanli (三元里) and Wanshengwei (萬勝圍), with interchange at Gongyuanqian (公園前) station. In December 2005, part of Line no.3 (from Guangzhou East Station to Kecun (客村)) and Line no.4 (from Wanshengwei to Xinzao (新造)) were completed.

### ***Shenzhen Transport Development Strategy***

20. Shenzhen is Hong Kong’s immediate neighbor. Any changes in infrastructure development and transport policy in Shenzhen will have direct impact on cross-boundary traffic as well as infrastructure requirement at the boundary. According to the “Shenzhen Comprehensive Plan (1996-2010) (深圳市城市總體規劃)”, the layout of

Shenzhen's highways will be in the form of three main corridors, namely the western, central and eastern corridors. The western corridor comprises the GuangShen Expressway (廣深高速) and the planned GuangShen Coastal Expressway (廣深沿江高速). The central corridor is made up of MeiGuan Expressway (梅觀高速) and ShenGuan Expressway (深莞高速) and the eastern corridor consists of ShenShan Expressway (深汕高速) and ShenHui Expressway (深惠高速).

21. Shenzhen also adopts this development pattern as a base to formulate policy to regulate cross-boundary vehicle movements. According to their plan, all cross-boundary vehicles are subject to the “east in-east out; west in-west out (東進東出、西進西出)” principle to make their way through Shenzhen. All goods vehicles will be allowed to use either the eastern or the western corridors. This would help to alleviate environmental and traffic impacts on the city centre. To take forward this principle, Shenzhen will have to complete the relevant expressways such as the GuangShen Coastal Expressway to link up with the Hong Kong Shenzhen Western Corridor and the Eastern Corridor via a new control point at Liantang. The latter is intended to divert goods vehicles from Man Kam To to the Eastern Corridor, leading to Huizhou and the eastern part of the Guangdong Province.
22. Shenzhen is also planning to construct a Bus Rapid Transit system (**Plan 10**) to supplement its Mass Transit Railway system. It will make use of high capacity buses running on dedicated road lanes. By 2010, 5 lines of total length of 128km will be built. To develop railway as the backbone for the public transport system, Shenzhen is regulating the existing bus and coach services and developing multi-modal interchanges along its railway lines. When all these plans are completed, the cross-boundary travel pattern will be significantly affected.

## Input Assumptions for Hong Kong Development

### ***Population and Employment***

23. Population and employment data matrices are derived based on the Stage 4 development scenarios. The assumptions of each scenario are described in the Working Papers 41 to 43<sup>5</sup>. In order to identify infrastructure requirements, only the Reference Scenario and the High Population and High Economic Growth Scenario (HPGS) are worth testing. Under the Reference Scenario, the population<sup>6</sup> in 2030 could be in the region of 9.1 million which is lower than the population of 9.4 million adopted previously in the Stage 3 Study. On the other hand, the HPGS adopts a marginally higher population of 9.55 million.

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<sup>5</sup> WP 41 on “Modified Population and Employment Assumptions under Stage 4 Reference Scenario”, WP 42 on “Population and Employment Assumptions under the What If Scenarios”, WP 43 on “Revised Forecast of Economic Floor space Requirement under Stage 4 Reference Scenario”

<sup>6</sup> Population includes ‘Usual Residents’ plus ‘Persons other than Usual Residents present in Hong Kong at the reference moment’. ‘Persons other than Usual Residents’ include the defacto Mobile Residents and Transients.

24. In deriving the number of job places in the three design years i.e. 2010, 2020 and 2030, we have adjusted the growth rates for individual industry group to reflect higher growth in “pillar industries”. We have also assumed higher worker participation rates in older age group to reflect deferment of retirement age. In terms of in-bound cross-boundary workers, the number is expected to grow following the past trends as observed in the cross-boundary travel surveys, amounting to a small proportion of the total cross-boundary trip makers. The population and employment assumptions adopted for the transport assessment are at [Annex 4](#).

### ***Port Related Development***

25. Reference has been made to the “Study on Hong Kong Port – Master Plan 2020” (HKP2020) in preparing the port related development assumptions. [Annex 5](#) shows the container port cargo growth and port back-up areas assumed for the two development scenarios. Two locations were identified for future terminal expansion in the HKP2020, the option with better potential is North West Lantau, primarily because of its economic and financial performance relative to South West Tsing Yi .

### ***Economic Growth***

26. The Stage 4 assessment has adopted higher GDP growth rates as compared with those in Stage 3 Study. By 2030, the economic growth is assumed to be 30% higher than those assumed previously ([Annex 5](#)). Detailed assumptions are described in Working Paper 41.

### ***Vehicle Fleet Size***

27. The assessment has adopted the same vehicle fleet size assumptions as used by the Transport Department in all strategic infrastructure assessments. The private vehicle fleet sizes are assumed 14% higher than those in Stage 3 in 2020 and 8% in 2030. However, the goods vehicle fleet sizes would be 2% lower ([Annex 5](#)).

### ***International Air Travel***

28. The airport usage forecasts adopted is summarized at [Annex 5](#). To cater for the difference in GDP growth between the two development scenarios, air cargoes are assumed to increase by 5% and 10% for the HPGS in 2020 and 2030 respectively.

### ***Hong Kong Transport Networks***

29. References are made to the recommended networks derived under the Stage 3 Study to review their suitability for the two development scenarios. Recommended networks can be divided into cross-boundary and domestic transport infrastructure.

### ***Cross-Boundary Transport Infrastructures (committed and testing options)***

30. There are two committed projects, namely the Hong Kong-Shenzhen Western Corridor and the Sheung Shui to Lok Ma Chau Spur Line. Both have been commissioned in 2007. Other projects under active planning include the Hong Kong Zhuhai Macao Bridge, ERL and the Northern Link ([Plan 11](#)). Details of which are described below:

#### ***Hong Kong-Shenzhen Western Corridor (HK-SWC)***

31. The HK-SWC is a 5.5km long dual 3-lane carriageway, of which the Hong Kong section is 3.5km long, spanning across the Deep Bay. The Hong Kong section links up the northern end of Deep Bay Link at Ngau Hom Shek with the Mainland section, initially to GuangShen Expressway (廣深高速) via Yueliangwan Highway (月亮灣大道) and at a later stage to the GuangShen Coastal Expressway by 2020. For the transport assessment, HK-SWC is assumed in the three design years.

#### ***Sheung Shui to Lok Ma Chau Spur Line (LMCSL)***

32. The LMCSL is constructed to meet the increasing cross-boundary passenger travel demand and to relieve pressure at the Lo Wu control point. This 7.4 km long railway line branches off from the existing East Rail just north of Sheung Shui to the new Lok Ma Chau Terminal and connects with the new Futian Port via a footbridge. Cross-boundary passengers can easily interchange with Shenzhen's metro Line no.4. It forms part of the base network in all the design years.

#### ***Hong Kong-Zhuhai-Macao Bridge (HZMB)***

33. The proposed HZMB, situated at Lingdingyang of the Pearl River Estuary, is a crossing linking Hong Kong with Zhuhai and Macao. It serves as a direct road connection with the west bank of PRD, opening up new opportunities for economic activities. The HZMB is a 35 km long, dual 3-lane carriageway with landing points at San Shek Wan of Hong Kong, Gongbei of Zhuhai and A Pérola of Macao. Upon completion, HZMB will connect with JingZhu Expressway (京珠高速) and TaiAo Expressway (太澳高速) in Zhuhai and join the expressway system in Guangdong. On Hong Kong side, it will connect with our highway network via the North Lantau Highway. As the earliest possible completion date of HZMB will be beyond 2010, the assessment has assumed it in 2020 and 2030.

#### ***Guangzhou-Shenzhen-Hong Kong Express Rail Link (ERL)***

34. The proposed ERL is an express rail link between Guangzhou and Hong Kong, and will shorten the journey time to within an hour. The Mainland section of the ERL will start from Shibi in Guangzhou, run through Humen in Dongguan and Longhua in Shenzhen, and then cross the boundary through Huanggang into Hong Kong. There are two options for the Hong Kong section of the ERL: the Shared Corridor Option which shares the tracks with the existing West Rail, proposed Northern Link, part of the Kowloon Southern Link now under construction and a new track to connect to the Mainland section of the ERL; and the Dedicated Corridor Option which consists of a dedicated

track from West Kowloon to the boundary. The projection figures in this report are generated by assuming that the Shared Corridor Option will be adopted. For sensitivity testing purpose, the Dedicated Corridor Option is assumed instead.

35. Both through train and shuttle train services are expected. For the through train services, it is assumed that there will be direct through trains between West Kowloon and Shibi, some of which will have an intermediate station at Humen. The journey time of the non-stop through train services is assumed to be 60 and 50 minutes for shared track and dedicated track respectively. There will also be through train services to cities beyond Guangzhou, such as Beijing. The journey time of the shuttle services between West Kowloon and Longhua will be 31 minutes for shared track and 22 minutes for dedicated track. Passengers could interchange with the Beijing-Guangzhou-Shenzhen Passenger Rail Line and Hangzhou-Fuzhou-Shenzhen Passenger Rail Line at Longhua/Shibi to other major cities along these lines. For the transport assessment, ERL is assumed in 2020 and 2030.

### ***The Northern Link (NOL)***

36. The proposed NOL will run between the existing West Rail at Kam Sheung Road Station and the new Lok Ma Chau Terminal recently completed as part of the LMCSL project. The proposed NOL will also interchange with the LMCSL at Chau Tau and connect with the East Rail. Upon completion, it will not only facilitate traveling between the eastern and western New Territories but also provide convenient cross-boundary rail services to residents of the western New Territories.

### ***Eastern Crossing at Liantang/Heung Yuen Wai***

37. Hong Kong and Shenzhen have set up a joint study group on the Eastern Crossing (Liantang-Heung Yuen Wai Control Point) to explore the needs, functions and benefits of the Liantang-Heung Yuen Wai Control Point. For sensitivity testing purpose, Liantang control point is assumed in 2020. The proposed Eastern Corridor in Shenzhen will link up the new control point with the ShenHui Expressway (深惠高速) and ShenShan Expressway (深汕高速), enhancing the accessibility to the eastern part of the Guangdong Province. The former will also join up with HuiHe Expressway (惠河高速), YueGan Expressway (粤赣高速) and HeMei Expressway (河梅高速) to provide access to Jiangxi and Fujian.

## **CROSS-BOUNDARY TRAVEL DEMAND**

### **Influencing Factors**

38. Apart from the socio-economic development and transport infrastructure planning of Hong Kong and Mainland that play an important role in determining the cross-boundary

travel demand, there are other factors that could have major effect on the demand pattern such as routing and modal choice. These factors can be grouped into three main categories, i.e. hardware provision, cross-boundary regulatory policies and service provision.

39. In general, the number, location, scale and operating hours of control points affect the accessibility. Currently, all land-based control points are located in the east bank of the PRD that limits interaction between Hong Kong and the west bank cities. Among these land-based control points, Sha Tau Kok (STK) and Man Kam To (MKT) are of limited scale without high quality connective roads which have weakened the connectivity between Hong Kong and the eastern part of the Guangdong Province.
40. Any changes in cross-boundary policies have significant impact on travel demand. For example, the implementation of Individual Visitor Scheme (IVS) has greatly increased the number of Mainland visitors. The closed road permit with different quota limits on various kinds of vehicles has restricted the choice of transport modes and the control points. The Mainland Customs Authority rescinded the "4 Up 4 Down" requirement in December 2004 has brought economic benefits to cargo operation and the operators can make use of their vehicle fleets more effectively and efficiently. Subsequently, reduction in the number of empty goods vehicles/container truck trips is anticipated.
41. For cross-boundary passenger movements, the extent of public transport service provision at different control points and the connecting domestic transport services, in terms of fare, frequency, carrying capacity, stopping points, etc., will also have great impact on the demand pattern.

### **The Trend of Travel Demand**

42. Owing to geographical and economic reasons, our relationship with cities located on the east bank of the PRD, particularly Shenzhen and Dongguan, is growing stronger than ever before. Based on the movements of people and vehicles across the boundary and their trip ends, both Shenzhen and Dongguan are the key sources of cargoes for our port and destinations for Hong Kong people. On the contrary, cities located further east such as Huizhou (惠州), Shanwei (汕尾), Heyuan (河源), Shantou (汕頭), Meizhou(梅州), Jieyang (揭陽) and Chaozhou (潮州)) have a comparatively weak socio-economic ties with Hong Kong.

### ***Cross-Boundary Passenger Movements***

43. In 1986, only some 25.7 million cross-boundary passenger trips were recorded. Cross-boundary trips grew rapidly from 1997 to 2005 with an annual average growth rate

of 9.5% (**Annex 6**). By end 2005, there was a total of 154 million 2-ways trips<sup>7</sup>. According to the Cross-boundary Travel Survey 2003 (XBTS 2003), the majority of these trips were made by Hong Kong residents, of which 89% were made by Hong Kong residents living in Hong Kong and the rest living in the Mainland.

44. With the abolishment of the quota system for the Hong Kong Group Tour Scheme in early 2002 and the introduction of IVS in July 2003, the annual cross-boundary trips made by Mainland visitors increased from 5.1 million in 2000 to 21.1 million in 2005. IVS was initially applicable to Foshan, Zhongshan, Dongguan and Jiangmen, and has been gradually extended to cover 34 cities including Beijing, Shanghai, Chongqing, Tianjin, 21 cities in the Guangdong Province and 9 cities in Fujian, Jiangsu and Zhejiang Provinces. As the share of Mainland visitors rises from 4.6% in 2000 to 13.7% in 2005, there has been considerable changes in the trip makers' composition. We anticipate a similar growth pattern will continue and estimate that by 2030 for every 3 cross-boundary trip makers, one will be a Mainland visitor.
45. Based on the XBTS 2003, the cross-boundary trip purposes of Hong Kong residents were made up of 16% commuting<sup>8</sup>, 29% business related<sup>9</sup> and 55% leisure and other purposes trips<sup>10</sup>. With the effect of Closer Economic Partnership Agreement (CEPA), the rapid economic growth in Mainland and more Hong Kong residents residing in Mainland, we anticipate a continual growth in business trips whereas the commuting and leisure trips would show a mild increase. By 2030, we estimate about 54% of the cross-boundary trips will be business related, 12% for commuting and 34% for leisure and other purposes.
46. The trip ends of most cross-boundary passenger flows (93%)<sup>11</sup> were in the PRD cities (**Annex 6**). The XBTS 2003 revealed that Shenzhen was the most popular destination, accounting for some 65% of all trips. Dongguan and Guangzhou shared about 11% and 8% respectively whilst Huizhou areas<sup>12</sup> accounted for only 1.3%. The number of trips to cities in Guangdong east (including Shanwei, Heyuan, Shantou, Meizhou, Jieyang and Chaozhou) was even less, about 0.7%. Trips to the cities in Guangdong west (including Zhongshan, Zhuhai, Jiangmen, Foshan, Zhaoqing) however, had a higher share of 7%. With the continuous emphasis on the development of the Guangdong west, the construction of JingZhu expressway, GuangZhu railway, the PRD RTS and the planned HZMB, it is anticipated that the accessibility to the west will be greatly enhanced and thus shifting people's choice of destination from the current pattern.

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<sup>7</sup> Excluding those cross-boundary passenger trips via China Ferry Terminal, Macao Ferry Terminal and Hong Kong International Airport by means of e-channels.

<sup>8</sup> Commuting trips include school trips and work trips.

<sup>9</sup> Business trips are trips made for other job-related purposes, such as meeting and conference, inspection, etc.

<sup>10</sup> Leisure and other purposes include visiting relatives/friends, medical treatment, shopping, sightseeing or vacation, etc.

<sup>11</sup> Information from Cross Boundary Travel Survey 2003, Planning Department.

<sup>12</sup> Huizhou areas cover Huizhoushi, Boluo, Huidong and Huiyang

47. On the other hand, the trip distribution pattern within Hong Kong is fairly stable. Kowloon is still the largest trip generator, representing 32% of all trips in 2003 but its dominance is reducing. North East New Territories also represents a major segment of 24%. With the Lok Ma Chau-Huanggang shuttle bus service, the North West New Territories also shows a considerable increase in share from 10% in 1999 to 14% in 2003. The availability of cross-boundary bus services and their convenience will have significant impact on people's trip generation and distribution pattern.
48. For the choice of transport modes, 70% of the cross-boundary trips to Shenzhen and Dongguan and some 49% to Guangzhou used boundary trains (i.e. East Rail). Only about 2% of the trips to Dongguan and 18% to Guangzhou used through trains. The rest were mainly undertaken by coaches, private vehicles or ferries. To certain extent, the mode choice depends on the availability of transport modes, accessibility of destinations and the cross-boundary vehicle quota system<sup>13</sup>.

### ***Cross-Boundary Vehicle Movements***

49. In 1990, there were some 4.9 million vehicle 2-ways trips recorded at all the boundary crossing points. From 1997 to 2005, the annual average growth rate was 5.6%<sup>14</sup> ([Annex 7](#)). The number of trips reached 14.8 million in 2005. Of which, some 67% were goods vehicle trips including container trucks. Almost all of the trips were made by vehicles registered in Hong Kong.
50. The growth rate of cross-boundary private car trips in recent years was high, at an average annual rate of 22.5% with 3.6 million trips in 2005. In 1997, private car constituted 7% of the total vehicle trips but in 2005, it rose to 24%. With the completion of HSWC and the planned HZMB, we anticipate a continuous growth trend and greater pressure for relaxation of the quota limit.
51. The "4 Up 4 Down" requirement which bundled the movement of the drivers, the containers, the trucks and the trailers of the container trucks (CTs) made the operation of cross-boundary CTs very inefficient. With the relaxation of this requirement in 2005 and the higher efficiency of the logistics industry, it was estimated that cross-boundary haulage cost would decrease over time.
52. About 60% of the trips had origins/destinations in Shenzhen, about 27% in Dongguan, 5% in Guangzhou and 4% in Huizhou. Cities in the Guangdong east, principally Shanwei, Jieyang, Heyuan and Shantou, generated/attracted very little cross-boundary road traffic, amounting only about 1% of the total vehicle trips. On the other hand, cities

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<sup>13</sup> The cross-boundary vehicle quota system is jointly administered by the Hong Kong and Guangdong authorities, with the number of quotas set at a level commensurate with the processing capacities of the control points to ensure smooth cross-boundary traffic flow, especially for freight traffic.

<sup>14</sup> Based on statistics collected by the Immigration Department and the Customs and Excise Department.

in Guangdong west, mainly Zhongshan, Zhuhai, Jiangmen, Foshan, Zhaoqing, had a share of about 3%. For trips to/from areas outside Guangdong, they only accounted for 0.2% ([Annex 7](#)).

### Future Demand of the Reference Scenario

53. The growth in both goods and passenger vehicles across the boundary could be affected by:
- (a) the economic growth in terms of South China/PRD Gross Domestic Product and in particular growth in export;
  - (b) growth in Hong Kong-Mainland trade;
  - (c) Continuous increase in Mainland visitors and population growth of Hong Kong and the Mainland; and
  - (d) highway and railway network development and policy assumptions such as the quota system for cross-boundary vehicles.

It would be very difficult to forecast the future demand as many of the above issues are still uncertain given the rapid and drastic development in the Mainland. Among them, changes in policies would have the most significant impact on the travel demand and IVS is a good example.

54. For planning purpose, with reference to the latest development trends and the growth in economy, we have assumed a continual expansion of the IVS and increase in Mainland visitors as in the following scale:

Forecasts of Annual Visitors to Hong Kong ('000)

Year	Visitors from Mainland	Visitors from Foreign Countries	Total	Average Annual Growth Rate (%)
2004	12,422	9,520	21,942	
2010	28,205	12,625	40,830	11%
2020	52,907	16,000	68,907	5%
2030	77,006	19,164	96,170	3%

Source: Planning Department

The annual visitor arrival in 2030 would reach 96 million, of which 80% would be Mainland visitors and the rest be foreign visitors. From 2004 to 2010, the growth rate would be about 11% per annum in 2010, gradually slow down to 5% per annum in 2020 and finally 3% per annum from 2030 onwards. Mainland visitors would still represent the majority and their number would increase from about 12.4 million (57%) in 2004 to about 77 million in 2030.

55. The transport assessment has assumed maintenance of the vehicle quota control when HK-SWC is opened in 2007. With closer linkage with the Mainland, we are expecting a higher freedom of car movements across the boundary. For the purpose of transport infrastructure planning to cater for the highest possible traffic volume, we have assumed total relaxation of the private car quota system in the long term in 2020. However, without information on modal preference of cross-boundary trip makers on both sides, we adopted a coarse and conservative approach to estimate the resulting travel demand based upon the domestic travel characteristics of Hong Kong people observed in the Travel Characteristics Survey 2002. By 2030, we estimated the majority of private car trips would still be generated by Hong Kong residents.
56. In response to the above assumption in relaxing private car movements across the boundary, the proportion of cross-boundary passenger trips by private cars is expected to increase throughout the study period.
57. The traffic projections of goods vehicle (GV) trips including CTs were based upon the cargo forecasts in the Hong Kong Port Master Plan 2020. We projected the total road eligible cargo<sup>15</sup> between Guangdong and Hong Kong in 2010 to be 121 million tonnes, about 47% higher than that in 2002. By 2020, it will reach 169 million tonnes with an annual growth rate of about 3.4% p.a. The rate of growth will slow down to about 1.4% p.a. for the next decade and the total cargo volume would probably reach 193 million tonnes. The cargo volume in the western part of Guangdong would grow at a much higher rate of 4.7% p.a. between 2010 and 2020 and then at about 2.0% p.a. from 2020 onward. Its cargo share would also expand from 28% in 2010 to 33% in 2030. By 2030, the central part of Guangdong will still be the main source of road eligible cargo, accounting for about 64% of the total while the eastern region will only be 3%.

Annual Road Eligible Cargo By Region ('000 tonnes)

Year		West	Central	East	Total
2010		33,300	84,000	3200	120,600
Share		28%	70%	3%	100%
2020		52,600	111,700	4700	169,000
Share		31%	66%	3%	100%
2030		64,100	124,300	5300	193,700
Share		33%	64%	3%	100%
Annual Growth Rate	2010-2020	4.7%	2.9%	3.9%	3.4%
	2020-2030	2.0%	1.1%	1.2%	1.4%

<sup>15</sup> Road eligible cargoes include all road cargoes, containerized cargoes and break bulk transported by river.

58. In summary, the cross-boundary vehicle demand is expected to grow. By 2010, the traffic volume would double that of 2005, reaching an annual sum of about 32 million with a growth rate of about 17 % p.a.. For the period of 2010-2020 and 2020-2030, the average growth rates would be about 5% and 3% respectively. By 2020, the vehicle traffic would be about 52 million and probably reach 69 million by 2030, which is about 4.5 times that of 2005.
59. As mentioned in para. 56, cross-boundary private car trips in terms of both share and volume would increase substantially in the future years. On the other hand, other vehicle types would experience a steady growth of about 4% to 5% p.a. between 2005 and 2030. By 2030, private car trips may represent half of the total vehicle trips. For GV and CT trips, although their volume would increase moderately from 27,000 in 2005 to about 79,300 in 2030, their share of the total trips would drop from 67% in 2005 to 49% and 42% in 2020 and 2030 respectively .
60. In order to strengthen our boundary facilities to cater for the increasing travel demand, cross-boundary movements are grouped into three main demand corridors according to their directions for analysis, namely the western, central & north and the eastern demand corridors. The western demand corridor covers trips generated from Macao, Foshan, Zhongshan, Zhuhai, Zhaoqing, Jiangmen, Yunfu, Yangjiang, Maoming and Zhanjiang. The central & north demand corridor covers those from Shenzhen, Dongguan, Guangzhou, Qingyuan and Shaoguan. The eastern demand corridor includes those from Huizhou, Heyuan, Shanwei, Meizhou, Jieyang, Shantou and Chaozhou. The above forecasts indicate that HK-SWC and LMCSL would not be able to sustain the long term growth. The presence of ERL and HZMB could alleviate the likely congestion problem. The forecasted travel demand pattern for the Reference Scenario are summarised below.

Average Weekday Daily 2-ways trips By Region

Year	Vehicle Demand#			Passenger Demand*		
	Western	Central & North	Eastern	Western	Central & North	Eastern
2003	3%	93%	4%	13%	85%	2%
2010	10,900 (13%)	68,200 (83%)	3,400 (4%)	135,000 (23%)	414,000 (72%)	27,000 (5%)
	82,500			576,000		
2020	30,000 (22%)	97,000 (73%)	6,000 (5%)	288,000 (30%)	619,000 (65%)	46,000 (5%)
	133,000			953,000		
2030	47,000 (27%)	120,000 (68%)	9,000 (5%)	459,000 (35%)	795,000 (60%)	73,000 (5%)
	176,000			1,327,000		

# Vehicle demand excludes bus and coach which are provided according to service schedule

\* Passenger demand includes private car and public transport passengers to/from Guangdong and Macao

61. The central & north demand corridor will continue to be the major source of vehicle and passenger cross-boundary trips, accounting for over 68% and 60% of the total respectively in 2030. The western demand corridor would become more important and would represent about one-third of all cross-boundary traffic in the long term. In contrast, the growth of the eastern demand corridor would be quite stagnant although in absolute volume there would be a 2-folded increase in passenger flow and slightly more than doubled vehicle flow from 2010 to 2030.
62. The central & north demand corridor is served by two road-based crossings, namely LMC and HK-SWC, and four rail-based crossings, viz. LMCSL, Lo Wu, Hung Hom and West Kowloon. All these centrally located crossings will be heavily utilized to satisfy the growing passenger and vehicle demand not only generated from the central and north demand corridor. LMC and HK-SWC would have 42,000 and 110,000 daily vehicle trips respectively by 2030, carrying about 80% of the total cross-boundary demand. For passenger flows, there would be about 384,000 daily trips using both crossings and 651,000 daily trips using the rail services, representing about 78% of the overall total cross-boundary patronage.
63. The western demand corridor is served by the HZMB. Its presence would attract more passenger and vehicle flows from cities on the west bank and further west of the PRD. It is estimated that by 2030, it would carry approximately 13% and 12% of the total demand of passenger and vehicle trips respectively. Ferry would provide supplementary services, carrying about 91,000 daily passenger trips or 7% of the total cross-boundary demand.
64. For the eastern demand corridor, it would mainly be served by MKT and STK crossings. Both the demand of vehicle and passenger trips along this corridor is about 5% of the total cross-boundary demand throughout the planning horizon. By 2030, there could be a demand of 9,000 vehicle trips and 73,000 passenger trips. However, the limited capacities of MKT and STK have constrained the vehicle throughputs to the current level, around 9,000 and 3,000 daily vehicle trips respectively. For passenger flows, the daily passenger trips via MKT and STK could be increased from 8,000 and 6,000 in 2005 to 13,000 and 16,000 by 2030 respectively if the frequency of the existing coach services could be improved. Nevertheless, if the demand is to be satisfied by MKT and STK, additional crossing facilities will have to be provided.

## Future Demand for the HGPS

65. We have tested the demand envelope by using the HPGS together with a higher port cargo demand as estimated in the HKPMP 2020. We have also assumed a higher degree of private car usage. The result indicates that the total demand would increase to 209,000 vehicle trips and 1,379,000 passenger trips by 2030, about 11% and 4% more than the Reference Scenario respectively.
66. Although the travel demand pattern would be similar to the Reference Scenario, the extra passenger trips would predominantly use the coach and bus services via LMC and HZMB and the ferry services. With a higher cargo throughput and private car usage, the extra loadings would be on HZMB, LMC and HK-SWC. There could be congestion at LMC and HK-SWC.
67. As the central/north and eastern demand corridors will continue to be the main source of vehicle and passenger flows, it is essential to assess if the existing and committed cross-boundary facilities could handle the projected flows as summarized in the following section.

## The Estimated Handling Capacity of Cross-Boundary Facilities

68. Handling capacity of a control point is difficult to determine as the processing time for customs and immigration clearance varies with vehicle loading condition and passenger's nationality by the Mainland and Hong Kong authorities. Any variation in vehicle and passenger composition with time and potential streamlining of clearance procedure will also pose uncertainties to the estimated capacity value. Nevertheless, the handling capacity of a control point is also affected by the capacity available on the other side of the boundary. For example, given the physical constrain of MKT and STK on the Mainland side, the vehicle handling capacities on our side could only contain at the current level, i.e. around 10,000 and 2,500 respectively.
69. The total handling capacities<sup>16</sup> of our existing and committed control points, using current standard of operation and practice, are estimated to be 0.2 million 2-way daily vehicles and 1.2 million 2-way daily passenger when HK-SWC is in full operation.

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<sup>16</sup> Daily 2-ways handling capacities were estimated by assuming all kiosks and immigration counters would be fully manned during peak periods with reference to the January 2006 hourly arrival/departure profiles, processing time and vehicle/passenger composition. For Hung Hom and ferry terminals, the critical path is the service operation.

Control Point	Estimated Average Weekday Daily Handling Capacity (2-ways)	
	Passenger	Vehicle
Shenzhen Bay	130,000	140,000
Lok Ma Chau	122,000	41,000
Lok Ma Chau Spur Line	266,000	-
Man Kam To	32,000	15,000
Sha Tau Kok	15,000	5,000
Lo Wu	472,000	-
Hung Hom	15,000	-
Ferry Terminals*	122,000	-
<b>Total</b>	<b>1,174,000</b>	<b>201,000</b>

Source: Planning Department, April 2006-based estimation.

\*Ferry Terminals include Macau Ferry Terminal, China Ferry Terminal and Tuen Mun Ferry Terminal.

70. Assuming no further enhancement or improvement works to MKT and STK to increase their handling capacities, under the Reference Scenario, the projected daily vehicle flow of 165,000 to/from the east bank could be marginally accommodated by the eastern and central corridors up to 2030 with a utilization level slightly above 80%. Majority of the flow will have to route through the central corridor (HK-SWC and LMC) which handles some 93% of the total east bank demand.
71. The HPGS would add pressure on the above two corridors, jettling up the overall utilization level to about 90%. In the long term, the central and eastern corridors could have congestion problem as their usage level could reach 90% and 110% respectively.
72. On passenger demand, the projected flows through STK and HK-SWC would be above their estimated capacities whilst those across LMC would be close to the current estimated capacity by 2030 under both Scenarios. On the other hand, there would be spare capacity on rail-based transport. People should be encouraged to use rail services to fully utilize all available crossing facilities and maintain railway as the backbone of our public transport system. Efforts should also be made to continuously streamline the immigration checking procedure to increase capacity and regulate cross-boundary public transport services to balance the flows through each crossing point.

## CROSS-BOUNDARY TRANSPORT INFRASTRUCTURE REQUIREMENTS

73. The above assessment is focused on the travel demand between Hong Kong and the Guangdong Province, in particular the PRD cities. It reveals a continual rapid growth in cross-boundary travel demand in both the central and western PRD. Timely provision

of cross-boundary transport infrastructure and multi-modal transportation system is essential to support socio-economic development of the whole region.

74. The recently commissioned HK-SWC and LMCSL will enhance the accessibility to the central PRD. However, the continual growth in demand in the central and western regions would warrant consideration of additional infrastructure, i.e. the HZMB and ERL. Though the travel demand to the eastern region is relatively lower, the limited crossing facilities on the east might impose constrain to efficient inter-city development and could suppress potential demand.
75. The following paragraphs summarize the cross-boundary transport infrastructure recommended to meet the three demand corridors.

### **The Western Demand Corridor – HZMB by 2020**

76. At present, river transport is a key transport mode for cargoes to/from the western part of PRD. The presence of HZMB could not only shorten the spatial distance between Hong Kong and the western PRD, it would also help widen Hong Kong's cargo sources, strengthen Hong Kong's position as a hub port and logistics centre and boost the development of Mainland's central and western regions.
77. HZMB will alter the present passive condition of transport linkage between Hong Kong and the western PRD. It will shorten the travel distance to Macao and Zhuhai to about 30km, and reduce the journey time between landing points to within half an hour. Its presence could induce an overall demand of 6,500 vehicle trips (or 4.8% of the total) in 2020. The bridge could help relieving the traffic pressure at LMC and HK-SWC by diverting respectively 3,800 and 2,600 vehicle trips. Otherwise, LMC would experience a congestion problem in 2020.
78. Besides facilitating vehicle flow, HZMB would also promote passenger flow through various transport infrastructure development on the Mainland side, such as the PRD RTS with termination point at Zhuhai. It would generate a new demand of about 3.6% of the total passenger trips (or 29,000 trips) in 2020. By 2030, it would carry 12% of the daily total, majority of them would be diverted from ferry services.
79. In the long term, Mainland is planning to extend the Hang-Fu-Shen passenger rail line to the western PRD and further west to complete the Southeast coastal railway line. To facilitate further socio-economic growth with the western region, consideration should be given to link up with this coastal railway to strengthen our accessibility to the western part of Guangdong, Hainan and Guangxi provinces.

## The Central Demand Corridor - NOL & ERL by 2020

80. To serve the central demand corridor, we have already developed a comprehensive system of crossing facilities to provide many modal and routing choices. These facilities also take care of the eastern and western demands when there are no sufficient capacities to serve. Due to the high handling capacity of the rail services, they also serve the demand outside the Guangdong Province.
81. The transport assessment reveals a persistently high utilization level of facilities serving this corridor throughout the planning horizon and there could be congestion problems in the long term given the limited capacity offered by the eastern corridor.
82. By 2020, ERL should have been built in the form of share track with the West Rail. It would stimulate an additional daily cross-boundary passenger demand of about 19,000 trips (2% of the total). About 10% of coach/bus passengers would shift mode, resulting in an increase in total rail share from 53% to 58%. The ERL through train services would greatly enhance the modal share of through train. The NOL would provide a direct rail linkage between NWNT and the city center of Shenzhen via LMCSL control point. If the dedicated corridor option is adopted, the ERL would have about 10% more patronages traveling between Hong Kong and Guangdong. For other long haul through train patronage, it would very much depend on the establishment of control points in Mainland cities.
83. Following the improvement of the Mainland's transportation network, Hong Kong should improve and establish efficient and convenient direct links with its neighbouring comprehensive transportation hubs. This would facilitate rapid cross-regional movement of major economic factors, shorten the spatial distance with the Mainland and develop closer links with provinces and cities throughout the nation. At present, Hong Kong's "half-day transport circle"<sup>17</sup> by highway can basically cover the whole PRD Region. Upon completion of GD's proposed internal and outbound expressways, the circle is expected to expand and cover all major cities in the GD Province. Our "one-day transport circle" can even extend to cover major cities adjacent to the GD Province.
84. The Mainland places emphasis on the construction of passenger rail lines, inter-city rapid transit systems and mass transit railway networks. Upon completion of the Hangzhou-Fuzhou-Shenzhen Passenger Rail Line, Wuhan-Guangzhou Passenger Rail Lines and ERL, it is possible to extend the "half-day transport circle" to cover major cities along these rail lines such as Hangzhou and Wuhan. This will strengthen our links with Mainland cities having major economic co-operation with Hong Kong. Besides, if we further improve our transportation systems in terms of comfort and accessibility and

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<sup>17</sup> According to the "Expressway Network Plan in Guangdong Province (2004-2030)", "one-day transport circle" refers to the travel distance between two cities which would be reached in the same day.

provide diversified non-stop services or convenient interchange facilities, the level of service will be greatly enhanced.

85. Planning with the principle of providing smooth, rapid and comfort services, it is essential to strengthen interchange with the rail network in the Mainland and step up information exchange with the relevant Mainland cities on the planning of rail-based boundary control points and ancillary facilities so as to achieve seamless interchange between rail networks on both sides. Apart from considering “shared corridor option”<sup>18</sup> for the Hong Kong section of ERL, the “dedicated corridor option” should also be looked at in order to adopt the best option to cater for strategic development needs via the linkage with the national express rail network. Moreover, to maintain Hong Kong as an Asia world city, it is essential to develop a comprehensive cross-boundary transportation system to serve people and cargo movements to/from major cities all over the Mainland. Railway could play an important part if more point-to-point through train services could be established.

### **The Eastern Demand Corridor – a new crossing at Liantang-Heung Yuen Wai**

86. Irrespective of the relative lower projected freight and passenger flows along this corridor in the long term, the need for a new eastward cross-boundary link could be considered in two dimensions, viz regional and local. From regional perspective, the proposed crossing might broaden our potential catchment area to Huizhou, Guangdong east and beyond; and strengthen the development potential of the region. For local dimension, the crossing might play a part in rationalizing the functions of road-based control points and synchronize with Shenzhen’s transport plan for managing cross-boundary traffic through its city centre.
87. Even though there is no imminent need of a new crossing point at Liantang - Heung Yuen Wai purely from the overall traffic demand perspective, the proposed crossing could link up with the Eastern Corridor under construction by Shenzhen to ShenHui Expressway, ShenShan Expressway and join the rest of the expressway system. This would certainly promote fast and direct movements of people and vehicles to the east and might broaden our potential catchment area to the coastal provinces further east of GD.
88. The strategic planning of national coastal ports (全國沿海港口佈局規劃) has made clear that under the premise of maintaining Hong Kong’s status as an international maritime centre, initiatives should be taken to realize fully the strengths of the container transport system rendered by Hong Kong port and other coastal ports in the PRD region. The idea is to have Shenzhen, Guangzhou and Xiamen as main ports, Fuzhou, Quanshou,

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<sup>18</sup> The “shared corridor option” scheme adopted in the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link refers to the sharing of rail tracks by the existing West Rail, the proposed Northern Link and the Kowloon Southern Link under construction. The “dedicated corridor option” scheme refers to laying an exclusive cross-boundary rail track.

Shantou, Humen, Zhuhai, Zhanjiang, Fangchenggang, and Haikougang as second-tier ports and others as feeder ports. Shenzhen and Hong Kong, as the main container ports in South China, will complement each other to achieve mutual development. Linkages between the sea and land transport systems should be further enhanced to raise the efficiency of freight transport between the ports and the sources/destinations of cargoes. The proposed crossing may have a part to play to boost regional development.

89. From a local dimension, the proposed crossing would open up opportunity to rationalize the use of our existing and committed crossing facilities and release the potential long-term pressure on LMC and HK-SWC. Sensitivity test shows that its potential flow level could reach 48,000 to 60,000 daily vehicle trips and 22,000 daily passenger trips for the two development scenarios by year 2030. It would provide relief to LMC and HK-SWC through diversion of some traffic with origin/destination in Dongguan east and further north to this new crossing. As such, the utilization level of LMC and HK-SWC could be reduced from 103-110% and 79-87% to 82-87% and 55-57% respectively for both the Reference Scenario and HPGS.
90. Furthermore, some goods and container vehicles currently using MKT and STK control points could also be diverted to this new crossing, releasing capacity for potential increase in passenger vehicles. More capacity at STK control point could be reserved for private vehicles and coaches to cater for the development of a tourist attraction belt between the north eastern part of Hong Kong with Shenzhen's tourist spots at Daxiaomeisha and along Mirs Bay.

### Hong Kong Domestic Transport Demand

91. The current assessment is to examine if the previously recommended strategic highway and railway networks under the Stage 3 Study could meet the demand generated by the Stage 4 development scenarios. The transport demands of the two scenarios are assessed using the up-to-date economic as well as transport policy assumptions.
92. **Annexes 4** and **5** list out all the major changes in assumptions adopted in this assessment as compared with those in the Stage 3 assessment. For the Reference Scenario, the most significant differences are:
  - lower population projection of usual residents, about 7% or 0.57 million less in 2030;
  - 30% more GDP growth by 2030;
  - larger workforce to sustain the economic activities. By 2030, the working population could be 3.9 million, about 0.3 million more;
  - 60% more visitors; and
  - higher private vehicle fleet size assumption of 575,400 by 2030 instead of 532,000.

The HPGS would have even greater difference in the workforce and the economic assumption. Although with similar population total, the workforce is 4.3 million or 0.66 million more than Stage 3 by 2030. For the economic assumption, there is 43% more GDP growth by 2030.

93. The assessment of the Reference Scenario shows that the daily private person trip<sup>19</sup> would be 13% and 21% higher than those of the Stage 3 Study in 2020 and 2030 respectively as a result of the change in assumptions. The corresponding public person trips<sup>20</sup> are 11.7 millions and 12.5 millions respectively, only about 3-5% more than the Stage 3 values ([Annex 8](#)).
94. On the choice of transport mode ([Annex 8](#)), the pattern are similar to those in the Stage 3 Study but with an increase in coach or SPB share, which is in line with the projected rapid growth in transient visitors. The modal choices are about 35-36% by rail, 32-34% by non-rail public transport, 12% by car, 9% by taxi and 10-11% by coaches in 2020 and 2030. Travel by car will continuously be maintained at a low level as revealed in the Travel Characteristics Survey of 12.8% in 2002.
95. As compared with Stage 3, more population would be housed in the NT that constituting 45% of the total usual residents in 2030 as against 41% in 2003. Together with this is more employment opportunity in NT, rising from 23% to 28%. Although there is a general improvement in the distribution of resident workers and employment opportunities within most of the districts, the imbalance of workers and employment places within Hong Kong Island, particularly the CBD region is however more acute. As such, the degree of self-containment has been maintained at around the current level except the Hong Kong Island. This has resulted in an overall increase in the average travel distance and time because of more cross-harbour travel.
96. With an increase in vehicle trips ([Annex 8](#)), the average traveling speed for the Reference Scenario will drop from 28 km/hr in 2010 to 26 km/hr during morning peak hour in 2020, and 22 km/hr in 2030 without the 4th Harbour Crossing. With additional harbour crossing, the speed could improve to 24 km/hr. For the HPGS, average speed will drop to 20 km/hr if no additional infrastructure is built or 25 km/hr if improvement to the north-south corridor between NENT and HK Island is provided.
97. During the morning peak period, the average travel distance of private car trips for the Reference Scenario is estimated to increase gradually from 8.5 km in 2003 to 9.0 km in 2020 and maintain at such thereafter, i.e. 6% increase. Associated with this is a corresponding increase in journey time from 21.2 minutes in 2003 to 23.1 minutes in 2020, and further increase to 27.4 minutes (29% increase) in 2030 if the 4th Harbour

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<sup>19</sup> Private person trips comprise car, taxi and special purpose bus (SPB)

<sup>20</sup> Public person trips comprise seven PT modes of MTR, KCR, LRT, Tram, Ferry, PLB and Bus

Crossing is not in place. With additional cross-harbour infrastructure, the average journey time could improve to 26 minutes. Given the growth in the total person travel by 34% over the planning horizon, such increase is very mild. But for the HPGS, without additional infrastructure, the journey time may lengthen to 32 minutes.

98. When analyzing the flow level along the strategic corridors in 2020, without further new infrastructure, morning peak period congestion would be experienced for movement between NT and the Metro, across Kowloon, the harbour and along the north coast of Hong Kong Island. With the provision of appropriate new infrastructures, majority of the identified congested corridors would be relieved except for the cross-harbour one.
99. By 2030, similar to the Stage 3 findings, traffic congestion problems will appear along the corridors between NWNT/NENT and the Metro as well as the cross harbour movements if no additional highway infrastructures be provided after 2020 . Comparing with the assessment in Stage 3, the degree of congestion will be slightly lessened between NT and Kowloon but much severe across the harbour. Improvement between NT and Kowloon is attributed to relocating more employment opportunity to the NT region, mostly to NWNT and SWNT having additionally 29,000 and 21,000 job places respectively. But with an assumed larger workforce, there are still about 570,000 workers in NWNT and NENT need to travel to the Metro, in particular across the harbour to the Hong Kong Island as the imbalance in the resident workers against the job places by region, i.e. 1.15 million job places against 612,000 workers, is most acute in the HK Island. Therefore, it is necessary to examine the provision of the Fourth Harbour Crossing to sustain the possible economic activities.
100. In addition, there is also a need to monitor those projects, including the Eastern Highway (Fanling to Kowloon section) and Tsing Yi-Lantau Link as previously studied under the Third Comprehensive Transport Study and the NWNT Traffic and Infrastructure Review (NWNT Review) respectively to meet the long term demand. Tsing Yi-Lantau Link would serve as a possible alternative route for through traffic from NWNT to the Metro and provide a second linkage between Lantau and the Metro as recommended in the Stage 3 Study. The scope and feasibility of the above infrastructures are subject to further investigation.
101. Similar to the Stage 3 assessment, the location of the new container terminal would have negligible effect on the strategic transport assessment and hence making no difference in the strategic network requirement.

## **DOMESTIC TRANSPORT INFRASTRUCTURE REQUIREMENTS**

102. For the purpose of the Study, the transport assessment focused on the examination of strategic transport demand. The Stage 4 assessment concludes that all transport

infrastructures recommended in Stage 3 are generally applicable in terms of projects and programme except that the timing of South Island Line (West) and Tsing Yi-Lantau Link be suggested to be after 2020. The required infrastructure projects are summarized below with details in [Annex 9](#) and [Plan 12](#).

### Design Year 2010

103. With all committed railway and highway projects, the existing capacity problem at the east-west corridor along the north shore of the Hong Kong Island and across central Kowloon particularly along Gascoigne Road Flyover/Chatham Road corridor will still remain. Projects like the Central-Wanchai Bypass, Central Kowloon Route and widening of Gascoigne Road Flyover should be implemented to alleviate the congestion.

### Design Year 2020

104. With the completion of the identified major railway and highway projects before 2020, capacity problems in 2020 will only appear at the three existing cross-harbour tunnels. The proposed new infrastructures to be included in the 2020 network are at [Annex 9](#).

105. Although the Stage 4 Study has revised the projection of transient visitors upward in light of the IVS, both development scenarios still do not have sufficient demand to support the South Island Line (East). However, to promote tourism development and to provide alternative transport mode to various tourism nodes in the Southern District, a rail system extending from Admiralty to join all these tourism nodes in Southern District may worth further consideration from its economic benefits other than just the transport gain.

106. Despite the lower population growth, the NOL can complete the rail network in the north, forming a circular line between NT and Kowloon as well as within the Northern NT to facilitate better circulation. Moreover, the currently proposed ERL will also be in place by 2020.

### Design Year 2030

107. Traffic projections up to 2030 could only be treated as indicative as there are great uncertainties in the assumptions.

108. With the completion of the Shatin to Central Link by 2020, there will be two railway lines running along the same east-west corridor along the north shore of the Island. As demands build up, the North Hong Kong Island Line is assumed to be in place by 2030 to increase capacity and improve rail operation. The South Island Line (West) (or Route 4 as an alternative) is also assumed.

109. By 2030, the cross-harbour vehicle movements will have serious capacity problem. Consideration should be given to the provision of an additional harbour crossing before 2030. To address the possible traffic congestion problems along the corridors between Lantau/NWNT/NENT and the Metro, timely review of the Tsing Yi-Lantau Link and the Eastern Highway (Fanling to Kowloon section) is necessary.

## CONCLUSION

110. The Stage 4 Study has assessed the transport requirements for the two scenarios. The assessment was carried out with various assumptions of policies, development and economic growth on both sides of the boundary. All these assumptions are vulnerable to changes. However, the travel demands across the boundary and within Hong Kong provide a good framework for transport infrastructure planning. To follow up, regular transport assessments should be carried out to monitor the demand situation and adjust the program of the recommended projects.

**Planning Department**  
**October 2007**

## 1. Guangdong Population Projection

Region	2005	Projected Growth Rate per annum		
		2005-10	2010-20	2020-30
East PRD	11,290,000	2.33%	2.18%	1.97%
Central PRD	14,880,000	0.85%	0.76%	0.68%
West PRD	6,600,000	1.04%	1.19%	1.22%
Other Guangdong cities	43,667,000	0.70%	0.55%	0.48%
Total	76,437,000	1.00%	0.92%	0.86%

## 2. Guangdong GDP Projection (in 10,000 RMB)

Region	2005	Projected Growth Rate per annum			
		2005-10	2010-15	2015-20	2020-30
East PRD	57,450,000	11.7%	9.3%	9.3%	6.9%
Central PRD	66,520,000	9.6%	7.6%	7.6%	5.7%
West PRD	21,640,000	12.7%	11.2%	11.3%	8.5%
Other Guangdong cities	45,515,427	7.6%	6.8%	6.1%	5.4%
Total	191,125,427	10.2%	8.5%	8.5%	6.6%

Notes: (1) East PRD includes Shenzhen, Dongguan and Huizhou.  
(2) Central PRD includes Guangzhou, Foshan and Zhaoqing.  
(3) West PRD includes Zhuhai, Zhongshan and Jiangmen.

Sources: 《港珠澳大橋工程可行性研究報告》(送審稿) prepared by HPDI, Dec 2004 and 《香港與珠江西岸交通聯系研究》分報告 3 prepared by ICT, June 2003.

## Key Features of the proposed Guangdong Expressway Network

	Origin-Destination	Length (km)
<b>Nine Verticals</b>		
One	Shantou (汕頭)- Fujian (福建龍岩)	217
Two	Shanwei (汕尾)- Jiangxi (江西尋烏)	300
Three	Shenzhen (深圳)- Jiangxi (江西贛州)	281
Four	Shenzhen (深圳)- Wunam (湖南汝城)	435
Five	京珠高速公路粵境路段	465
Six	Zhuhai (珠海橫琴)- Lianzhou (連州)	375
Seven	Zhuhai (珠海)- Wunam (湖南永州)	474
Eight	Yangjiang (陽江)- Yunfu (雲浮)	197
Nine	Maoming (茂名)- Guangxi (廣西岑溪)	160
<b>Five Horizontals</b>		
One	Fujian (福建漳州)- Guangxi (廣西賀州)	631
Two	Jieyang (揭陽)- Maoming (茂名)	781
Three	Huizhou (惠州)- Guangxi (廣西梧州)	403
Four	Fujian (福建漳州)- Guangxi (廣西玉林)	767
Five	同三國道主幹線及聯絡線	1377
<b>Two Circles</b>		
One	珠江三角洲環形高速公路	185
Two	珠江三角洲外環高速公路	416

Source: 《廣東省高速公路規劃 2001-2030》(送審稿) prepared by 廣東省交通諮詢中心, June 2004

## Key Features of Guangdong Railway Networks

Railway	Origin - Destination	Length (km)
梅坎鐵路—廣東段	梅州—長治	136
京九鐵路—廣東段	深圳—上陵	366
京廣鐵路—廣東段	廣州—坪石	315
粵海鐵路—廣東段	湛江—海安	139
廣珠鐵路	廣州—珠海	140
惠州至澳頭鐵路	惠州—澳頭	46
廣深四線	廣州—深圳	147
廣三茂鐵路	廣州—茂名	363
南沙鐵路支線	廣州—南沙	79
龍州北至常平鐵路	龍州—常平	200
惠花鐵路	惠州—花都	130
廣州至新塘鐵路	廣州—新塘	32
廣九鐵路	廣州—九龍	150
廣深港客運專線	廣州—香港	130
廣州—南沙貨運專線	廣州—南沙港	50
東南沿海鐵路—廣東段	深圳—饒平	423
漳潮汕鐵路—潮汕段	汕頭—潮州	220
龍贛韶鐵路—韶關至贛州段	連山—贛州	194
武廣高速客運專線—廣東段	韶關—廣州番禺區鍾村鎮新客站	273
韶柳鐵路—廣東段	韶關—連山	171
肇柳鐵路—廣東段	肇慶—封開	132
洛湛鐵路—廣東段	湛江—信宜	160
黎湛鐵路—廣東段	河唇—湛江	62
河合鐵路	河唇—合浦	133

Source: Hong Kong-Macao-Guangdong Information Database prepared by C&SD and PlanD dated March 2005

**Summary of Reference Scenario and High-Population-Growth Scenario**

(with comparison against Stage 3 assumptions)

**Projections of the Total Population and Employment**

Development Scenario	Population*			Employment (Job Places)		
	2010	2020	2030	2010	2020	2030
<b>Stage 3</b>	7,672,046	8,635,630	9,405,771	3,583,678	3,867,201	4,032,214
<b>Reference</b>	7,466,534	8,318,071	9,126,659	3,491,369	3,743,609	3,974,388
<b>High-Population-Growth</b>	7,466,534	8,493,202	9,552,831	3,491,369	3,933,697	4,366,808

\* Population includes 'Usual Residents' plus 'Persons other than Usual Residents present in Hong Kong at the reference moment'. 'Persons other than Usual Residents' include the defacto Mobile Residents and Transients.

**Population and Employment Distribution by Broad Regions and Years**

**Population (Reference Scenario)**

	2003	2010	10/03	2020	20/10	2030	30/20
Metro	4,093,320	4,448,213	9%	4,704,994	6%	5,067,666	8%
NWNT	1,038,533	1,140,500	10%	1,344,263	18%	1,519,910	13%
NENT	1,223,872	1,266,129	3%	1,389,368	10%	1,590,520	14%
SENT	372,897	436,768	17%	534,459	22%	570,531	7%
SWNT	116,680	174,923	50%	344,988	97%	378,033	10%
NT	2,751,980	3,018,321	10%	3,613,077	20%	4,058,993	12%
Total	6,845,300	7,466,534	9%	8,318,071	11%	9,126,659	10%

**Population (High-Population-Growth Scenario)**

	2003	2010	10/03	2020	20/10	2030	30/20
Metro	4,093,320	4,448,213	9%	4,789,538	8%	5,076,455	6%
NWNT	1,038,533	1,140,500	10%	1,374,618	21%	1,921,660	40%
NENT	1,223,872	1,266,129	3%	1,421,885	12%	1,600,260	13%
SENT	372,897	436,768	17%	548,118	25%	573,432	5%
SWNT	116,680	174,923	50%	359,042	105%	381,023	6%
NT	2,751,980	3,018,321	10%	3,703,664	23%	4,476,376	21%
Total	6,845,300	7,466,534	9%	8,493,202	14%	9,552,831	12%

### Employment (Reference Scenario)

	2003	2010	10/03	2020	20/10	2030	30/20
Metro	2,322,067	2,641,882	14%	2,745,614	4%	2,868,264	4%
NWNT	218,207	253,424	16%	286,123	13%	340,524	19%
NENT	321,118	368,388	15%	397,941	8%	433,060	9%
SENT	76,773	112,565	47%	138,312	23%	142,388	3%
SWNT	68,960	115,111	67%	175,620	53%	190,152	8%
NT	685,058	849,487	24%	997,995	17%	1,106,124	11%
Total	3,007,125	3,491,369	16%	3,743,609	7%	3,974,388	6%

### Employment (High-Population-Growth Scenario)

	2003	2010	10/03	2020	20/10	2030	30/20
Metro	2,322,067	2,641,882	14%	2,859,564	8%	3,119,293	9%
NWNT	218,207	253,424	16%	339,988	34%	425,657	25%
NENT	321,118	368,388	15%	410,286	11%	466,109	14%
SENT	76,773	112,565	47%	142,851	27%	152,623	7%
SWNT	68,960	115,111	67%	181,009	57%	203,126	12%
NT	685,058	849,487	24%	1,074,133	26%	1,247,515	16%
Total	3,007,125	3,491,369	16%	3,933,697	13%	4,366,808	11%

Notes: The above figures are only results of modeling exercises and do not necessarily represent the exact future population and employment distribution.

### Comparison of Planning Data with Stage 3 Assumptions in 2030

Year 2030	Usual Resident	Defacto Mobile Resident	Transients	Employment	Resident Workers	Resident Students
Stage 3	8,623,918	150,347	631,506	4,032,214	3,617,532	1,230,247
Reference Scenario	8,052,366	63,782	1,010,511	3,974,388	3,914,531	1,032,668
High-Population-Growth Scenario	8,478,538	63,782	1,010,511	4,366,808	4,278,247	1,069,745

## Assumptions for Hong Kong Domestic Transport Modeling (with comparison against Stage 3 assumptions)

### (i) Container Terminal Cargo Demand Growth (million TEUs)

Development Scenario	2010	2020	2030
Stage 3	19.7	29.2	35.6
Reference	18.0	28.8	34.5
High- Population- Growth Scenario	18.9	31.3	37.4

Sources:

1. Port Cargo Forecast 2001 for Stage 3; and
2. For Stage 4, CT1-10 cargo demand figures of Scenarios C2 and B2 from "Study on Hong Kong Port - Master Plan 2020" are adopted for Reference and HPGS respectively.

### (ii) Port Back-up Areas (demand figures in hectares)

Year	Stage 3	Reference Scenario	HPGS
2010	353	284	288
2020	457	436	463
2030	504	553	588

Source: PBU demand figures of Scenarios C2 and B2 from "Study on Hong Kong Port - Master Plan 2020" are adopted for Reference and HPGS respectively. But the trend for these uses to move over the boundary near the cargo centers in the PRD is expected to increase.

### (iii) Economic Growth

Year	<u>Percentage GDP growth per annum (in real terms)</u>		
	Stage 3	Reference Scenario	HPGS
2003	+3.0%	+3.3%	+3.3%
2004	+3.0%	+8.1%	+8.1%
2005	+3.0%	+5.0%	+5.0%
2006-2010	+3.0%	+4.0%	+4.0%
2011-2020	+2.5%	+3.5%	+4.0%
2021 onwards	+2.5%	+3.0%	+3.5%

Note: For period 2003 to 2005, the figures for Stage 4 in the table are from the information released by C&SD in November 2005. For period from 2006 onwards, the forecasts are assumed for the purpose of the assessment and are subject to change.

**(iv) Vehicle Fleet (for both Scenarios)**

Year	Private Vehicles		Goods Vehicles	
	Stage 3	Stage 4	Stage 3	Stage 4
2010	395,000	431,600	116,910	113,600
2020	455,000	518,500	122,280	119,400
2030	532,000	575,400	128,530	125,600

**(v) International Air Travel**

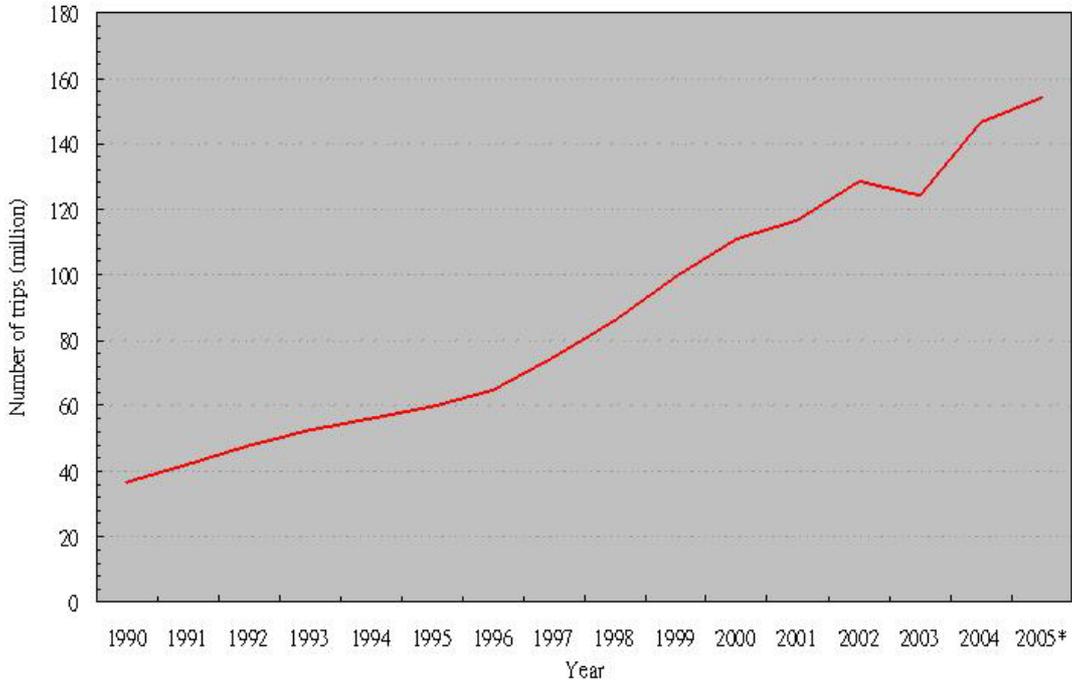
According to the difference of GDP growth % between the two scenarios, the cargo demand for the Reference Scenario in 2020 and 2030 is increased by 5% and 10% respectively to project the HPGS figures. The number of daily air passengers is assumed to be the same under both scenarios.

**Airport Usage Forecasts (Excluding Transfer/Transit Passengers and Transshipment Cargo)**

	Scenario	2010	2020	2030
<b>Daily Air Passengers</b>	Stage 3	113,000	138,200	155,500
	Stage 4 (both Scenarios)	99,100	124,200	156,500
<b>Daily Cargo (Tonnes)</b>	Stage 3	9,600	15,940	25,100
	Reference	11,5300	15,800	21,200
	HPGS	-	16,590	23,320

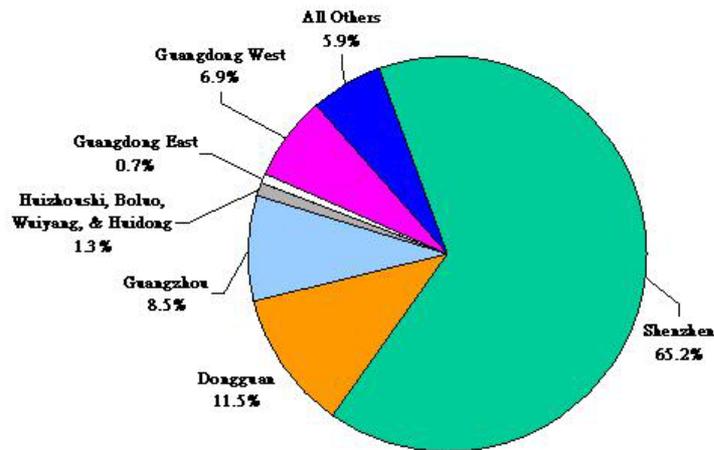
Note: The above forecasts for Reference Scenario are developed by the Planning Department after consultation with the Airport Authority Hong Kong, and is for preliminary review of vehicular flows in major roads only.

Cross-boundary Passenger Movements

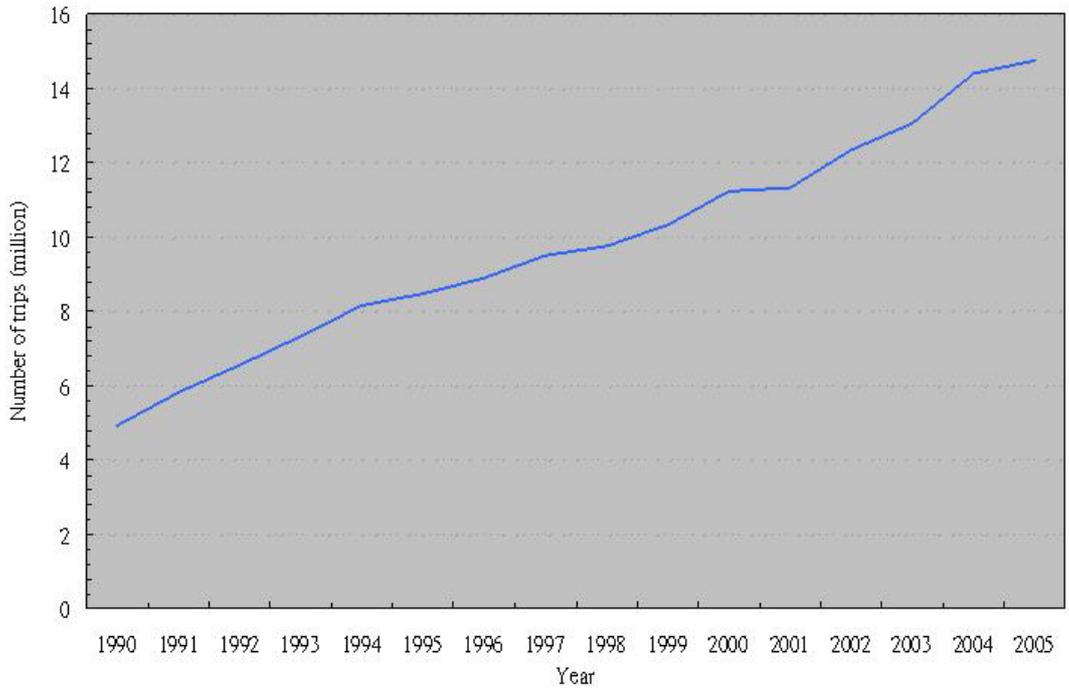


\* Exclude some trips that were made through the e-channels at MFT, CFT & Airport.

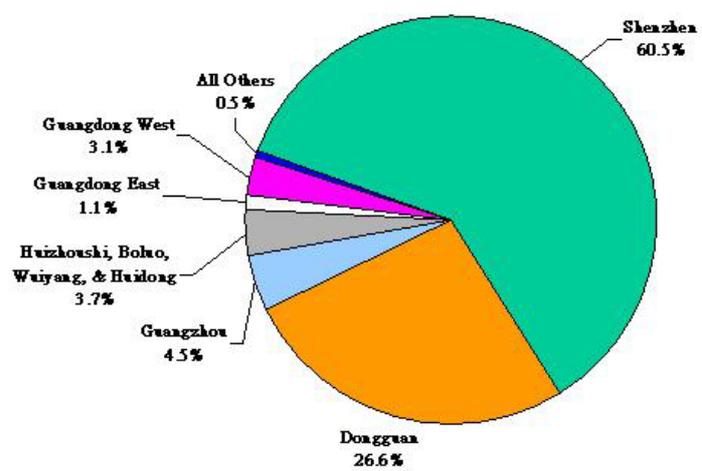
Distribution of Cross-boundary Passenger Trips by Trip Ends in the Mainland  
(Cross-boundary Travel Survey 2003)



Cross-boundary Vehicle Movements



Distribution of Cross-boundary Vehicular Trips by Trip Ends in the Mainland  
(Cross-boundary Travel Survey 2003)



## Comparison on Projected Domestic Transport Characteristics between Stage 3 and Stage 4

### 1. Mechanized Person Trips

Development Scenario	Assumed New CT Location	Person Trips		
		Private	Public	Total
<b>2020</b>				
Stage 3	NW Lantau	4,612,000	11,361,000	15,972,000
Reference	SW Tsing Yi	5,223,000	11,737,000	16,960,000
	NW Lantau	5,223,000	11,749,000	16,971,000
High-Population-Growth	SW Tsing Yi	5,288,000	11,995,000	17,283,000
	NW Lantau	5,292,000	12,006,000	17,298,000
<b>2030</b>				
Stage 3	NW Lantau	5,062,000	11,897,000	16,960,000
Reference	SW Tsing Yi	6,113,000	12,461,155	18,573,980
	NW Lantau	6,119,000	12,499,000	18,618,000
High-Population-Growth	SW Tsing Yi	6,265,000	13,058,000	19,322,000
	NW Lantau	6,270,000	13,055,000	19,325,000

Notes:

1. Private person trips comprise car, taxi and special purpose bus.
2. Public person trips comprise seven PT modes of MTR, KCR, LRT, Tram, Ferry, PLB and bus.
3. For comparison purpose, only Consolidation option with NWL port of Stage 3 is compared due to its similarity in planning data pattern.

### 2. Modal Share

Development Scenario	Assumed New CT Location	Main Modal Split (%)				
		Car	Taxi	SPB	PT (non rail)	Rail
<b>2020</b>						
Stage 3	NW Lantau	10.6	10.6	7.6	33.7	37.4
Reference	SW Tsing Yi	11.9	8.9	10.0	33.4	35.8
	NW Lantau	11.9	8.9	10.0	33.4	35.8
High-Population-Growth	SW Tsing Yi	11.9	8.7	9.9	33.7	35.7
	NW Lantau	11.9	8.7	9.9	33.6	35.8
<b>2030</b>						
Stage 3	NW Lantau	11.1	10.3	8.4	33.0	37.2
Reference	SW Tsing Yi	12.1	9.4	11.4	31.9	35.2
	NW Lantau	12.1	9.4	11.4	32.0	35.1
High-Population-Growth	SW Tsing Yi	12.2	9.0	11.2	32.5	35.1
	NW Lantau	12.2	9.0	11.2	32.6	35.0

Note : Rail mode includes MTR, KCR, LRT and tram

### 3. Rail Patronage

Development Scenario	Assumed New CT Location	Rail person trips
<b>2020</b>		
Stage 3	NW Lantau	6,475,000
Reference	SW Tsing Yi	6,719,000
	NW Lantau	6,728,000
High-Population-Growth	SW Tsing Yi	6,845,000
	NW Lantau	6,865,000
<b>2030</b>		
Stage 3	NW Lantau	6,936,000
Reference	SW Tsing Yi	7,381,000
	NW Lantau	7,418,000
High-Population-Growth	SW Tsing Yi	7,645,000
	NW Lantau	7,652,000

### 4. Trip Characteristics (AM Peak)

Development Scenario	Assumed New CT Location	Trip Characteristics (AM Peak)		
		Average Speed Km/hr	Trip Length in km	Trip Length in min.
<b>2020</b>				
Stage 3	NW Lantau	30.1	10.3	20.5
Reference	SW Tsing Yi	25.9	9.9	22.8
	NW Lantau	25.9	10.0	23.1
High-Population-Growth	SW Tsing Yi	26.8	10.0	22.3
	NW Lantau	26.4	10.0	22.8
<b>2030</b>				
Stage 3	NW Lantau	29.5	11.0	22.4
Reference	SW Tsing Yi	23.2	10.0	25.9
	NW Lantau	23.6	10.2	26.0
High-Population-Growth	SW Tsing Yi	24.8	10.5	25.4
	NW Lantau	25.3	10.9	25.8

**List of Committed and Assumed Major Transport Infrastructures**

**(i) Major Roads**

**By 2010 (Committed in addition to existing network)**

***New Territories***

- Route 8 - Shatin to Tsing Yi
- Castle Peak Road Widening (Tsuen Wan Area 2 to Siu Lam)

***Cross Boundary***

- Hong Kong - Shenzhen Western Corridor
- Deep Bay Link

**By 2020 (in addition to 2010 network)**

***Hong Kong***

- Central -Wan Chai Bypass
- Island Eastern Corridor Improvement (Causeway Bay-North Point)

***Kowloon***

- Gascoigne Road Flyover widening
- Central Kowloon Route
- Trunk Road T2 (Kai Tak – Cha Kwo Ling)

***New Territories***

- Tseung Kwan O - Lam Tin Tunnel
- Cross Bay Link at Tseung Kwan O
- Tolo Highway / Fanling Highway widening (Island House Interchange - Fanling)
- Hiram's Highway Dualling (Clearwater Bay Road - Sai Kung Town)
- Lantau Road P1 (Tung Chung – Sunny Bay)
- \* Strategic North-South Link between NWNT and North Lantau

***Cross Boundary***

- Hong Kong-Zhuhai-Macao Bridge (HZMB)
- HZMB's North Lantau Highway Connection

**By 2030 (in addition to 2020 network)**

***Hong Kong***

- The Fourth Harbour Crossing
- Route 4 (Kennedy Town – Aberdeen) as an alternative to South Island Line (West)

### ***New Territories***

- Eastern Highway (NENT to Kowloon)
- Tsing Yi-Lantau Link - with Coastal road and Chok Ko Wan Link Road (Pa Tau Kwu Section)

### **(ii) Railways**

#### **By 2010 (Committed in addition to existing network)**

- Tseung Kwan O South Station
- Kowloon Southern Link
- Sheung Shui to Lok Ma Chau Spur Line

#### **By 2020 (in addition to 2010 network)**

- Shatin to Central Link
- Northern Link
- Guangzhou-Shenzhen-Hong Kong Express Rail Link
- West Island Line
- South Island Line (East)

#### **By 2030 (in addition to 2020 network)**

- South Island Line (West)
- North Hong Kong Island Line

#### Notes:

1. \* ***The Strategic North-South Link between NWNT and North Lantau*** stands for the possible alternative options being considered in the NWNT Traffic and Infrastructure Review, which cover candidate projects of Lam Tei Tunnel, Tai Lam Chung Tunnel, Tsing Lung Bridge, Tuen Mun Western Bypass, Tuen Mun-Chek Lap Kok Link, Tuen Mun Eastern Bypass, and Link Options between Tuen Mun and Lantau.
2. It should be noted that projects assumed are purely postulates for strategic transport assessments of the development scenarios under the Study. The need, scope and timing of each of the assumed transport projects, particularly for those beyond 2020, would be subject to further review.