

For Information

**Legislative Council Panel on Transport  
Subcommittee on Matters Relating to Railways**

**The Hong Kong Section of the  
Guangzhou-Shenzhen-Hong Kong Express Rail Link**

**Patronage Forecast, Economic Benefit and  
Operational Viability**

**INTRODUCTION**

This paper provides supplementary information on the patronage forecast, economic benefits and operational viability of the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL).

**BACKGROUND**

2. The patronage of the XRL can be broken down into two parts: long haul services (from West Kowloon to cities beyond Pearl River Delta area); and shuttle services (from West Kowloon to Shenzhen/Humen/Guangzhou)<sup>1</sup>. The patronage forecast and economic benefit of the XRL are listed in **Table 1** –

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<sup>1</sup> Including interchange passengers at Shenzhen/Humen/Guangzhou, with destination in cities beyond the Pearl River Delta region

**Table 1** – Patronage forecast and economic benefit of the Hong Kong section of the XRL

<b>Forecast 2-way Daily Patronage in 2016 (Two-way)</b>	<b>99,000</b>
West Kowloon – Shenzhen/Humen/Guangzhou	84,000
West Kowloon – beyond Guangzhou	15,000
<b>Estimated Operational Margin<sup>2</sup> in 2016</b>	34%
<b>Average time saving over 50 years of operation per annum</b>	42 million hours
<b>Discounted economic benefits<sup>3</sup> over 50 years (in 2009 prices, mainly in terms of time savings to passengers)</b>	\$87 billion
<b>Economic Internal Rate of Return (EIRR) in real terms</b>	6% <sup>4</sup>

3. Details of the above-mentioned forecast will be elaborated in the following paragraphs.

## **PATRONAGE FORECAST**

### **Methodology of XRL Patronage Forecast**

4. The XRL shuttle patronage is forecasted by a four-stage transport model. This systematic model projects the XRL passenger flow based on various survey data and statistical information, and take into account latest planning data and developments of both Hong Kong and the Mainland.

5. The four-stage transport model is commonly used in transport infrastructure planning around the world. It comprises the following four stages of trip modelling procedures: –

<sup>2</sup> Calculated based on earnings before interest, tax, depreciation and amortization

<sup>3</sup> Social discount rate at 4% per annum.

<sup>4</sup> Calculated based on the relevant part of the cost of railway works. It is generally considered viable if EIRR exceeds the social discount rate of 4% adopted in government projects

- trip generation;
- trip distribution;
- modal split; and
- trip assignment.

6. Under the transport model, the study areas in the Mainland and Hong Kong are divided into a number of small zones. Various design data, including demographic and socio-economic data, are inputted for each zone against different design years. A transport network system, including railway and highway networks, has to be set up under the model, incorporating all relevant information of different transport modes operating in the network, such as public transport routes, frequencies, fares, station locations and interchange arrangements.

7. Based on the above-mentioned socio-economic data and transport network information, the transport model projects the number of trips generated from each zone by passenger type (e.g. Hong Kong residents versus non-Hong Kong residents) and trip purpose (e.g. business versus non-business), and distributes the trips between zone pairs to produce a trip distribution matrix. With reference to the generalised travel time cost of various public transport modes, the model simulates the modal choice for different trips between zone pairs. The data is used to forecast the utilisation of various public transport modes and calculate the XRL patronage.

8. When forecasting the distribution of public transport modes, the model projects the incoming and outgoing passenger flow at each railway station, fare revenue and total patronage by taking into account various mixed modes (e.g. interchange from minibus to railway; interchange from bus to ferry), routes, fares and travel time (including interchange and waiting time).

9. As for the XRL long-haul patronage forecast, the model projects the inter-city travel demand and the XRL patronage based on various factors including the ticket fares for railway and air services in Hong Kong and Mainland, journey time, waiting time, time for security check,

travel time to and from city centres, frequencies, etc.

### **Data Input Assumptions of Transport Model**

10. Design assumptions, mainly demographic and socio-economic data, have to be inputted for each zone against different design years under the transport model. Please refer to **Annex I** for major assumptions adopted in the Base Case.

### **Sensitivity Tests Based on Various GDP Assumptions**

11. Separately, the model conducts sensitivity tests, namely the High Case and the Low Case, based on different GDP growth rates. Details of the assumptions adopted in the High and Low Case are also listed in **Annex I**.

### **Patronage Forecast Results**

12. The transport model computes patronage forecast for the design years 2016, 2021 and 2031 under the three above-mentioned cases. Cross-boundary patronage forecast with the use of the model and a more in-depth analysis for the projected XRL patronage in 2016 are listed in **Tables 2 and 3** (the forecast for 2021 and 2031 are in **Annex II**).

**Table 2 – Daily Cross-boundary Patronage Forecast for 2016**

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
XRL	89,000	99,000	116,400
Through Train	4,400	5,200	6,900
Boundary Train	301,200	315,900	329,400
Cross-boundary Coach	238,800	250,300	256,700
Cross-boundary Ferry	24,600	27,600	36,100
<i>Total</i>	<b>658,000</b>	<b>698,000</b>	<b>745,500</b>

**Table 3** – Patronage Forecast of XRL in 2016

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
<b>Shuttle service</b>	<b>75,500</b>	<b>84,000</b>	<b>99,900</b>
<i>Shenzhen</i>	59,800	65,400	75,000
<i>Humen</i>	5,000	5,900	7,700
<i>Shibi</i>	10,700	12,700	17,200
<b>Long-haul service</b>	<b>13,500</b>	<b>15,000</b>	<b>16,500</b>
<i>Total</i>	<i><b>89,000</b></i>	<i><b>99,000</b></i>	<i><b>116,400</b></i>

13. Referring to past information, the annual land-based cross boundary passengers in Hong Kong increased from around 75 million in 1998 to around 163 million passengers in 2008, more than doubling the figures in 10 years period. This can be converted to an average increase of 24,000 daily passengers per year. As economy in the Mainland keeps developing and procedures for the Mainland residents visiting Hong Kong become simpler, we believe such growing trend will continue.

14. Currently, around 60% of land-based cross boundary passengers are railway passengers. If the XRL can maintain a competitive fare level and take up around half of the new land-based cross boundary passengers (i.e. similar to the current portion of the rail passengers), it will be sufficient to achieve the patronage forecasted in the Base Case (i.e. around 99,000 passengers per day in 2016). As such, we consider the above-mentioned patronage forecast reasonable. As a matter of fact, an academic study points out that the implementation of “Individual Travel Scheme” will further increase the number of Mainland visitors coming to Hong Kong for leisure purposes, and hence the above-mentioned estimation may tend to be conservative.

15. Separately, the model has considered the distribution of various types and trip purposes of the XRL passengers, and the estimated figures are compared with the actual figures in 2007. Details are set out in **Table 4**.

**Table 4** – Distribution of Types and Trip Purposes for the XRL Passengers

<b>XRL Passenger Type</b>	<b>Trip Purpose</b>	<b>Actual distribution for cross-boundary passengers in 2007</b>	<b>Distribution for XRL passengers in 2016<sup>5</sup></b>
Hong Kong residents	Business	25%	24%
	Non-business	56%	46%
Non-Hong Kong residents	<b>Total</b>	<b>81%</b>	<b>70%</b>
Non-Hong Kong residents	Business	4%	12%
	Non-business	15%	18%
	<b>Total</b>	<b>19%</b>	<b>30%</b>

16. Trip purpose of “business” as mentioned in **Table 4** includes “Going to work” and “Business trip”. “Going to work” refers to trips to and from fixed working places, whilst “Business trip” refers to trips for the purposes of working, including attending meetings, meeting with costumers, and goods examination, etc. Passengers with trip purpose of “business” are not necessarily senior executives of companies. Many are ordinary staff of companies with businesses in both Hong Kong and the Mainland.

17. According to the figures shown in **Table 4**, the portion of non-Hong Kong residents for XRL passengers in 2016 is larger than that for the overall cross-boundary passengers in 2007. This is due to the growing economy in the Mainland and the simpler procedures for the Mainland visitors to Hong Kong. At the same time, as the journey time of XRL is more competitive, it will be even more attractive to business travellers than non-business travellers. Hence, the portion of business travellers for XRL passengers is larger than that for cross boundary passengers as a whole. We consider the above passenger mix estimated by the model reasonable in general.

<sup>5</sup> Distributions for various design years are similar.

## **ECONOMIC BENEFIT ASSESSMENT**

18. Based on the above patronage forecast, we calculate the direct economic benefits and the Economic Internal Rate of Return (EIRR) which serve as indicators for assessing the economic benefits that the XRL project will bring to Hong Kong.

### **Direct Economic Benefits**

19. In typical railway projects, as mentioned above, the direct economic benefits will only take into account the cost savings due to time savings of passengers, the cost savings in the operation of other public transport modes and the cost savings due to accident reduction. Majority (more than 95%) of the direct economic benefits come from the cost savings due to passenger time savings.

### **Time Savings of Passengers**

20. The transport model calculates the travel time from various Hong Kong zones to cross-boundary nodes by different public transport modes. The travel time includes walking time, waiting time, on-board time and interchange time.

21. The average travel time of a cross-boundary public transport mode (e.g. the boundary train or coach) is the average time travelling from various Hong Kong zones to a cross-boundary node by that mode plus the time travelling from the node to a boundary station in Shenzhen. The average travel time savings of that mode refer to the difference between such average travel time and the average time travelling from various Hong Kong zones to the XRL West Kowloon Terminus, and then to a boundary station in Shenzhen by the XRL. The time saving in travelling from the boundary station in Shenzhen to other Mainland destinations by the XRL have not been taken into account; hence the estimated travel time savings are relatively conservative.

### *Value of Time to Cross-Boundary Passengers*

22. The cost savings due to time savings of passenger refer to the time saved by passengers switching to the XRL which is converted to monetary terms, with reference to “2002 Travel Characteristics Survey” published by the Transport Department. Based on the assumption made on “average travel time savings” as described in paragraph 21, the direct economic benefits of the Hong Kong section of the XRL is calculated.

23. Based on the above computation method, the XRL passenger time savings and the economic benefits of the project in the Base, High and Low Cases are forecasted and tabulated in **Table 5**.

**Table 5** – Time Saving for XRL Passengers and the Estimated Economic Benefit of the Project

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
Average annual time savings over 50 years of operation	38 million hours	42 million hours	52 million hours
Total economic benefits over 50 years of operation (discounted to 2009 prices at a rate of 4%)	\$78 billion	\$87 billion	\$106 billion

### **Economic Internal Rate of Return**

24. The EIRR is the net rate of return of the project calculated by subtracting the construction and operation costs during construction and the subsequent 50 years of operation from the economic benefits.

25. Considering the above direct economic benefits alone, the EIRR of the project over 50 years of operation is around 6% in the Base Case, 5% in the Low Case and 7% in the High Case. As shown in **Table 6**, the EIRR of the XRL is comparable with those of the other major infrastructure projects.



**Table 6 – EIRR of Some Infrastructural Projects in Hong Kong**

<b>Infrastructure Projects</b>	<b>EIRR</b>	
Hong Kong section of the XRL	at current price 6% (Base Case ) 7% (High Case) 5% (Low Case)	9% (2008 estimate)
HK-Zhuhai-Macau Bridge	8.8% (estimated based on the construction price at 2008 level)	
West Island Line	5% (estimated based on the construction price at 2008 level)	
South Island Line (East)	9% (estimated based on the construction price at 2008 level)	

26. The above EIRR estimated for the XRL is very conservative as the indirect social benefits, substantial but difficult to be quantified, have not been taken into account.

### **Indirect Economic Benefits**

27. Upon completion, the XRL will offer a new cross-boundary transport mode with a direct linkage to Mainland cities and provinces. Frequent and high speed rail services will reduce the travel time between Hong Kong and the Mainland. The XRL is expected to bring immense indirect economic benefits to Hong Kong, details of which are summarised in paras. 28-48 below –

#### **Linking the National High Speed Rail Network**

28. The value of the Hong Kong section of the XRL is to enhance the connectivity between Hong Kong and the Mainland, strengthening the Hong Kong's position as the international city in the Pearl River Delta region, and enhancing and reinforcing Hong Kong's competitiveness as an international service centre.

29. The Hong Kong section of the XRL links up Hong Kong with the largest high speed rail network in the world. Currently, the total length

of the high speed rail network in the Mainland (that is being designed and constructed) is around 16,000 kilometres. Unlike some European high speed rail systems, the high speed rail system in the Mainland adopts a web-like topology with east-west and north-south connections providing direct services between major cities. It is estimated that a population of 60 million will be within the reach of four-hour journey time from the West Kowloon Terminus, which will be the largest coverage in the world. With enhanced connectivity between Hong Kong and the Mainland, cultural exchange with the Mainland and the economic development in Hong Kong can be further promoted.

### **Induced/Additional Patronage**

30. Making reference to global experience, induced patronage due to the commissioning of high speed rail can be as much as 20% or even 30% of the overall patronage (some examples are listed in **Table 7**). The induced patronage will also promote the economic activities in the relevant districts.

**Table 7 – Patronage Analyses of High Speed Rail in Other Region<sup>6</sup>**

<b>Patronage source</b> \ <b>Railway projects</b>	East-South Line, Train à Grande Vitesse, France	Svealandssbanan, Sweden,	Alta Velocidad Española, Spain	
			Madrid – Barcelona	Madrid – Seville
Induced/additional patronage	21%	30%	20%	34%
Diverted from road traffic	10%	15%	9%	27%
Diverted from other rail traffic	59%	55%	10%	13%
Diverted from air traffic	10%	—	61%	26%

31. Some European academic researches point out that the demand for high speed rail services depends on population density. The Hong Kong section of the XRL connects to the high speed rail network in the

<sup>6</sup> Information from J.Meunier , 2001. F. Bruinsma et al., 2007. Coto-Millán et al., 2007. Spanish Railways Foundation 2008

Mainland. With the population density of the Mainland cities much higher than that of the European cities, the demand for the XRL Hong Kong section services is beyond doubt from the perspective of transport demand.

32. In addition, connecting to densely populated cities will induce traffic demand. In 2011, it is estimated that the four cities along the XRL will be densely populated, each with tens of million of residents and floating population. Local academic also points out that patronage induced by the XRL will be higher than that in Europe.

33. Generally speaking, the competitive advantages of high speed rail service cover the areas within 4-hour journey time, i.e. around 1,000 kilometres in length. Some studies point out that connecting to the Mainland high speed rail network the Hong Kong section of the XRL allows Hong Kong citizens to reach Mainland cities much further away within four hours. Population of at least 60 million will be covered in area within four-hour journey time from the West Kowloon Terminus, which will be the largest coverage in the world. It is possible that the XRL patronage may follow the exponential growth pattern, similar to that of Tōkaidō Shinkansen in Japan<sup>7</sup>.

### **Market Integration and Mutual Complement with Pearl River Delta Region**

34. The XRL will reduce significantly the travel time and cost between Hong Kong and Mainland cities. More Mainland cities and regions will be embraced in the daily living area of Hong Kong residents. The concept of one-hour living circle of the Pearl River Delta area can be materialized.

35. As residents of Hong Kong and the Mainland come into contact more easily, the labour and consumer markets in the Pearl River Delta

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<sup>7</sup> The patronage of Tōkaidō Shinkansen during its the early years of operation was less than 50% of its original estimation, but started to exceed estimation for more than 10-20% starting from the seventh year of operation (Yong, 2007). The patronage has been doubled in 10 years (Vickerman 1997, from Plassard 1991).

Region will be integrated. There will be closer co-operation between Hong Kong and Mainland cities in the development of various sectors, such as tourism, retail and professional services, and at the same time cultural and academic exchanges will also be promoted.

36. The XRL will improve regional transport by enabling different market demands in the region to complement each other and hence give full play to their various socio-economic roles. The greater synergy and complementary effect so created will boost the overall productivity in the region, bringing direct benefits to Hong Kong.

### **Creation of Job Opportunities**

37. The XRL will bring in a larger number of visitors and huge business opportunities. In short term, there will be on average 5,500 jobs created during the construction period of the Hong Kong section of the XRL and 11,000 at the peak. Over 1,500 jobs will be created immediately, including more than 1,100 labourers and over 400 clerical and technical/professional staff during the early construction stage of the Hong Kong section of the XRL (estimated to be from December 2009 to June 2010). At the peak of construction activities, there will be more than 11,000 jobs created, with over 9,100 labourers and over 2,400 clerical and technical/professional staff. When the XRL comes into operation, it will provide 10,000 employment opportunities, which include those relating to railway operation, maintenance, station management, catering, retails, boundary control, etc.

### **Development of Services Industry**

38. Mainland residents can visit Hong Kong to spend money or acquire professional services much faster and more easily, resulting in substantial jobs creation in various sectors, such as consumer goods/services, catering and professional services.

39. An academic research points out that with reduction in journey time between Hong Kong and the Pearl River Delta area after the

commissioning of the XRL, Guangdong residents will come to Hong Kong more easily and conveniently for one-day trips or two-day weekend trips. In longer term, the mode of leisure travel of visitors coming from Pearl River Delta will converge to the mode of Hong Kong citizens going to Shenzhen for leisure activities. The difference between the two will be the Mainland visitors being attracted by the diversity, reliability and the internationality of the medium/high-priced retail sector in Hong Kong. This will facilitate the specialisation of retail market among Hong Kong, Shenzhen and other Pearl River Delta region. Development of labour intensive retail and catering industries will offer more job opportunities for local labour with lower level of education; and hence the additional social benefits so arising may be greater than the economic benefits. On the other hand, the market for sophisticated professional services, such as legal, accounting, consultancy and other knowledge intensive services will be expanded due to the large group of business visitors brought by the XRL from the Mainland. Therefore, the Hong Kong section of the XRL will benefit labours in various sectors with different levels of education and skills.

40. Representatives of various sectors in Hong Kong, including catering, tourism, convention and exhibition, professional services, industrial and commercial organisations, have respectively pointed out that the XRL would help attract more visitors to Hong Kong to acquire relevant services and stimulate consumptions. The XRL will also attract more foreign visitors going to the Mainland via Hong Kong, and development in various sectors can hence be further promoted.

### **Development of Tourism**

41. Stakeholders in tourist industry point out that Mainland visitors will be the major market for further development of the industry. In complementation with the development of the high speed rail system in the Mainland, the XRL will make it much more convenient for visitors along the XRL corridor to come to Hong Kong, which will bring more Mainland visitors to Hong Kong.

42. At the same time, connecting Hong Kong and its neighbouring cities by the XRL will help them complement each other, facilitate the development of “point-to-point” travel mode. Local or foreign visitors may depart from Hong Kong and go to various Mainland cities along the XRL corridor, materialising “one-trip multi-stops” by the rail link. This will attract more overseas visitors stopping at Hong Kong before heading north, further consolidating Hong Kong’s status as the southern gateway of China.

43. In addition, the XRL terminus will be in proximity to the West Kowloon Cultural District, which will create synergy. It is expected that more visitors, who are fond of international art and cultural performance or exhibition, will come to Hong Kong for art and cultural exchange via the XRL.

44. According to a rough but conservative estimation, if there are 10% of additional Mainland visitors induced (on top to the current patronage forecast where no induced passengers have been taken into account) with the commissioning of the XRL, there will be an addition of \$3-6 billion expenditure in Hong Kong each year.

#### **Benefits of Re-allocating Transport Resources**

45. As mentioned in para. 33 above, the XRL has its competitive advantages mainly over areas within 4-hour journey time, i.e. around 1,000 kilometres in radius. Aviation services within the same catchment area will inevitably face competition from the XRL. However, at the same time, the airlines will have more opportunities in developing air-railway inter-modal products, which may open up new market segments. In addition, airlines will be able to launch more international long-haul services which are more profitable and strategically important, thereby strengthening Hong Kong’s status as an international and regional transport hub.

### **Environmental Benefits**

46. The Hong Kong section of the XRL runs in tunnel, and hence impact to the environment and the local communities will be minimised. In addition, the high speed rail provides environmentally friendly train services when compared with other cross-boundary transport modes. In the United Kingdom, on a per passenger-kilometre basis, the carbon emission on an Eurostar journey is only about 15% and 25% of that by plane and bus/coach respectively<sup>8</sup>. It also consumes less energy and emits fewer pollutants by a similar magnitude<sup>9</sup>. At the same time, comparing with aeroplanes that emit pollutant in the air and vehicles that travel everywhere on land, the emission of the XRL will be mainly in the power plants, impact of which to the environment is relatively easier to mitigate.

47. In Hong Kong, if all XRL passengers, i.e. 99,000 daily passengers in 2016, use the cross-boundary coach instead, it is estimated that around 13 tonnes of additional carbon dioxide will be emitted every day or 4,700 tonnes annually, for the 26 km journey of the Hong Kong section alone.

### **Transport Service of Higher Quality**

48. XRL passengers will enjoy wider and more comfortable travelling environment than air or coach passengers. The trains in motion are also relatively more stable. With telecommunication access on board, XRL passengers can use their mobile phones or hook up onto the Internet as they wish. Apart from travel time savings, XRL passengers can make better use of their time aboard to process their personal and business affairs. As such, the productivity loss due to travelling can be reduced.

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<sup>8</sup> Information from the Department for Environment, Food and Rural Affairs, UK

<sup>9</sup> Information from “Recent Experience of and Prospects for High-Speed Rail in Korea: Implications of a Transport System and Regional Development from a Global Perspective” by Dong-Chun Shin, Director General, Ministry of Transport of Korea in the University of California, Berkeley in 2005.

## OPERATIONAL VIABILITY

49. In assessing the operational viability of the Hong Kong section of the XRL, we have assumed that operating revenue include the share of fare revenue and the non-fare revenue of the Hong Kong section of the XRL; and that the operator will be responsible for the recurrent operating cost.

### The Fare Sharing Assumptions

50. The assumptions used in assessing operational viability are the same as those used in the patronage forecast. The XRL fare is assumed to be competitive and comparable with that of boundary and through train services. The fare assumptions are listed in **Table 8**.

**Table 8** – Fare Assumptions

<b>Destination</b>	<b>XRL Assumed Fares (HK\$)</b>	<b>Trains (HK\$)</b>	<b>Coaches (HK\$)</b>
Shenzhen	\$45-\$49	\$34-\$41	\$10-\$45
Dongguan	\$131 (Hummen)	\$145	\$100
Guangzhou	\$180 (Shibi)	\$190 – 210	\$80 – \$100

51. The fare revenue is to be shared between the Mainland and Hong Kong operators of the XRL. We are in close co-operation with the Ministry of Railways and the Guangdong operator on the planning of the railway scheme. We have set up a joint working group with the Ministry of Railways to oversee the implementation of the XRL project, including the formulation of effective operating arrangements with a view to maximizing the benefits of the XRL to passengers, the railway operators and the regional economy. Our discussions with the Ministry of Railways and the Guangdong operator on the operating arrangements will continue.

52. For the purpose of revenue forecast for the Hong Kong section of the XRL, we have assumed a similar mileage-based mechanism used in the existing Through Train service for trips to Dongguan and Guangzhou.



We have also made reference to the revenue contribution from the existing Hunghom-Lo Wu service for trips to Shenzhen. The revenue contribution to the Hong Kong section of the XRL is summarized in **Table 9**.

**Table 9** – Assumption of Revenue Contribution to the Hong Kong Section of the XRL

<b>Destination</b>	<b>XRL Assumed Fares (HK\$)</b>	<b>Revenue to the Hong Kong Section (HK\$)</b>
Shenzhen	\$45-\$49	\$31
Dongguan	\$131 (Humen)	\$45
Guangzhou	\$180 (Shibi)	\$45

### **Operating Profit**

53. Based on the above patronage forecast and the assumed revenue sharing, we have projected the fare contribution to the Hong Kong section of XRL at various design years. We have also made reference to data provided by MTR Corporation Limited (MTRCL) to estimate the fare and non-fare revenue. The projected operating revenue, operating cost, operating profit (in terms of EBITDA<sup>10</sup>) and operating margins of the Hong Kong section of the XRL at various design years are summarized in **Table 10**. The situation for High and Low Cases are summarized in **Annex III**.

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<sup>10</sup> Earnings Before Interest, Tax, Depreciation and Amortization

**Table 10 – Projected Operation Details in Base Case**

	<b>2016</b>	<b>2021</b>	<b>2031</b>
<b>Operating Revenue</b>	<b>1.118</b>	<b>2.063</b>	<b>3.606</b>
Fare Revenue	1.068	1.941	3.309
Non-fare Revenue	0.050	0.122	0.297
<b>Operating Cost</b>	<b>(0.733)</b>	<b>(0.880)</b>	<b>(1.418)</b>
Energy	(0.137)	(0.158)	(0.235)
Non-staff Operating and Maintenance Cost	(0.274)	(0.314)	(0.504)
Staff Costs	(0.152)	(0.184)	(0.307)
Support Services	(0.152)	(0.187)	(0.305)
Rent and Rates	(0.018)	(0.037)	(0.067)
<b>EBITDA</b>	<b>0.385</b>	<b>1.183</b>	<b>2.188</b>
<b>Operating Margin</b>	<b>34%</b>	<b>57%</b>	<b>61%</b>

Figures in '\$B (Money of the day)

54. Non-fare revenue includes railway-related commercial activities such as advertising, kiosks, rental income of telecommunication facilities, etc. The projected non-fare revenue has taken into account rental income of commercial area of the XRL West Kowloon Terminus, and has made reference to those for airport and other major stations. The total gross floor area (GFA) and commercial GFA of those stations and the airport are listed in **Table 11**. As for operating cost, it includes energy, maintenance, staff, supporting services, etc. We have assumed operating costs for High and Low Cases are the same as those adopted in Base Case.

**Table 11**– Total GFA and Commercial GFA in Stations and Airport

<b>Station / Airport</b>	<b>Commercial GFA in the Station (m<sup>2</sup>)</b>	<b>Total GFA in the Station (m<sup>2</sup>)</b>	<b>Percentage of Commercial GFA over the Total GFA</b>
<b>West Kowloon Terminus (XRL)</b>	not more than 30,000	around 380,000	not more than 8%
<b>Hunghom Station (East Rail, West Rail and Through Train)</b>	5,000	around 70,000	7%
<b>Hong Kong Station (Airport Express and Tung Chung Line)</b>	7,000	around 170,000	4%
<b>Kowloon Station (Airport Express and Tung Chung Line)</b>	4,000	around 140,000	3%
<b>Lok Ma Chau Station (East Rail)</b>	10,000	around 90,000	12%
<b>Lo Wu Station (East Rail)</b>	2,000	around 30,000	7%
<b>Terminal 2, Hong Kong International Airport</b>	20,000	around 140,000	14%

55. EBITDA is a good and well accepted indicator of the operational performance of infrastructure projects like the XRL. It can show whether recurrent cash subsidy is necessary to keep the railway running. The projected positive EBITDA suggests that the operation of the XRL can be sustained without subsidy. In fact, with a comfortable projected operating margin, even if the patronage is lower than expected, it is unlikely that the operating revenue will drop below the operating cost and thus resulting in operating loss. The above-mentioned figures show that EBITDA of the XRL in three cases are positive, and hence we consider that the XRL is operationally viable.

#### **Experience in Other Districts**

56. Making reference to experience in other countries, as the construction cost of high speed rail is relatively high, in most cases, the

construction costs require substantial government subsidy. That said, as the operation expenditures for these projects are relatively low, the fare can be set at a competitive level and reasonable operating margins can be achieved. For example, it was recently reported that a high-speed rail system in another jurisdiction suffered huge losses and is now facing financial difficulty. After studying its profit and loss statement, we note that the project is in fact generating good operating profit in the first two years of its operation. The operating margins stand at 30% and 56% in the two years respectively, which is in the same range as the projected operating margin of the Hong Kong section of the XRL indicated above. A major reason for reporting net losses is the burden to make huge interest payments arising from loans for financing the construction costs. The construction of the Hong Kong section of the XRL is proposed to be a public works project to be funded by the Capital Works Reserved Fund, not by loans. There will not be huge interest expenses incurred during the operation phase; and hence recurrent cash subsidy from the Government will be very unlikely.

### **Financial Contribution to the Government**

57. The Government will fund the construction of the XRL and its ancillary infrastructures, and ultimately own the railway. Under the current understanding, upon completion of the railway, the MTRCL would be granted a service concession for the operation. The Government will receive service concession payment accordingly, which is dependent on the fare prices, actual patronage and non-fare revenues after the XRL has come into operation. The amount in the Base Case is estimated to be about \$28.1 billion (in MOD terms) for 50 years. Upon the end, expiry or termination of the service concession, the MTRCL will have to return an operating railway to the Government. The residual value of the railway should be quite substantial (around \$31.0 billion). In addition, the XRL will facilitate growth in other sectors, which will also increase the tax revenue to the Government.

## Implication on the Fare of East Rail

58. The demand for cross-boundary transport services has increased rapidly over the last decade and is expected to continue to grow at 5.4% per annum between 2008 and 2016, and at 3.3% from 2016 to 2031. We expect that the XRL will take up a large portion of the potential growth of the cross-boundary segment of the East Rail but not its existing patronage. Hence, we do not think that the introduction of the XRL services will have any material impact on the operation of the domestic services of the East Rail. By 2016 after XRL commences operation, the daily patronage of Lo Wu/Lok Ma Chau Stations of the East Rail will still be higher than its patronage level in 2008 (please see **Table 12**).

**Table 12** – Cross Boundary Passengers in 2008 and the Estimation in 2016 (Base Case)

Daily patronage	2008	2016	Annual Growth
XRL	—	99,000	—
East Rail (Lo Wu/ Lo Ma Chau)	273,000	315,900	+1.8%
Through Train	9,000	5,200	-6.6%
Buses/coaches	150,000	250,300	+6.6%
Ferries	26,000	27,600	+0.7%
<b>Total</b>	458,000	698,000	+5.4%

59. Current fares of the domestic railway lines, including those of the East Rail, are adjusted based on the existing formula of the Fare Adjustment Mechanism. In addition, the profit or loss of individual railway lines will not affect existing fares of the domestic railway lines.

## Data Input Assumptions of Transport Model

### Population and GDP Growth Assumptions Adopted in Base Case

	<b>Population Forecast (million)</b>			
<b>Design Year</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2031</b>
Shenzhen	9.2	10.2	11.2	13.2
Dongguan	6.4	6.5	6.5	6.6
Guangzhou	10.8	12.1	13.4	16.0
Guangdong Province	99.2	107.0	115.1	130.4
Hong Kong	7.5	7.8	8.3	9.0

	<b>GDP Growth Rate (Annual Growth Rate) Forecast for Hong Kong and Guangdong Province</b>		
<b>Design Year</b>	Short Term (2009 - 2015)	Medium Term (2015 - 2020)	Long Term (2020 – 2031)
Shenzhen	10.8%	8.0%	4.0%
Dongguan	9.0-13.3%	9.0%	4.0%
Guangzhou	8.5-10.9%	8.5%	4.0%
Guangdong Province	9.6-11.8%	9.0%	4.4%
Hong Kong	2.0-3.5%	2.0%	

GDP Growth Assumptions Adopted in High Case

	<b>GDP Growth Rate (Annual Growth Rate) Forecast for Hong Kong and Guangdong Province</b>		
<b>Design Year</b>	Short Term (2009 - 2015)	Medium Term (2015 - 2020)	Long Term (2020 - 2031)
Shenzhen	12.8%	10.0%	6.0%
Dongguan	11.0-15.3%	11.0%	6.0%
Guangzhou	10.5-12.9%	10.5%	6.0%
Guangdong Province	11.6-13.8%	11.0%	6.4%
Hong Kong	2.5-4.0%	3.0-4.0%	2.0-3.0%

GDP Growth Assumptions Adopted in Low Case

	<b>GDP Growth Rate (Annual Growth Rate) Forecast for Hong Kong and Guangdong Province</b>		
<b>Design Year</b>	Short Term (2009 - 2015)	Medium Term (2015 - 2020)	Long Term (2020 - 2031)
Shenzhen	8.8%	6.0%	3.0%
Dongguan	7.0-11.3%	7.0%	3.0%
Guangzhou	6.5-8.9%	6.5%	3.0%
Guangdong Province	7.6-9.8%	7.1%	3.4%
Hong Kong	2.0-2.5%	2.0%	

## Cross Boundary Traffic and Patronage Forecast for XRL

### Daily Cross Boundary Traffic Forecast in 2021

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
XRL	107,600	119,700	147,700
Through Train	5,500	6,700	9,400
Boundary Train	344,600	368,000	402,400
Cross-boundary Coach	287,700	305,300	322,500
Cross-boundary Ferry	33,500	37,800	50,300
<b>Total</b>	<b>778,900</b>	<b>837,500</b>	<b>932,300</b>

### Patronage Forecast for XRL in 2021

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
<b>Shuttle service</b>	<b>90,600</b>	<b>100,800</b>	<b>127,000</b>
Shenzhen	69,000	75,500	92,500
Humen	6,200	7,400	9,800
Shibi	15,400	17,900	24,700
<b>Long-haul service</b>	17,000	18,900	20,700
<b>Total</b>	<b>107,600</b>	<b>119,700</b>	<b>147,700</b>



Daily Cross Boundary Traffic Forecast in 2031

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
XRL	144,200	160,000	199,700
Through Train	10,800	12,200	15,600
Boundary Train	424,500	470,500	544,500
Cross-boundary Coach	390,900	419,600	467,300
Cross-boundary Ferry	67,700	72,000	87,600
<b><i>Total</i></b>	<b><i>1,038,100</i></b>	<b><i>1,134,300</i></b>	<b><i>1,314,700</i></b>

Patronage Forecast for XRL in 2031

	<b>Low Case</b>	<b>Base Case</b>	<b>High Case</b>
<b>Shuttle service</b>	<b>121,400</b>	<b>134,700</b>	<b>171,800</b>
Shenzhen	92,200	102,100	128,500
Humen	8,000	8,900	11,000
Shibi	21,200	23,700	32,300
<b>Long-haul service</b>	<b>22,800</b>	<b>25,300</b>	<b>27,900</b>
<b><i>Total</i></b>	<b><i>144,200</i></b>	<b><i>160,000</i></b>	<b><i>199,700</i></b>

## Projected Operating Details for High and Low Cases

### Low Case

	<b>2016</b>	<b>2021</b>	<b>2031</b>
<b>Operating Revenue</b>	<b>1.002</b>	<b>1.850</b>	<b>3.250</b>
Fare Revenue	0.957	1.737	2.983
Non-fare Revenue	0.045	0.113	0.267
<b>Operating Cost</b>	<b>(0.733)</b>	<b>(0.880)</b>	<b>(1.418)</b>
Energy	(0.137)	(0.158)	(0.235)
Non Staff Operating and Maintenance Cost	(0.274)	(0.314)	(0.504)
Staff Costs	(0.152)	(0.184)	(0.307)
Support Services	(0.152)	(0.187)	(0.305)
Rent and Rates	(0.018)	(0.037)	(0.067)
<b>EBITDA</b>	0.269	0.970	1.832
<b>Operating Margin</b>	27%	52%	56%

Figures in '\$B (Money of the day)

### High Case

	<b>2016</b>	<b>2021</b>	<b>2031</b>
<b>Operating Revenue</b>	<b>1.324</b>	<b>2.551</b>	<b>4.500</b>
Fare Revenue	1.265	2.399	4.124
Non-fare Revenue	0.059	0.152	0.376
<b>Operating Cost</b>	<b>(0.733)</b>	<b>(0.880)</b>	<b>(1.418)</b>
Energy	(0.137)	(0.158)	(0.235)
Non Staff Operating and Maintenance Cost	(0.274)	(0.314)	(0.504)
Staff Costs	(0.152)	(0.184)	(0.307)
Support Services	(0.152)	(0.187)	(0.305)
Rent and Rates	(0.018)	(0.037)	(0.067)
<b>EBITDA</b>	0.591	1.671	3.082
<b>Operating Margin</b>	45%	66%	68%

Figures in '\$B (Money of the day)