Legislative Council Public Works Subcommittee
Meeting on 2 February 2016

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

INTRODUCTION

At the Meeting of the Public Works Subcommittee ("PWSC") meeting on 2 February 2016, Members continued to discuss matters relating to the construction of the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link ("XRL") project. This paper aims to respond to Members' enquiries raised at the meeting.

MAJOR XRL CONTRACTS

2. According to the information provided by the MTR Corporation Limited ("MTRCL"), at 31 December 2015, the total awarded contract sum for the XRL contracts signed by MTRCL is $45.236 billion, including 42 major contracts[1] and about 70 minor contracts[2]. Details of the awarded contracts are at **Annex**.

3. According to the information provided by the MTRCL, at present, there are two major contracts, including the equipment at the Stabling Sidings and the testing of electric and mechanical ("E&M") interface works, and about ten minor contracts which have not been awarded. The MTRCL will handle the related procurement works in a timely manner taking into account the overall construction progress and financial situation of the project.

4. On the basis of the estimated revised cost submitted by the MTRCL and reviewed by the Monitoring and Verification Consultant engaged by the Highways Department, the Government finally recommended to apply for an additional funding of $19,625 million for

[1] Major contract refers to the awarded contract with the contract sum value more than $50 million.
[2] Minor contract refers to the awarded contract with the contract sum value less than $50 million.

the XRL project to pay for the increase in XRL project cost and potential claims submitted by the contractors. The Government has also reached an agreement with the MTRCL to put a "cap" on the revised Entrustment Cost at $84.42 billion, and reserves all the rights to pursue the warranties and obligations from the MTRCL. The MTRCL, as the project manager of the XRL project, has been discussing the details of the claims with the contractors concerned, and would thoroughly assess the amount claimed. The MTRCL would process each claim in a prudent manner, and the contractors would have to provide sufficient justifications and information. As the specific information requested by the Members is commercially sensitive in nature, it is no appropriate for the Government to disclose the details, in order not to affect the on-going discussion between the MTRCL and the contractors.

COMPARISON OF ECONOMIC BENEFITS OF CO-LOCATION OF CUSTOMS, IMMIGRATION AND QUARANTINE ("CIQ") FACILITIES ("CO-LOCATION ARRANGEMENTS") AND SEPARATE-LOCATION MODEL

5. We submitted two supplementary information papers (paper numbers CB(4)333/15-16(02) and CB(4)394/15-16(01)) to the Subcommittee on Matters Relating to Railways ("RSC") of the Legislative Council in December 2015 and two supplementary information papers (paper numbers PWSC82/15-16(01) and PWSC102/15-16(01)) to the PWSC in January 2016, which provided information relating to the economic benefits of the XRL project. We have consolidated the information as below for easy reference by the Members of the Finance Committee.

6. We estimated the direct economic benefits of the XRL project that come from the cost savings due to passenger time savings by using the transport model adopted in the paper (CB(1)503/09-10(02)) submitted to the RSC in November 2009. The relevant transport model is commonly adopted internationally to assess the direct economic benefits of transport infrastructure. **The patronage forecast at that time was based on the assumption that the XRL can expeditiously connect Hong Kong and major destinations in the Mainland and the**

passengers can conveniently complete the clearance procedures of both sides. In 2015, we adopted the transport model mentioned above to make a forecast by inputting updated data (such as growth rate in population and gross domestic product) with consideration of the latest planning data and development of Hong Kong and the Mainland (including road and railway network data, public transport data, and XRL assumed fares, etc.).

Methodology of XRL Patronage Forecast

7. 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.

8. 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: –

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

9. 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.

10. 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.

11. 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).

12. 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.

13. Based on the above transport model, the 2015 assessment on the daily patronage compared with that in November 2009 is illustrated in the table below.

	Base case in 2009			**Updated forecast in 2015**		
	2016	**2021**	**2031**	**2018**[Note]	**2021**	**2031**
Short-haul	84,000	100,800	134,700	90,600	98,200	119,800
Shenzhen (Shenzhen North and Futian)	65,400	75,500	102,100	67,500	74,000	93,400
Humen	5,900	7,400	8,900	4,800	4,800	5,800
Guangzhou South	12,700	17,900	23,700	18,300	19,400	20,600
Long-haul	15,000	18,900	25,300	18,600	21,000	30,000
Total	**99,000**	**119,700**	**160,000**	**109,200**	**119,200**	**149,800**

Note: assuming the commissioning in the third quarter of 2018.

14. The patronage forecast in 2015 shows that based on the commissioning of the XRL in 2018, the patronage forecast of first year of commissioning slightly increases compared with the forecast in 2009. On the other hand, the patronage forecast of 2021 and 2031 decreases as compared with the forecast in 2009. This is mainly due to the slower growth in local population and the slower economic growth in the Pearl River Delta. According to the assessment, the patronage of short-haul services in 2021 and 2031 decreases as compared with the forecast in 2009; while the patronage of long-haul services increases as compared with the forecast in 2009 due to improved connectivity of the Mainland high-speed rail network following the commissioning of various high-speed rail lines in the Mainland.

Time Saving for Passengers

15. 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.

16. 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 the XRL 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 ("WKT"), 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 XRL Passengers

17. 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 "Travel Characteristics Survey 2011"

published by the Transport Department. Based on the assumption made on "average time savings" as described in paragraph 16 above, the direct economic benefits of the XRL is calculated.

XRL Fare Assumption

18. We have adopted the same assumption for XRL fares in the patronage forecast in 2015 as in the assessment in 2009, i.e. the XRL fare is assumed to be comparable with that of a train to boundary with Shenzhen (i.e. taking the East Rail Line to Lok Ma Chau) and through train services to maintain the competitiveness of the XRL. The fare assumption is listed in the table below.

Destination	**XRL Assumed Fares (HK$)**
Shenzhen (Futian and Shenzhen North)	53-57
Dongguan (Humen)	153
Guangzhou (Guangzhou South)	210

Direct Economic Benefits of the XRL

19. The benefits estimated to be brought about by the cost savings due to passenger time savings as a result of the XRL project over 50 years of operation (2018 to 2067) would be about $90 billion (discounted to 2015 prices at a rate of 4%), with an Economic Internal Rate of Return ("EIRR") of 4%. The EIRR is the net rate of return[3] of the project calculated by subtracting the construction costs and operation costs during construction and the subsequent 50 years of operation from the economic benefits. The decrease in newly calculated EIRR as compared with the figure in 2009 (6%) is mainly due to the increase in capital cost for construction of the XRL, the slower growth in long-term population

[3] We assess the fare revenue for the XRL based on the updated patronage forecast and XRL assumed fares. We also base on the assumptions adopted in 2009 with consideration of inflationary factors to assess the operation cost (including energy, non-staff operating and maintenance cost, staff costs, support services, etc.) of the XRL project for assessment of the net rate of return of the project.

of Hong Kong and the slower economic growth in the Pearl River Delta, etc.

Comparison of forecast in time saving for XRL passengers and the estimated economic benefit of the project

	Base Case in 2009	**Updated forecast in 2015**
Average annual time savings over 50 years of operation	42 million hours	39 million hours
Total economic benefits overs 50 years of operation	$87 billion (discounted to 2009 prices at a rate of 4%)	$90 billion (discounted to 2009 prices at a rate of 4%)

20. However, it should be borne in mind that using only the EIRR, as derived above, to estimate the benefits of the XRL project presents only part of the picture and is in fact conservative since other indirect economic and social benefits, which could be substantial but are difficult to be easily and instantly quantified, have not been taken into account. When the Government decides to implement major transport infrastructure projects, normally we will not only consider the EIRR as estimated by the benefits brought about by passenger time savings. Other economic and social benefits, e.g. the induced development potential, improving people's livelihood, and strengthening competitiveness of Hong Kong will also be taken into account[4].

Indirect Economic Benefits of the XRL

21. The indirect benefits or positive impacts, which cannot be simply and instantly quantified, that would be brought about by the XRL project were elaborated in the paper submitted to RSC in November 2009. We have made reference to relevant research studies in the past few years about the impact on the socioeconomics of the development of

[4] Taking the example of the seven new local railway projects proposed in the Railway Development Strategy 2014, the overall EIRR is estimated at about 2%.

high-speed railway networks in the Mainland and overseas and consider that these points remain valid today. They include:

(a) improved connectivity with Mainland cities by linking the national high speed rail network;
(b) induced/additional patronage;
(c) fostering market integration and mutual complement with the Pearl Delta Region;
(d) creation of employment opportunities in construction, railway operation and further indirect sectors;
(e) enhancing development of service industry;
(f) promoting development of tourism;
(g) benefits and opportunities to re-allocate transportation resources;
(h) environmental benefits brought about by reducing reliance to road transport; and
(i) transport service of higher quality.

22. Amongst those, the major indirect benefits brought about by the XRL in four main areas are illustrated below.

Enhancing productivity

23. The Hong Kong economy has close ties with many Mainland cities and regions. There is overseas research showing that the productivity of a region can be improved by enhancing the external transportation connection of this region. The XRL enhances the connectivity of Hong Kong with many Mainland cities and regions. Through expanding import and export, enhancing matching between producers and consumers, and transferring technology and information in a more convenient way, productivity of the broader region can be fostered. Different market demands in the region can complement each other and hence give full play to their various socio-economic roles. The greater synergy so created will boost the overall productivity in the region. Some pillar industries of Hong Kong economy, such as financial services, trade, tourism and producer and professional services, stand to benefit in particular.

Inducing employment

24. As a cross-boundary transport infrastructure, the XRL will not only create job opportunities in the transportation sector in the railway operation and maintenance, as well as in retail, catering and station management at the WKT; employment opportunities will also be indirectly created in sectors supplying to and supporting the XRL operation. Furthermore, induced employment will be created as a result of increased economic activities promoted by the XRL through improved connectivity with Mainland.

Promoting tourism

25. The XRL will shorten the distance between Hong Kong and neighbourhood cities, hence opening up a new market for fast and comfortable trips to many Mainland cities at a more affordable price. This will boost the tourism industry in terms of increase in traveler-trips both into and out of Hong Kong. Local and overseas tourists may depart from Hong Kong and reach different cities in the Mainland using high-speed rail. There will also be an opportunity to introduce new tourism products such as high-speed rail multi-destination trips, air-rail inter-modal tickets, new tourist destinations etc. This is not only a development for tourism between Hong Kong and the Mainland but an attraction for overseas travelers to make Hong Kong their start or end point of multi-destination rail journeys.

Strengthening the Position of Hong Kong as the Southern Gateway to the Mainland

26. The strategic benefit of the construction of the XRL is to speedily connect Hong Kong to the many different Mainland cities and provinces. In turn, this will foster closer economic ties between Hong Kong and the Mainland and extend Hong Kong's reach into the Mainland hinterland, helping to strengthen the key position of Hong Kong as the southern gateway to the Mainland.

Co-location Arrangements Will Bring More Patronage Than Separate-location Model

27. The common target of the Hong Kong Special Administrative Region ("HKSAR") Government and the Central Government is to both ensure the maximum economic and social benefits of the XRL, and to strictly comply with the Basic Law without violating the "one country, two systems" principle. The HKSAR Government has been discussing with the Mainland authorities, with the goal being to implement co-location arrangements at the WKT at the commencement of service of the XRL.

28. We understand that currently the high speed train stations in the Mainland (including the four short-haul stations within Guangdong Province and long-haul stations in 16 cities outside Guangdong Province) do not have any established clearance facilities. Although Hong Kong currently has Intercity Through Train to Guangzhou, Shanghai and Beijing, the XRL is served in Guangzhou by Guangzhou South Railway Station, not the Guangzhou East Railway Station which serves the Intercity Through Train. For Shanghai and Beijing, although there is special arrangement for clearance staff on train arrivals to perform CIQ clearance procedures for the passengers taking the Hong Kong Intercity Through Trains, the schedule of the Intercity Through Train to Shanghai and Beijing is not frequent (on alternate days respectively), so the Mainland side can make this special arrangement. However, the Mainland side has difficulty to set up CIQ facilities in the four short-haul stations within Guangdong Province and other long-haul stations in 16 cities in the Mainalnd, or even more cities which the XRL will connect directly and implement separate-location model for XRL passengers. Moreover, since passengers on the train have not yet gone through CIQ clearance processes, it is necessary to implement closed-off management of passengers, whereby passengers departing from Hong Kong and those departing from the Mainland are separated. The operational efficiency of the XRL will be hampered as the seats in "Hong Kong passengers section" and "Mainland passengers section" cannot be used in the most efficient way. Similarly, in order to separate passengers crossing the border from those travelling within the Mainland, platform and passageway management within mainland stations will also be very

complicated, and hence reduce the overall efficiency of the XRL.

29. The above assessment on direct economic benefits adopting the methodology in 2009 has not fully reflected the benefits brought about by the implementation of co-location arrangements. In the case of co-location arrangements, the passengers may directly take the XRL train to different cities in the Mainland after they have completed the Mainland and Hong Kong CIQ clearance procedures at the WKT. If co-location arrangements are not implemented, passengers must (and can only) complete CIQ clearance procedures in a Mainland city with CIQ facilities to continue their journey to their destinations, which may facilitate the planning of their trips. **Under co-location arrangements, since passengers are not necessary to complete the CIQ clearance procedures in a Mainland city with CIQ facilities, passengers can enjoy more freedom to choose among train schedules and routes to reach their destinations directly or indirectly.** It greatly facilitates passengers' plan of their trips and enhances connectivity of the XRL. **We expect that it will attract more passengers who need to go to different Mainland cities**, especially those within the distance (journey time of about four hours) that high-speed railway has strength in. From overseas experience, within a journey time of four hours, high-speed railway provides an alternative convenient and comfortable transport mode other than by air, hence bring out new transport demand. Therefore, co-location arrangements will surely indure more patronage than separate-location model and maximise the overall efficiency of the XRL.

Transport and Housing Bureau
Highways Department
February 2016

Annex

Details of major contracts for XRL project

No.	Contract No.	Contract	Contractor	Awarded Contract Sum ($ million)
1	802	Nam Cheong Property Foundation Removal and Reprovisioning	Hsin Chong Construction Co. Ltd.	334
2	803A	West Kowloon Terminus Diaphragm Walls (Site A)	Bachy Soletanche Group Limited	461
3	803B	West Kowloon Terminus Piles (Site A - North)	Tysan Foundation Limited	497
4	803C	West Kowloon Terminus Piles (Site A - South)	VIBRO – Chun Wo Joint Venture	321
5	803D	West Kowloon Terminus Diaphragm Walls and Piles (WKCD)	Bachy Soletanche Group Limited	819
6	805	Sham Mong Road Obstruction Removal	Paul Y Construction Co. Ltd.	160
7	810A	West Kowloon Terminus Station North	Gammon – Leighton Joint Venture	8,910

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8	810B	West Kowloon Terminus Station South	Laing O'Rourke - Hsin Chong – Paul Y Joint Venture	3,321
9	811A	West Kowloon Terminus Approach Tunnel (North)	Bachy Soletanche – Laing O'Rourke Joint Venture	1,040
10	811B	West Kowloon Terminus Approach Tunnel (South)	Gammon – Leighton Joint Venture	2,883
11	815A	Supply of Metal Doors and Frames including Ironmongery	The Jardine Engineering Corporation, Ltd.	99
12	815F	West Kowloon Terminus – Public Toilet Fit-out works	Wan Chung Construction Co. Ltd.	53
13	816A	West Kowloon Terminus – Environmental Control System	Shinryo Corporation	783
14	816B	West Kowloon Terminus – Building Services Control System	Johnson Controls Hong Kong Limited	60
15	816C	West Kowloon Terminus – Electrical Installation	Shinryo Corporation	550
16	816D	West Kowloon Terminus – Fire Services, Plumbing & Drainage	Leighton – Chubb E&M Joint Venture	664

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17	820	Mei Lai Road to Hoi Ting Road Tunnels	Dragages – Bouygues Joint Venture	3,669
18	821	Shek Yam to Mei Lai Road Tunnels	Dragages – Bouygues Joint Venture	1,384
19	822	Tse Uk Tsuen to Shek Yam Tunnels	Leighton Contractors (Asia) Limited	3,235
20	823A	Tai Kong Po to Tse Uk Tsuen Tunnels	Maeda – China State Joint Venture	1,502
21	823B	Shek Kong Stabling Sidings & Emergency Rescue Sidings	Maeda – China State Joint Venture	3,218
22	824	Ngau Tam Mei to Tai Kong Po Tunnels	Kier - Kaden - OSSA Joint Venture	1,515
23	825	Mai Po to Ngau Tam Mei Tunnels	Penta – Ocean Construction Co., Ltd.	1,684
24	826	Huanggang to Mai Po Tunnels	CRCC-HC-CR15G Joint Venture	1,691
25	830	Trackwork and Overhead Line System	Chun Wo – CRGL – QR Joint Venture	1,169

26	840	Express Rail Link: Rolling Stock	CSR Qingdao Sifang Co. Ltd.	1,744
27	841A	Signalling System - Trackside Equipment	Beijing HollySys Co., Ltd.	308
28	841B	Signalling System - Trainborne Equipment	Beijing HollySys Co., Ltd.	182
29	842A	Mainland E&M Interface Modification Works	Kong Passenger Dedicated Line Co. Ltd.	94
30	843	Tunnel Environmental Control System	GAS Joint Venture	260
31	844	11kV Power Distribution	CLP Power Hong Kong Limited	89
32	846	Trackside Auxiliaries	Shinryo Corporation	295
33	847	Lifts	KONE Elevator (HK) Ltd.	175
34	848	Escalators and Moving Walkways	ThyssenKrupp Elevator (HK) Ltd.	91
35	849	Radio Communications System	GTECH-CIC Joint Venture	244

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36	850	Passenger Mobile Communications System	Comba Telecom Limited	105
37	851	Fixed Communications System	Siemens Ltd.	273
38	852	Ticketing System	Nuctech Company Limtied	166
39	853	Main Control System	Beijing HollySys Co., Ltd.	66
40	855	Building Services for Tunnel Ventilation Facilities and Emergency Rescue Siding	ATAL Engineering Ltd.	297
41	856	Building Services for Shek Kong Stabling Sidings	ATAL Engineering Ltd.	140
42	861A	Locomotives and Flat Wagons	Jiangsu KTK Locomotive & Rolling Stock Co Ltd	78
About 70 minor contracts		These contracts include procurement of plants and facilities of railway system, procurement of station facilities, landscaping works, independent monitoring of work sites, etc.		607
			Total	**45,236**