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Panel on Transport

Subcommittee on Matters Relating to Railways
Meeting on 19 April 2016

Updated background brief on capacity and loading of MTR trains

Purpose

This paper provides background information on capacity and loading of MTR trains. It also summarizes the major views and concerns expressed by Legislative Council ("LegCo") Members during previous discussions on this subject.

Background

Carrying capacity and Design Capacity

2. All train compartments of the existing MTR heavy rail lines are designed based on the industry standard adopted at the time of the construction of railway lines. The maximum carrying capacity of train compartments is calculated based on accommodating up to six persons (standing) per square metre ("ppsm") on average. The number of train compartments a train comprises and train frequency are determined at the design stage to meet projected passenger demand. Platform length is designed and constructed accordingly to ensure compatible use of the trains. As to the frequency of train services, it is regulated by the signalling system which governs the distance between operating trains to ensure safety, while maximizing efficiency. Increased frequency is made possible through provision of additional trains, but train frequency reaches its maximum level when the signalling system permits no more additional train trips. The carrying capacity permitted by this maximum train frequency level is the Design Capacity[1] of a railway line.

[1] Design Capacity of a railway line refers to the maximum number of passengers that can be carried per hour per direction when all the space within the train compartments are taken up by passengers based on a 6 ppsm passenger density level (and all seats are taken up) and train frequencies are maintained at the maximum level its signalling system permits.

3. As for the carrying capacity of Light Rail, since the carrying capacity of Light Rail Vehicles ("LRVs") largely depends on the loading which can be safely carried by the vehicles, instead of being limited by other infrastructure (e.g. station concourse and escalators) like the heavy rail, LRVs can carry more passengers than heavy rail trains and achieve a passenger density of eight ppsm.

4. According to the Administration's observation in recent years, passengers' travelling behaviour and preferences have changed. People are less willing to board a train that looks crowded, and the increasing use of mobile devices requires more personal space on trains. Coupled with other factors that would increase the dwell time of trains at each platform (e.g. the retrofitting of platform screen doors and automatic platform gates on pre-existing rail line, reopening and reclosing of doors as objects being caught between doors), the actual carrying capacity is less than Design Capacity. Trains running during the busiest hours on the busiest corridors can only achieve a passenger density of around four ppsm in actual operation. Passenger throughput and loading of MTR heavy rail lines per hour per direction during morning peak for critical links in 2014 are listed in **Appendix I**. The overall passenger loading during the busiest hour of the morning peak hours for the Light Rail is around 80% in 2014, assuming a carrying capacity of 200 passengers for each LRV.

Increase in train frequencies

5. With a view to alleviating crowdedness on trains and reducing passengers' waiting time, the MTR Corporation Limited ("MTRCL") launched the "Listening • Responding" programme in 2012. Under the programme, MTRCL has introduced a "2+1" train service arrangement[2] for Tseung Kwan O Line during the morning and evening peak periods since 8 December 2014. According to MTRCL, from 2012 to 2014, more than 2 400 train trips were added to different MTR lines per week and more than 200 extra trips were made on Light Rail routes during both peak and non-peak periods on weekdays and weekends[3]. Furthermore, since the current signalling systems are operating at maximum level, MTRCL has awarded the signalling system replacement contract in March 2015 to replace the signalling systems of seven railway lines (i.e. Tsuen Wan line, Island Line, Kwun Tong Line, Tseung Kwan O Line, Disney Resort Line, Tung Chung Line and Airport Express). Upon the full commissioning of the upgrading of signalling systems of the seven railway lines in 2026, the overall carrying capacity can be enhanced by about 10%.

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[2] For every group of three trains departing from North Point Station, the first two trains head to Po Lam Station and the third train terminates at LOHAS Park Station.

[3] http://www.mtr.com.hk/en/customer/services/listening_programme2015.html

New railway lines to increase network carrying capacity

6. Over the next few years, with the opening of new domestic railway lines now under construction, there will be additional carrying capacity and a redistribution of existing passenger flow in the MTR system. To complement the commission of Shatin to Central Link ("SCL"), the existing seven-car trains on the West Rail Line ("WRL") will be replaced by eight-car trains in phases starting from January 2016. When all the eight-car trains have been put into service in 2018, the overall carrying capacity of WRL will be enhanced by about 14%. For the East Rail Line ("ERL"), after the commissioning of the "East-West Corridor" of SCL in 2019, it is estimated that about 20% of the passengers of the ERL from the section between Tai Wai and Kowloon Tong will switch to the "East-West Corridor" of SCL for onward trips to Kowloon East and Hong Kong Island, which can alleviate the loading of the East Rail Line.

7. In September 2014, the Administration announced the Railway Development Strategy 2014 ("RDS-2014"), which is an update of the Railway Development Strategy 2000 and provides a framework for planning the expansion of Hong Kong's railway network up to 2031. RDS-2014 recommends that seven railway projects (i.e. Northern Link and Kwu Tung Station, Tuen Mun South Extension, East Kowloon Line, Tung Chung West Extension, Hung Shui Kiu Station, South Island Line (West) and North Island Line) be completed in the planning horizon up to 2031 having regard to transport demand, cost-effectiveness and the development needs of new development areas and other new developments. All new railway lines to be recommended in the new railway development blueprint will use 4 ppsm as the target service benchmark where resources and other relevant factors permit.

Other improvement measures

8. To achieve smoother passenger flow and optimize the efficiency of train operations during peak hours, MTRCL has implemented various measures to enhance platform management to even out passenger distribution on platforms and in trains, including:

(a) erecting barriers at the platforms of key stations;

(b) deploying Platform Assistants to encourage passengers to move further inside trains to make room for the others, and to manage the boarding and alighting process to minimise the number of times that train doors have to be reopened and reclosed; and

(c) applying new queuing arrangement to facilitate passengers to get on and off trains more quickly.

Major concerns over capacity and loading of MTR trains

9. Members have discussed capacity and loading of MTR trains in the Fifth LegCo. Their major views and concerns are summarized in the ensuing paragraphs.

Fare concessions to alleviate crowdedness in MTR trains

10. At the Subcommittee on Matters Relating to Railways ("the Subcommittee") meetings, members suggested that MTRCL should, with reference to the past practices, provide early-bird discount to passengers in order to encourage them to use MTR outside peak hours. The Administration explained that the early-bird scheme could not be simply copied from the ones implemented previously because the local circumstances nowadays were different. MTRCL supplemented that the early-bird scheme should be carefully studied. From 1 June 2015 to 31 May 2016, MTRCL provides early-bird discount to passengers who use an Adult Octopus to exit any of 29 designated core urban stations between 7:15 am and 8:15 am on weekdays (except public holidays).[4]

Replacement of MTR signalling systems

11. Members urged MTRCL to expedite the replacement of MTR signalling systems so as to increase the train frequencies as soon as practicable. They also questioned whether the Administration had assessed if the upgraded signalling systems were able to cope with the rapid growing population, in particular, in New Territories East and West. MTRCL promised that it would expedite upgrading MTR signalling systems.

Development of new railway projects

12. Members generally supported the development of new railway projects as the new railways would, in the long run, be able to alleviate the crowdedness of the existing rail lines. However, some members of the Subcommittee and the Panel on Transport were concerned whether WRL and the Light Rail could cope with the future population growth in Northwest New Territories ("NWNT"), as well as the increasing demand arising from the commissioning of the Northern Link, the Tuen Mun South Extension and Hung Shui Kiu Station. They were also worried that the train capacity for ERL would be reduced after the replacement of 12-car trains with nine-car trains in relation to SCL.

[4] http://www.mtr.com.hk/en/customer/main/early_bird.html

13. The Administration explained that they had been closely monitoring the transport demand in NWNT. Upon completion of SCL and other proposed railway projects set out in RDS-2014, the crowdedness of WRL should have been relieved. The Administration would better coordinate various public transport modes and commence studies for improving the carrying capacity of the railways in NWNT beyond 2031. With regard to members' concern on the replacement of 12-car trains with nine-car trains for ERL which might aggravate the overcrowding condition, MTRCL advised that the impact of which would be offset by the enhanced signalling system as train frequency would be shortened. The six interchange stations under SCL would also serve the diverging purpose and share the patronage of ERL.

Transport policy

14. Some Subcommittee members opined that the Administration should review the current transport policy of having railway as the backbone of the public transport system in Hong Kong, attaching greater importance to other public transport modes so as to lessen the burden on MTR train services. In response, the Administration advised that they would strive to build a diversified public transport system under which various public transport modes could complement with each other so that the public would be provided with different choices.

LegCo questions and relevant papers

15. In the Fifth LegCo, Members raised ten questions relating to the carrying capacity and loading of MTR train services, including the Light Rail, WRL, Tseung Kwan O Line and Tung Chung Line. The hyperlinks to the above LegCo questions and other relevant papers are in **Appendix II**.

Recent developments

16. The Administration is invited to brief members on the capacity and loading of MTR trains at the Subcommittee meeting to be held on 19 April 2016.

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Passenger throughput and loading of MTR heavy rail lines per hour per direction during morning peak for critical links in 2014

Heavy rail line (critical link)	**East Rail Line** (Tai Wai to Kowloon Tong)	**West Rail Line** (Kam Sheung Road to Tsuen Wan West)	**Ma On Shan Line** (Che Kung Temple to Tai Wai)	**Tseung Kwan O Line** (Yau Tong to Quarry Bay)	**Island Line** (Tin Hau to Causeway Bay)	**Kwun Tong Line** (Shek Kip Mei to Prince Edward)	**Tsuen Wan Line** (Tsim Sha Tsui to Admiralty)	**Disneyland Resort Line** (Sunny Bay to Disneyland Resort)	**Tung Chung Line** (Olympic to Kowloon)	**Airport Express** (Tsing Yi to Airport)
Passenger throughput	58 700	36 600	15 200	45 200	53 700	48 100	52 300	1 800	22 800	2 500
Loading (6 ppsm)	71%	74%	57%	72%	67%	67%	70%	19%	61%	52%
Loading (4 ppsm)	100%	104%	80%	102%	94%	95%	98%	26%	85%	61%

Note:

1. The MTRCL has implemented the "2+1" train service arrangement on Tseung Kwan O Line from 8 December 2014 during the morning and evening peak periods. For every group of three trains departing North Point Station, the first two trains will head to Po Lam Station while the third train will terminate at LOHAS Park Station. Under the "2+1" train service arrangement, the passenger loading with 6 ppsm has been reduced from 72% to 65%, while the passenger loading with 4 ppsm has been reduced from 102% to 91%.

2. "ppsm" stands for persons (standing) per square meter.

Source: Annex I of the written reply by the Secretary for Transport and Housing to Hon Michael TIEN's question as raised in the Legislative Council meeting dated 9 December 2015

Appendix I

Appendix II

Panel on Transport
Subcommittee on Matters Relating to Railways

List of relevant papers on capacity and loading of MTR trains

Committee	Date of meeting	Minutes/Paper
Council meeting	17.7.2013	Hon LEUNG Che-cheung raised a question on train services of MTR West Rail Line and Light Rail
Council meeting	4.12.2013	Hon Tony TSE Wai-chuen raised a question on MTR service
Council Meeting	19.2.2014	Dr Hon KWOK Ka-ki raised a question on the railway services for residents in Tsing Yi
Subcommittee on Matters Relating to Railways	28.2.2014	Administration's paper on capacity and loading of MTR trains Minutes of meeting Administration's supplementary paper on the capacity and loading of MTR trains, the outcome of the independent expert review of MTRCL's overhead line system as a result of the insulator incidents in February 2014 and the report on stray dog incident on the East Rail Line on 20 August 2014 (Chinese version only) Administration's supplementary paper on carrying capacity of the West Rail Line
Council meeting	19.3.2014	Hon Starry LEE Wai-king raised a question on crowdedness in MTR train compartments
Council meeting	14.5.2014	Dr Hon LAM Tai-fai raised a question on MTR railway services

Committee	Date of meeting	Minutes/Paper
Subcommittee on Matters Relating to Railways	27.10.2014	Administration's paper on Railway Development Strategy 2014 Minutes of meeting
Council meeting	3.12.2014	Hon CHAN Han-pan raised a question on Railway Development Strategy 2014
Council meeting	17.12.2014	Hon Tony TSE Wai-chuen raised a question on additional demand for railway services
Council meeting	25.3.2015	Dr Hon Elizabeth QUAT raised a question on the transport to and from Tseung Kwan O
Panel on Transport	17.7.2015	Administration's paper on planning of transport infrastructure at Northwest New Territories Minutes of meeting
Council meeting	9.12.2015	Hon Michael TIEN raised a question on train services
Council meeting	17.2.2016	Hon IP Kwok-him raised a question on the transport of Tseung Kwan O

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