

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

Deployment of Coupled-set Light Rail Vehicles

Purpose

This paper briefs Members on the current situation and way forward regarding the deployment of coupled-set Light Rail Vehicles (“LRVs”) by the MTR Corporation Limited (“MTRCL”) in providing Light Rail service.

Development of the Light Rail

2. The Light Rail was commissioned in 1988. The then network comprised 6 routes and 70 LRVs serving Tuen Mun and Yuen Long districts, with 43 LRVs providing service during peak hours. During the initial years of operation, the average daily patronage was about 150 000. In 1993, the Light Rail network was extended to Tin Shui Wai in tandem with the development of this new town. The number of Light Rail routes increased to 9 and the LRV fleet size was expanded to 100 LRVs, with 88 LRVs providing service during peak hours. Following the further development of the Tin Shui Wai section of the Light Rail, some Light Rail routes were reorganised in 2003 and 2004 to strengthen the service in Tin Shui Wai. The number of Light Rail routes was increased to 12. Upon the Rail Merger in December 2007, the operation of the Light Rail was taken over by the MTRCL. In 2008, the average daily patronage was about 376 000. In 2016, the figure increased to about 490 000. According to the on-site observation by MTRCL in 2016, the average loading of Light Rail is around 80%¹. During peak hours, most of the passengers can board the first arriving LRV. Details of the current utilisation are at **Annex 1**.

¹ As there may be a number of routes passing through a single Light Rail stop, the MTRCL cannot ascertain which routes the passengers take after they purchase tickets or pay by Octopus. Therefore, the MTRCL is unable to assess the loading of individual Light Rail routes by making reference to the entry/exit records of passengers. The approach of on-site observation has been adopted by the MTRCL in assessing the loading of Light Rail. MTRCL staff observe and assess the vacant space of LRV compartments at platforms during the busiest hour during morning peak hours. Data obtained within the hour will be consolidated for assessing the loading of individual Light Rail routes. In 2016, the loading of the 12 Light Rail routes ranged from 69% to 96%, with 80% as an average.

Carrying capacity of Light Rail

3. The carrying capacity of the Light Rail system is determined by various factors, including the coverage of the network, number of LRVs, layout and design of the LRV compartments, service frequency, deployment of single-set and coupled-set LRVs, and design of Light Rail platforms. Also, operating at grade, the Light Rail adopts an open design and has to share certain space of the roads with other road users. The traffic at the junctions of the shared road sections will affect the number of LRVs which can be deployed, thereby affecting the carrying capacity of Light Rail.

4. Similar to other MTR railway lines, the respective highest loading of the Light Rail routes is mostly found within an hour in the morning (the busiest hour slightly varies among different Light Rail routes). The MTRCL has been closely monitoring the overall service demand for the Light Rail, the travelling pattern of passengers and the loading of the Light Rail routes. It endeavours to work out corresponding service plans and deployment of Light Rail, and put in place different measures to increase the carrying capacity of the Light Rail, with a view to shortening the waiting time of passengers of the busy sections of various Light Rail routes during the morning peak hours as far as practicable, and providing a more comfortable travelling environment for passengers. Currently, on average 133 LRVs² are deployed to provide Light Rail service during the morning peak hours on weekdays.

5. In view of the increase in the patronage of the Light Rail, the MTRCL has undertaken the following measures to increase the carrying capacity of the service. Besides the patronage, these measures also take into account the travelling pattern of passengers and the situations of individual busy routes. Different supporting facilities are required for different measures and these measures have their own effect and constraints.

² The LRV fleet now consists of 140 LRVs. 133 LRVs on average are deployed to provide service during the peak hours every day, while 7 LRVs are sent to the Light Rail Depot on a rotational basis for routine maintenance. Besides, two LRVs were severely damaged in accidents and have been disposed of.

Increase in frequency

6. The MTRCL increases the frequency of the Light Rail service during peak and non-peak hours where practicable. Since 2009, 22 newly purchased LRVs had been delivered to Hong Kong by batches, and all of them were put into service by 2011. The number of LRVs in service was increased from 118 to 140. Since 2012, Light Rail trips have been added by about 660 per week, increasing the total number of trips from 20 370 to 21 030 per week, which represents an increase of 3%. However, since the Light Rail adopts an open design and has to share certain space of the roads with other road users, the shared road sections impose certain constraints on the number of operating LRVs. Considering the current traffic condition and the capacity of the roads, the utilisation rates of certain road junctions are already very high and the room for increasing the Light Rail service frequency during morning peak hours is rather small.

Layout and design of the LRV compartments

7. There are currently four generations of LRVs in operation. They came into operation at different time and vary slightly in their compartment designs. In particular, the carrying capacity of the Phase 1 LRVs was slightly lower than that of LRVs of the other three generations. The MTRCL completed the refurbishment of the Phase 1 LRVs in 2014. The refurbished compartments are basically the same as those of the Phase 4 LRVs and the average carrying capacity of these LRVs was increased by about 8%. As for LRVs of the other three generations, since the layouts of the compartments have already enabled the maximum carrying capacity, it would be difficult to further increase the carrying capacity by modifying the layouts of the compartments.

Platform management

8. The MTRCL strengthens its management of passenger flow at platforms through different measures, including improving the locations of the entry/exit processors and the design of the access at Light Rail platforms, and widening the space for passengers at platforms with very high utilisation rates (such as the Tai Tong Road Stop) where practicable, so that passengers can enter and leave the LRV compartments and platforms more smoothly. LRVs can then depart on time and the overall

carrying capacity of Light Rail service can be increased.

Short-haul special service

9. The patronage of some sections of individual Light Rail routes is higher (particularly the sections connecting to the West Rail Line stations). To enable effective diversion of passenger flow in these busier sections and stops, the best way is to introduce short-haul special service. The MTRCL has introduced short-haul special service to some busier Light Rail sections (including Routes 505, 507, 614, 614P, 615P, 751, 705 and 706) to carry passengers to and from the West Rail Line stations. Nevertheless, the short-haul special service is not applicable to all sections of all routes. The prerequisite is that there should be enough track space between the original scheduled LRV trips for the extra short-haul special service. Also, similar to addition of ordinary LRV trips, when increasing the short-haul special service, the constraint imposed by the open design of the Light Rail system on the number of operating LRVs should be considered.

Coupled-set LRVs

10. LRVs can be operated in the form of single-set or coupled-set. As long as circumstances allow, the MTRCL would deploy coupled-set LRVs to increase the carrying capacity of the Light Rail. Through flexible deployment of single-set and coupled-set LRVs, the MTRCL has increased the carrying capacity of the Light Rail and relieved crowdedness.

11. The purposes, current situation, applicable conditions and experience with regard to the deployment of coupled-set LRVs are set out in the ensuing paragraphs.

Purposes of deploying coupled-set LRVs and current situation

12. Deploying additional LRVs, either single-set or coupled-set, can increase the carrying capacity of the Light Rail. When a coupled-set LRV reaches a stop, passengers can alight from both compartments at the same time. Therefore, a coupled-set LRV can attain higher efficiency and achieve better on-time performance if compared with two single-set LRVs, enhancing the overall operational efficiency and the carrying

capacity of the Light Rail. On the other hand, single-set LRVs can be deployed with greater flexibility. Generally speaking, short-haul special service is mainly operated by single-set LRVs, which can also increase the service frequency and the carrying capacity effectively.

13. Having carefully considered the patronage of the various Light Rail routes, the travelling pattern of passengers, the busy sections of individual routes and the purposes of deploying single-set and coupled-set LRVs as mentioned above, the MTRCL has formulated the current deployment arrangements for LRVs. The ordinary service of the 12 Light Rail routes during peak hours are categorised into three types –

- (a) the whole route is operated by coupled-set LRVs: Routes 705 (Tin Shui Wai Circular Route), 706 (Tin Shui Wai Circular Route) and 761P (Tin Yat – Yuen Long);
- (b) the route is operated by a mix of single-set and coupled-set LRVs: Routes 505 (Sam Shing – Siu Hong), 507 (Tuen Mun Ferry Pier – Tin King), 610 (Tuen Mun Ferry Pier – Yuen Long) and 751 (Yau Oi – Tin Yat); and
- (c) the whole route is operated by single-set LRVs: Routes 614 (Tuen Mun Ferry Pier – Yuen Long), 614P (Tuen Mun Ferry Pier – Siu Hong), 615 (Tuen Mun Ferry Pier – Yuen Long), 615P (Tuen Mun Ferry Pier – Siu Hong) and 751P (Tin Shui Wai – Tin Yat).

14. The number of coupled-set LRVs in service during morning peak hours accounts for around 36% of the total number of LRVs, representing an increase by 9% if compared with the situation in 2009. Details are set out in **Annex 2**. As observed by the MTRCL, the above deployment arrangements during the peak hours can, to a large extent, cater for the passenger demand and the road traffic. Take Route 705 which serves Tin Shui Wai as an example: in 2009, the route was operated by two single-set and three coupled-set LRVs during peak hours. The

maximum carrying capacity during peak hours was 3 921 passengers³ per hour and the average loading rate of the LRVs was 95% (see **Annex 2** for details). In 2016, the route was operated by five coupled-set LRVs. The maximum carrying capacity increased to 4 900 passengers per hour and the loading dropped to 87%, relieving the crowdedness. For certain Routes (such as 614P), deploying an appropriate number of additional single-set LRVs can already help lower the loading. As for Routes 505 and 507, in light of their higher patronage, the MTRCL has increased their frequency and carrying capacity by deploying an appropriate number of additional single-set and coupled-set LRVs. The loading of the two routes has dropped by about 20%.

Applicable conditions for and the experience of the deployment of coupled-set LRVs

15. The MTRCL has been planning and adjusting the Light Rail service in accordance with the changes in the overall service demand. In determining the type of measures to be adopted to increase the carrying capacity, the MTRCL also needs to consider the actual operating environment and conditions. As regards the deployment of coupled-set LRVs, according to operating experience, the MTRCL has to consider the following factors.

³ The design capacity of a LRV is based on the total weight it can carry safely (according to the information provided by the manufacturers). According to the MTRCL, each LRV can safely carry a total weight of around 13 700 kilogrammes. On this basis, the design capacity of a LRV is around 240 persons. How this design capacity could be translated into passenger density in terms of persons (standing) per square metre (“ppsm”) would depend on the number of seats in a LRV. There are currently four generations of LRVs in operation. They came into operation at different time and vary slightly in their design capacity. On average, the design capacity of about 240 persons per LRV could in theory be translated into a passenger density of about 8 ppsm for one single-set LRV. A number of factors may affect the actual number of passengers that can be carried by a LRV. These factors include the riding habits of passengers (e.g. increasing number of passengers using mobile devices, such as tablet computers or smart phones, thus taking up more space). Owing to these factors, in practice the maximum number of passengers that are carried by a single-set LRV, as observed during peak hours, is about 200, which can in theory be translated into a passenger density of about 6-7 ppsm. This figure, which is calculated based on the fact that each single-set LRV can at most carry about 200 passengers as observed on site, is the actual passenger density of the Light Rail under the actual operating environment.

Junctions at the shared road sections

16. At present, all Light Rail platforms contain the hardware required for the operation of coupled-set LRVs. Nevertheless, since the Light Rail adopts an open design, the MTRCL has to consider, in addition to the facilities available at Light Rail stops, the traffic volume of roads, in particular the utilisation of each junction, when deciding whether more coupled-set LRVs should be introduced to a particular Light Rail route or to a particular section of a Light Rail route. There are 11 junctions with busier traffic (see **Annex 3**) along the existing Light Rail routes. At these junctions, the traffic volume is rather high as there are considerable number of other vehicles in addition to LRVs. Although LRVs have certain priority in passing these junctions, they still have to wait for traffic lights from time to time to allow time for other road users to cross the junctions. When determining the most effective deployment of LRVs for Light Rail routes passing by these junctions in order to increase the carrying capacity, the MTRCL has to take into account such factors as the waiting time for the traffic lights, the journey time, the carrying capacity of each LRV and the distance between junctions, so as to decide whether coupled-set or single-set LRVs should be deployed for the additional services.

17. Considering the current road situations and volumes, the utilisation rates of certain junctions passed by Light Rail routes are already very high during peak hours (especially the busier junctions set out in **Annex 3**). If a large number of additional coupled-set LRVs are deployed during peak hours, the LRVs may obstruct one another, reducing the overall operating speed and the operational efficiency of the Light Rail. The purpose of increasing the carrying capacity cannot be achieved.

Technical constraints of coupled-set LRVs

18. The length of a coupled-set LRV is as twice as that of a single-set LRV. Coupled-set LRVs take longer time than single-set LRVs when turning or passing through turnouts or inner roads, thus affecting the journey time. To maximise the effectiveness of service, the MTRCL has to carefully consider the number of single-set and coupled-set LRVs that can be accommodated by an individual Light Rail route.

Overlapping routes

19. Some sections of some Light Rail routes overlap. For example, Routes 610, 614 and 615 all run from Tuen Mun to Yuen Long and share most sections along the Castle Peak Road. When travelling through the busier junctions, LRVs encounter traffic congestion from time to time. The problem is more severe at the junction between Castle Peak Road – Yuen Long and Fung Cheung Road and the junction between Castle Road – Yuen Long and Yuen Long On Lok Road. If a large number of additional LRVs (no matter single-set or coupled-set LRVs) are deployed under such circumstances, the Light Rail system will become even more crowded and it will be difficult for LRVs to arrive at stops on time. In this case, the overall carrying capacity cannot be effectively increased.

Public Transport Strategy Study

20. The Government and the MTRCL are examining the long-term development of Light Rail in the Public Transport Strategy Study (“PTSS”). As mentioned in the paper submitted by the Transport and Housing Bureau to the Legislative Council Panel on Transport in November 2014 (please refer to LC Paper No. CB(1)238/14-15(06) for details), topics covered in the PTSS include: (1) the feasibility of increasing the carrying capacity of Light Rail with original design of the system; (2) the feasibility of upgrading the existing system to increase the carrying capacity; (3) the long-term demand of North West New Territories for public transport services; and (4) the roles of various public transport services including Light Rail in meeting such demand.

21. Specifically, in view of the constraints on the effective increase of carrying capacity of the Light Rail system through increasing the number of LRVs, the Government and the MTRCL are examining the feasibility of the following measures:

- (1) To review the overlapping Light Rail routes at busy road sections. Since the commissioning of the West Rail Line in 2003, its service partly overlaps with that of Light Rail serving Yuen Long to Tuen Mun, and the number of passengers using Light Rail as a long-haul transport mode (e.g. cross-district journeys between Yuen Long and Tuen Mun) has decreased. According to the MTRCL, long-haul passengers has dropped from 7% (about

25 700 passenger trips) in 2009 to 5% (about 23 000 passenger trips) of the daily passenger trips in 2016⁴. The PTSS will examine the feasibility of rationalising some Light Rail routes to reduce overlapping of the routes and relieve congestion, enhance the capability of increasing the number of LRVs and increase the overall carrying capacity of Light Rail. If the route rationalisation is found feasible after studies, certain Light Rail passengers (such as cross-district passengers) will naturally need to interchange from one Light Rail route to another route;

- (2) To review whether traffic lights at busier junctions can be adjusted to better dovetail with the time for LRVs to cross the junctions; and
- (3) To review whether the design of certain busier junctions can be enhanced to shorten the waiting time of LRVs at junctions as far as practicable.

22. To expand the Light Rail fleet, the MTRCL awarded a contract in July 2016 to purchase 40 new LRVs, of which 30 will be used to replace Phase 2 LRVs which have been in service since 1992, while the remaining 10 would be deployed to expand the fleet. The PTSS will examine how these 10 LRVs can be deployed effectively during peak hours, including the feasibility of increasing the supply of coupled-set LRVs and deploying more coupled-set LRVs in individual Light Rail routes, in order to increase the carrying capacity of Light Rail. It is expected that these 10 LRVs will be delivered to Hong Kong by batches between 2019 and 2023 to strengthen the service during peak hours. Upon completion of the PTSS, the MTRCL will confirm with its supplier the concrete delivery time of the LRVs, with a view to increasing the supply of LRVs as soon as possible and making the most appropriate deployment of LRVs (including single-set and coupled-set vehicles).

23. The PTSS is expected to be completed in mid-2017. The findings of the above studies will be included in the PTSS report.

⁴ According to the MTRCL, Octopus users travelling for 16 or above stops or single-journey ticket users travelling for 4 or above fare zones can be regarded as long haul passengers. Apart from Light Rail, passengers can also choose to travel on the West Rail Line or to interchange from Light Rail to West Rail Line to arrive at their destinations.

Conclusion

24. By further implementing and enhancing the measures mentioned in the above paragraphs, there is still room for increasing the carrying capacity of the Light Rail system. Nevertheless, having regard to the sharing of certain space of the roads with other road users, the constraint imposed by the open design of the Light Rail system on the number of operating LRVs should be taken into account. Any increase in the number of LRVs operating during peak hours must be carefully considered to ensure that the carrying capacity of Light Rail can be effectively enhanced. The Government and the MTRCL will continue to conduct the studies of enhancing the carrying capacity of Light Rail under the PTSS. Findings will be reported in mid-2017.

Other Public Transport Services in North West New Territories

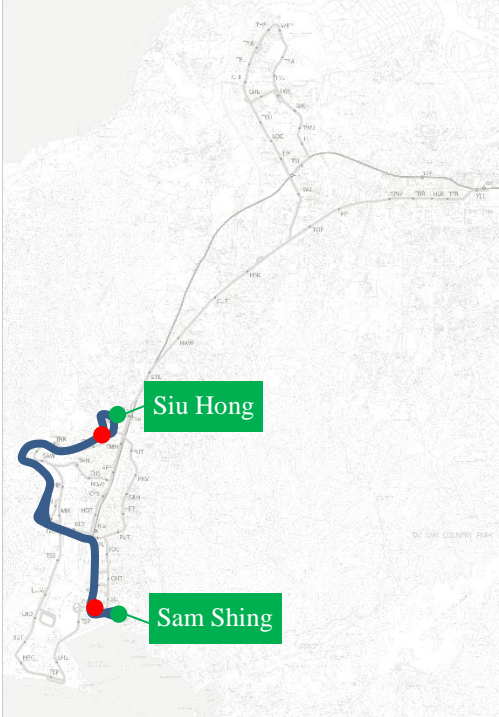
25. In addition to Light Rail, there are other mass transit public transport services in North West New Territories (“NWNT”) which provide the residents with different choices. As regards the West Rail Line, to tie in with the commissioning of the East-West Corridor of the Shatin to Central Link in mid-2019, the MTRCL is progressively converting the West Rail Line trains from seven-car to eight-car ones. When all trains have been converted to eight-car, the carrying capacity can be increased by about 14%, from about 35 000 passengers per hour to about 40 000 passenger per hour during peak hours.

26. Franchised buses are mass carriers on roads. In the past few years, the Government and franchised bus operators have strengthened the external bus services of Tuen Mun and Yuen Long districts, including enhancing the interchange supporting facilities and strengthening the services to enable passengers to continue to enjoy a wide range of services. Regarding the enhancement of interchange supporting facilities, the full commissioning of the bus-bus interchange of Tuen Mun Road in mid-2013 facilitates the public to travel to more destinations by means of different bus routes, thus improving the external bus network of the district. Also, franchised bus companies have installed seats and real time bus arrival information display panels at interchange stations to further improve the environment for waiting passengers. In addition, as far as Tuen Mun or Yuen Long is concerned, franchised bus companies introduced nine new routes between 2014 and 2016, and enhanced the services of 23 routes (e.g. extending the service hours, extending bus routes or increasing the frequency of bus services), providing a total of

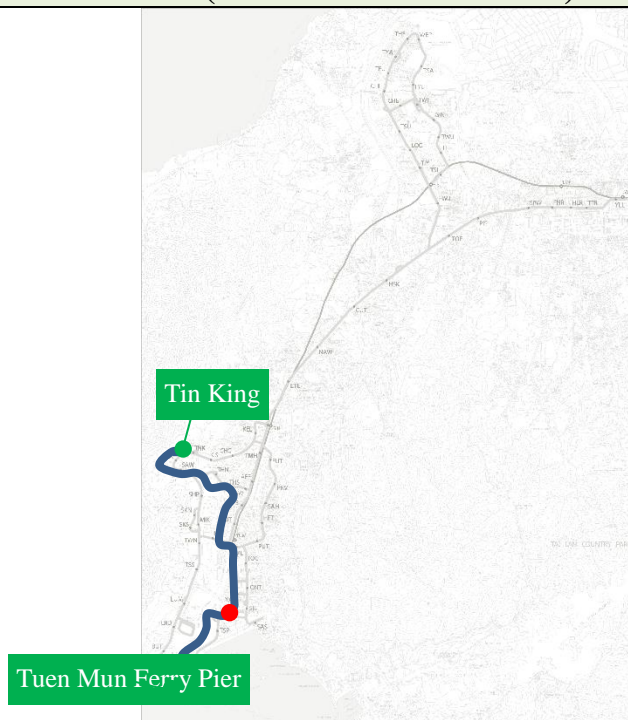
more than 100 daily trips to dovetail with population growth and changes in passenger demand. The Transport Department and franchised bus operators will continue to pay close attention to residents' demand for franchised bus services, and continue to suitably adjust the external bus services of the two districts.

**Transport and Housing Bureau
MTR Corporation Limited
3 February 2017**

Utilisation of the 12 Light Rail routes during peak hours

Route 505 – Sam Shing to Siu Hong (commissioned in 1988)	
 A map showing the route of Light Rail 505. The route is highlighted in blue, starting from Sam Shing (marked with a red dot) and ending at Siu Hong (marked with a green dot). The map shows the route passing through various streets and junctions in the area.	
Journey time	About 25 minutes for a single journey (Total route length: about 5.9 km)
Number of stops	16(Siu Hong-bound journeys); 14(Sam Shing-bound journeys)
Frequency of service	6 – 9 minutes
Number of LRVs deployed	6 single-set and 2 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	2 356
Loading at the busiest section in 2016	74%
Number of junctions en-route	17 for Siu Hong-bound journeys and 16 for Sam Shing-bound journeys, of which 2 are busy junctions: <ol style="list-style-type: none">1. Tsing Lun Road (near Tuen Mun Government Primary School)2. Junction between Hoi Chu Road/Tuen Mun Heung Sze Wui Road

**Route 507 – Tuen Mun Ferry Pier to Tin King
(commissioned in 1989)**



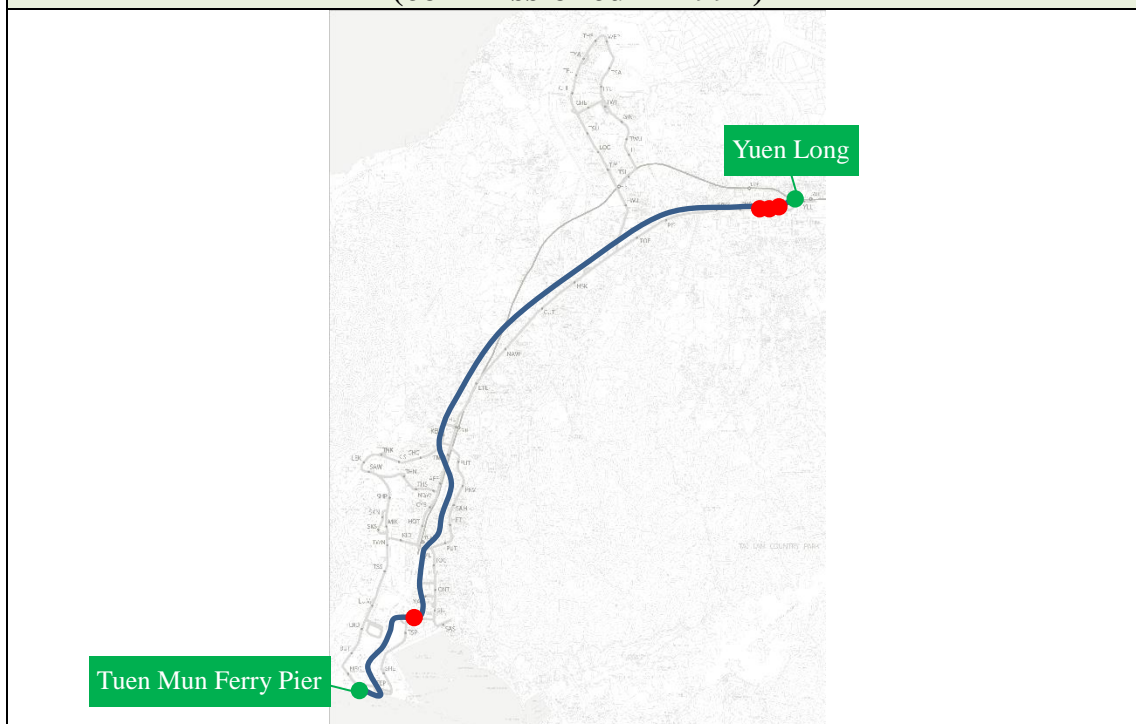
Journey time	About 27 minutes for a single journey (Total route length: about 6.6 km)
Number of stops	16
Frequency of service	5 – 9 minutes
Number of LRVs deployed	10 single-set and 1 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	2 430
Loading at the busiest section in 2016	83%
Number of junctions en-route	18, of which 1 is a busy junction: 1. Junction between Hoi Chu Road/Tuen Mun Heung Sze Wui Road

**Route 610 – Tuen Mun Ferry Pier to Yuen Long
(commissioned in 1988)**



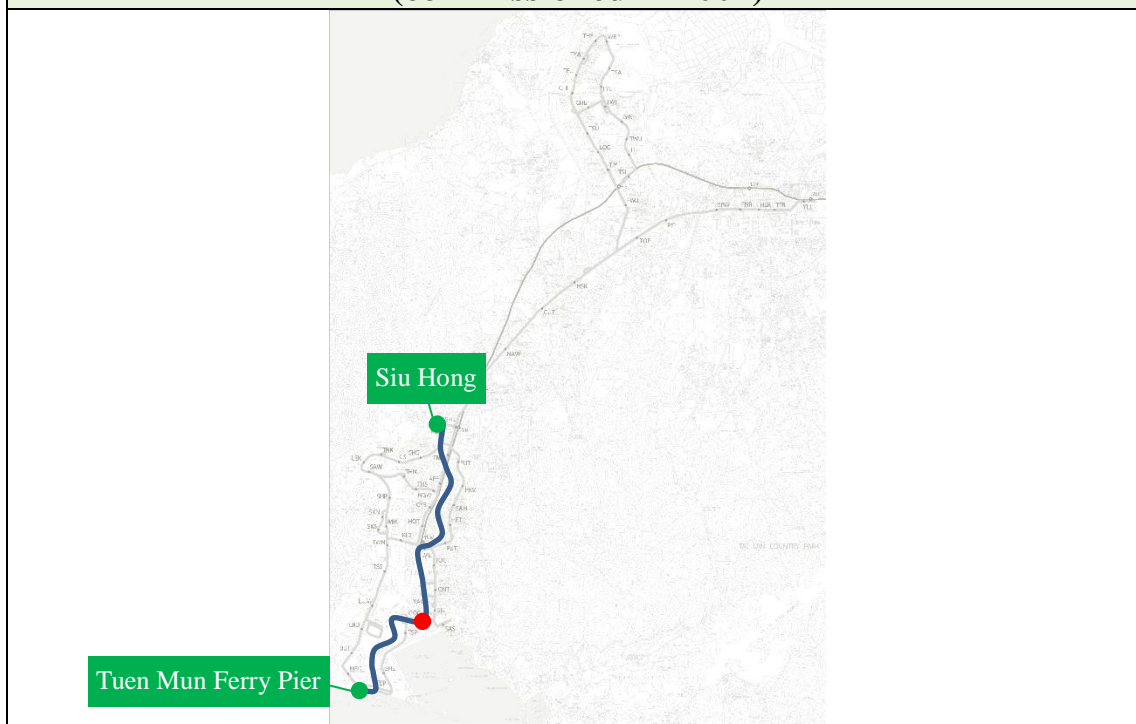
Journey time	About 45 minutes for a single journey (Total route length: about 13.7 km (Yuen long-bound journeys) / about 14.3 km (Tuen Mun-bound journeys))
Number of stops	26
Frequency of service	5 – 9 minutes
Number of LRVs deployed	11 single-set and 2 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	2 019
Loading at the busiest section in 2016	85%
Number of junctions en-route	43 for Yuen Long-bound journeys and 45 for Tuen Mun-bound journeys, of which 3 are busy junctions: 1. Junction between On Lok Road / Castle Peak Road-Yuen Long Section 2. Junction between Fung Cheung Road / Castle Peak Road-Yuen Long Section 3. Junction between Kuk Ting Street / Tai Tong Road and Castle Peak Road-Yuen Long Section

Route 614 – Tuen Mun Ferry Pier to Yuen Long (commissioned in 1992)



Journey time	About 42 minutes for a single journey (Total route length: about 13.4 km)
Number of stops	24
Frequency of service	10 – 17 minutes
Number of LRVs deployed	7 single-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	980
Loading at the busiest section in 2016	69% (average loading of 614 and 614P)
Number of junctions en-route	34, of which 4 are busy junctions: <ol style="list-style-type: none"> 1. Junction between On Lok Road / Castle Peak Road – Yuen Long Section 2. Junction between Fung Cheung Road / Castle Peak Road – Yuen Long Section 3. Junction between Kuk Ting Street / Tai Tong Road / Castle Peak Road – Yuen Long Section 4. Junction between Hoi Chu Road / Tuen Mun Heung Sze Wui Road

**Route 614P – Tuen Mun Ferry Pier to Siu Hong
(commissioned in 2004)**



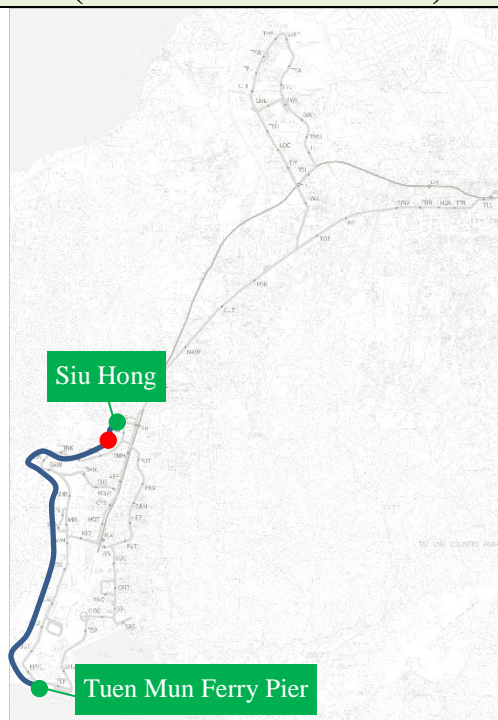
Journey time	About 22 minutes for a single journey (Total route length: about 5.9 km (Siu Hong-bound journeys) / about 5.6 km (Tuen Mun Ferry Pier-bound journeys))
Number of stops	13
Frequency of service	7 – 12 minutes
Number of LRVs deployed	5 single-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	1 225
Loading at the busiest section in 2016	69% (average loading of 614 and 614P)
Number of junctions en-route	9, of which 1 is a busy junction: 1. Junction between Hoi Chu Road / Tuen Mun Heung Sze Wui Road

Route 615 – Tuen Mun Ferry Pier to Yuen Long (commissioned in 1993)



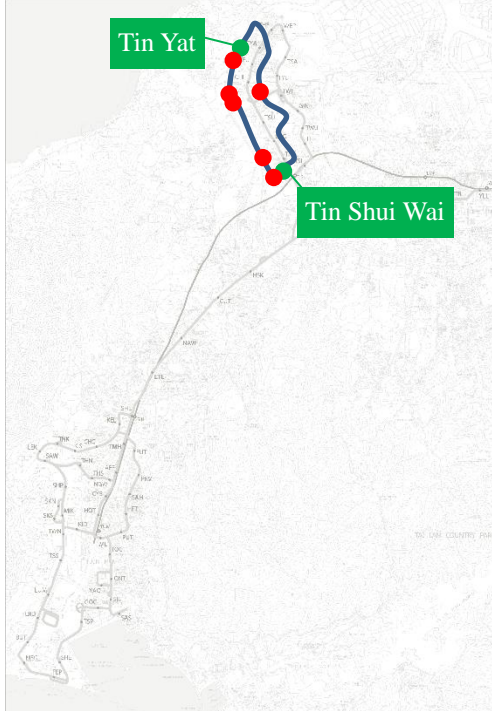
Journey time	About 45 minutes for a single journey (Total route length: about 13.9 km (Yuen Long-bound journeys) / about 14.6 km (Tuen Mun-bound journeys))
Number of stops	26
Frequency of service	10 – 18 minutes
Number of LRVs deployed	7 single-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	942
Loading at the busiest section in 2016	80% (average loading of 615 and 615P)
Number of junctions en-route	41 for Yuen Long-bound journeys and 43 for Tuen Mun-bound journeys, of which 4 are busy junctions: <ol style="list-style-type: none"> 1. Junction between On Lok Road / Castle Peak Road – Yuen Long Section 2. Junction between Fung Cheung Road / Castle Peak Road – Yuen Long Section 3. Junction between Kuk Ting Street / Tai Tong Road / Castle Peak Road – Yuen Long Section 4. Tsing Lun Road (near Tuen Mun Government Primary School)

**Route 615P – Tuen Mun Ferry Pier to Siu Hong
(commissioned in 2004)**



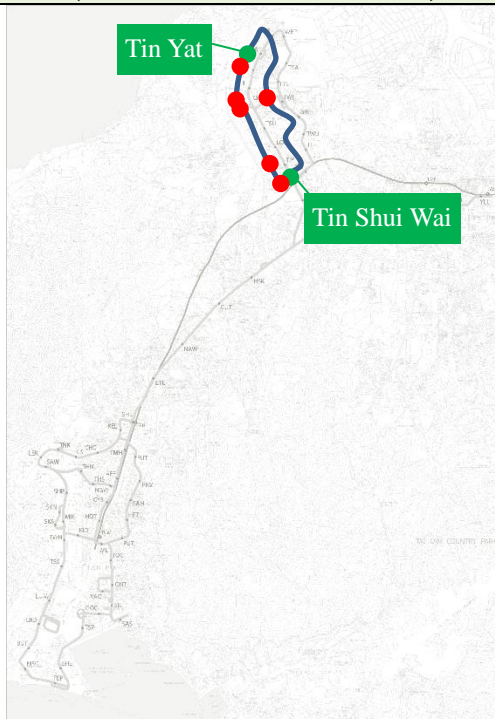
Journey time	About 24 minutes for a single journey (Total route length: about 6.6 km (Siu Hong-bound journeys / about 6.8 km (Tuen Mun Ferry Pier-bound journeys))
Number of stops	16
Frequency of service	9 – 12 minutes
Number of LRVs deployed	5 single-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	1 225
Loading at the busiest section in 2016	80% (average loading of 615 and 615P)
Number of junctions en-route	18 for Siu Hong-bound journeys and 20 for Tuen Mun Ferry Pier-bound journeys, of which 1 is a busy junction: 1. Tsing Lun Road (near Tuen Mun Government Primary School)

**Route 705 – Tin Shui Wai Circular (anti-clockwise)
(commissioned in 2004)**



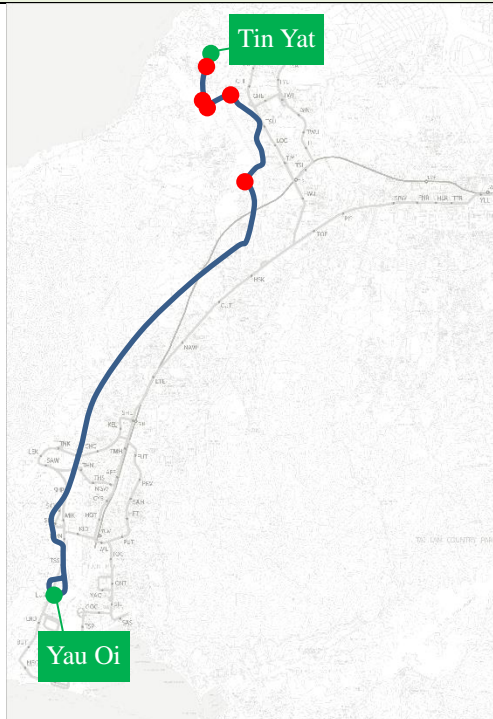
Journey time	About 25 minutes (Total route length: about 5.9 km)
Number of stops	15
Frequency of service	5 – 6 minutes
Number of LRVs deployed	5 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	4 900
Loading at the busiest section in 2016	87%
Number of junctions en-route	20, of which 6 are busy junctions: <ol style="list-style-type: none"> 1. Junction between Tin Shui Road / Tin Sau Road 2. Junction between Tin Shui Road / Tin Tan Street 3. Junction between Tin Shui Road / Tin Wing Road 4. Junction between Tin Yiu Road / Tin Ho Road 5. Junction between Tin Fuk Road / Tin Yiu Road and Ping Ha Road 6. Junction between Tin Wing Road/ Tin Shing Road

**Route 706 – Tin Shui Wai Circular (clock-wise)
(commissioned in 2004)**



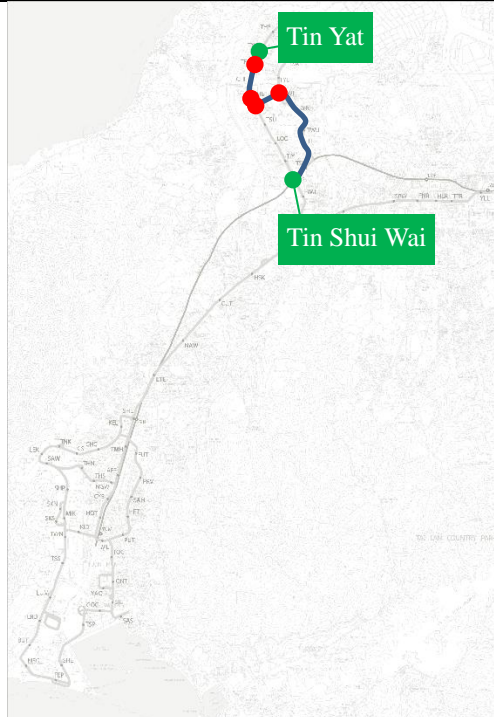
Journey time	About 25 minutes (Total route length: about 5.8 km)
Number of stops	15
Frequency of service	5 – 7 minutes
Number of LRVs deployed	5 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	4 900
Loading at the busiest section in 2016	91%
Number of junctions en-route	20, of which 6 are busy junctions: <ol style="list-style-type: none"> 1. Junction between Tin Shui Road / Tin Sau Road 2. Junction between Tin Shui Road / Tin Tan Street 3. Junction between Tin Shui Road / Tin Wing Road 4. Junction between Tin Yiu Road / Tin Ho Road 5. Junction between Tin Fuk Road / Tin Yiu Road and Ping Ha Road 6. Junction between Tin Wing Road/ Tin Shing Road

Route 751 – Yau Oi to Tin Yat (commissioned in 2003)



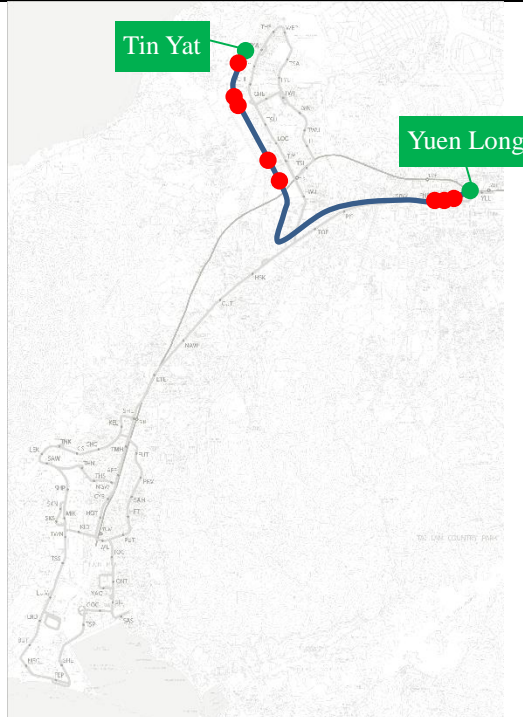
Journey time	About 41 minutes for a single journey (Total route length: 11.9 km)
Number of stops	23 (Tin Yat-bound journeys) / 22(Yau Oi-bound journeys)
Frequency of service	4 – 9 minutes
Number of LRVs deployed	6 single-set LRVs and 6 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	2 625
Loading at the busiest section in 2016	96%
Number of junctions en-route	30 for Tin Yat-bound journeys and 32 for Yau Oi-bound journeys, of which 5 are busy junctions: <ol style="list-style-type: none"> 1. Junction between Tin Shui Road / Tin Sau Road 2. Junction between Tin Shui Road / Tin Tan Street 3. Junction between Tin Shui Road / Tin Wing Road 4. Junction between Tin Wing Road / Tin Shing Road 5. Junction between Tin Fuk Road / Tin Yiu Road and Ping Ha Road

Route 751P – Tin Shui Wai to Tin Yat (commissioned in 2004)



Journey time	About 15 minutes for a single journey (Total route length: about 3.3 km)
Number of stops	9
Frequency of service	7 – 15 minutes
Number of LRVs deployed	4 single-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	1 532
Loading at the busiest section in 2016	78%
Number of junctions en-route	12, of which 4 are busy junctions: <ol style="list-style-type: none"> 1. Junction between Tin Shui Road / Tin Sau Road 2. Junction between Tin Shui Road / Tin Tan Street 3. Junction between Tin Shui Road / Tin Wing Road 4. Junction between Tin Wing Road / Tin Shing Road

Route 761P – Tin Yat to Yuen Long (commissioned in 2005)



Journey time	About 28 minutes for a single journey (Total route length: about 6.8 km (Tin Yat-bound journeys) / about 7.4 km (Yuen Long-bound journeys))
Number of stops	14
Frequency of service	3 – 7 minutes
Number of LRVs deployed	13 coupled-set LRVs
Hourly carrying capacity (per direction) in 2016 (about 200 persons per LRV)	5 444
Loading at the busiest section in 2016	81%
Number of junctions en-route	26, of which 8 are busy junctions: <ol style="list-style-type: none"> 1. Junction between Tin Shui Road / Tin Sau Road 2. Junction between Tin Shui Road / Tin Tan Street 3. Junction between Tin Shui Road / Tin Wing Road 4. Junction between Tin Yiu Road / Tin Ho Road 5. Junction between Tin Fuk Road / Tin Yiu Road and Ping Ha Road 6. Junction between On Lok Road/Castle

	<p>Peak Road-Yuen Long Section</p> <p>7. Junction between Fung Cheung Road / Castle Peak Road-Yuen Long Section</p> <p>8. Junction between Kuk Ting Street / Tai Tong Road and Castle Peak Road-Yuen Long Section</p>
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Annex 2

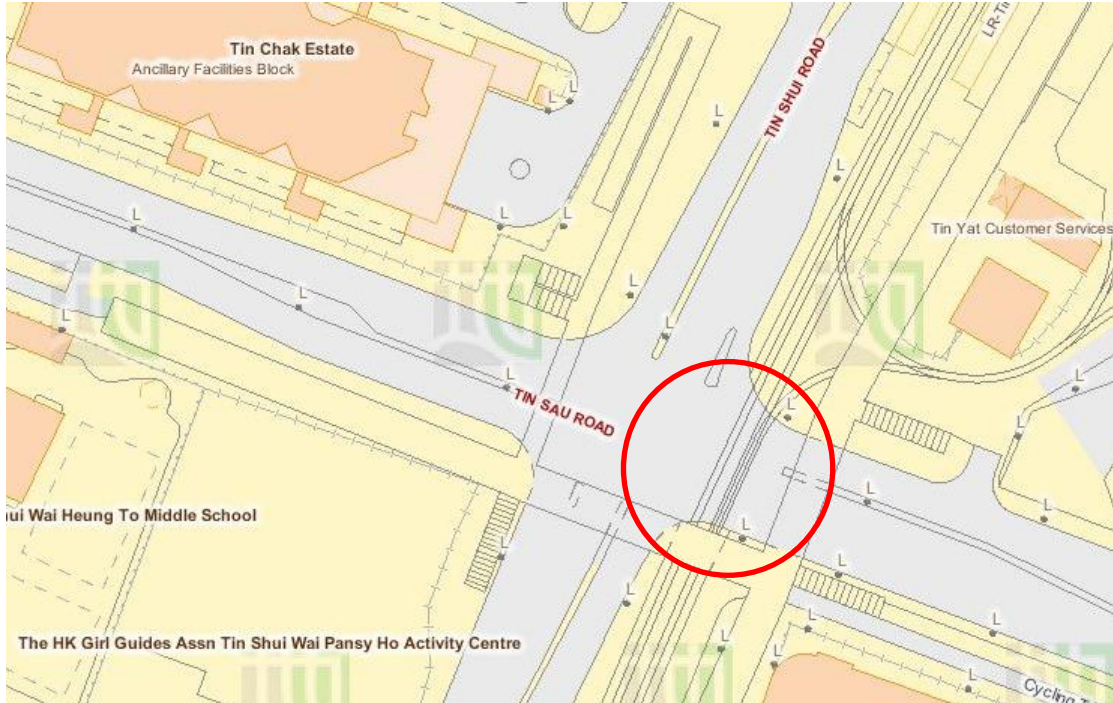
Deployment of LRVs in December 2009 and December 2016

Route	Number of LRVs deployed				Number of LRVs deployed			
	(December 2009)				(December 2016)			
	Single -set	Coupled-set	Hourly carrying capacity during peak hours *	Loading at the busiest section	Single -set	Coupled -set	Hourly carrying capacity during peak hours *	Loading at the busiest section
505	8	0	1 885	99%	6	2	2 356	74%
507	8	0	1 885	101%	10	1	2 430	83%
610	12	1	1 885	85%	11	2	2 019	85%
614	7	0	980	89% (average loading of 614 and 614P)	7	0	980	69% (average loading of 614 and 614P)
614P	4	0	980		5	0	1225	
615	7	0	942	70% (average loading of 615 and 615P)	7	0	942	80% (average loading of 615 and 615P)
615P	4	0	980		5	0	1 225	
705	2	3	3 921	95%	0	5	4 900	87%
706	1	4	4 411	82%	0	5	4 900	91%
751	6	6	2 625	93%	6	6	2 625	96%
751P	4	0	1 532	78%	4	0	1 532	78%
761P	2	11	5 026	100%	0	13	5 444	81%
Special service	3	0			2	1		
Total	68	25			63	35		
	118				133			

*About 200 persons per LRV

Busy junctions en-route for Light Rail routes

1. Junction between Tin Shui Road/ Tin Sau Road



2. Junction between Tin Shui Road/ Tin Tan Street



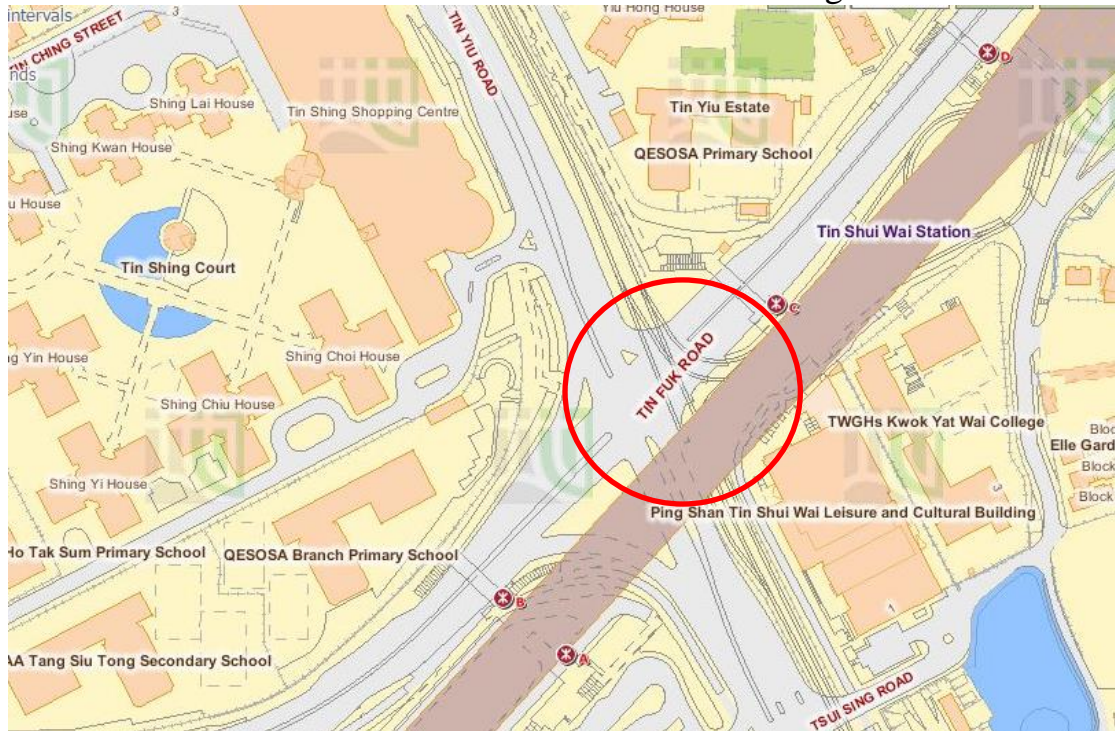
3. Junction between Tin Shui Road/ Tin Wing Road



4. Junction between Tin Yiu Road/ Tin Ho Road



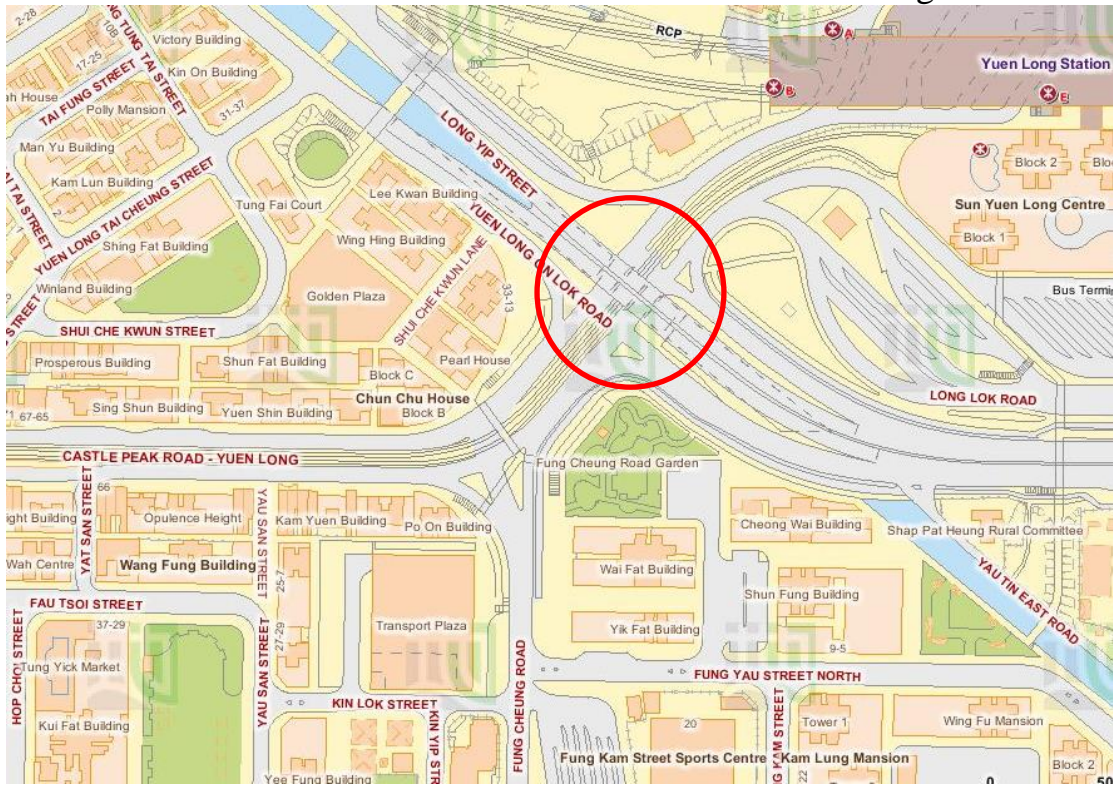
5. Junction between Tin Fuk Road/ Tin Yiu Road and Ping Ha Road



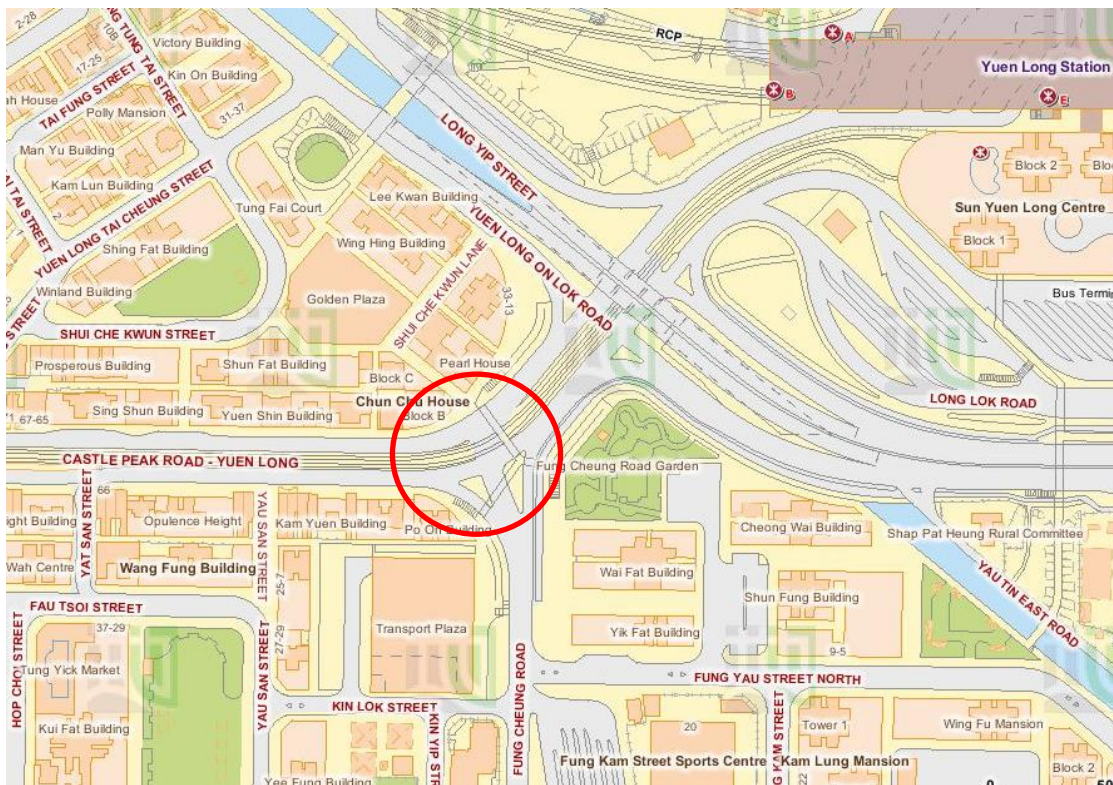
6. Junction between Tin Wing Road/ Tin Shing Road



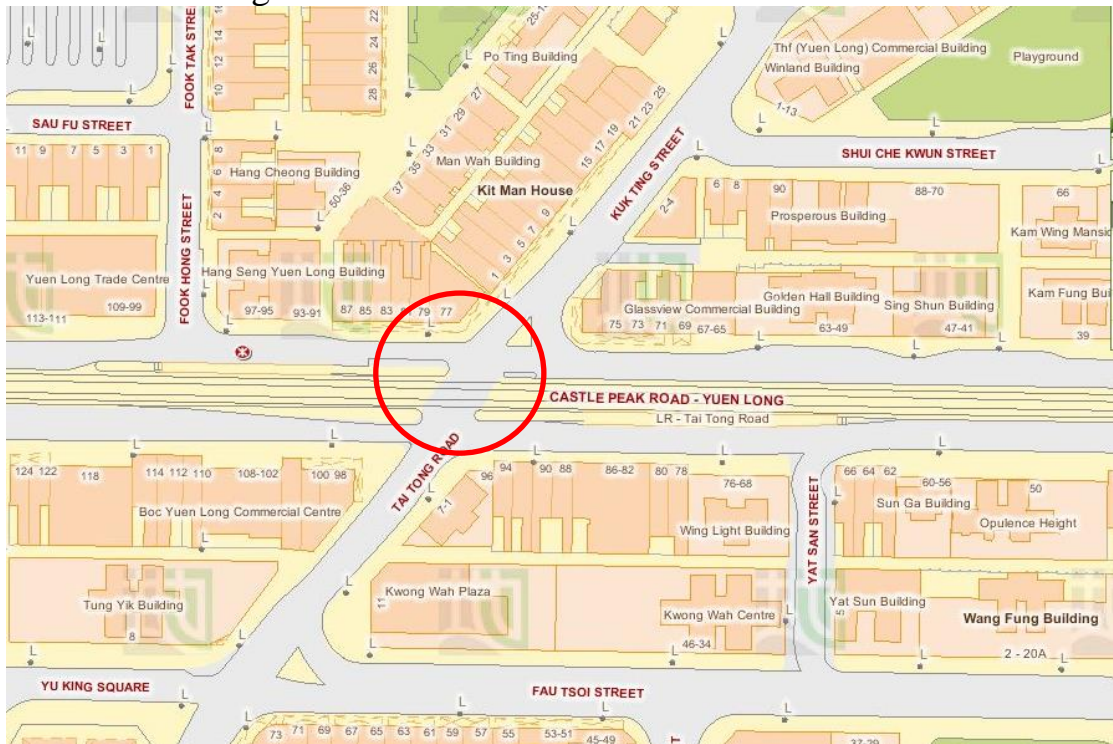
7. Junction between On Lok Road/ Castle Peak Road Yuen Long Section



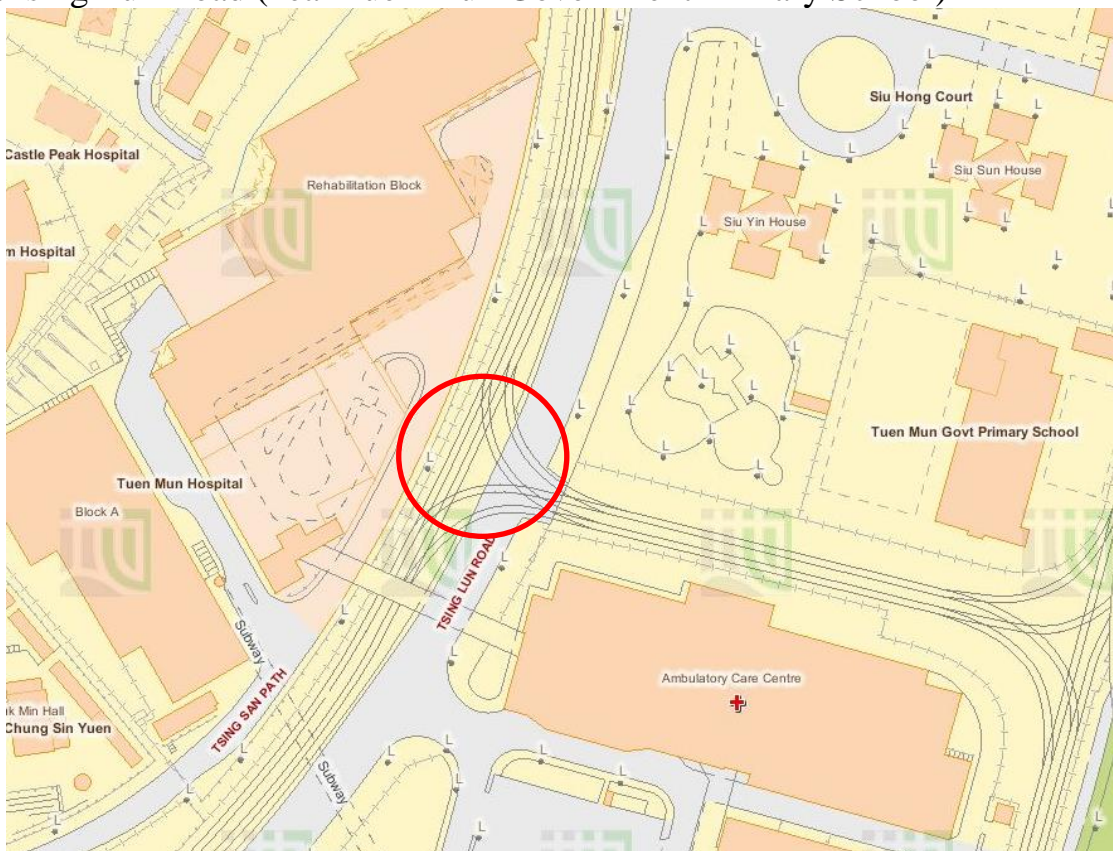
8. Junction between Fung Cheung Road/ Castle Peak Road Yuen Long Section



9. Junction between Kuk Ting Street/ Tai Tong Road and Castle Peak Road- Yuen Long Section



10. Tsing Lun Road (near Tuen Mun Government Primary School)



11. Junction between Hoi Chu Road/ Tuen Mun Heung Sze Wui Road

