



**Research Study on  
Open Road Tolling in Hong Kong**

**Statistical Analysis**

**Hong Kong Policy Research Institute  
Commissioned Researchers: Dr Hung Wing-tat  
& Master Alliance (China) Limited**

**4 October 2018**

## 1 ANNUAL VARIATION

### 1.1 Overall Tunnel/Bridge

#### Annual Vehicular Flows

- 1.1.1 With reference to Annual Traffic Census 2016 (ATC 2016) and Annual Traffic Census 2017 (ATC 2017) published by Transport Department, the annual vehicular flows through main tunnels & bridge in Hong Kong (i.e. Aberdeen Tunnel, Crossing Harbour Tunnel, Eastern Harbour Crossing, Lion Rock Tunnel, Shing Mun Tunnel, Tate's Cairn Tunnel, Tseung Kwan O Tunnel, Tai Lam Tunnel and Western Harbour Crossing) are summarized in **Table 1.1**, there was 248,528,280 vehicles in year 2016 and 248,008,938 vehicles in year 2017.

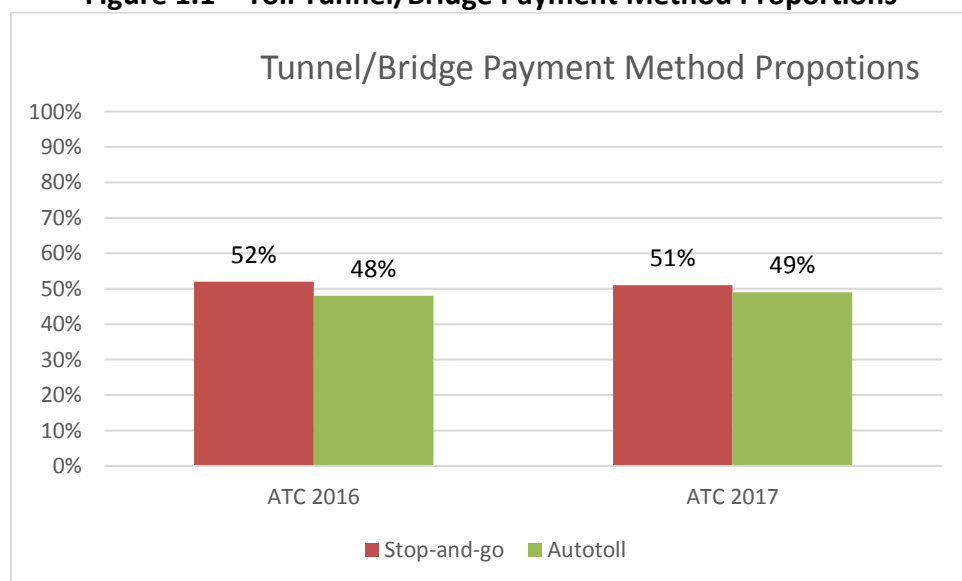
**Table 1.1 – Annual Vehicular Flows Through Tunnel & Bridge**

| ATC (Year) | Annual Vehicular Flows Through Tunnel & Bridge (veh) |
|------------|--|
| 2016       | 248,528,280  |
| 2017       | 248,008,938  |

#### Payment Method

- 1.1.2 In nowadays, there are two tolls payment method could be used, which are 1) By Cash/Octopus/Contactless Credit Cards (Stop-and-go) or 2) Autotoll System (Autotoll). In 2016 and 2017, the proportion of Stop-and-go and Autotoll were around 52% : 48% and 51% : 49% respectively as shown in **Figure 1.1**.

**Figure 1.1 – Toll Tunnel/Bridge Payment Method Proportions**



### Vehicular Split

- 1.1.3 In ATC 2016 and ATC 2017, vehicle classifications are available only for time period of 0700-2300 at Monday to Friday, therefore, daily trips by vehicle classes for the mentioned time period are summarized in **Table 1.2** and the corresponding proportions are shown in **Table 1.3** and **Figure 1.3**.
- 1.1.4 As shown in **Table 1.2a** and **Table 1.2b**, the proportion of Stop-and-go and Autotoll for the period of 0700-2300 at Monday to Friday is around 51% : 49% in both 2016 and 2017, which is more or less the same with the proportion of annual trip as stated in **Para. 1.1.2**.
- 1.1.5 **Table 1.2a** and **Table 1.2b** also show that private car is the main user in both 2016 and 2017, which is around 51% for the overall trip, around 39-40% in Stop-and-go and around 61-62% in Autotoll. It also revealed that most public light bus is using Autotoll, while most motorcycle and taxi are using Stop-and-go.

**Table 1.2a – Year 2016 Daily Trips by Vehicle Class (Mon to Fri) (07:00-23:00)**

| Vehicle Class                 | ATC 2016             |                               | Payment Method       |                               |                      |                               |
|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|
|                               |                      |                               | Stop-and-go          |                               | Autotoll             |                               |
|                               | Daily Trip (veh/day) | Proportion (by vehicle class) | Daily Trip (veh/day) | Proportion (by vehicle class) | Daily Trip (veh/day) | Proportion (by vehicle class) |
| Motorcycle                    | 15,409               | 3%                            | 15,376               | 5%                            | 33                   | < 1%                          |
| Private Car                   | 299,063              | 51%                           | 117,585              | 39%                           | 181,478              | 61%                           |
| Taxi                          | 94,743               | 15%                           | 90,547               | 30%                           | 4,197                | 1%                            |
| Private Light Bus             | 4,320                | 1%                            | 2,227                | 1%                            | 2,093                | 1%                            |
| Public Light Bus              | 6,412                | 1%                            | 277                  | < 1%                          | 6,135                | 2%                            |
| Light Goods Vehicle           | 98,204               | 16%                           | 59,807               | 20%                           | 38,397               | 13%                           |
| Medium/Heavy Goods Vehicle    | 38,375               | 6%                            | 10,909               | 4%                            | 27,466               | 9%                            |
| Franchised/Non-franchised Bus | 44,371               | 7%                            | 7,343                | 2%                            | 37,028               | 12%                           |

**Table 1.2b – 2017 Daily Trips by Vehicle Class (Mon to Fri) (07:00-23:00)**

| Vehicle Class                 | ATC 2017             |                               | Payment Method       |                               |                      |                               |
|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|
|                               |                      |                               | Stop-and-go          |                               | Autotoll             |                               |
|                               | Daily Trip (veh/day) | Proportion (by vehicle class) | Daily Trip (veh/day) | Proportion (by vehicle class) | Daily Trip (veh/day) | Proportion (by vehicle class) |
| Motorcycle                    | 16,881               | 3%                            | 16,845               | 5%                            | 35                   | < 1%                          |
| Private Car                   | 305,757              | 51%                           | 122,174              | 40%                           | 183,583              | 62%                           |
| Taxi                          | 90,855               | 15%                           | 86,463               | 27%                           | 4,391                | 1%                            |
| Private Light Bus             | 4,459                | 1%                            | 2,316                | 1%                            | 2,143                | 1%                            |
| Public Light Bus              | 5,814                | 1%                            | 120                  | < 1%                          | 5,693                | 2%                            |
| Light Goods Vehicle           | 98,548               | 16%                           | 60,406               | 19%                           | 38,142               | 13%                           |
| Medium/Heavy Goods Vehicle    | 38,929               | 6%                            | 11,531               | 4%                            | 27,397               | 9%                            |
| Franchised/Non-franchised Bus | 43,971               | 7%                            | 7,357                | 3%                            | 36,613               | 12%                           |

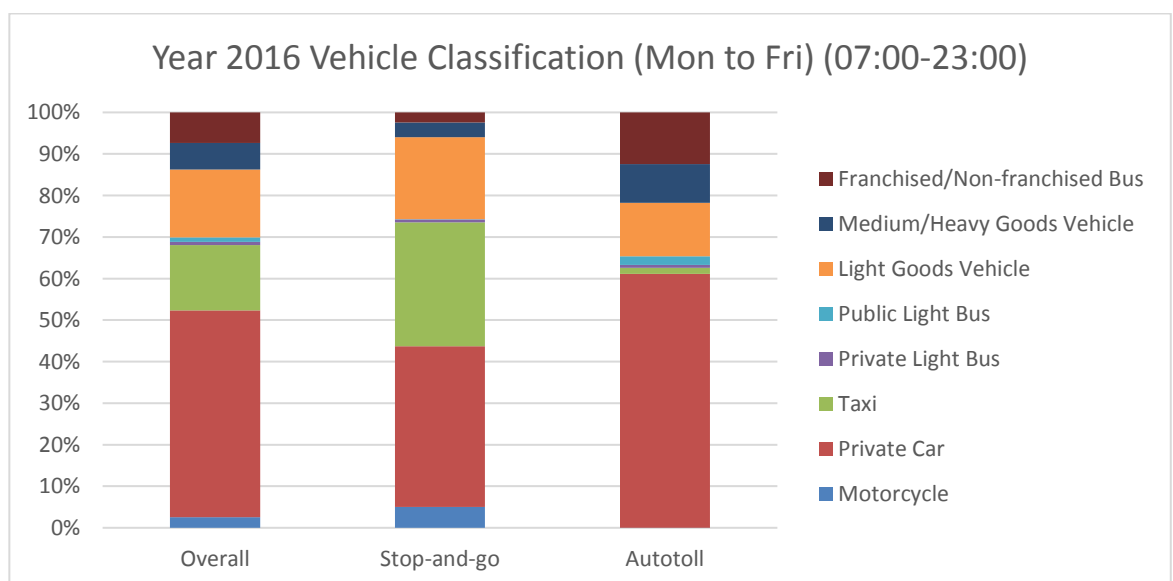
**Table 1.2c –Year 2016 Proportion of Payment Method by Vehicle Class (Mon to Fri) (07:00-23:00)**

| Vehicle Class                 | Payment Method |          |
|-------------------------------|----------------|----------|
|                               | Stop-and-go    | Autotoll |
| Motorcycle                    | 100%           | < 1%     |
| Private Car                   | 39%            | 61%      |
| Taxi                          | 96%            | 4%       |
| Private Light Bus             | 52%            | 48%      |
| Public Light Bus              | 4%             | 96%      |
| Light Goods Vehicle           | 61%            | 39%      |
| Medium/Heavy Goods Vehicle    | 28%            | 72%      |
| Franchised/Non-franchised Bus | 17%            | 83%      |

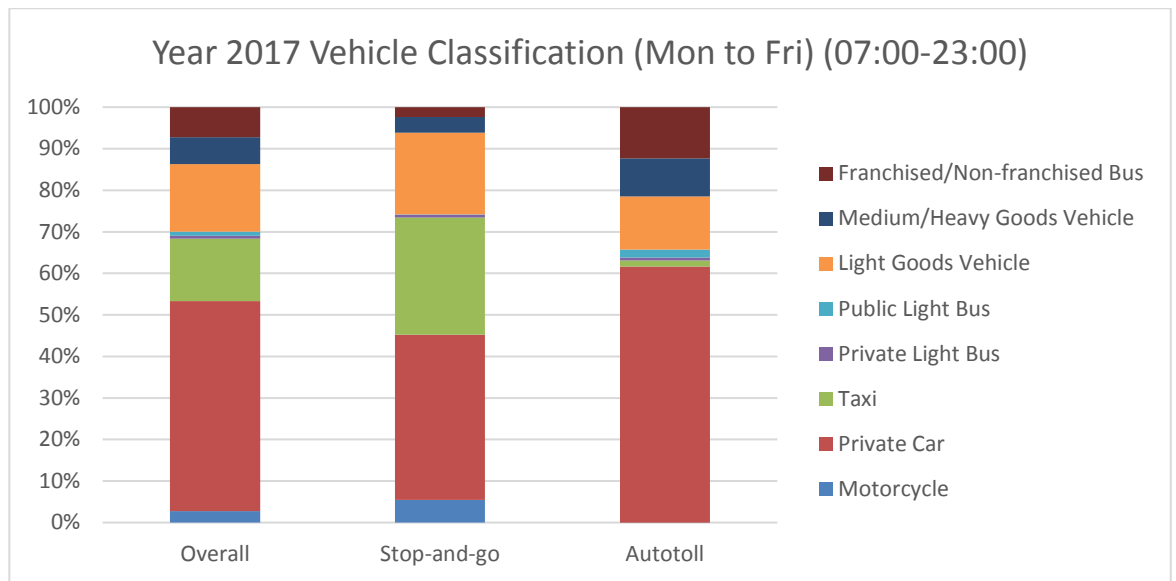
**Table 1.2d –Year 2017 Proportion of Payment Method by Vehicle Class (Mon to Fri) (07:00-23:00)**

| Vehicle Class                 | Payment Method |          |
|-------------------------------|----------------|----------|
|                               | Stop-and-go    | Autotoll |
| Motorcycle                    | 100%           | < 1%     |
| Private Car                   | 40%            | 60%      |
| Taxi                          | 95%            | 5%       |
| Private Light Bus             | 52%            | 48%      |
| Public Light Bus              | 2%             | 98%      |
| Light Goods Vehicle           | 61%            | 39%      |
| Medium/Heavy Goods Vehicle    | 30%            | 70%      |
| Franchised/Non-franchised Bus | 17%            | 83%      |

**Figure 1.2a –Year 2016 Vehicle Classification (Mon to Fri) (07:00-23:00)**



**Figure 1.2b –Year 2017 Vehicle Classification (Mon to Fri) (07:00-23:00)**



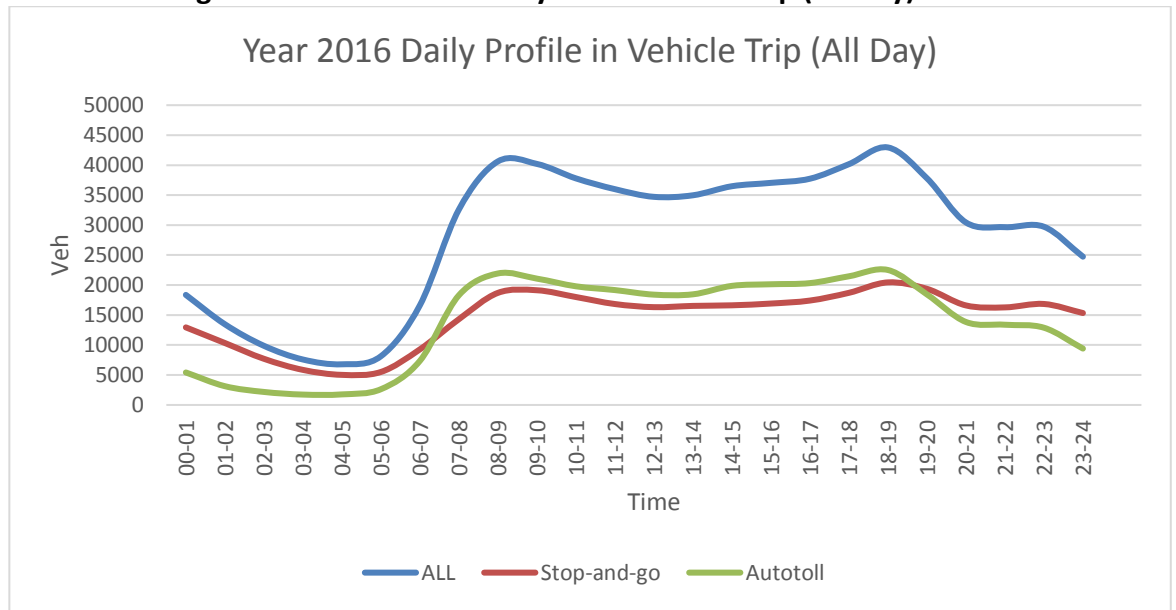
Daily Profile

1.1.6 **Table 1.3** and **Figure 1.3a-1.3b** summarized the daily profile of the toll tunnel/bridge flows in 2016 and 2017. It shows that the AM peak and PM peak occurred from 0800 to 0900 and 1800 to 1900 respectively.

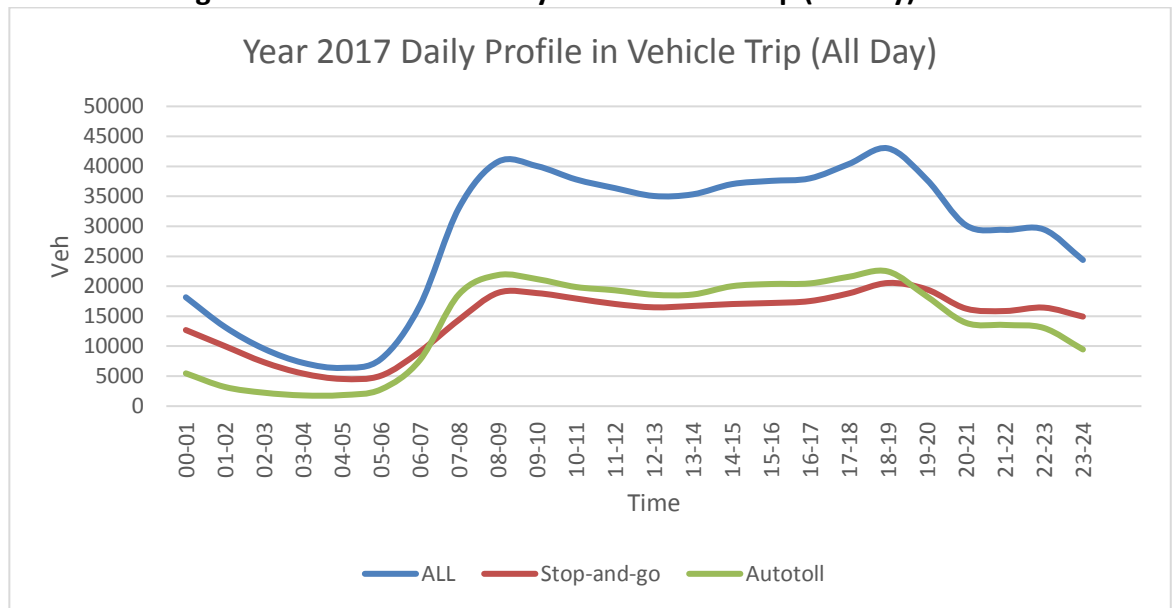
**Table 1.3 – Daily Profile (All Day)**

| Time Period      | ATC 2016    |                |             | ATC 2017    |                |             |
|------------------|-------------|----------------|-------------|-------------|----------------|-------------|
|                  | Overall     | Payment Method |             | Overall     | Payment Method |             |
|                  |             | Stop-and-go    | Autotoll    |             | Stop-and-go    | Autotoll    |
| 0000-0100        | 2.7%        | 3.7%           | 1.6%        | 2.7%        | 3.6%           | 1.6%        |
| 0100-0200        | 2.0%        | 2.9%           | 0.9%        | 1.9%        | 2.9%           | 1.0%        |
| 0200-0300        | 1.4%        | 2.2%           | 0.7%        | 1.4%        | 2.1%           | 0.7%        |
| 0300-0400        | 1.1%        | 1.7%           | 0.5%        | 1.1%        | 1.6%           | 0.5%        |
| 0400-0500        | 1.0%        | 1.4%           | 0.5%        | 0.9%        | 1.3%           | 0.5%        |
| 0500-0600        | 1.2%        | 1.6%           | 0.8%        | 1.1%        | 1.5%           | 0.8%        |
| 0600-0700        | 2.4%        | 2.6%           | 2.2%        | 2.4%        | 2.6%           | 2.3%        |
| 0700-0800        | 4.8%        | 4.1%           | 5.5%        | 4.8%        | 4.1%           | 5.5%        |
| <b>0800-0900</b> | <b>5.9%</b> | <b>5.3%</b>    | <b>6.6%</b> | <b>6.0%</b> | <b>5.4%</b>    | <b>6.5%</b> |
| 0900-1000        | 5.9%        | 5.5%           | 6.3%        | 5.8%        | 5.4%           | 6.3%        |
| 1000-1100        | 5.5%        | 5.1%           | 5.9%        | 5.5%        | 5.2%           | 5.9%        |
| 1100-1200        | 5.3%        | 4.8%           | 5.7%        | 5.3%        | 4.9%           | 5.7%        |
| 1200-1300        | 5.1%        | 4.6%           | 5.5%        | 5.1%        | 4.7%           | 5.5%        |
| 1300-1400        | 5.1%        | 4.7%           | 5.5%        | 5.2%        | 4.8%           | 5.5%        |
| 1400-1500        | 5.3%        | 4.7%           | 6.0%        | 5.4%        | 4.9%           | 5.9%        |
| 1500-1600        | 5.4%        | 4.8%           | 6.0%        | 5.5%        | 4.9%           | 6.1%        |
| 1600-1700        | 5.5%        | 5.0%           | 6.1%        | 5.5%        | 5.0%           | 6.1%        |
| 1700-1800        | 5.9%        | 5.3%           | 6.4%        | 5.9%        | 5.4%           | 6.4%        |
| <b>1800-1900</b> | <b>6.3%</b> | <b>5.8%</b>    | <b>6.7%</b> | <b>6.3%</b> | <b>5.9%</b>    | <b>6.7%</b> |
| 1900-2000        | 5.5%        | 5.5%           | 5.5%        | 5.5%        | 5.6%           | 5.4%        |
| 2000-2100        | 4.4%        | 4.7%           | 4.2%        | 4.4%        | 4.7%           | 4.1%        |
| 2100-2200        | 4.3%        | 4.6%           | 4.0%        | 4.3%        | 4.6%           | 4.0%        |
| 2200-2300        | 4.3%        | 4.8%           | 3.9%        | 4.3%        | 4.7%           | 3.9%        |
| 2300-2400        | 3.6%        | 4.4%           | 2.8%        | 3.6%        | 4.3%           | 2.8%        |

**Figure 1.3a –Year 2016 Daily Profile in Veh Trip (All Day)**



**Figure 1.3b –Year 2017 Daily Profile in Veh Trip (All Day)**



## 1.2 Individual Tunnel/Bridge

### Annual Vehicular Flows

1.2.1 **Table 1.4a-14.b** and **Figure 1.4a-14.b** summarized the annual trips of individual toll tunnel/bridge and the corresponding trips under Stop-and-go and Autotoll.

1.2.2 The proportion of Stop-and-go and Autotoll for individual toll tunnel/bridge are also summarized in **Table 1.4a-1.4b**, which show a range of from 43% : 58% to 57% : 42% and 42% : 58% to 58% : 42% in 2016 and 2017 respectively.

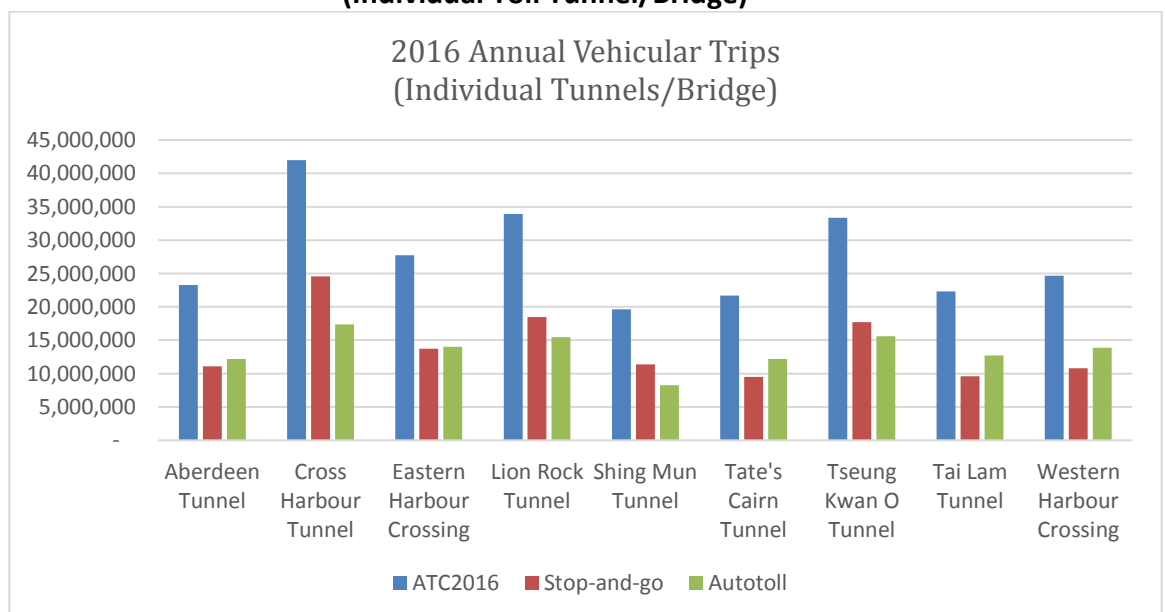
**Table 1.4a –Year 2016 Annual Vehicular Trips  
(Individual Toll Tunnel/Bridge)**

| Tunnel                   | ATC 2016     | Payment Method |            |              |            |
|--------------------------|--------------|----------------|------------|--------------|------------|
|                          |              | Stop-and-go    |            | Autotoll     |            |
|                          | Annual Trips | Annual Trips   | Proportion | Annual Trips | Proportion |
| Aberdeen Tunnel          | 23,294,366   | 11,091,341     | 48%        | 12,203,025   | 52%        |
| Cross Harbour Tunnel     | 41,972,669   | 24,582,333     | 59%        | 17,390,336   | 41%        |
| Eastern Harbour Crossing | 27,730,541   | 13,712,330     | 49%        | 14,018,211   | 51%        |
| Lion Rock Tunnel         | 33,900,734   | 18,460,674     | 54%        | 15,440,060   | 46%        |
| Shing Mun Tunnels        | 19,624,974   | 11,369,841     | 58%        | 8,255,133    | 42%        |
| Tate's Cairn Tunnel      | 21,670,436   | 9,483,650      | 44%        | 12,186,786   | 56%        |
| Tseung Kwan O Tunnel     | 33,345,029   | 17,733,251     | 53%        | 15,611,778   | 47%        |
| Tai Lam Tunnel           | 22,311,564   | 9,593,629      | 43%        | 12,717,935   | 57%        |
| Western Harbour Crossing | 24,677,967   | 10,790,573     | 44%        | 13,887,394   | 56%        |

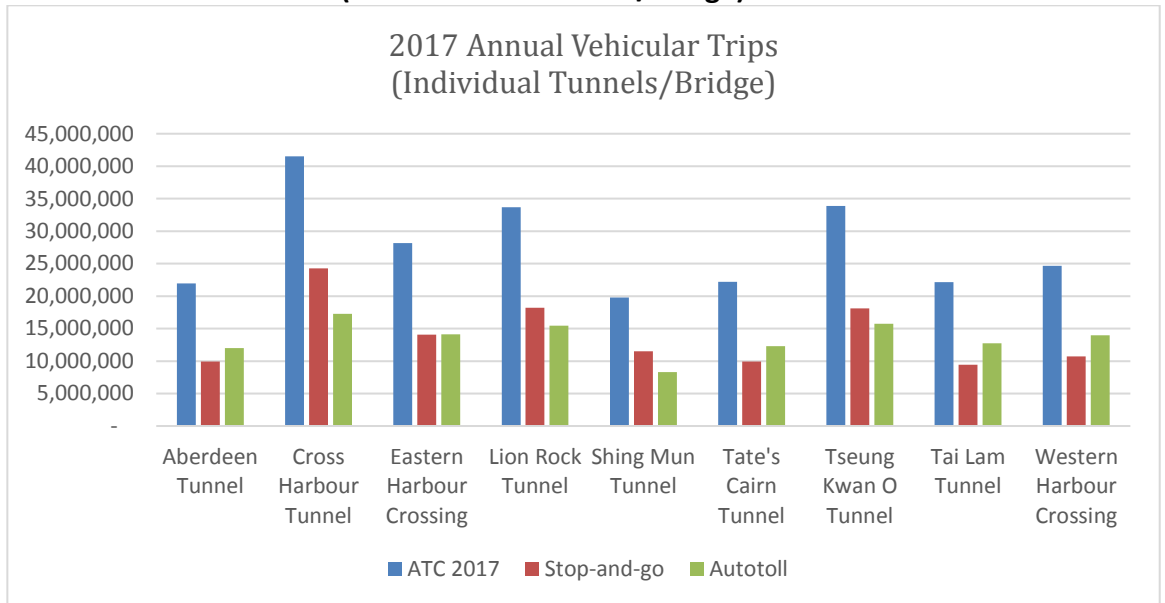
**Table 1.4b–Year 2017 Annual Vehicular Trips  
(Individual Toll Tunnel/Bridge)**

| Tunnel                   | ATC 2017     | Payment Method |            |              |            |
|--------------------------|--------------|----------------|------------|--------------|------------|
|                          |              | Stop-and-go    |            | Autotoll     |            |
|                          | Annual Trips | Annual Trips   | Proportion | Annual Trips | Proportion |
| Aberdeen Tunnel          | 21,931,321   | 9,939,740      | 45%        | 11,991,581   | 55%        |
| Cross Harbour Tunnel     | 41,527,796   | 24,273,739     | 58%        | 17,254,057   | 42%        |
| Eastern Harbour Crossing | 28,173,747   | 14,060,379     | 50%        | 14,113,368   | 50%        |
| Lion Rock Tunnel         | 33,689,016   | 18,220,287     | 54%        | 15,468,729   | 46%        |
| Shing Mun Tunnels        | 19,800,392   | 11,487,141     | 58%        | 8,313,251    | 42%        |
| Tate's Cairn Tunnel      | 22,198,385   | 9,917,693      | 45%        | 12,280,692   | 55%        |
| Tseung Kwan O Tunnel     | 33,858,239   | 18,127,243     | 54%        | 15,730,996   | 46%        |
| Tai Lam Tunnel           | 22,163,195   | 9,415,750      | 42%        | 12,747,445   | 58%        |
| Western Harbour Crossing | 24,666,847   | 10,719,735     | 43%        | 13,947,112   | 57%        |

**Figure 1.4a –Year 2016 Annual Autotoll Trips/ Annual Vehicular Trips  
(Individual Toll Tunnel/Bridge)**



**Figure 1.4b –Year 2017 Annual Autotoll Trips/ Annual Vehicular Trips  
(Individual Toll Tunnel/Bridge)**





## 2 MONTHLY VARIATION

### 2.1 Overall Tunnel/Bridge

#### Monthly Vehicular Flows

2.1.1 Based on the ATC 2016 and ATC 2017, the monthly statistics have been analysed and summarized in **Table 2.1a-2.1b** and the monthly variation of daily trip have been summarized in **Figure 2.1a-2.1b**.

2.1.2 **Table 2.1a-2.1b** and **Figure 2.1 a-2.1b** show that there is no significant monthly variation for the overall toll tunnel/bridge trip.

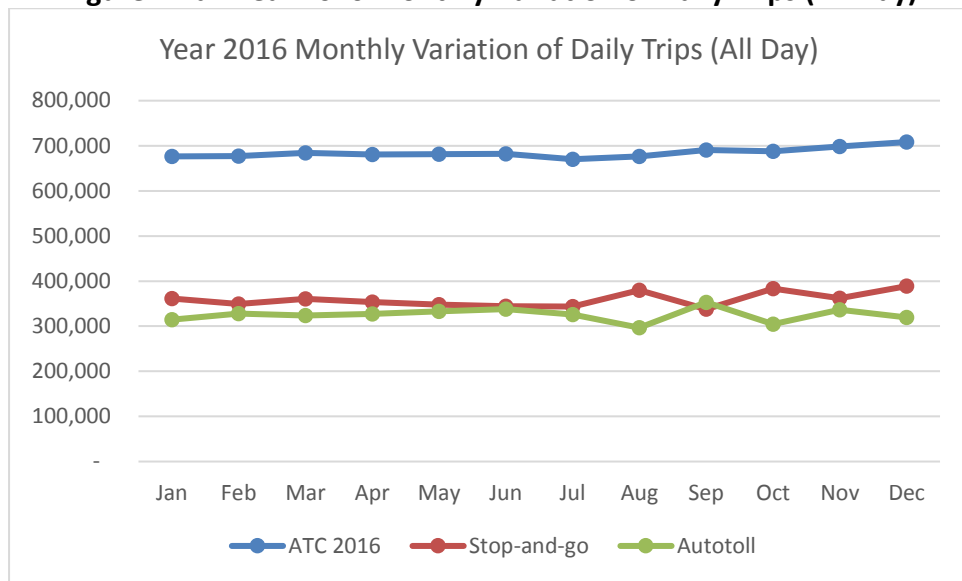
**Table 2.1a – Year 2016 Monthly Toll Tunnel/Bridge Trips (Overall)**

| Month | ATC 2016<br>Monthly Trip<br>(veh) | Payment Method        |            |                       |            |
|-------|-----------------------------------|-----------------------|------------|-----------------------|------------|
|       |                                   | Stop-and-go           |            | Autotoll              |            |
|       |                                   | Monthly Trip<br>(veh) | Proportion | Monthly Trip<br>(veh) | Proportion |
| Jan   | 20,966,938                        | 11,211,920            | 53%        | 9,755,018             | 47%        |
| Feb   | 20,322,911                        | 10,478,739            | 52%        | 9,844,172             | 48%        |
| Mar   | 21,208,213                        | 11,170,982            | 53%        | 10,037,231            | 47%        |
| Apr   | 20,420,868                        | 10,612,561            | 52%        | 9,808,307             | 48%        |
| May   | 21,117,161                        | 10,788,801            | 51%        | 10,328,360            | 49%        |
| Jun   | 20,460,665                        | 10,321,544            | 50%        | 10,139,121            | 50%        |
| Jul   | 20,774,509                        | 10,662,646            | 51%        | 10,111,863            | 49%        |
| Aug   | 20,967,757                        | 11,768,701            | 56%        | 9,199,056             | 44%        |
| Sep   | 20,721,555                        | 10,131,384            | 49%        | 10,590,171            | 51%        |
| Oct   | 21,311,486                        | 11,874,523            | 56%        | 9,436,963             | 44%        |
| Nov   | 20,943,152                        | 10,851,803            | 52%        | 10,091,349            | 48%        |
| Dec   | 21,954,969                        | 12,052,572            | 55%        | 9,902,397             | 45%        |

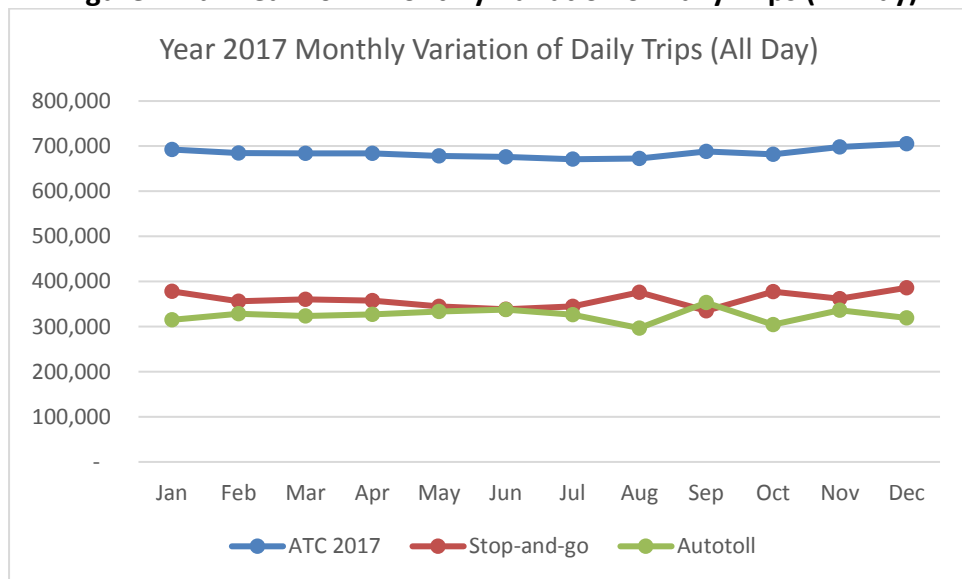
**Table 2.1b –Year 2017 Monthly Tunnel/Bridge Trips (Overall)**

| Month | ATC 2017<br>Monthly Trip<br>(veh) | Payment Method        |            |                       |            |
|-------|-----------------------------------|-----------------------|------------|-----------------------|------------|
|       |                                   | Stop-and-go           |            | Autotoll              |            |
|       |                                   | Monthly Trip<br>(veh) | Proportion | Monthly Trip<br>(veh) | Proportion |
| Jan   | 21,475,169                        | 11,720,151            | 55%        | 9,755,018             | 45%        |
| Feb   | 20,533,113                        | 10,688,941            | 52%        | 9,844,172             | 48%        |
| Mar   | 21,201,044                        | 11,163,813            | 53%        | 10,037,231            | 47%        |
| Apr   | 20,525,295                        | 10,716,988            | 52%        | 9,808,307             | 48%        |
| May   | 21,022,828                        | 10,694,468            | 51%        | 10,328,360            | 49%        |
| Jun   | 20,285,763                        | 10,146,642            | 50%        | 10,139,121            | 50%        |
| Jul   | 20,800,003                        | 10,688,140            | 51%        | 10,111,863            | 49%        |
| Aug   | 20,855,543                        | 11,656,487            | 56%        | 9,199,056             | 44%        |
| Sep   | 20,642,405                        | 10,052,234            | 49%        | 10,590,171            | 51%        |
| Oct   | 21,143,535                        | 11,706,572            | 55%        | 9,436,963             | 45%        |
| Nov   | 20,952,509                        | 10,861,160            | 52%        | 10,091,349            | 48%        |
| Dec   | 21,869,165                        | 11,966,768            | 55%        | 9,902,397             | 45%        |

**Figure 2.1a –Year 2016 Monthly Variation of Daily Trips (All Day)**



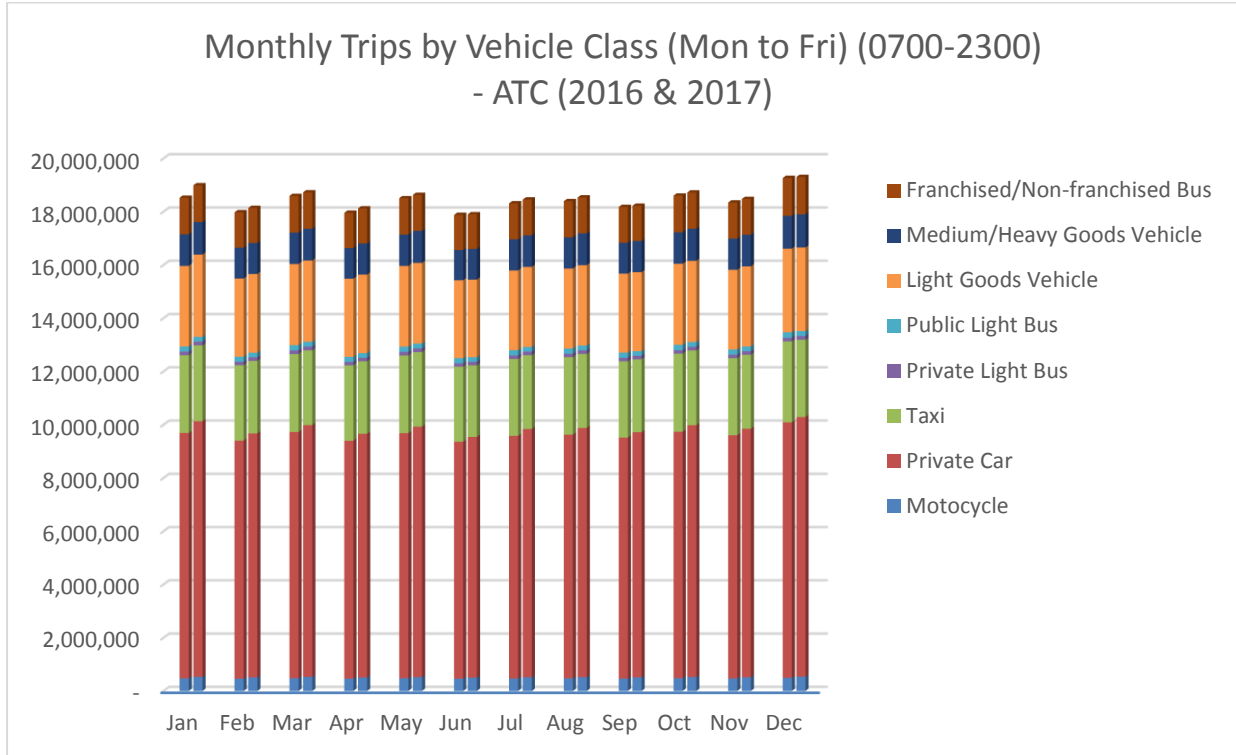
**Figure 2.1b –Year 2017 Monthly Variation of Daily Trips (All Day)**



Vehicular Split

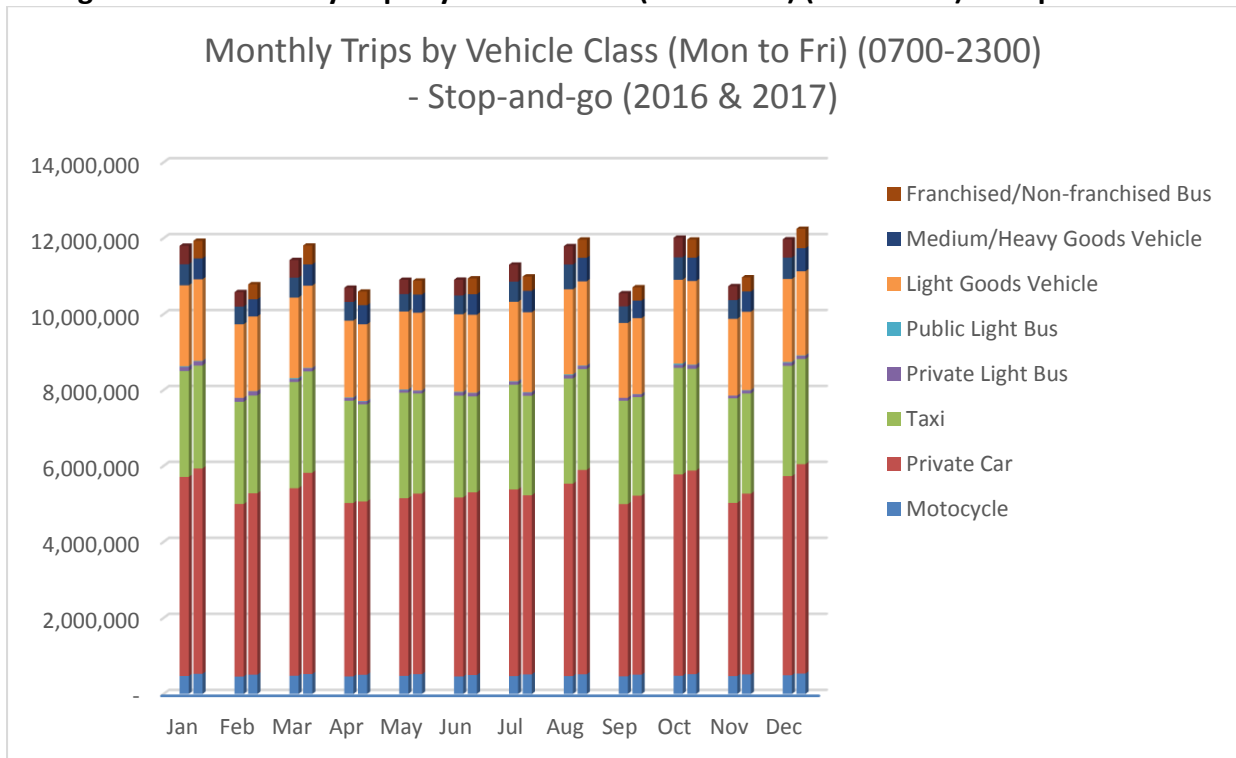
2.1.3 **Figure 2.2a to 2.2c** summarized the monthly trips by vehicle class for individual month.

**Figure 2.2a - Monthly Trips by Vehicle Class (Mon to Fri) (0700-2300) – ATC**



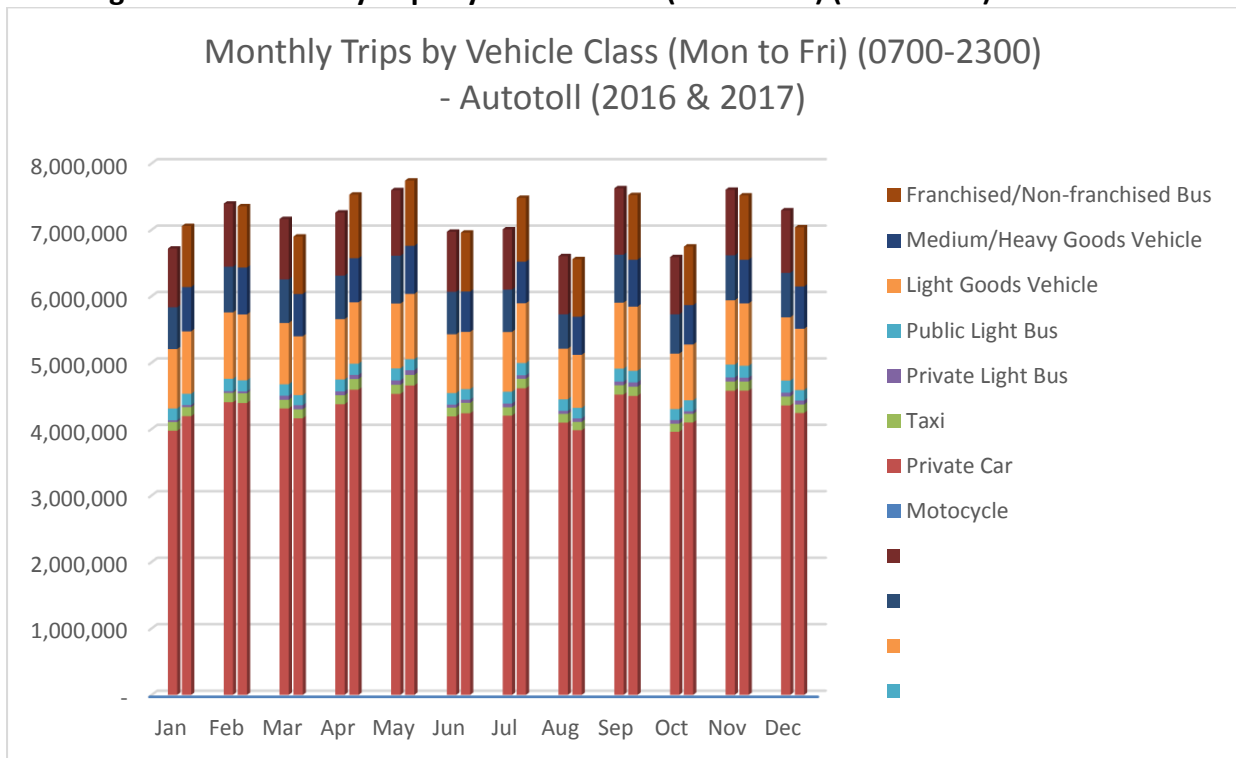
Remark: Bar charts on the left = figures in 2016, bar charts on the right = figures in 2017

**Figure 2.2b - Monthly Trips by Vehicle Class (Mon to Fri) (0700-2300) – Stop-and-Go**



Remark: Bar charts on the left = figures in 2016, bar charts on the right = figures in 2017

**Figure 2.2c - Monthly Trips by Vehicle Class (Mon to Fri) (0700-2300) – Autotoll**

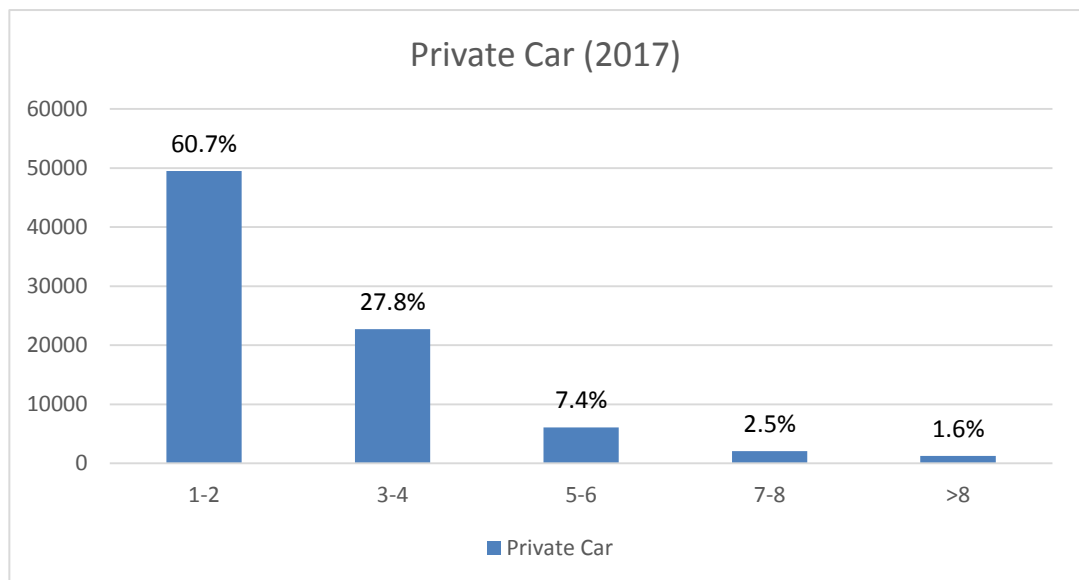
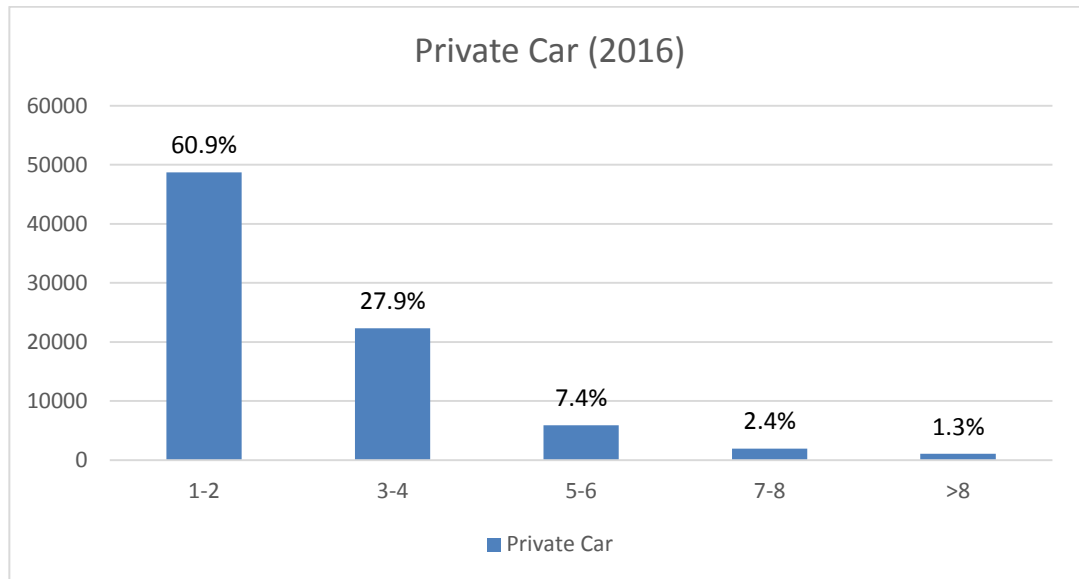


Remark: Bar charts on the left = figures in 2016, bar charts on the right = figures in 2017

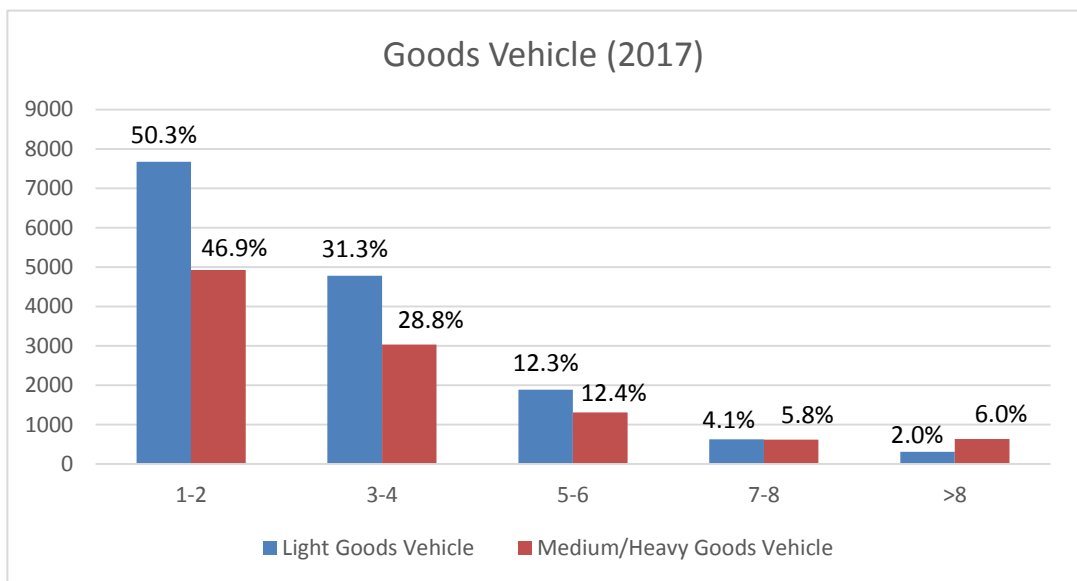
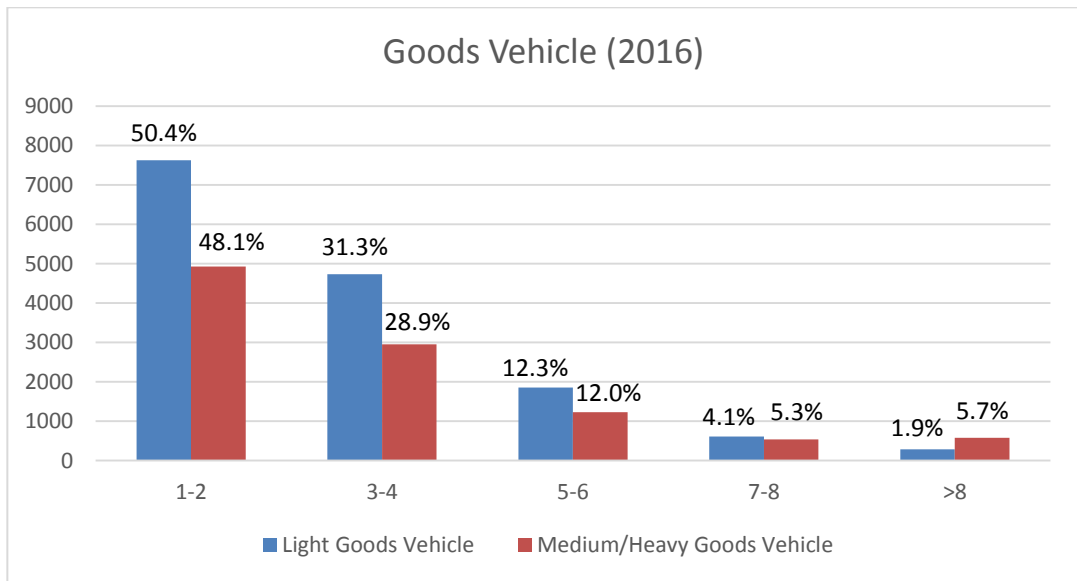
Daily Number of Trips by Autotoll Per User

2.1.4 **Figure 2.3a to 2.3d** summarized the daily number of trip by Autotoll per individual user in 2016 and 2017. The figures show that there is no significant change of the pattern of daily number of trip by Autotoll per individual user from 2016 to 2017.

**Figure 2.3a – Daily Number of Trips by Autotoll Per User (Mon to Fri) – Private Car**



**Figure 2.3b – Daily Number of Trips by Autotoll Per User (Mon to Fri) – Goods Vehicle**



**Figure 2.3c – Daily Number of Trips by Autotoll Per User (Mon to Fri) – Scheduled Mass Transit**

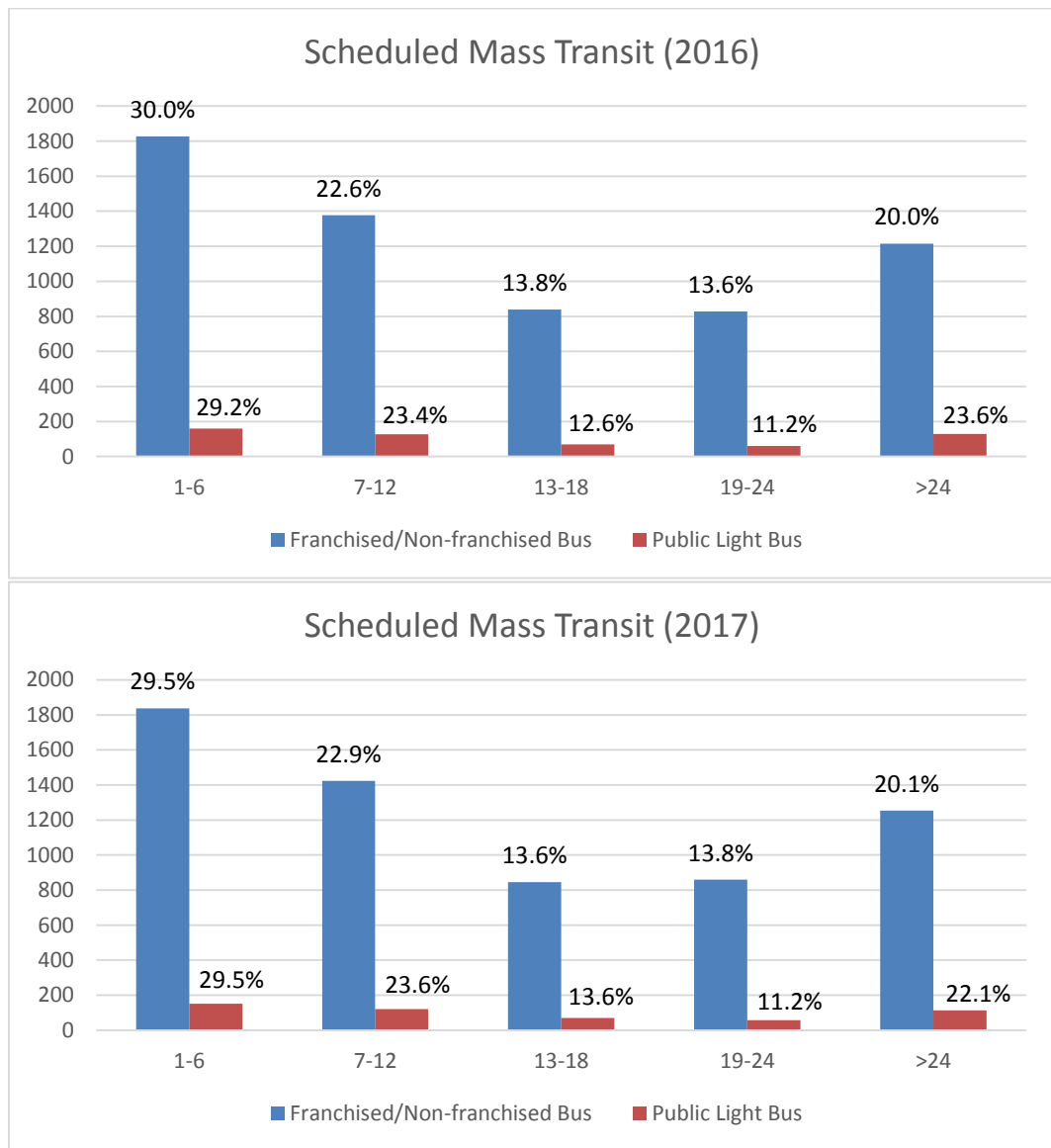
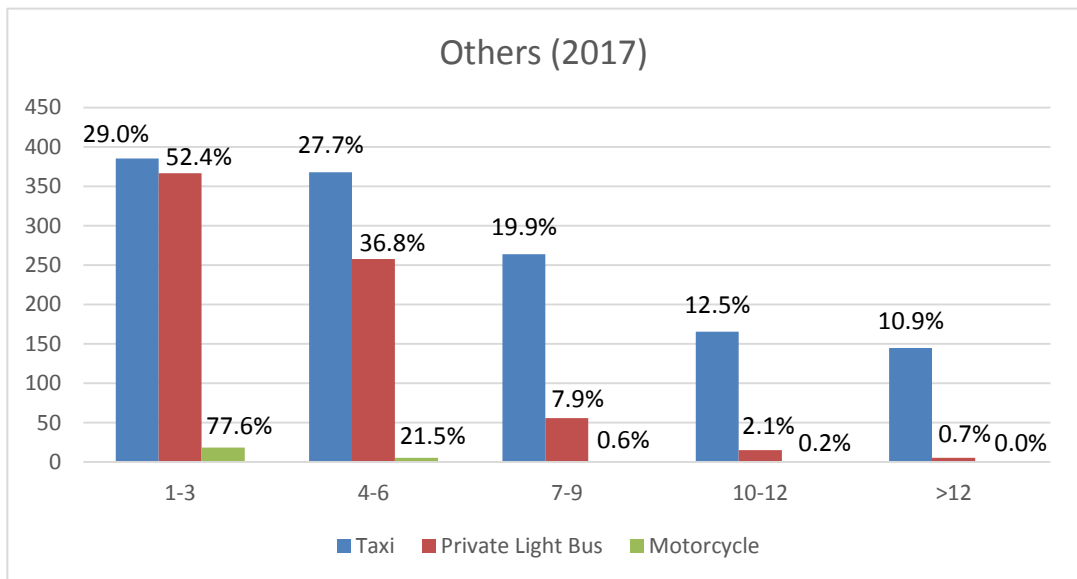
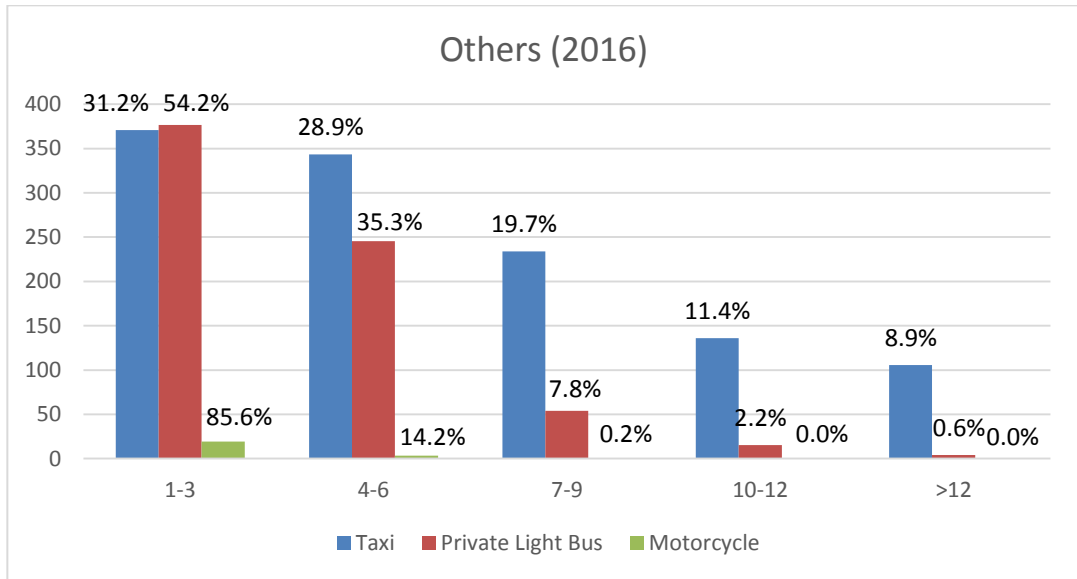


Figure 2.3d – Daily Number of Trips by Autotoll Per User (Mon to Fri) – Others



- End -