

# Metropolitan Tram Load Standards Survey Report

May 2019

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# 1 Summary and Key Results

## 1.1 Introduction

The Metropolitan Tram Load Standards Surveys (Tram Load Surveys) are conducted each year in May to measure passenger loads against agreed load standards of rolling stock.

The survey's findings help pinpoint at which sections on each route and at which times loads exceed the desired standards, to assist in planning for rolling stock and service changes. Surveying is generally confined to the AM and PM peaks when the network is at its busiest. In this survey the peak periods are defined as 7.01am to 10.00am and 3.01am to 7:00pm. On occasion and upon request by stakeholders, other survey times may be included.

In this report, key metrics from the May 2019 survey are outlined.

## 1.2 Key Results

In May 2019, a total of 4 rolling hour cordon average loads above desired standards (breaches) were observed in the AM peak and 0 in the PM peak. This is a decrease of 4 breaches in the AM peak and 3 breaches in the PM peak compared to May 2018.

**Table 1 - Rolling hour cordon average loads above desired standards recorded**

AM Rolling Hour	2018	2019
7:01-8:00	0	0
7:31-8:30	2	0
8:01-9:00	5	3
8:31-9:30	1	1
9:01-10:00	0	0
<b>Total</b>	<b>8</b>	<b>4</b>

PM Rolling Hour	2018	2019
15:01-16:00	0	0
15:31-16:30	0	0
16:01-17:00	0	0
16:31-17:30	0	0
17:01-18:00	1	0
17:31-18:30	1	0
18:01-19:00	1	0
<b>Total</b>	<b>3</b>	<b>0</b>

Key insights of the May 2019 Tram Load Survey include:

- The tram network is more congested in the morning peak than the evening peak, particularly between 8 and 9 AM when 3 of the 4 AM breaches were reported in 2019. Elgin St / Lygon St (routes 1 and 6), Swanston St / Flinders St (Federation Sq) (all tram routes) and Clarendon St (Crown Casino) (route 12) are the locations and routes accounting for the breaches reported.
- In the evening peak, there were no breaches reported in 2019. This is a significant improvement from the last year results, when 3 breaches were reported.

## 2 Background and Definitions

### 2.1 Background

Tram Load Surveys have been conducted since 2000 as part of the Franchise Agreement (The Agreement) between the metropolitan tram operator and the State Government.

Decision criteria shaping the scope of the survey have a focus on cordon locations and locations that previously recorded rolling hour breaches (breaches). In addition, locations impacted by service changes either to the tram or train timetables may be included. Discussions with external stakeholders further influence the final list of locations, directions, times and load types (departing or arriving counts) to be surveyed.

Survey results are useful to review and re-allocate tram rolling stock across the network. In addition, transport modellers frequently rely on data gathered on average or total passenger load counts for information about demand for tram services.

### 2.2 Terminology

**AM Peak** – AM Peak Services may span different time periods for different purposes. For the Tram Load Survey and within this document, the AM Peak period refers to services that arrive at a survey point travelling in the survey direction *between 7:01am and 10:00am*.

**CBD monitoring point** – Any point in the Central Business District (CBD), or any other point determined by Transport for Victoria (TFV), at which passenger counts are conducted in accordance with the Agreement, utilising CBD Maximum Capacities for each vehicle.

**Cordon** – Historical points designed to capture the expected maximum load of passengers entering the CBD.

**Corridor** – A group of tram routes at a location that have or will share/d substantial sections of track and are expected to be interchangeable to passengers. The loads and capacities of these corridors are aggregated for the calculation of rolling hour breach estimates.

**Counter-peak Direction** – The direction opposite to which most passengers are expected to travel. In the AM Peak this is services that are travelling away from the CBD and in the PM Peak this is services that are travelling towards the CBD.

**Load** – For a service, the number of passengers travelling on a tram at a given point in time.

**Load standard** – see Maximum Capacity.

**Location** – A generic term indicating a survey point, with CBD or Non-CBD or Cordon as context requires.

**Maximum Capacity** – The desired maximum load of a tram in service. (See Appendix 4 for details of capacities for each tram class). The maximum capacity is often higher for trams operating in the CBD than for trams operating outside the CBD. This is also referred to as *desired standard* or *standard* in this report. This standard does not relate to a safety requirement but to the relative comfort level.

**Non-CBD monitoring point** – Any point that is not a CBD monitoring point at which passenger counts are conducted in accordance with the Agreement, utilising non-CBD Maximum Capacities for each vehicle.

**Peak** – Either or both the AM Peak and the PM Peak, as the context requires.

**Peak Direction** – The direction in which most passengers are expected to travel. Generally, in the AM Peak it refers to services that are travelling towards the CBD and in the PM Peak to services that are travelling away from the CBD.

**PM Peak** – PM Peak Services may span different time periods for different purposes. For the Tram Load Survey and within this document, the AM Peak period refers to services that arrive at a survey point travelling in the survey direction between 3:01pm and 7:00pm.

**Rolling hour** – Each hour from 6:31am to 6:31pm, commencing on each half-hour during that period (e.g. 6:31am to 7:30am, 7:01am to 8:00am).

**Rolling hour breach (breach)** – where the total passenger load within a rolling hour, at a given location, exceeds the total maximum capacity at that location within the rolling hour.

## 3 Cordon Location

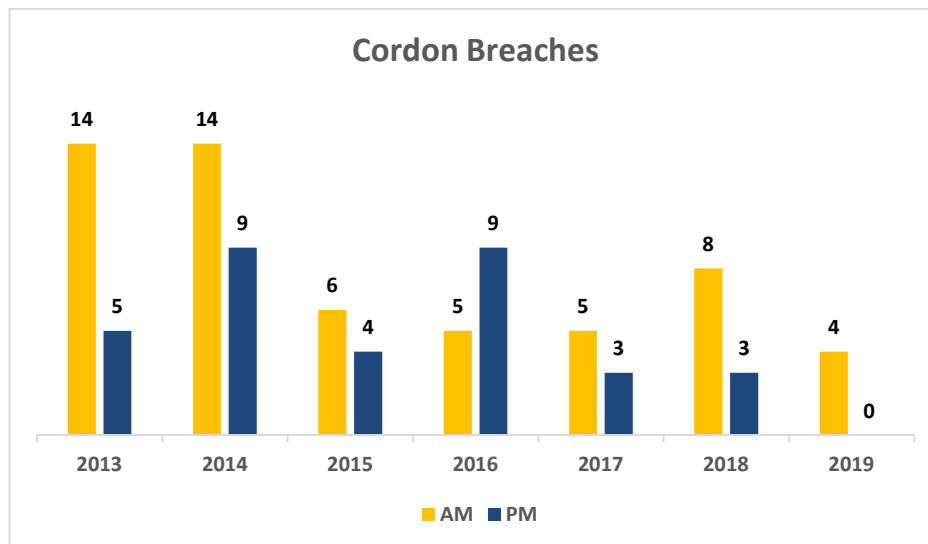
### 3.1 Rolling Hour Breaches – Cordon Locations

In 2019, there are 14 cordon locations that represent entry or exit points for all routes through the CBD. For most of these cordon locations, loads are counted in the direction consistent with the maximum passenger demand for services, i.e. in the peak direction. Exceptions occur at *Swanston St / Flinders St (Federation Square)*, *Clarendon St (Crown)* and *Bourke St / Spring St* where cordon breaches are reported in both directions, peak and counter-peak.

#### 3.1.1 Key Results

In the May 2019 Tram Load Survey, the number of breaches of load standards has decreased in the AM Peak period from 8 to 4 breaches compared to May 2018. In the 2019 PM Peak, the number of breaches has decreased from 3 to 0 compared to May 2018.

Figure 1 - Rolling Hour Cordon Breaches in May - AM Peak and PM Peak - From 2013 to 2019



### 3.1.2 AM Peak Rolling Hour Breaches

AM peak rolling hour breaches decreased in May 2019 compared to May 2018, from 3 to 2 at *Elgin St / Lygon St* and from 2 to 1 at *Swanston St / Flinders St (Federation Sq)* (South direction). The fourth breach occurred at *Clarendon St (Crown Casino)*, where there was also a breach in 2018. There were no locations where the number of breaches grew in May 2019 compared to May 2018.

**Table 2 - Rolling Hour Cordon Breaches in May by Location and Route or Corridor - Weekday AM Peak (7:01-10:00)**

Cordon Location	Direction	Count Type	Route/s	2017	2018	2019
Bourke St / Spring St	East	Departure	86, 96	-	-	-
Bourke St / Spring St	West	Arrival	86, 96	-	-	-
Clarendon St (Crown Casino)	North	Arrival	12	-	1	1
Clarendon St (Crown Casino)	North	Arrival	96, 109	-	-	-
Clarendon St (Crown Casino)	South	Departure	12	-	1	-
Clarendon St (Crown Casino)	South	Departure	96, 109	-	-	-
Collins St West End (Southern Cross Station)	West	Departure	11, 48	-	-	-
Docklands (Flinders St West End)	East	Arrival	35, 70, 75 as corridor	-	-	-
Docklands (LaTrobe St West End)	East	Arrival	30, 35, 86 as corridor	-	-	-
Elgin St / Lygon St	South	Arrival	1, 6 as corridor	2	3	2
Errol St / Victoria St	South	Arrival	57	-	-	-
Flinders St / Russell St	West	Arrival	35, 70, 75 as corridor	-	-	-
Haymarket (Elizabeth St)	South	Arrival	19, 59	-	-	-
Peel St / Victoria St	South	Arrival	58	-	-	-
Queensbridge St (Casino East)	North	Arrival	58	-	-	-
St Vincents Plaza	West	Arrival	12, 109 as corridor	-	-	-
Swanston St / Flinders St (Federation Sq)	South	Departure	3, 5, 6, 16, 64, 67, 72 as corridor	1	2	1
Swanston St / Flinders St (Federation Sq)	North	Arrival	3, 5, 6, 16, 64, 67, 72 as corridor	-	-	-
Wellington Pde / Jolimont Rd	West	Arrival	48, 75 as corridor	2	1	-
<b>Total</b>				<b>5</b>	<b>8</b>	<b>4</b>

The breaches reported here are aggregated and calculated at the route level as average total load per rolling hour over average capacity per rolling hour. At some locations, routes are combined into corridors for the evaluation of breaches; these locations are indicated in Table 2 above. The numbers in the table may therefore understate the crowding discomfort experienced by some tram passengers.

### 3.1.3 PM Peak Rolling Hour Breaches

The PM Peak cordon breach count decreased from 3 to 0 compared to May 2018. The improvement occurs at *Elgin St / Lygon St*, where there were 2 breaches in May 2018, and at *Swanston St / Flinders St (Federation Sq)* (direction North) where there was one breach in May 2018.

**Table 3 - Rolling Hour Cordon Breaches in May by Location and Route or Corridor - Weekday PM Peak (15:01-19:00)**

Cordon Location	Direction	Count Type	Route/s	2017	2018	2019
Bourke St / Spring St	West	Arrival	86, 96	-	-	-
Bourke St / Spring St	East	Departure	86, 96	-	-	-
Clarendon St (Crown Casino)	South	Departure	12, 96, 109	-	-	-
Clarendon St (Crown Casino)	North	Arrival	12, 96, 109	-	-	-
Collins St West End (Southern Cross Station)	East	Arrival	11, 48	-	-	-
Docklands (Flinders St West End)	West	Departure	35, 70, 75 as corridor	-	-	-
Docklands (LaTrobe St West End)	West	Departure	30, 35, 86 as corridor	-	-	-
Elgin St / Lygon St	North	Departure	1, 6 as corridor	1	2	-
Errol St / Victoria St	North	Departure	57	-	-	-
Flinders St / Russell St	East	Departure	35, 70, 75 as corridor	-	-	-
Haymarket (Elizabeth St)	North	Departure	19, 59 as corridor	-	-	-
Peel St / Victoria St	North	Departure	58	-	-	-
Queensbridge St (Casino East)	South	Departure	58	-	-	-
St Vincents Plaza	East	Departure	12, 109 as corridor	-	-	-
Swanston St / Flinders St (Federation Sq)	North	Arrival	3, 5, 6, 16, 64, 67, 72 as corridor	-	1	-
Swanston St / Flinders St (Federation Sq)	South	Departure	3, 5, 6, 16, 64, 67, 72 as corridor	-	-	-
Wellington Pde / Jolimont Rd	East	Departure	48, 75 as corridor	2	-	-
<b>Total</b>				<b>3</b>	<b>3</b>	<b>-</b>

## 3.2 Average Daily Passenger Loads - Cordon Locations

Survey counts at cordon locations are used to estimate the number of people arriving into Melbourne's CBD by tram in the AM Peak and the number of people departing the CBD by tram during the PM Peak.

In this section, cordon loads in the peak direction are reported. Counter-peak loads for cordon locations can be found in Section 4.2.

### 3.2.1 AM Peak Passenger Loads

There was 4.5 per cent growth in passenger loads arriving at CBD cordon locations in the AM Peak. The top 5 busiest entry points to the CBD were:

- *Swanston St / Flinders St (Federation Sq)*
- *Clarendon St (Crown Casino)*
- *St Vincent's Plaza*
- *Haymarket (Elizabeth St)*
- *Bourke St / Spring*

which jointly account for 62.3 per cent of arriving morning passengers.



**Table 4 - May Cordon Passenger Loads by Location with Growth Rates - AM Peak – From 2017 to 2019**

<b>Weekday AM Peak Direction (7:01-10:00) May Cordon Loads - 2017 to 2019</b>									
							<b>% Change in Load</b>		
<b>Location</b>	<b>Direction</b>	<b>Count Type</b>	<b>Routes</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>% Change in Load From 2017 to 2018</b>	<b>% Change in Load From 2018 to 2019</b>	
Bourke St / Spring St	West	Arrival	86, 96	4,395	4,751	4,312	8.1	-9.2	
Clarendon St (Crown Casino)	North	Arrival	12, 96, 109	4,770	5,181	5,212	8.6	0.6	
Collins St West End (Southern Cross Station)	East	Arrival	11, 48	1,753	2,300	2,533	31.2	10.1	
Docklands (Flinders St West End)	East	Arrival	35, 70, 75	595	663	674	11.4	1.7	
Docklands (LaTrobe St West End)	East	Arrival	30, 35, 86	973	1,160*	1,449	19.2	24.9	
Elgin St / Lygon St	South	Arrival	1, 6	3,283	3,529	3,469	7.5	-1.7	
Errol St / Victoria St	South	Arrival	57	1,267	1,129	1,169	-10.9	3.5	
Flinders St / Russell St <sup>^</sup>	West	Arrival	70	661	600	595	-9.2	-0.8	
Haymarket (Elizabeth St)	South	Arrival	19, 59	4,484	3,894	4,331	-13.2	11.2	
Peel St / Victoria St	South	Arrival	58	2,219	2,435	2,165	9.7	-11.1	
Queensbridge St (Casino East)	North	Arrival	58	1,608	1,344	1,650	-16.4	22.8	
St Vincents Plaza	West	Arrival	11, 12, 109	4,762	4,850	5,126	1.8	5.7	
Swanston St / Flinders St (Federation Sq)	North	Arrival	1, 3, 5, 6, 16, 64, 67, 72	6,852	6,438	7,783	-6.0	20.9	
Wellington Pde / Jolimont Rd	West	Arrival	48, 75	3,018	2,830	2,485	-6.2	-12.2	
<b>Total</b>				<b>40,640</b>	<b>41,104</b>	<b>42,954</b>	<b>1.1</b>	<b>4.5</b>	

\* - Data corrected which impacts the reported growth rate for 2018

<sup>^</sup> Only route 70 is reported at Flinders St / Russell St from 2018 forward. Prior reports may have included loads from all routes passing this location.

Of the 14 locations surveyed, *Swanston St / Flinders St (Federation Square)* remains the busiest tram cordon, with an estimated 7,783 passengers travelling through this location between 7 and 10am (18.1 per cent of passenger arrivals into the CBD). This represents an increase of 20.9 per cent (1,345 more passengers) compared to May 2018 and a 13.6 per cent increase (931 more passengers) compared to May 2017.

The greatest percentage growth came from *Docklands (LaTrobe St West End)*, which increased 24.9 per cent (an additional 289 passengers) to a total of 1,449 in May 2019. Other changes include *Queensbridge St (Casino East)* which increased 22.8 per cent, following a decrease in loads seen in May 2018. Total loads at this location increased just 2.6 per cent in May 2019 compared to May 2017

### 3.2.2 PM Peak Passenger Loads

Passenger loads departing the cordon in the PM peak have increased 1.9 per cent in May 2019 compared to May 2018.

The top 5 busiest cordon locations were the same as in the AM peak:

- *Swanston St / Flinders St (Federation Sq)*
- *St Vincent's Plaza*
- *Clarendon St (Crown Casino)*
- *Bourke St / Spring*
- *Haymarket (Elizabeth St).*

As in previous years, *Swanston St / Flinders St (Federation Square)* remains the busiest cordon location with an average of 9,862 passengers departing the CBD between 3 and 7pm (19.0 per cent of passenger departures from the CBD). This stop also shows an increase in passenger load by 9.6 per cent year on year.

Passenger loads at 8 of the 14 cordon stops show year on year growth. The stops *Swanston St / Flinders St (Federation Sq)*, *Queensbridge St (Casino East)*, *Docklands (LaTrobe St West End)* and *Haymarket (Elizabeth St)* jointly account for around 72 per cent of the observed growth.

The top 3 declining passenger loads observed in May 2019 were at *Clarendon St (Crown Casino)*, *Docklands (Flinders St West End)* and *Bourke St / Spring St*. Loads at *Docklands (Flinders St West End)* returned to a similar level to May 2017, after increasing 23.9 per cent in May 2018 and declining 22.1 per cent in May 2019.

**Table 5 - May Cordon Passenger Loads by Location with Growth Rates - PM Peak - From 2017 to 2019**

<b>Weekday PM Peak Direction (15:01-19:00) May Cordon Loads - 2017 to 2019</b>								
							<b>% Change in Load</b>	
<b>Location</b>	<b>Direction</b>	<b>Count Type</b>	<b>Routes</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>% Change in Load From 2017 to 2018</b>	<b>% Change in Load From 2018 to 2019</b>
Bourke St / Spring St	East	Departure	86, 96	5,526	6,013	5,674	8.8	-5.6
Clarendon St (Crown Casino)	South	Departure	12, 96, 109	6,017	6,311	5,723	4.9	-9.3
Collins St West End (Southern Cross Station)	West	Departure	11, 48	2,102	2,630	2,929	25.1	11.4
Docklands (Flinders St West End)	West	Departure	35, 70, 75	1,261	1,562	1,216	23.9	-22.1
Docklands (LaTrobe St West End)	West	Departure	30, 35, 86	1,378	1,747	2,069	26.8	18.4
Elgin St / Lygon St	North	Departure	1, 6	3,645	3,680	3,757	1.0	2.1
Errol St / Victoria St	North	Departure	57	1,273	1,264	1,337	-0.7	5.8
Flinders St / Russell St <sup>^</sup>	East	Departure	70	990	1,103	1,075	11.4	-2.5
Haymarket (Elizabeth St)	North	Departure	19, 59	5,502	5,076	5,382	-7.7	6.0
Peel St / Victoria St	North	Departure	58	2,383	2,196	1,954	-7.8	-11.0
Queensbridge St (Casino East)	South	Departure	58	1,365	1,366	1,810	0.1	32.5
St Vincents Plaza	East	Departure	11, 12, 109	5,205	6,058	5,897	16.4	-2.7
Swanston St / Flinders St (Federation Sq)	South	Departure	1, 3, 5, 6, 16, 64, 67, 72	9,238	8,996	9,862	-2.6	9.6
Wellington Pde / Jolimont Rd	East	Departure	48, 75	3,484	2,896	3,188	-16.9	10.1
<b>Total</b>				<b>49,369</b>	<b>50,898</b>	<b>51,874</b>	<b>3.1</b>	<b>1.9</b>

<sup>^</sup> Only route 70 is reported at Flinders St / Russell St from 2018 forward. Prior reports may have included loads from all routes passing this location.

## 4 Non-Cordon Locations

### 4.1 Rolling Hour Breaches – Non-Cordon Locations

While the cordon locations are consistently recorded to provide a long-term time series on load standard breaches and to analyse the impact of network changes, other, non-cordon locations are included after consultation with stakeholders from DoT (Network Planning) and Yarra Trams.

Selection of non-cordon locations may occur for several reasons: a need to understand tram load bottlenecks outside the CBD or to provide before and after analysis for planned network changes. Breaches and the total loads in these locations are reported below.

In the May 2019, 27 non-cordon locations were surveyed in the AM and PM peaks.

#### 4.1.1 AM Peak Rolling Hour Breaches

A total of 2 rolling hour average loads above desired standards (breaches) were observed in the AM peak at non-cordon locations, as shown in Table 6. One of these breaches occurred on Route 82 at *Droop St / Ballarat Rd* and another one at *St Kilda Rd / Union St*.

**Table 6 - Rolling Hour Non-Cordon Load Breaches in May by Location and Route or Corridor - Weekday AM Peak - From 2017 to 2019**

Non-Cordon Location	Direction	Count Type	Route/s	2017	2018	2019
Droop St / Ballarat Rd	South	Arrival	82	X	2	1
St Kilda Rd / Toorak Rd (previously Domain) ++	North	Departure	72	X	1	-
St Kilda Rd / Union St	North	Arrival	3, 67 as corridor	X	-	1
<b>Total</b>				<b>X</b>	<b>3</b>	<b>2</b>

++During April 2018, the former Domain Interchange platform was demolished to prepare for the construction of Anzac Station. The data prior to 2018 represent Domain Interchange counts.

X = Not surveyed in that year

#### 4.1.2 PM Peak Rolling Hour Breaches

In the PM peak, there was one breach observed at non-cordon locations. This occurred at *St Kilda Rd / Toorak Rd* where there were three breaches in May 2018.

**Table 7 - Rolling Hour Non-Cordon Breaches in May by Location and Route or Corridor – Weekday PM Peak -From 2017 to 2019**

Non-Cordon Location	Direction	Count Type	Route/s	2017	2018	2019
St Kilda Rd / Toorak Rd (previously Domain) ++	North	Departure	72	X	3	1

++During April 2018, the former Domain Interchange platform was demolished to prepare for the construction of Anzac Station. The data prior to 2018 represent Domain Interchange counts.

X = Not surveyed in that year

## 4.2 Average Daily Passenger Loads – Non-Cordon Locations

### 4.2.1 AM Peak Passenger Loads

The busiest non-cordon stops observed in the AM peak in May 2019 were *Swanston St / Flinders St (Federation Sq)* in the southern (counter-peak) direction, *St Kilda Rd / Toorak Rd* (both directions) and *St Kilda Rd / Union St* in the northern direction.

The largest decline in passenger loads was observed on east bound services from *St Vincent's Plaza* and *Bourke St / Spring St*.

Note that at *Swanston St / Flinders St (Federation Sq)* the AM counter-peak loads travelling out of the CBD towards the St Kilda Rd business district (9,212) are substantially more, 18 per cent, compared to loads travelling into the CBD (7,783). At *Collins St West End (Southern Cross Station)* and *Docklands (Flinders St West End)* the AM counter-peak loads travelling out of the CBD are also greater than the loads travelling into the CBD.

**Table 8 - May Non-Cordon Passenger Loads by Location with Growth Rates - AM Peak - From 2017 to 2019**

Weekday AM Peak (7:01-10:00) May Non-Cordon Loads - 2017 to 2019								
Location	Direction	Count Type	Routes	2017	2018	2019	% Change in Load	
							% Change in Load From 2017 to 2018	% Change in Load From 2018 to 2019
Abbotsford St Royal Children	South	Arrival	57	923	913	1,074	-1.1	17.6
Bourke St / Spring St	East	Departure	86, 96	X	1,559	1,346	na	-13.6
Bridge Rd / Yarra Blvd	West	Arrival	48, 75	2,008	1,890	1,772	-5.9	-6.3
Chapel St / Toorak Rd	North	Departure	78	X	X	511	na	na
Church St / Swan St	South	Departure	78	X	X	446	na	na
Clarendon St (Crown Casino)	South	Departure	12, 96, 109	4,076	3,176	3,233	-22.1	1.8
Clarendon St / Park St	North	Departure	12	752	758	832	0.8	9.8
Collins St West End (Southern Cross Station)	West	Departure	11, 48	2,846	2,773	3,983	-2.6	43.6
Dandenong Rd / Wattletree Rd	North	Departure	5, 64	X	X	1,071	na	na
Docklands (Flinders St West End)	West	Departure	35, 70, 75	X	887	919	na	3.7
Docklands (LaTrobe St West End)	West	Departure	30, 35, 86	X	519	519	na	0.1
Droop St / Ballarat Rd	South	Arrival	82	X	516	615	na	19.1
Droop St / Ballarat Rd	North	Departure	82	X	X	301	na	na

### Weekday AM Peak (7:01-10:00) May Non-Cordon Loads - 2017 to 2019

							% Change in Load	
Location	Direction	Count Type	Routes	2017	2018	2019	% Change in Load From 2017 to 2018	% Change in Load From 2018 to 2019
Essendon Station	South	Arrival	59	X	X	1,301	na	na
Essendon Station	South	Departure	59	X	X	723	na	na
Flemington Rd / Abbotsford St	South	Arrival	58, 59	4,803	4,625	4,481	-3.7	-3.1
Flinders St / Russell St	East	Departure	35, 70, 75	X	X	1,130	na	na
Flinders St / Russell St	West	Arrival	35, 75	1,341	1,118	981	-16.6	-12.3
Haymarket (Elizabeth St)	North	Departure	19, 59	X	3,822	4,295	na	12.4
Lygon St / Brunswick Rd	South	Arrival	1, 6	2,422	2,476	2,407	2.3	-2.8
Park St / Clarendon St	North	Departure	1	772	678	757	-12.1	11.6
Peel St / Victoria St	North	Departure	58	X	1,076	1,159	na	7.7
Queensbridge St (Casino East)	South	Departure	58	X	913	1,078	na	18.0
Riversdale Junction	West	Arrival	70, 75	X	1,255	1,268	na	1.0
St Kilda Rd / Toorak Rd (previously Domain) ++	North	Departure	3, 5, 6, 16, 58**, 64, 67, 72	5,572	6,412	7,331	not comparable	14.3
St Kilda Rd / Toorak Rd (previously Domain) ++	South	Arrival	3, 5, 6, 16, 58**, 64, 67, 72	7,165	6,123	7,109	not comparable	16.1
St Kilda Rd / Union St	North	Arrival	3, 5, 16, 64, 67	X	3,869	4,564	na	18.0
St Vincent's Plaza	East	Departure	11, 12, 109	X	2,880	2,388	na	-17.1
Swanston St / Flinders St (Federation Sq)	South	Departure	1, 3, 5, 6, 16, 64, 67, 72	9,204	9,862	9,217	7.1	-6.5
Sydney Rd / Brunswick Rd	South	Arrival	19	2,393	2,548	2,390	6.4	-6.2
Victoria St / Burnley St	West	Arrival	109	X	1,093	997	na	-8.8

\*\* Route 58 was not counted at Domain Interchange in 2017

++During April 2018, the former Domain Interchange platform was demolished to prepare for the construction of Anzac Station. The data prior to 2018 represent Domain Interchange counts. Route 58 was not counted in 2017 at Domain.

X = Not surveyed in that year

#### 4.2.2 PM Peak Passenger Loads

The busiest non-cordon stops observed in the PM peak in May 2019 were *Swanston St / Flinders St (Federation Sq)* in the northern counter-peak direction, *St Kilda Rd / Toorak Rd (both directions)*, *Collins St West End (Southern Cross Station)*, *Haymarket (Elizabeth St)* and *St Kilda Rd / Union St*.

Where comparable data exists for 2018, growth was highest at *St Kilda Rd / Toorak Rd* in the southern direction at 17.9 per cent, at *St Kilda Rd / Toorak Rd* in the northern direction at 15.3 per cent year on year and at *Park St / Clarendon St* in the southern direction at 14.2 per cent year on year.

Note that the PM counter-peak loads travelling into the CBD are more compared to loads travelling out of the CBD at *Swanston St / Flinders St (Federation Sq)*, *Haymarket (Elizabeth St)*, *Collins St West End (Southern Cross Station)*, *Peel St / Victoria St* and *Docklands (Flinders St West End)*.

**Table 9 - May Non-Cordon Passenger Loads by Location with Growth Rates - PM Peak - From 2017 to 2019**

Weekday PM Peak (15:01-19:00) May Non-Cordon Loads - 2017 to 2019									
					% Change in Load				
Location	Direction	Count Type	Routes	2017	2018	2019	% Change in Load From 2017 to 2018	% Change in Load From 2018 to 2019	
Abbotsford St Royal Children	North	Departure	57	966	1,001	1,071	3.6	7.0	
Bourke St / Spring St	West	Arrival	86, 96	X	3,291	3,553	na	7.9	
Bridge Rd / Yarra Blvd	East	Departure	48, 75	2,245	2,330	2,196	3.8	-5.8	
Chapel St / Toorak Rd	South	Arrivals	78	X	X	718	na	na	
Church St / Swan St	North	Arrival	78	X	X	624	na	na	
Clarendon St (Crown Casino)	North	Arrival	12, 96, 109	5,481	5,141	4,721	-6.2	-8.2	
Clarendon St / Park St	South	Arrival	12	799	835	871	4.5	4.3	
Collins St West End (Southern Cross Station)	East	Arrival	11, 48	5,056	5,621	5,687	11.2	1.2	
Dandenong Rd / Wattletree Rd	South	Arrival	5, 64	X	X	1,189	na	na	
Docklands (Flinders St West End)	East	Arrival	35, 70, 75	X	1,852	1,788	na	-3.5	
Docklands (LaTrobe St West End)	East	Arrival	30, 35, 86	X	1,834	1,890	na	3.0	
Droop St / Ballarat Rd	North	Departure	82	X	828	888	na	7.2	
Droop St / Ballarat Rd	South	Arrival	82	X	X	448	na	na	
Essendon Station	North	Departure	59	X	X	1,400	na	na	

### Weekday PM Peak (15:01-19:00) May Non-Cordon Loads - 2017 to 2019

							% Change in Load	
Location	Direction	Count Type	Routes	2017	2018	2019	% Change in Load From 2017 to 2018	% Change in Load From 2018 to 2019
Essendon Station	North	Arrival	59	X	X	839	na	na
Flemington Rd / Abbotsford St	North	Departure	58, 59	5,056	4,346	4,946	-14.0	13.8
Flinders St / Russell St	West	Arrival	35, 70, 75	X	X	1,930	na	na
Flinders St / Russell St	East	Departure	35, 75	1,977	1,872	1,559	-5.3	-16.7
Haymarket (Elizabeth St)	South	Arrival	19, 59	X	5,226	5,642	na	7.9
Lygon St / Brunswick Rd	North	Departure	1, 6	2,397	2,383	2,629	-0.6	10.3
Park St / Clarendon St	South	Arrival	1	851	804	918	-5.5	14.2
Peel St / Victoria St	South	Arrival	58	X	1,957	1,999	na	2.1
Queensbridge St (Casino East)	North	Arrival	58	X	1,362	1,459	na	7.1
Riversdale Junction	East	Departure	70, 75	X	1,518	1,313	na	-13.5
St Kilda Rd / Toorak Rd ++	South	Arrival	3, 5, 6, 16, 58**, 64, 67, 72	7,302	7,849	9,254	7.5	17.9
St Kilda Rd / Toorak Rd ++	North	Departure	3, 5, 6, 16, 58**, 64, 67, 72	9,888	8,735	10,076	-11.7	15.3
St Kilda Rd / Union St	South	Departure	3, 5, 16, 64, 67	X	4,606	5,155	na	11.9
St Vincent's Plaza	West	Arrival	11, 12, 109	X	4,008	3,693	na	-7.9
Swanston St / Flinders St (Federation Sq)	North	Arrival	1, 3, 5, 6, 16, 64, 67, 72	11,908	11,971	11,131	0.5	-7.0
Sydney Rd / Brunswick Rd	North	Departure	19	2,713	2,759	2,731	1.7	-1.0
Victoria St / Burnley St	East	Departure	109	X	1,212	1,211	na	-0.1

\*\* Route 58 was not counted at Domain Interchange in 2017

++During April 2018, the former Domain Interchange platform was demolished to prepare for the construction of Anzac Station. The data prior to 2018 represent Domain Interchange counts. Route 58 was not counted in 2017 at Domain.

X = Not surveyed in that year



## 5 Data Collection and Analysis

Data was collected between the 1st and 21st of May 2019 on Tuesdays, Wednesdays and Thursdays, by independent surveyors from a contracted labour supply company.

Passenger counts were undertaken between 7.01 am and 10.00 am and between 3.01 pm and 7.00 pm at selected tram stops across the network, with all services under the Master Timetable surveyed.

In accordance with the Agreement each survey location was surveyed at least 3 times, on different weekdays, to form a Sampled Service Set. Survey observations made at locations impacted by significant network disruptions were excluded and these survey shifts rescheduled.

At most locations passenger counts consisted of arrival loads when the tram headed into the city in the morning and departure loads when leaving the CBD in the evening. However, at specific locations where high bi-directional passenger loads are known to occur, surveying was conducted in both directions.

Between 1 and 6 surveyors counted loads at each tram stop, depending on the frequency and volume of services at the stop. If more than 1 surveyor was present, surveyors worked in pairs with 1 recording the information and the other conducting the passenger count.

Surveyors recorded tram number, route number, arrival time and arrival or departure load. Exceptions occurred by stakeholder requests (see Appendix 2 for a list of survey locations).

On lightly loaded trams, each passenger was counted. On heavily loaded trams, the number of people standing and the empty seats were counted. The number of standing passengers was added to the known number of seats on the tram and the number of empty seats subtracted. Information on the seating capacity of each tram type is included in the table at Appendix 4.

Most routes passing through the CBD, and other routes that share substantial sections of track, have been combined into corridors. A list of the routes aggregated into corridors is at Appendix 3.

The average load for a route or corridor at each survey location was calculated by adding together the total number of passengers on each service surveyed in a rolling hour and dividing that by the number of services in that rolling hour. The average passenger loads are then measured against the average maximum capacity or load standard.

The average maximum capacity is calculated by totalling the individual maximum capacities of each service on each route and dividing that by the number of services for each rolling hour. Maximum capacity for each tram class is considered greater at CBD locations than at non-CBD locations (refer to Appendix 4).

### 5.1 Limitations of Manual Counts for Determining Loads

Loads for each vehicle are estimated by surveyors, and thus subjective. Factors such as glare, advertising signage, and variations of seating capacity within otherwise identical rolling stock create additional challenges to estimate occupancy accurately.

Surveys are conducted over a limited timeframe and results may therefore not be representative of the entire year. Flow on effects from network disruptions may lead to year on year variations in loads and patronage that are not indicative of a sustained trend.

The future of load standard reporting requires moving away from manual counts, and instead using technology. Vehicle loads can be measured directly with automatic passenger counters (APCs), where these have been installed. In addition to addressing the limitation of manual counts outlined above, technology based solutions have the advantage of providing information on loads all year round, on any given day, and at any location in the network. Department of Transport is working with Yarra Trams to explore options for integrating passenger counters across the tram fleet, with a view to replacing manual counts in the medium to long term.

## Appendix 1 – Map of Survey Locations



## Appendix 2 – List of Survey Locations

Loc_ID	Location	Routes	Timeband	Count_Type	Tram Tracker ID	Stop	Direction	Cordon
3021	Droop St / Ballarat Rd	82	AM	Arrival	4259	59	South	No
3021	Droop St / Ballarat Rd	82	PM	Departure	4359	59	North	No
3021	Droop St / Ballarat Rd	82	PM	Arrival	4259	59	South	No
3021	Droop St / Ballarat Rd	82	AM	Departure	4359	59	North	No
3022	Elgin St / Lygon St	1, 6	AM	Arrival	1224	112	South	Yes
3022	Elgin St / Lygon St	1, 6	PM	Departure	2224	112	North	Yes
3024	Errol St / Victoria St	57	AM	Arrival	3921	11	South	Yes
3024	Errol St / Victoria St	57	PM	Departure	3821	11	North	Yes
3025	Flemington Rd Royal Children	58,59	AM	Arrival	3177	19	South	No
3025	Flemington Rd Royal Children	58,59	PM	Departure	3074	19	North	No
3028	Haymarket (Elizabeth St)	19, 59	AM	Departure	3809	9	North	No
3028	Haymarket (Elizabeth St)	19, 59	AM	Arrival	3909	9	South	Yes
3028	Haymarket (Elizabeth St)	19, 59	PM	Departure	3809	9	North	Yes
3028	Haymarket (Elizabeth St)	19, 59	PM	Arrival	3909	9	South	No
3032	Swanston St / Flinders St (Federation Sq)	1, 3, 5, 6, 16, 64, 67, 72	AM	Arrival	3113	13	North	Yes
3032	Swanston St / Flinders St (Federation Sq)	1, 3, 5, 6, 16, 64, 67, 72	AM	Departure	3013	13	South	Yes
3032	Swanston St / Flinders St (Federation Sq)	1, 3, 5, 6, 16, 64, 67, 72	PM	Arrival	3113	13	North	Yes
3032	Swanston St / Flinders St (Federation Sq)	1, 3, 5, 6, 16, 64, 67, 72	PM	Departure	3013	13	South	Yes
3047	Lygon St / Brunswick Rd	1,6	AM	Arrival	1216	120	South	No
3047	Lygon St / Brunswick Rd	1,6	PM	Departure	2216	120	North	No
3053	St Vincents Plaza	11, 12, 109	AM	Departure	3412	12	East	Yes
3053	St Vincents Plaza	11, 12, 109	AM	Arrival	3512	12	West	Yes
3053	St Vincents Plaza	11, 12, 109	PM	Departure	3412	12	East	Yes
3053	St Vincents Plaza	11, 12, 109	PM	Arrival	3512	12	West	Yes
3060	Bridge Rd / Yarra Blvd	48,75	AM	Arrival	1922	22	West	No
3060	Bridge Rd / Yarra Blvd	48,75	PM	Departure	2922	22	East	No
3063	Clarendon St (Crown Casino)	12, 96, 109	AM	Arrival	3357	124A	North	Yes
3063	Clarendon St (Crown Casino)	12, 96, 109	AM	Departure	3257	124A	South	Yes
3063	Clarendon St (Crown Casino)	12, 96, 109	PM	Arrival	3357	124A	North	Yes
3063	Clarendon St (Crown Casino)	12, 96, 109	PM	Departure	3257	124A	South	Yes
3073	Collins St West End (Southern Cross Station)	11, 48	AM	Arrival	3400	D14	East	Yes
3073	Collins St West End (Southern Cross Station)	11, 48	AM	Departure	3500	D14	West	Yes
3073	Collins St West End (Southern Cross Station)	11, 48	PM	Arrival	3400	D14	East	Yes
3073	Collins St West End (Southern Cross Station)	11, 48	PM	Departure	3500	D14	West	Yes
3074	Docklands (Flinders St West End)	35, 70, 75	AM	Arrival	3600	D6	East	Yes
3074	Docklands (Flinders St West End)	35, 70, 75	AM	Departure	3700	D6	West	No
3074	Docklands (Flinders St West End)	35, 70, 75	PM	Arrival	3600	D6	East	No
3074	Docklands (Flinders St West End)	35, 70, 75	PM	Departure	3700	D6	West	Yes
3075	Docklands (LaTrobe St West End)	30,35,86	AM	Arrival	3550	D1	East	Yes
3075	Docklands (LaTrobe St West End)	30,35,86	AM	Departure	3650	D1	West	No
3075	Docklands (LaTrobe St West End)	30,35,86	PM	Arrival	3550	D1	East	No
3075	Docklands (LaTrobe St West End)	30,35,86	PM	Departure	3650	D1	West	Yes
3081	Bourke St / Spring St	86, 96	AM	Departure	3309	9	East	No
3081	Bourke St / Spring St	86, 96	AM	Arrival	3209	9	West	Yes
3081	Bourke St / Spring St	86, 96	PM	Departure	3309	9	East	Yes
3081	Bourke St / Spring St	86, 96	PM	Arrival	3209	9	West	No
3090	Wellington Pde / Jolimont Rd	48, 75	AM	Arrival	3710	10	West	Yes
3090	Wellington Pde / Jolimont Rd	48, 75	PM	Departure	3610	10	East	Yes
3098	Peel St / Victoria St	58	AM	Departure	3067	10	North	No
3098	Peel St / Victoria St	58	AM	Arrival	3169	10	South	Yes
3098	Peel St / Victoria St	58	PM	Departure	3067	10	North	Yes

Loc_ID	Location	Routes	Timeband	Count_Type	Tram Tracker ID	Stop	Direction	Cordon
3098	Peel St / Victoria St	58	PM	Arrival	3169	10	South	No
3099	Queensbridge St (Casino East)	58	AM	Arrival	3057	115	North	Yes
3099	Queensbridge St (Casino East)	58	AM	Departure	3159	115	South	No
3099	Queensbridge St (Casino East)	58	PM	Arrival	3057	115	North	No
3099	Queensbridge St (Casino East)	58	PM	Departure	3159	115	South	Yes
3102	Abbotsford St Royal Children	57	AM	Arrival	3929	19	South	No
3102	Abbotsford St Royal Children	57	PM	Departure	3829	19	North	No
3104	Flinders St / Russell St	35, 70, 75	AM	Arrival	3706	6	West	Yes
3104	Flinders St / Russell St	35, 70, 75	PM	Departure	3606	6	East	Yes
3104	Flinders St / Russell St	35, 70, 75	PM	Arrival	3706	6	West	No
3104	Flinders St / Russell St	35, 70, 75	AM	Departure	3606	6	East	No
3109	Sydney Rd / Brunswick Rd	19	AM	Arrival	1419	19	South	No
3109	Sydney Rd / Brunswick Rd	19	PM	Departure	2419	19	North	No
3129	Park St / Clarendon	1	AM	Departure	1234	24	North	No
3129	Park St / Clarendon	1	PM	Arrival	2234	24	South	No
3161	Clarendon St / Park St	12	AM	Departure	1396	129	North	No
3161	Clarendon St / Park St	12	PM	Arrival	2396	129	South	No
3166	Victoria St / Burnley St	109	AM	Arrival	1724	24	West	No
3166	Victoria St / Burnley St	109	PM	Departure	2724	24	East	No
3233	St Kilda Rd / Toorak Rd	3, 5, 6, 16, 58, 64, 67, 72	AM	Departure	1022	22	North	No
3233	St Kilda Rd / Toorak Rd	58	AM	Arrival	3022		South	No
3233	St Kilda Rd / Toorak Rd	3, 5, 6, 16, 64, 67, 72	AM	Arrival	2022	22	South	No
3233	St Kilda Rd / Toorak Rd	3, 5, 6, 16, 58, 64, 67, 72	PM	Departure	1022	22	North	No
3233	St Kilda Rd / Toorak Rd	58	PM	Arrival	3022		South	No
3233	St Kilda Rd / Toorak Rd	3, 5, 6, 16, 64, 67, 72	PM	Arrival	2022	22	South	No
3234	Riversdale Junction	70, 75	AM	Arrival	1929	29	West	No
3234	Riversdale Junction	70, 75	PM	Departure	2929	29	East	No
3237	St Kilda Rd / Union St	3, 5, 16, 64, 67	AM	Arrival	1029	29	North	No
3237	St Kilda Rd / Union St	3, 5, 16, 64, 67	PM	Departure	2029	29	South	No
3239	Essendon Station	59	AM	Arrival	1302	41	South	No
3239	Essendon Station	59	AM	Departure	1302	41	South	No
3239	Essendon Station	59	PM	Arrival	2302	41	North	No
3239	Essendon Station	59	PM	Departure	2302	41	North	No
3065	Dandenong Rd / Wattletree Rd	5, 64	AM	Departure	1110	40	North	No
3065	Dandenong Rd / Wattletree Rd	5, 64	PM	Arrival	2110	40	South	No
3238	Elizabeth Street / La Trobe St	30, 35	PM	Arrival	3555	5	East	No
3238	Elizabeth Street / La Trobe St	30, 35	PM	Departure	3655	5	West	No
3238	Elizabeth Street / La Trobe St	30, 35	PM	Arrival	3555	5	East	No
3238	Elizabeth Street / La Trobe St	30, 35	PM	Departure	3655	5	West	No
3020	Church St / Swan St	78	AM	Departure	4157	57	South	No
3020	Church St / Swan St	78	PM	Arrival	4057	57	North	No
3151	Chapel St / Toorak Rd	78	AM	Departure	4050	50	North	No
3151	Chapel St / Toorak Rd	78	PM	Arrivals	4150	50	South	No

## Appendix 3 – Locations at which Routes are Combined into Corridors for Breach Reporting


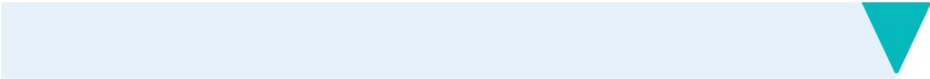
Load counts are aggregated into corridors for the following routes and locations.

Corridor Routes	Location	CBD
Routes 35, 70, 75 (All routes - CBD Locations)	Docklands (Flinders St West End)	Yes
Routes 30, 35, 86 (All routes - CBD Locations)	Docklands (LaTrobe St West End)	Yes
Routes 35, 70, 75 (All routes - CBD Locations)	Flinders St / Russell St	Yes
Routes 30 and 35 (All routes - CBD Locations)	Elizabeth Street / La Trobe St	Yes
Routes 1 and 6	Elgin St / Lygon St	No
Routes 1 and 6	Lygon St / Brunswick Rd	No
Routes 12 and 109	St Vincents Plaza	No
Routes 3, 5, 16, 64, 67	St Kilda Rd / Toorak Rd (previously Domain)	Yes
Routes 3, 5, 6, 16, 64, 67, 72	Swanston St / Flinders St (Federation Sq)	Yes
Routes 48 and 75	Wellington Pde / Jolimont Rd	No
Routes 3 and 67	St Kilda Rd / Union St	No
Routes 5 and 64	St Kilda Rd / Union St	No

Note that routes along Bourke St and Collins St in the CBD are not aggregated into corridors.

## Appendix 4 – Maximum Capacities by Tram Type

Tram class	Introduced	Number from	Number to	Seating capacity	Maximum planning capacity (non CBD)	Maximum planning capacity (CBD)
A	1984 - 1986	231	300	40	55	65
B1	1984 - 1994	2001	2132	52	110	120
B2	1984 - 1994	2001	2132	40	110	120
C1	2001 - 2002	3001	3036	36	110	120
C2	2008	5103	5123	54	160	180
D1 (3 car Combino)	2002 - 2003	3501	3538	40	80	90
D2 (5 car Combino)	2003 - 2004	5001	5021	58	130	140
E	2013 - *	6001	*	64	180	180
W	1939 - 1956	681	1040	46	65	75
Z	1975 - 1984	1	230	40	60	70



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