

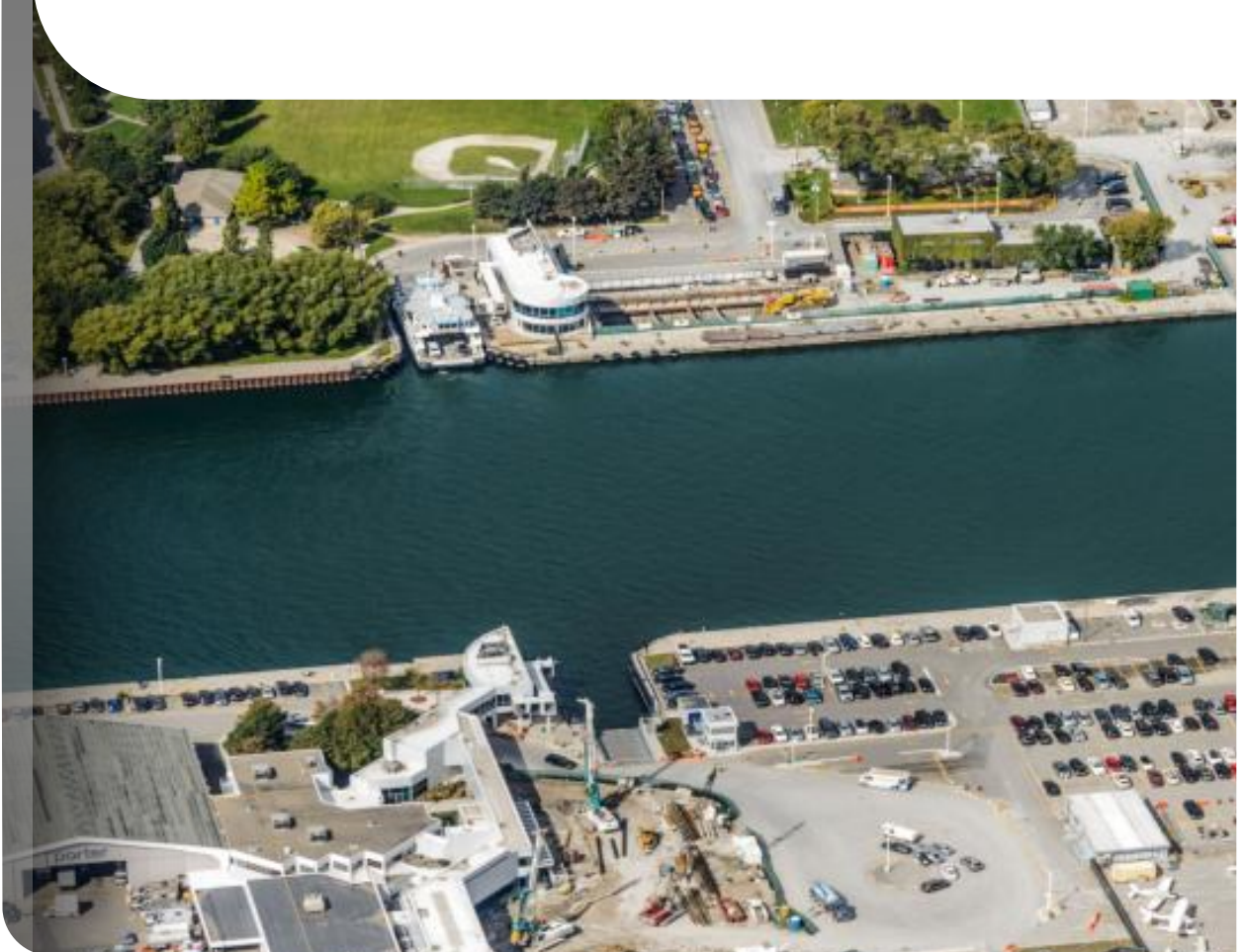


DILLON
CONSULTING

PORTSTORONTO

Billy Bishop Toronto City Airport

Results of 2015 Traffic and Passenger Surveys



August 2015 — 14-9816

Table of Contents

1.0	Introduction	1
2.0	Intersection Traffic Volumes	2
2.1	Scope of Intersection Surveys.....	2
2.2	Intersection Traffic Volumes.....	2
2.3	Observance of Signed Turn Prohibitions	5
2.4	Eireann Quay Traffic Volumes	7
3.0	Queue Surveys	10
3.1	Northbound Queues on Eireann Quay	10
3.2	Ferry Queue	12
4.0	Shuttle Usage	13
5.0	Taxi Usage	15
5.1	Taxi Corral Queues	15
5.2	Taxi Deadheading.....	17
6.0	Taxi and Auto Occupancy Levels	21
7.0	Modal Split	23
	Figures	
	Figure 1: Typical 2015 Peak Hour Traffic Volumes.....	3
	Figure 2: Typical 2015 Peak Hour Traffic Volumes (Taxis Only)	3
	Figure 3: Estimated 2015 Peak Hour Airport Traffic Volumes	4
	Figure 4: Estimated 2015 Peak Hour Airport Traffic Volumes (Taxis Only)	4
	Figure 5: Estimated Peak Hour 2015 Non-Airport Traffic Volumes	5
	Figure 6: Eastbound Right Turns at Lake Shore Boulevard and Stadium Road	6
	Figure 7: Northbound Left Turns at Lake Shore Boulevard and Stadium Road	6

Figure 8: Hourly Traffic Volumes on Eireann Quay (Thursday, April 23)	7
Figure 9: Hourly Traffic Volumes on Eireann Quay (Friday, May 1).....	7
Figure 10: Hourly Traffic Volumes on Eireann Quay (Thursday, April 23)	9
Figure 11: Hourly Traffic Volumes on Eireann Quay (Friday, May 1).....	9
Figure 12: Queue Length on Northbound Eireann Quay (Morning Surveys)	10
Figure 13: Queue Length on Northbound Eireann Quay (Afternoon Surveys).....	11
Figure 14: Surveyed Ferry Queues (Finger Lot)	12
Figure 15: Hourly Airport Shuttle Ridership	13
Figure 16: Shuttle Passengers per Trip.....	14
Figure 17: Number of Taxis Queued in Corral (Morning).....	15
Figure 18: Number of Taxis Queued in Corral and Loading Area (Friday Morning)	16
Figure 19: Number of Taxis Queued in Corral (Afternoon)	16
Figure 20: Number of Taxis Queued in Corral and Loading Area (Friday Afternoon).....	17
Figure 21: Taxi Deadheading Statistics (Morning)	19
Figure 22: Taxi Deadheading Statistics (Afternoon).....	20
Figure 23: Hourly Variation in Auto / Taxi Occupancy Levels	22
Figure 24: Passenger Movements by Travel Mode.....	23
Figure 25: Hourly Variation in Modal Split	24

Tables

Table 1: Average Number of Passengers per Taxi and per Auto.....	21
Table 2: Modal Split for Travel to/from BBTCA	25

Introduction

This memo documents the results of the mainland traffic and pedestrian surveys undertaken in April 2015 in the vicinity of Billy Bishop Toronto City Airport (BBTCA). The surveys establish baseline “pre-tunnel” conditions related to traffic volumes, modal split and taxi occupancy levels for travel to and from the airport, and update prior surveys undertaken in 2010 and in 2012.

The survey included three separate components:

- Traffic counts at key intersections near BBTCA;
- Queue length measurements; and
- Passenger counts leading to modal split and auto occupancy calculations.

Intersection surveys (six locations) were undertaken on Thursday, April 23, 2015. Surveys on Eireann Quay, south of Queens Quay, and at the mainland airport terminal were undertaken on Thursday and Friday, April 23–24, 2015. In both cases, the surveys were undertaken for four hours in the morning (6:30 to 10:30 AM) and for four hours in the afternoon (3:00 to 7:00 PM).

The survey data was augmented by parking and shuttle data obtained from Stolport (local parking operators) and from Pacific Western (shuttle bus operators), respectively.

2.0 Intersection Traffic Volumes

2.1 Scope of Intersection Surveys

Intersection traffic counts were undertaken at six locations:

- Lake Shore Boulevard at Stadium Road
- Lake Shore Boulevard / Fleet Street at Bathurst Street
- Lake Shore Boulevard at Dan Leckie Way
- Queens Quay at Stadium Road
- Queens Quay at Bathurst Street / Eireann Quay
- Queens Quay at Dan Leckie Way

The surveyed traffic volumes were adjusted to account for two factors:

- Traffic volumes along Lake Shore Boulevard appeared to be uncharacteristically low on the survey date (particularly eastbound during the morning peak period); and
- Traffic patterns along Queens Quay were affected by construction east of Dan Leckie Way (eastbound lanes were closed; westbound lanes were slightly constrained).

2.2 Intersection Traffic Volumes

Figure 1 and **Figure 2** illustrate the AM and PM peak hour intersection traffic volumes (all vehicles; taxis only) after accounting for the above adjustments.

From the existing volumes, the amount of airport traffic at each intersection was estimated (all vehicles; taxis only). These estimated volumes are illustrated in **Figure 3** and **Figure 4**.

The volume of non-airport related traffic was estimated by subtracting airport-related traffic from the total traffic volumes. The estimated non-airport traffic (or background traffic) volumes are illustrated in **Figure 5**.

FIGURE 1: TYPICAL 2015 PEAK HOUR TRAFFIC VOLUMES

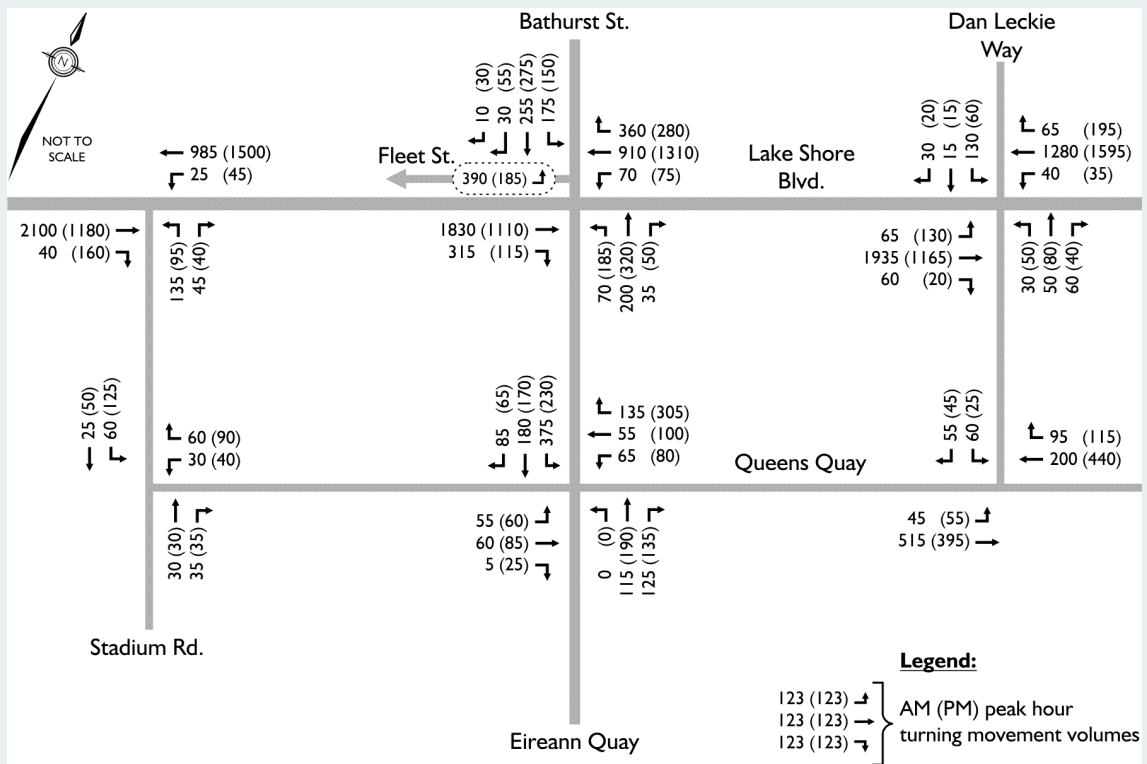


FIGURE 2: TYPICAL 2015 PEAK HOUR TRAFFIC VOLUMES (TAXI ONLY)

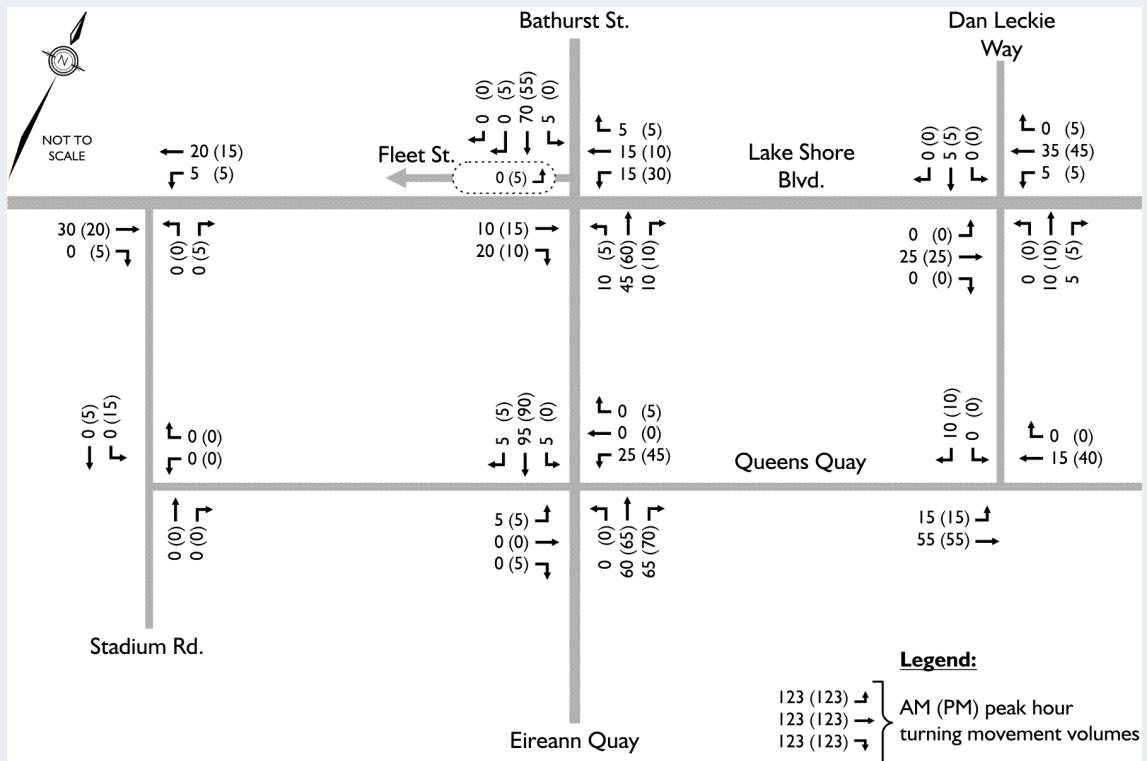


FIGURE 3: ESTIMATED 2015 PEAK HOUR AIRPORT TRAFFIC VOLUMES

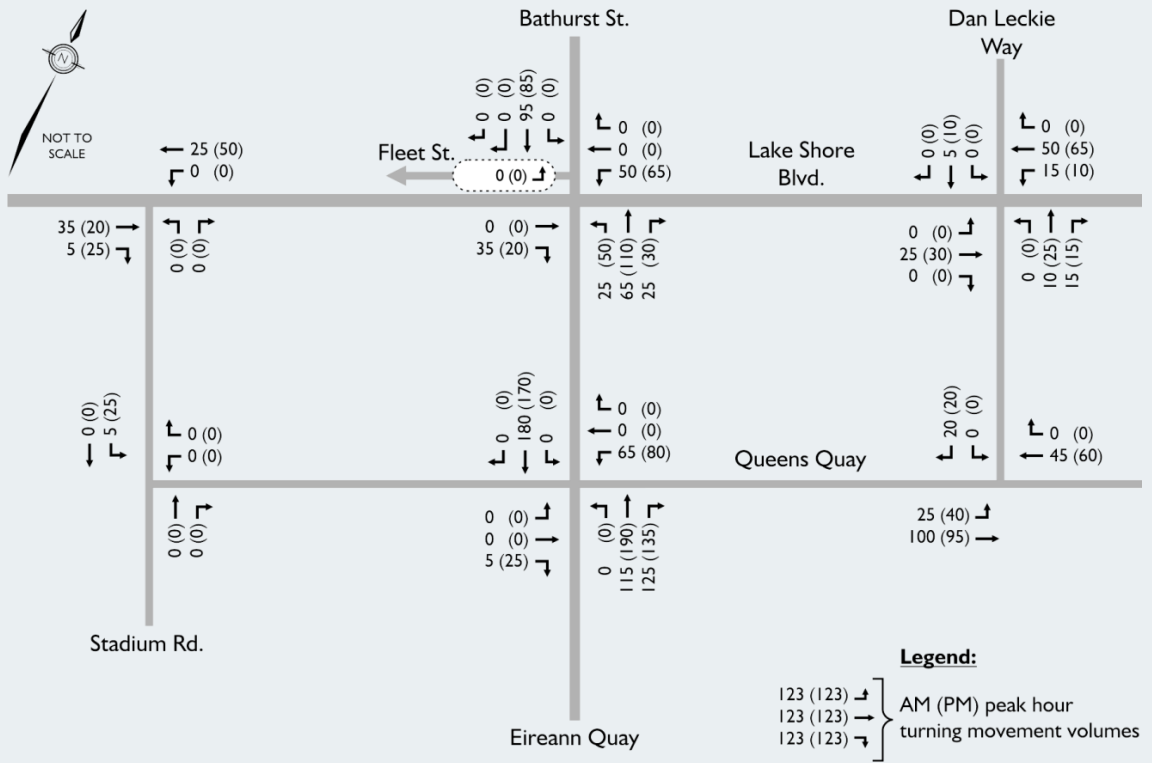


FIGURE 4: ESTIMATED 2015 PEAK HOUR AIRPORT TRAFFIC VOLUMES (TAXIS ONLY)

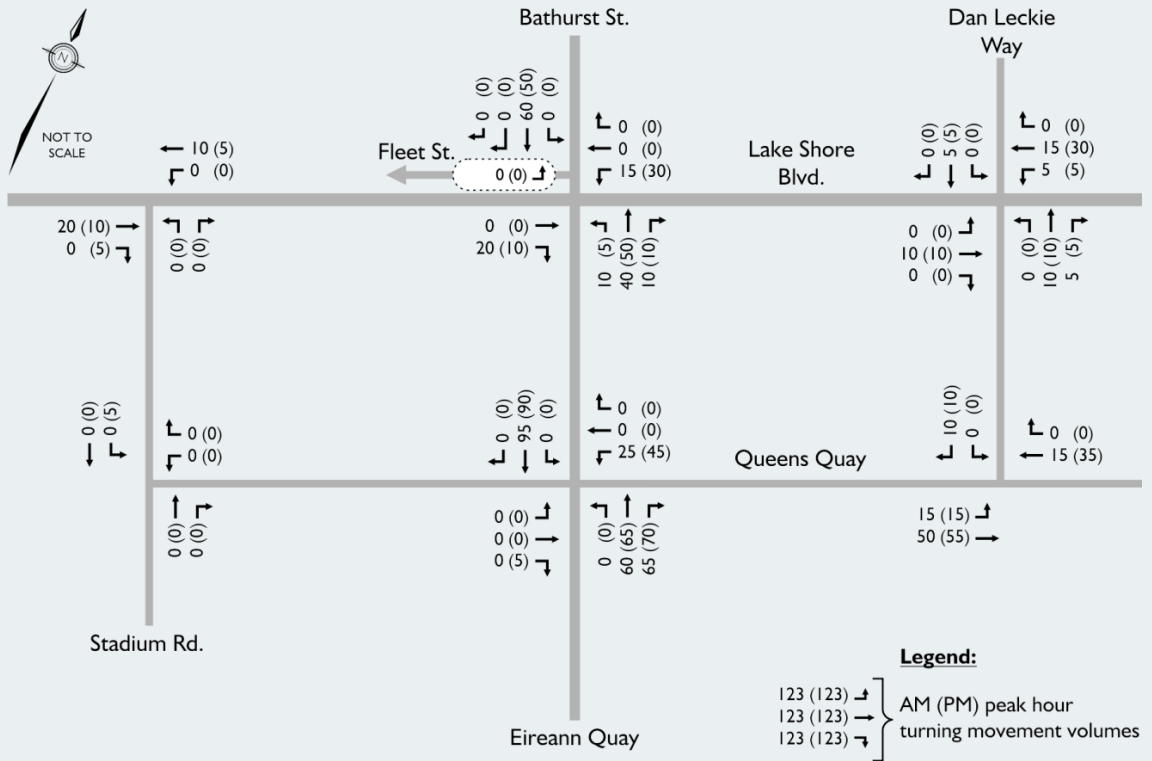
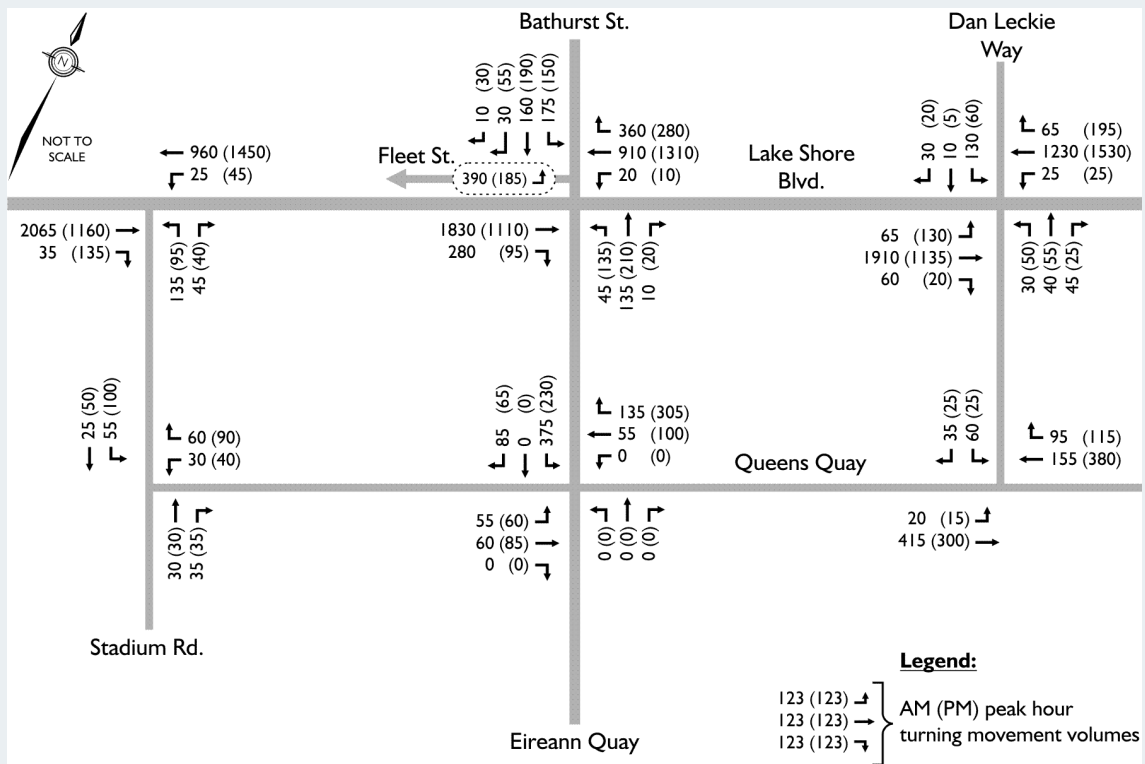


FIGURE 5: ESTIMATED PEAK HOUR 2015 NON-AIRPORT TRAFFIC VOLUMES



2.3 Observance of Signed Turn Prohibitions

Turn prohibitions were implemented near the airport in 2012; specifically:

- No left turn northbound from Eireann Quay to Queens Quay at any time;
- No right turn eastbound from Lake Shore Boulevard to Stadium Road during the morning peak period; and
- No left turn northbound from Stadium Road to Lake Shore Boulevard during the afternoon peak period.

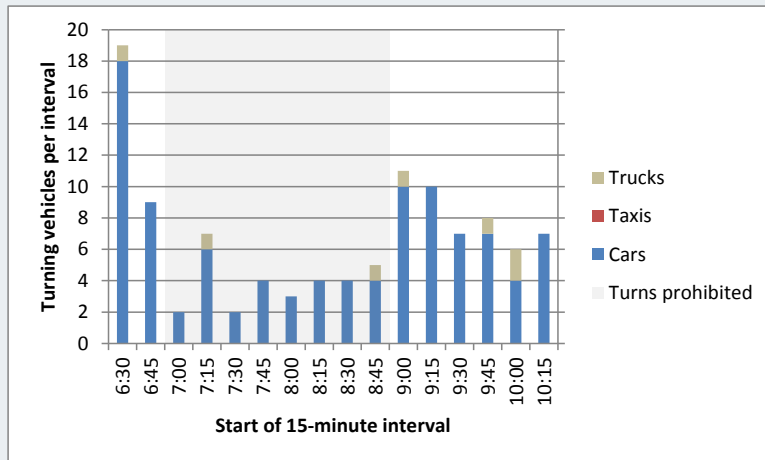
A small number of vehicles were observed making illegal left turns from Eireann Quay to Queens Quay:

- Four vehicles between 6:30 and 10:30 AM (including two taxis); and
- Seven vehicles between 3:00 and 7:00 PM (including one taxi).

These numbers can be considered to be negligible. (As shown in **Figure 1**, the peak hour volume is 0 vehicles per hour when rounding to the nearest 5 vehicles per hour.)

A larger number of vehicles were observed violating the turn prohibitions at Stadium Road and Lake Shore Boulevard, as shown in **Figure 6** and **Figure 7**.

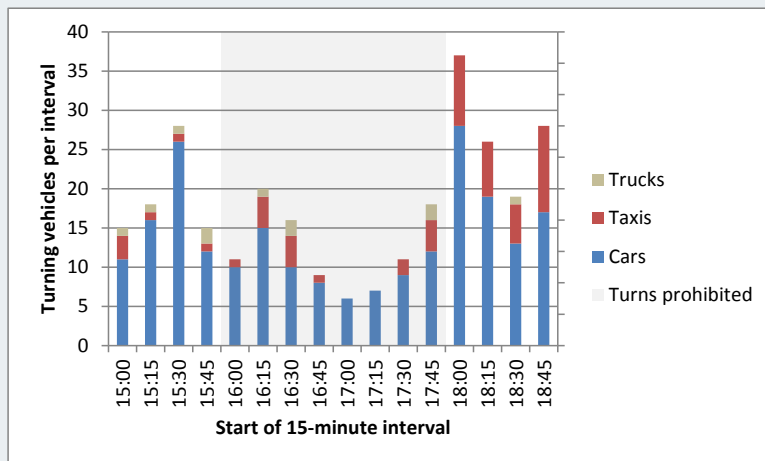
FIGURE 6: EASTBOUND RIGHT TURNS AT LAKE SHORE BOULEVARD AND STADIUM ROAD



During the morning, a minor number of vehicles were observed violating the eastbound right turn prohibition — an average of 15 per hour between 7:00 and 9:00, or approximately one vehicle every other cycle. No taxis were observed making this movement.

Given that 24 right turns were observed from Queens Quay to Eireann Quay over the same two-hour period, it is possible that some of this traffic is airport-related.

FIGURE 7: NORTHBOUND LEFT TURNS AT LAKE SHORE BOULEVARD AND STADIUM ROAD



During the afternoon, a greater number of vehicles were observed violating the northbound left turn prohibition — an average of 49 vehicles per hour between 4:00 and 6:00, or approximately 2 vehicles per green signal. Of the total during this period, 16% were taxis.

Given the minimal number of northbound left turns from Eireann Quay to Queens Quay over the same two-hour period, it is believed that most if not all of this traffic is unrelated to the airport.

2.4 Eireann Quay Traffic Volumes

The traffic volumes along Eireann Quay were determined from the turning movement counts at the Queens Quay and Bathurst Street intersection.

Traffic volumes were surveyed for Thursday and Friday conditions. The Friday survey was originally scheduled for April 24 but due to technical issues had to be rescheduled for the following Friday (May 1).

Figure 8 illustrates the hourly traffic volumes observed along Eireann Quay on Thursday, April 23. **Figure 9** illustrates the same information for Friday, May 1. The volumes reflect continuous (“rolling”) hourly traffic volumes (e.g., the data point at 8:25 AM reflects the number of vehicles observed during the one hour between 8:25 and 9:25).

FIGURE 8: HOURLY TRAFFIC VOLUMES ON EIREANN QUAY (THURSDAY, APRIL 23)

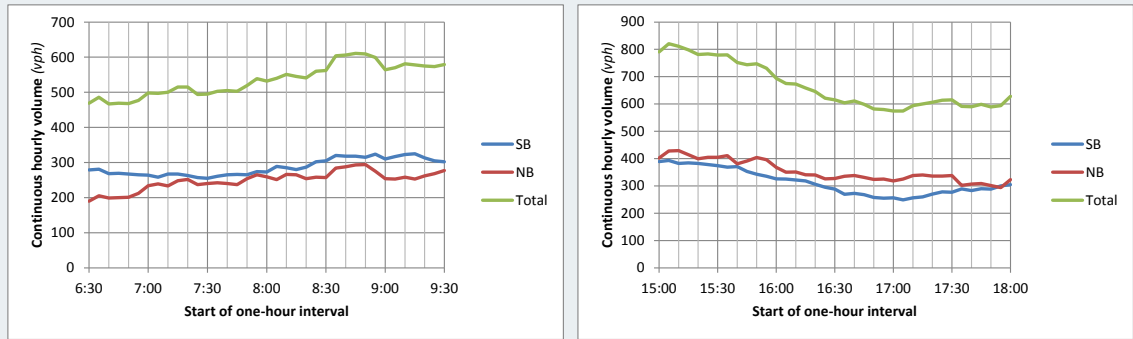
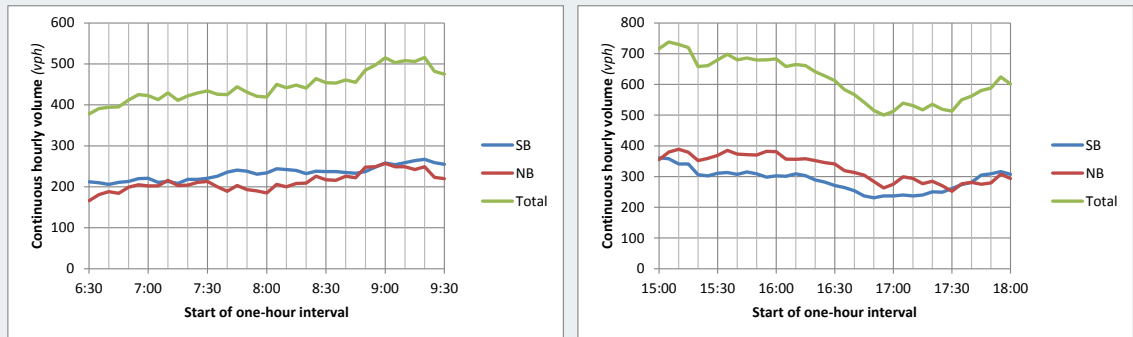


FIGURE 9: HOURLY TRAFFIC VOLUMES ON EIREANN QUAY (FRIDAY, MAY 1)



During the morning, the heaviest demand was observed near the end of the survey period (after 8:30 or 9:00 AM), peaking at approximately 600 vph on Thursday and 500 vph on Friday.

During the afternoon, the heaviest demand was observed between approximately 3:00 and 4:00 PM, prior to the start of the commuting peak hour, with two-way flows peaking at just

over 800 vph on Thursday and at just under 750 vph on Friday. By the 5:00-6:00 PM interval, during the main part of the commuting peak period, traffic on Eireann Quay had decreased by approximately 200 vph (to approximately 600 vph on Thursday and to just under 550 vph on Friday). It is notable that the airport peak hour and the background (commuting) peak hour do not coincide.

Figure 10 and **Figure 11** illustrate the variation in traffic demand from one five-minute interval to the next.

The five-minute volumes illustrate the difference between traffic flow patterns toward and away from the airport, with greater variability for northbound (away) traffic. This reflects the surges in activity that occur following the arrival of a ferry. Northbound traffic demand typically ranges from 5 to 30 vehicles per five minutes in the morning, and from 20 to 45 vehicles per five minutes in the afternoon. Conversely, southbound traffic demand shows less variability, generally in the order of 20 to 30 vehicles per five minutes throughout most of the survey period.

It is anticipated that the opening of the tunnel will assist in smoothing out the surges in pedestrian activity and reducing the variability in northbound demand.

FIGURE 10: HOURLY TRAFFIC VOLUMES ON EIREANN QUAY (THURSDAY, APRIL 23)

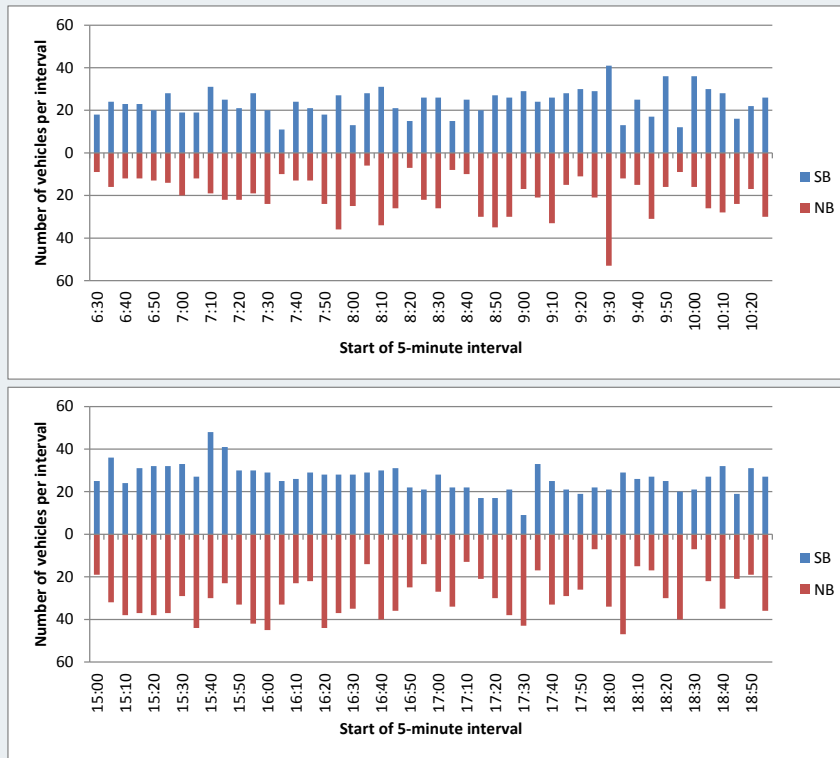
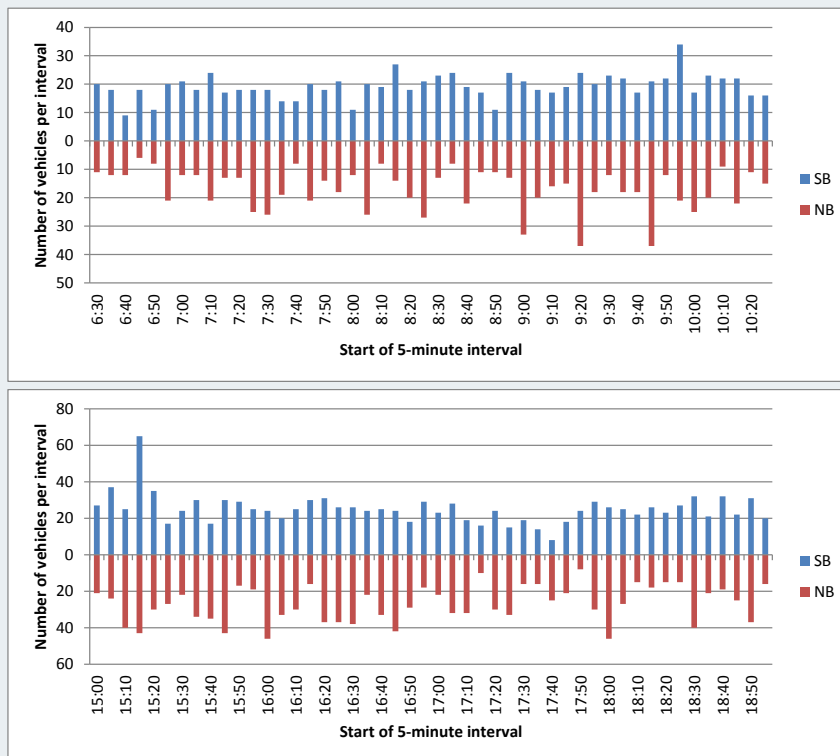


FIGURE 11: HOURLY TRAFFIC VOLUMES ON EIREANN QUAY (FRIDAY, MAY 1)



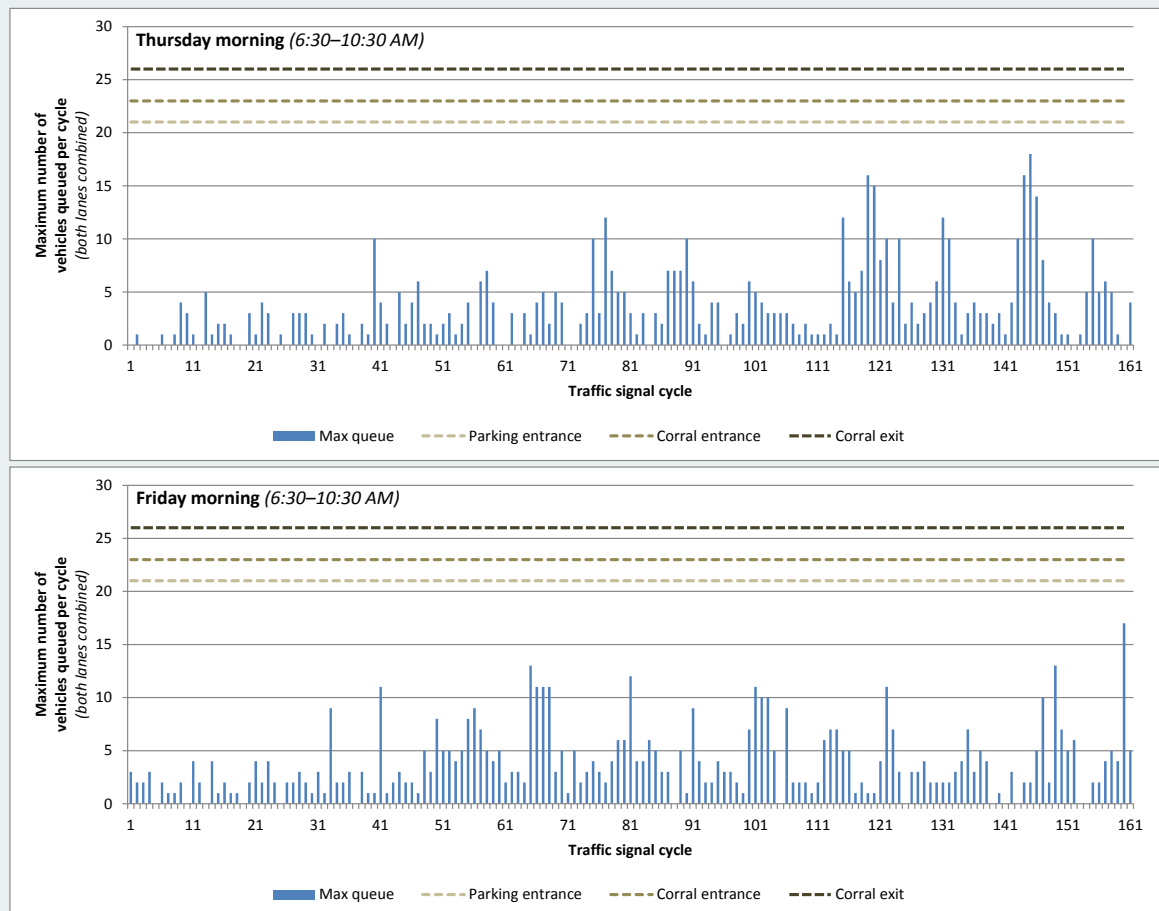
3.0 Queue Surveys

3.1 Northbound Queues on Eireann Quay

Surveyors recorded the number of vehicles queued on northbound Eireann Quay at the Queens Quay traffic signals. The number of queued vehicles was recorded at the start of every northbound green signal. Including the northbound right turn lane at Queens Quay, there is room to accommodate a queue of approximately 26 vehicles before blocking the exit to the taxi corral (depending on the number of trucks and buses in the queue, and the spacing between queued vehicles).

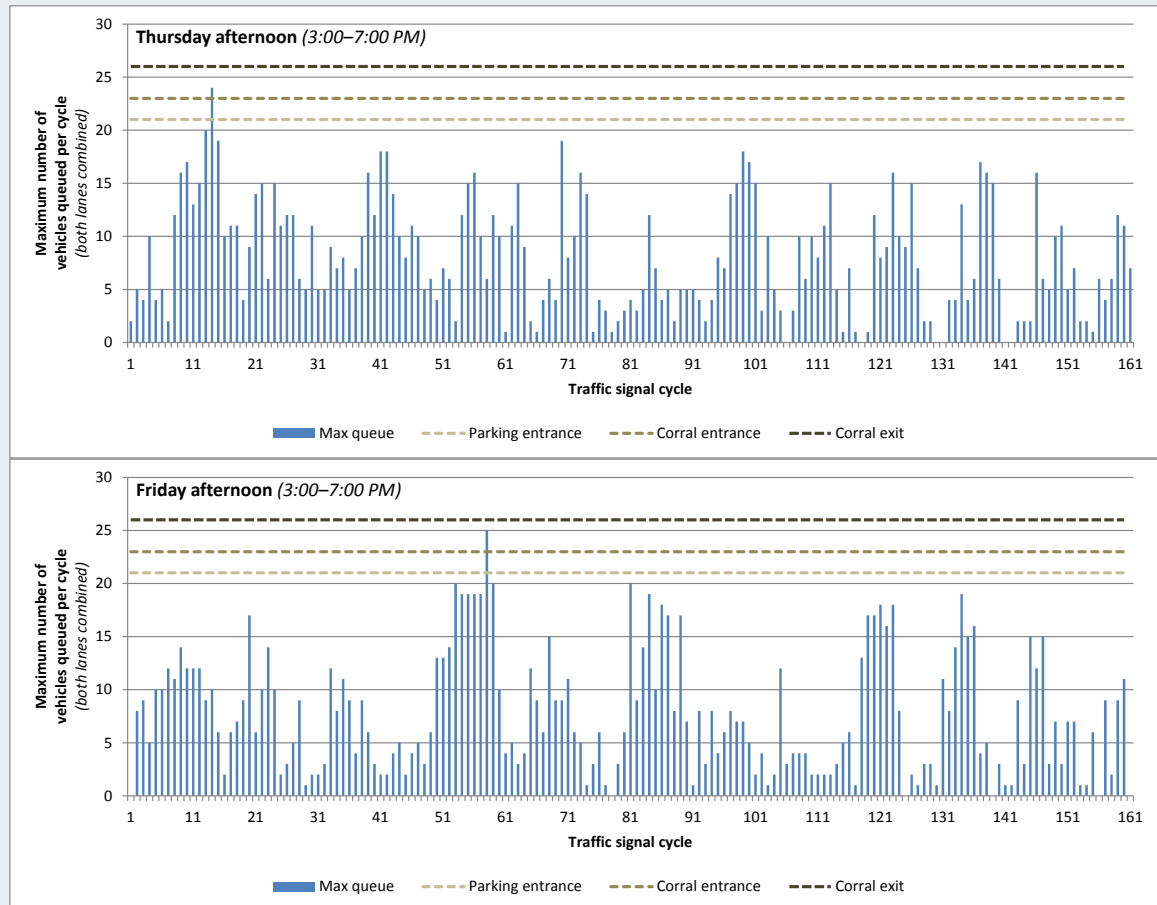
Figure 12 illustrates the maximum number of queued vehicles per cycle during the morning surveys; **Figure 13** illustrates the results from the afternoon surveys.

FIGURE 12: QUEUE LENGTH ON NORTHBOUND EIREANN QUAY (MORNING SURVEYS)



During the morning surveys, the queues were typically in the order of five vehicles or less, occasionally reaching 10 to 15 vehicles. Northbound queues were not found to reach the entrances to the taxi corral or Canada Malting site parking facilities. These queues can be reasonably managed and can typically be served on one green signal.

FIGURE 13: QUEUE LENGTH ON NORTHBOUND EIREANN QUAY (AFTERNOON SURVEYS)

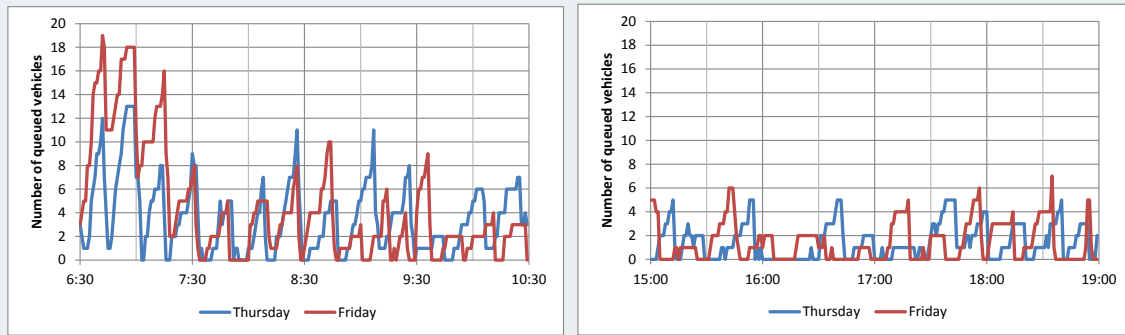


During the afternoon, longer queues were observed more frequently and for a greater duration per occurrence. Queues of 15 to 20 vehicles were regularly observed, reaching or approaching the entrance to the Canada Malting parking area. On occasion, northbound queues reached the taxi corral driveways. Once queues exceed approximately 15 vehicles, there is a greater potential for some queued vehicles to need to wait for a second green signal.

3.2 Ferry Queue

Surveyors recorded the number of vehicles in the Finger Lot waiting to board the ferry; measurements were taken at one-minute intervals. The results are shown in **Figure 14**.

FIGURE 14: SURVEYED FERRY QUEUES (FINGER LOT)



Ferry queues were longest between 6:30 and 7:30 AM, when up to 19 vehicles were observed waiting for the ferry on Friday (and some vehicles were required to wait for a second ferry before being able to board). For the rest of the morning, ferry queues were generally in the order of 10 vehicles or less.

During the afternoon, the ferry queues largely remained at five vehicles or less.

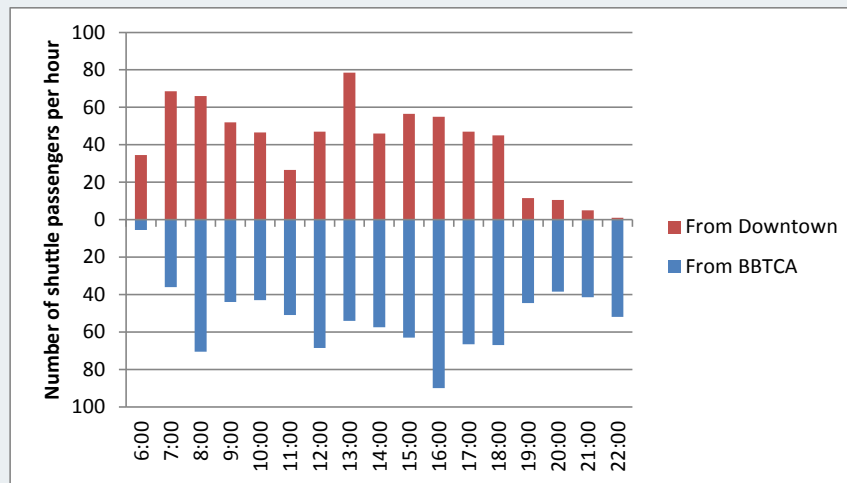
The ferry is scheduled to make four trips each way per hour, but frequently was only able to make approximately three trips per hour due to the time needed to serve boarding and disembarking passenger flows. The opening of the tunnel will substantially reduce passenger levels on the ferry and will remove this constraint to ferry service frequency. With the ferry operating more frequently, queues will be able to dissipate more often, which may assist in reducing queue lengths. It should be noted, however, that there is less likelihood of achieving more frequent service prior to 7:30 AM, when vehicle demand and queues are greatest, because the ferry was achieving its 15-minute frequency at that time.

4.0

Shuttle Usage

Shuttle passenger data was provided by Pacific Western, who operate the airport shuttle. **Figure 15** illustrates the number of passengers per hour (and shows the average of the Thursday and Friday data).

FIGURE 15: HOURLY AIRPORT SHUTTLE RIDERSHIP



The passenger levels shown in **Figure 15** represent the average of the Thursday and Friday data. However, there was considerable variation in the number of riders per trip, particularly for shuttle trips leaving BBTCA, as shown in **Figure 16**.

For shuttle trips leaving BBTCA, there is a great deal of variation. Some trips connect with incoming flights and are heavily used. Other trips that do not connect with flights leave empty; they cannot remain at the airport to wait for passengers because they need to return downtown so as to maintain a regular schedule for airport-bound passengers. Generally connecting trips carried 10 to 35 passengers each, and as many as 45 (Thursday at 4:55 PM).

For shuttle trips destined to BBTCA, there is less variation associated with the flight schedule because passengers have different thresholds of comfort in terms of how early they wish to check in for their flight. Generally each trip carried 5 to 20 passengers.

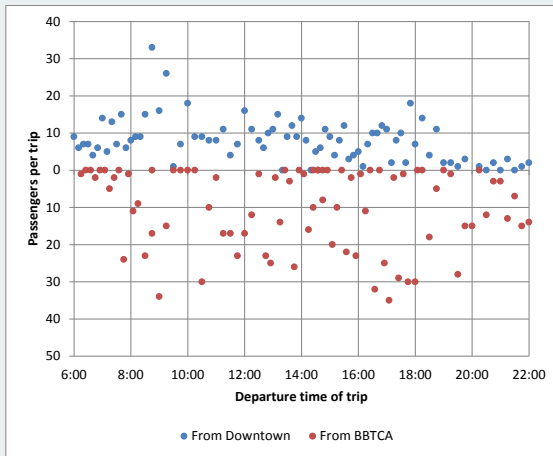
Because of the more variable nature of arriving passengers, higher passenger loads were regularly observed on trips leaving BBTCA, even though the total number of passengers was roughly comparable in both directions.

At the time of the surveys, three buses were in operation. A fourth bus has recently been added to the service in preparation for the opening of the tunnel. Until the tunnel is open, a

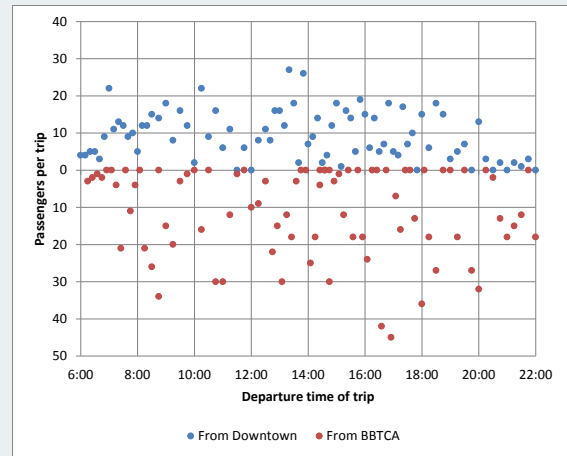
similar pattern is expected to be in place, with lower individual loads but less variation for trips to BBTCA, and high variation between full loads and empty loads leaving BBTCA depending on whether the shuttle was in the corral when a ferry arrived. Once the tunnel has opened and the surges in passenger activity become more dispersed, the number of empty trips leaving the airport is expected to decrease, and the increased frequency afforded by the fourth bus will become more important in reducing wait times leaving the airport once shuttle departures are no longer tied to ferry arrivals.

FIGURE 16: SHUTTLE PASSENGERS PER TRIP

Thursday, April 23, 2015



Friday, April 24, 2015



5.0 Taxi Usage

5.1 Taxi Corral Queues

Surveyors recorded the number of taxis queued in the corral at one-minute intervals.

Surveys were undertaken on both Thursday and Friday; however, the Thursday survey only included taxis queued in advance of the loading area, whereas the Friday survey included a separate measurement for taxis queued within the loading area.

Figure 17 and **Figure 19** illustrate the number of taxis queued in advance of the loading area on both dates. **Figure 18** and **Figure 20** show the Friday results only, and illustrate the difference between the number of taxis queued in advance of the loading area and the total number of waiting taxis.

The capacity of the corral itself is in the order of 32 to 38 taxis, depending on how tightly spaced the queued taxis are in each lane.

FIGURE 17: NUMBER OF TAXIS QUEUED IN CORRAL (MORNING)

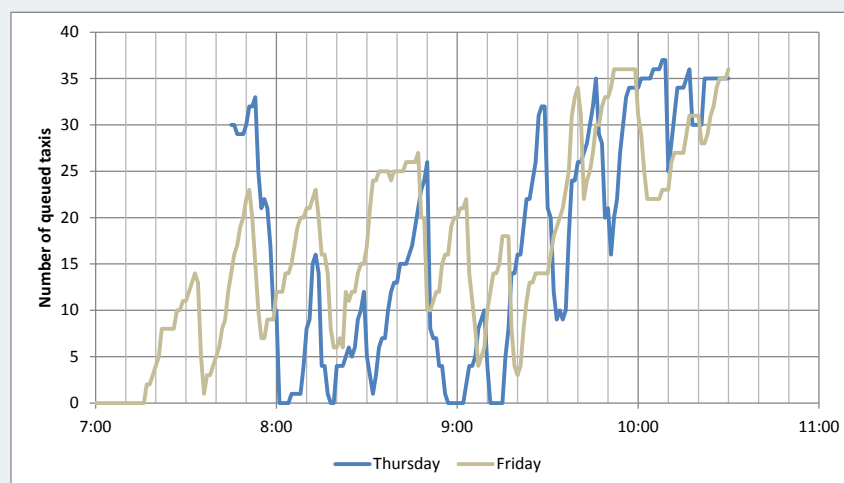
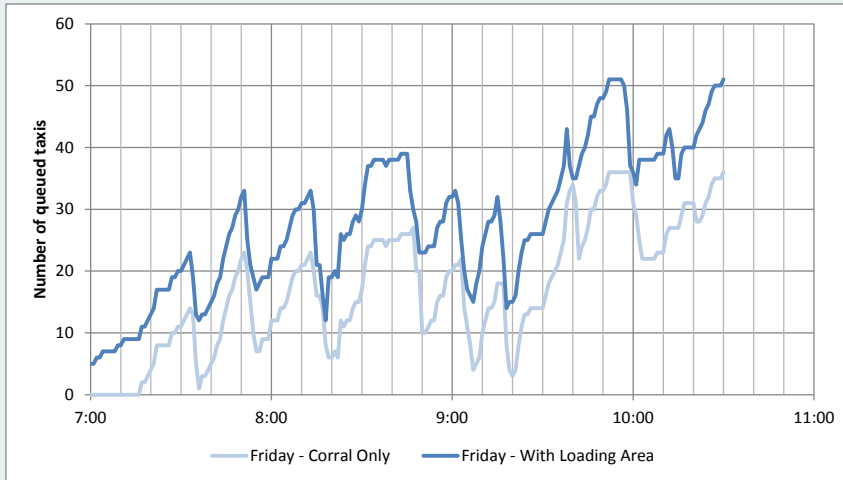


FIGURE 18: NUMBER OF TAXIS QUEUED IN CORRAL AND LOADING AREA (FRIDAY MORNING)



In the morning, the corral was observed to reach capacity for much of the period between 9:30 and 10:30 AM (and beyond), generally not falling below 20 to 25 queued taxis during that period.

FIGURE 19: NUMBER OF TAXIS QUEUED IN CORRAL (AFTERNOON)

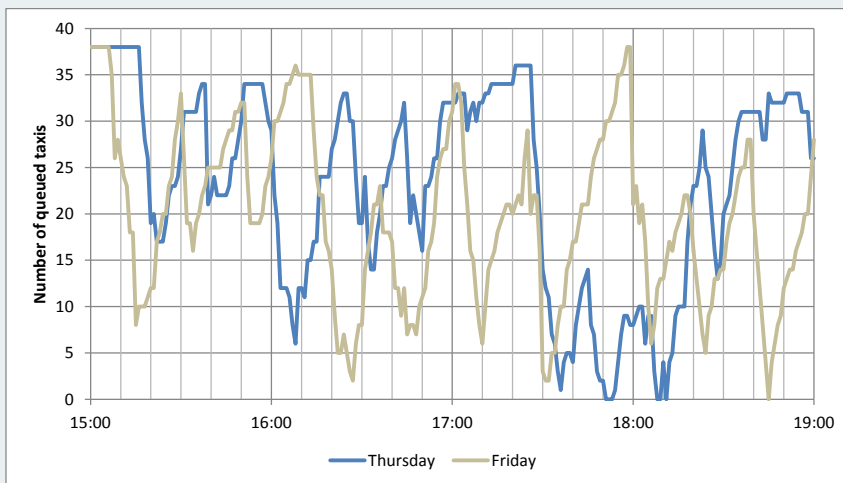
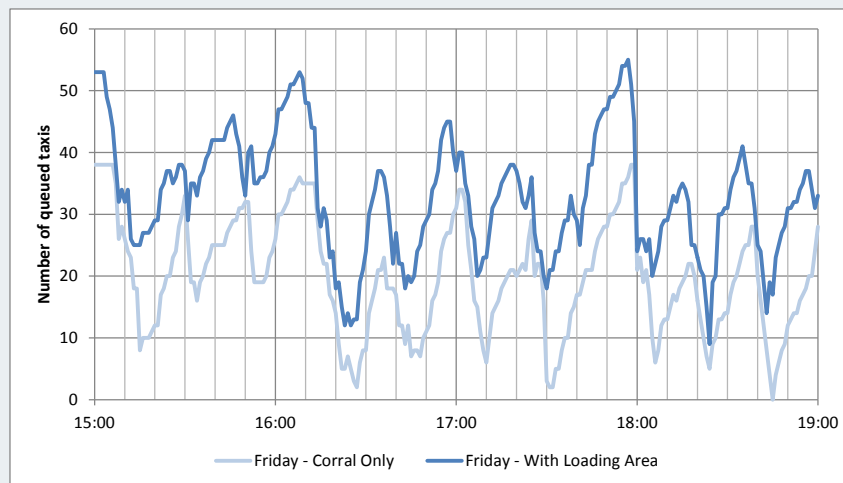


FIGURE 20: NUMBER OF TAXIS QUEUED IN CORRAL AND LOADING AREA (FRIDAY AFTERNOON)



In the afternoon, the corral reached capacity many times, but the turnover was quicker than in the morning and in most cases space opened up at the back of the corral within a few minutes.

5.2 Taxi Deadheading

One way to mitigate traffic levels is to decrease the number of “deadhead” taxi trips (i.e., taxis leaving empty after dropping off a passenger, or taxis arriving empty to enter the corral).

Surveyors tracked every taxi movement and categorized each taxi according to whether they picked up or dropped off passengers and if they:

- Arrived with passenger and entered corral (no deadhead trips);
- Arrived empty and entered corral (one deadhead trip);
- Arrived with passenger and left empty (one deadhead trip); and
- Arrived empty and left without entering corral (e.g., because the corral was full — two deadhead trips).

Figure 21 and **Figure 22** show the number of taxi trips made during the morning and afternoon survey periods, respectively, according to the above four categories.

For the taxis that dropped off passengers and left empty, it was not recorded whether the driver preferred to seek the next fare off-site or if the driver had intended to rejoin the corral but was turned away. This should be considered when reviewing the results for times when the corral was frequently at capacity (late morning; much of the afternoon).

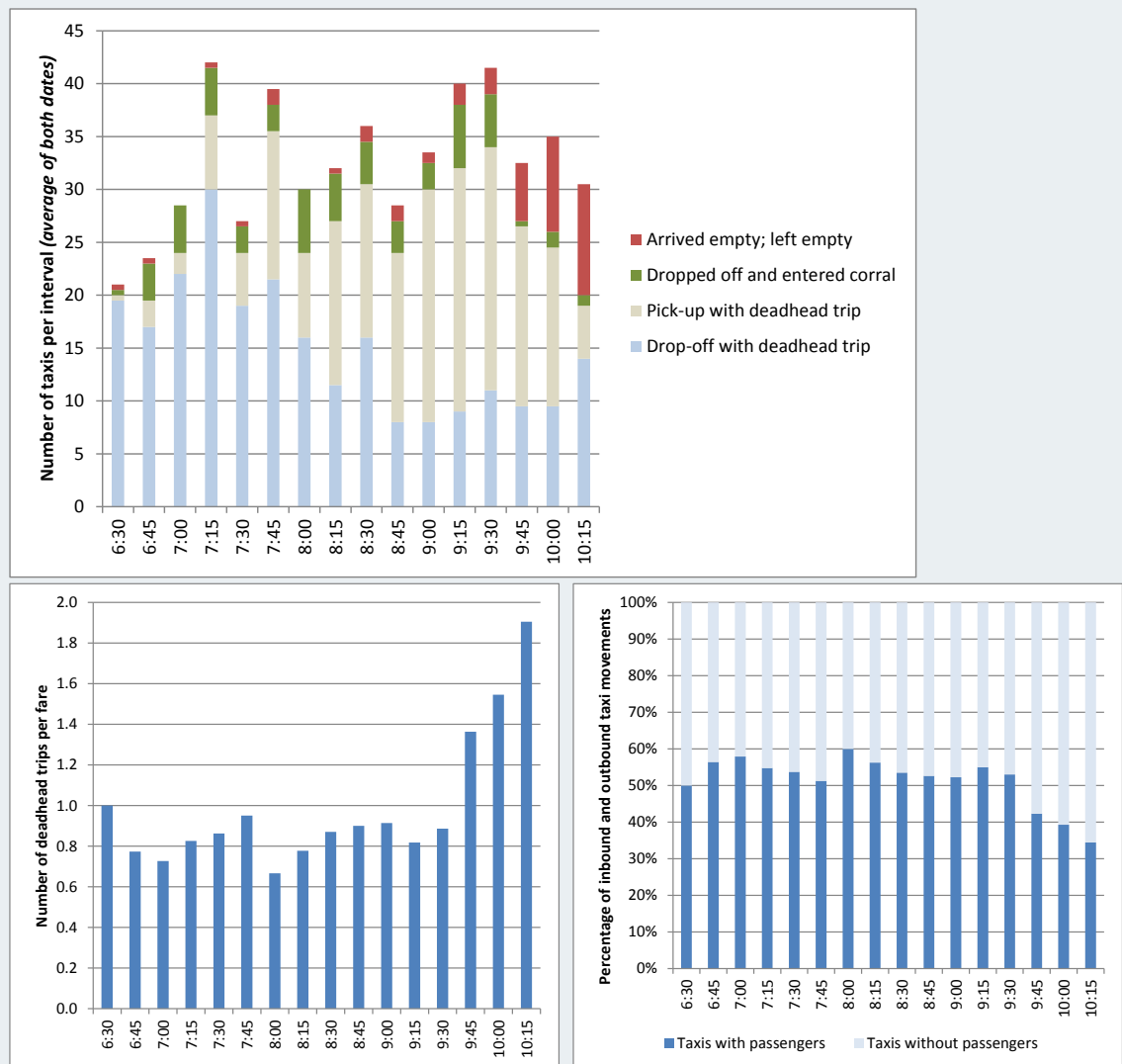
Figure 21 and **Figure 22** also show the average number of deadhead trips per fare during the morning and afternoon survey periods, respectively. Previous traffic analyses for BBTCA have been based on a value of 1 deadhead trip per fare (i.e., every taxi arrives empty before picking up a passenger; every taxi dropping off a passenger leaves empty). A lower value is positive (i.e., preferred) and indicates that taxi drivers are entering the corral after dropping off a fare. A higher value is negative and indicates that taxi drivers are being turned away from entering the corral, whether they arrived with a fare or not.

The proportion of deadhead trips fluctuates throughout the day depending on two factors:

- The balance between arriving and departing flights (generally more departing flights earlier in the morning and afternoon, and more arriving flights later in the morning and afternoon); and
- The occupancy level of the corral (both because taxis cannot enter the corral when it is full, but also potentially because there is a shorter wait time to get a second outbound fare if the corral queues are short).

Finally, **Figure 21** and **Figure 22** also show the percentage of taxis traveling along Eireann Quay (both directions combined) that are carrying one or more passengers, compared to those that are carrying the driver only.

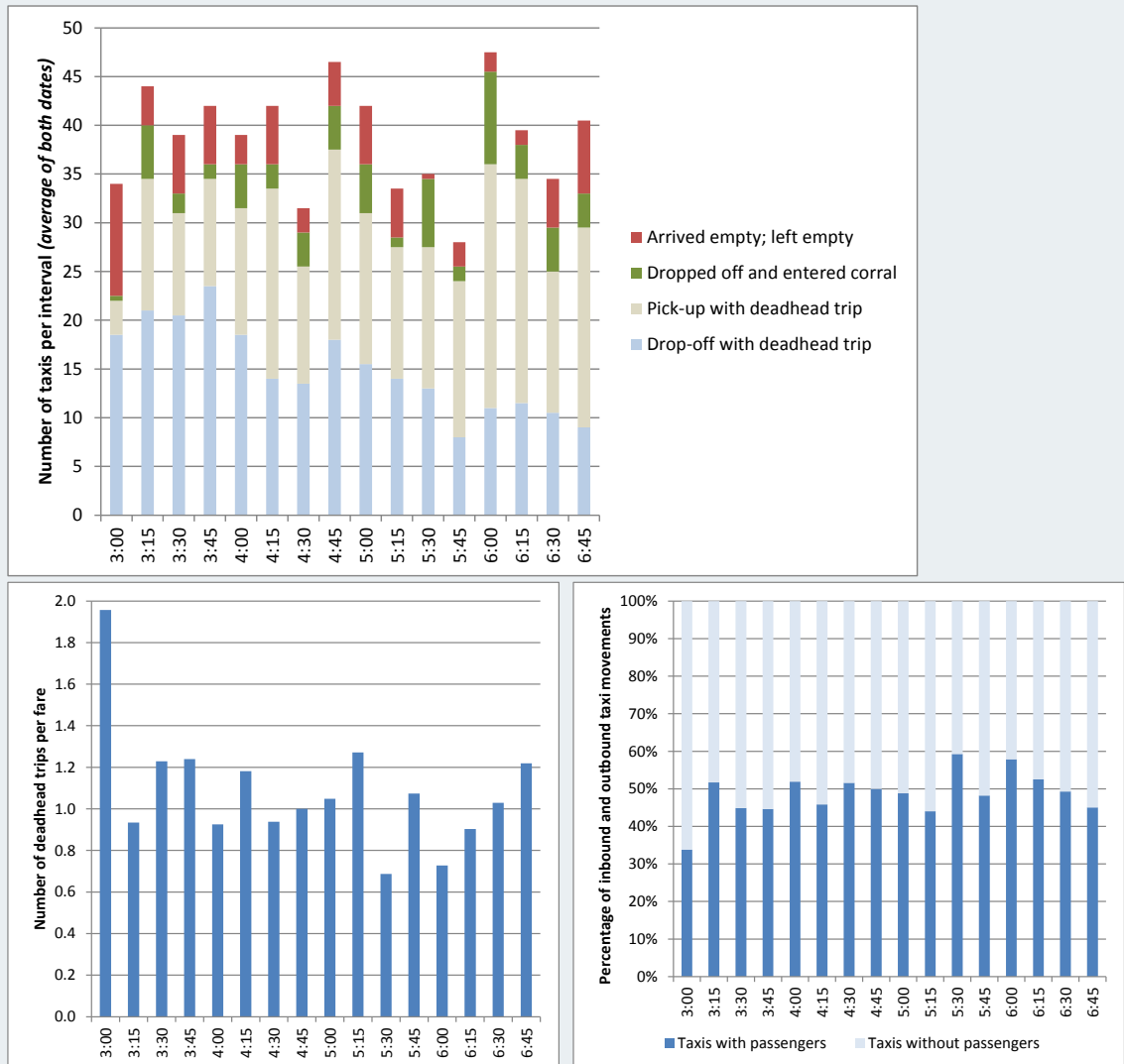
FIGURE 21: TAXI DEADHEADING STATISTICS (MORNING)



In the morning, some taxis were observed dropping off a passenger and entering the corral. This reflects a heavier proportion of drop-off demand earlier in the morning and plenty of space available in the corral. This results in the rate of deadhead trips generally ranging from 0.7 to 0.9 deadhead trips per fare (better than assessed).

By the end of the morning period, this activity had decreased substantially and instead a sizeable increase was observed in the number of taxis arriving empty and being turned away. The rate of deadhead trips during the last 45 minutes increased substantially, to the point where there two-thirds of the taxis on the road were empty. This corresponds to the portion of the morning period where the corral was full with a lower level of turnover.

FIGURE 22: TAXI DEADHEADING STATISTICS (AFTERNOON)



In the afternoon, the number of non-deadheading taxis was generally offset by the number of double-deadheading taxis such that the deadheading rate typically hovered close to 1 deadhead trip per fare, or slightly above, for most of the afternoon. The first 15-minute interval saw a high deadheading rate with many taxis turned away from the corral, it is possible that this was the tail end of an extended period during the early to mid-afternoon. As shown in **Figure 19**, the corral reached capacity numerous times during the afternoon, but with quick turnover. This makes it difficult for taxi operators to know whether to come to the corral or not, since arriving a few minutes earlier or later can make the difference between being near the front of the corral queue and being turned away.

6.0 Taxi and Auto Occupancy Levels

One way to mitigate traffic levels is to increase the number of passengers sharing a ride to or from the airport, either in a taxi or in a private vehicle.

Surveyors recorded the number of passengers picked up or dropped off by each taxi and each private vehicle at the pick-up / drop-off loop and at the taxi corral loading area. The taxi and auto occupancy level was observed to be generally in the order of 1.25 passengers per auto / taxi (not including the driver, and not including the “deadhead” trip). Occupancy levels were slightly higher for automobile pick-ups; however, the sample size for that subset is lower and it is possible that not all of these trips were captured (i.e., some pick-ups likely occurred at off-site locations, such as the short-term parking area, rather than at the loop in front of the ferry terminal).

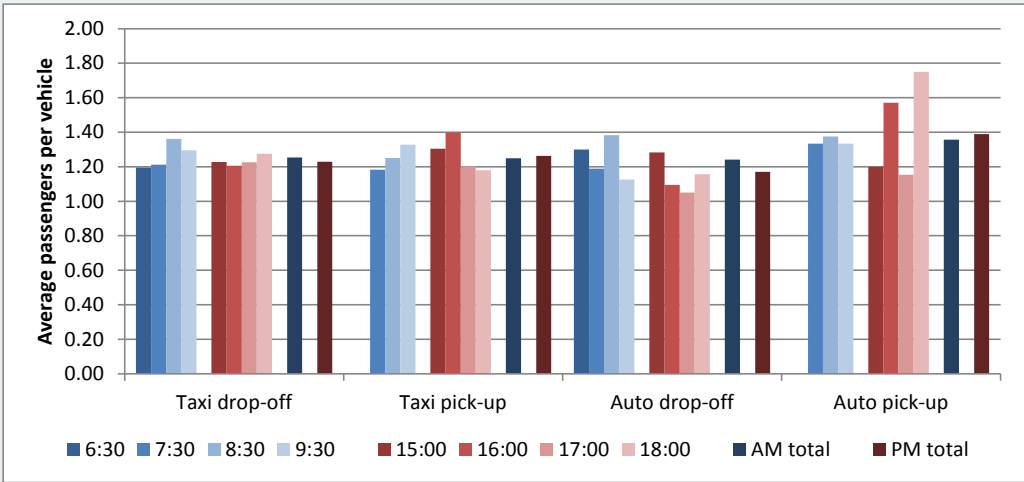
Occupancy levels have decreased compared to previous data (which have been used to date in traffic projections associated with airport passenger growth). A greater proportion of single-passenger trips was observed compared to 2010. This is contrary to the goal of mitigating traffic demand by increasing the number of passengers traveling together to and from the airport.

Table 1 shows the average number of passengers per vehicle during the peak periods. **Figure 23** shows the hourly fluctuation of occupancy by mode (auto vs. taxi) and passenger type (arriving vs. departing).

TABLE 1: AVERAGE NUMBER OF PASSENGERS PER TAXI AND PER AUTO

	Morning <i>(6:30–10:30)</i>	Afternoon <i>(3:00–7:00)</i>	Previous data <i>(2010 surveys)</i>
Taxi drop-offs	1.25	1.23	1.30
Taxi pick-ups	1.25	1.26	1.30
Auto drop-offs	1.24	1.17	1.45
Auto pick-ups	1.36	1.39	1.45

FIGURE 23: HOURLY VARIATION IN AUTO / TAXI OCCUPANCY LEVELS



7.0

Modal Split

Figure 24 shows the number of passengers traveling to and from the airport by each mode. **Figure 25** shows the same data, but by the percentage of passengers using each mode (modal split). **Figure 25** also shows the average mode split for the four-hour morning period, the four-hour afternoon period, and the total survey period.

FIGURE 24: PASSENGER MOVEMENTS BY TRAVEL MODE

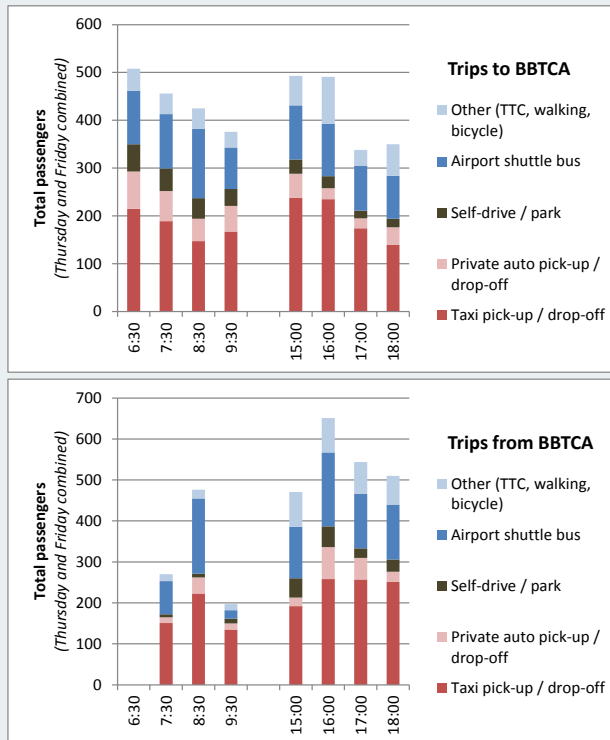
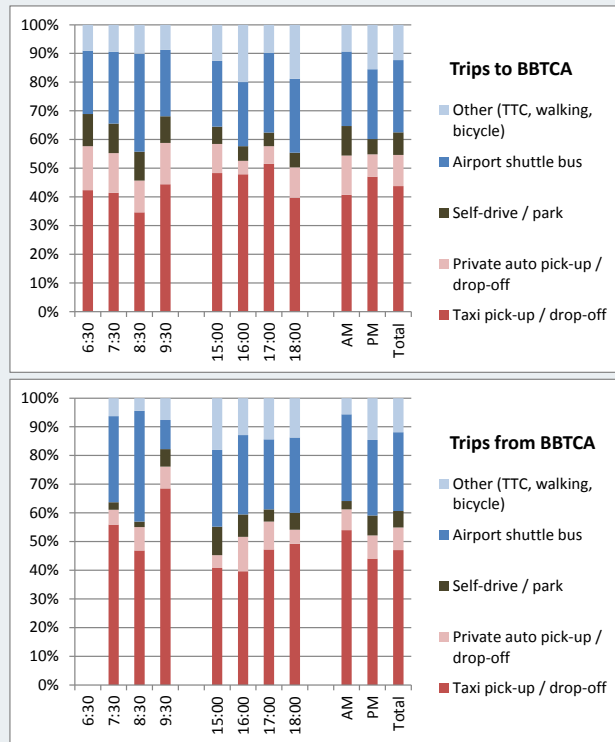


FIGURE 25: HOURLY VARIATION IN MODAL SPLIT



The average modal split for travel to and from the airport is presented in **Table 2**. This table also shows the modal splits that were obtained in 2012 from the passenger surveys. The survey methodology was different in 2012; rather than observing passenger movements, a random sample of passengers was interviewed within the terminal. As well, the 2012 modal split represents average values across the day, whereas the 2015 modal splits were specific to the four-hour morning and afternoon periods.

For travel from BBTCA (pick-ups), pick-up via private auto has decreased while other modes have increased slightly. It is possible that private auto pick-up may have temporarily decreased due to the limited space in the pick-up loop. It is also possible that pick-ups may be underreported if the limited space in the pick-up loop is resulting in drivers meeting passengers at other locations.

For travel to BBTCA (drop-offs), the shuttle modal split has increased, while the taxi and auto drop-off modal split has decreased.

TABLE 2: MODAL SPLIT FOR TRAVEL TO/FROM BBTCA

Travel mode to/from BBTCA	2015			2012	2012 to 2015	
	AM	PM	Avg.	24h	Change	% change
Trips to BBTCA (drop-offs):						
Taxi drop-off	41%	47%	44%	49%	-5 p.p.*	-10%
Private auto drop-off	14%	8%	11%	19%	-8 p.p.	-42%
Self-drive / park	10%	5%	8%	5%	+3 p.p.	+60%
Airport shuttle bus	26%	25%	25%	17%	+8 p.p.	+47%
Other (TTC, walking, bicycle)	9%	15%	12%	10%	+2 p.p.	+20%
Trips from BBTCA (pick-ups):						
Taxi pick-up	54%	44%	47%	46%	+1 p.p.	+2%
Private auto pick-up	7%	8%	8%	14%	-6 p.p.	-43%
Self-drive / park	3%	7%	6%	5%	+1 p.p.	+20%
Airport shuttle bus	30%	26%	27%	25%	+2 p.p.	+8%
Other (TTC, walking, bicycle)	6%	15%	12%	10%	+2 p.p.	+20%

*p.p. = percentage points