Host City Olympic Transportation Plan
Downtown Monitoring Study

Survey Data Analysis And Discussion

For:
City of Vancouver

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EXECUTIVE SUMMARY

The City of Vancouver, in partnership with TransLink, VANOC, and Transport Canada, appointed the Civil Engineering Department of the University of British Columbia (UBC) to conduct the monitoring of transportation through the Vancouver Downtown peninsula during the 2010 Olympic Winter Games. UBC was well poised to take on this challenge given the expertise and experience available within the Civil Engineering Department, as well as access to the 84 engineering graduate and undergraduate student supervisors and surveyors hired to fulfill the relatively large study scope within the effective two-week window of the Games. The data comprised of 3 samples of 24hr and partial-day screenline counts of all travel entering or leaving the downtown area by all modes. Additionally, intercept surveys captured the travel behaviour and choices of spectators and participants of Downtown Olympic-related events.

The data was collected in a high-quality manner both in design and conduct, and this continued through to the cleaning, processing, imputation, and summary of the resulting data. The results of the Host City Downtown Monitoring Study will be part of the legacy of the 2010 Olympic Winter Games.

KEY FINDINGS

The key findings[1] from the Host City Olympic Transportation Plan Downtown Monitoring Study were:

- Approximately **1.17 million trips** crossed into or out of the Downtown peninsula on an average 2010 Winter Games weekday -- **43.5% higher than the pre-Games weekday average of 813,000 person-trips**.

- Overall, the majority of person-trips in the Downtown CBD during the 2010 Winter Games were taken in sustainable modes (transit, walk, bike). **Almost 2/3 or 61% of all trips were taken on sustainable modes**, of which the **majority were on transit** (50% of the 61% share).

- Overall, the absolute number of **vehicle driver trips dropped by 58,000 trips (16% decrease) and combined vehicle driver and passenger trips dropped by 8,700 trips (2% decrease)**, whereas **sustainable mode trips doubled from 350,000 trips pre-Games to 713,100 trips** during-Games.

[1] Key findings are for an average 2010 Winter Games weekday in comparison to an average pre-games weekday in November 2009. The results are represented as total number of trips, only crossing into and out of the Downtown core.

- **Total walk trips to and from the Downtown core increased up to 288%**[2] from just over 30,300 trips before the Games, to almost 117,600 trips during the Games. Approximately **85% of all walking trips were made across the Main Street Screenline**. . A possibility of the high increase in walk trips may have been due to transit services at capacity at times and locations near Downtown.

- Based on the findings, the targets and goals of the Host City Olympic Transportation Plan were evaluated **and indications point towards all targets and goals being achieved**. Specifically:

    - Trips on sustainable modes more than doubled.
    - Pedestrian travel goals were overwhelmingly met.
    - Cycling volumes were higher than normal.[3]
    - Spectator travel to event venues were observed as the most sustainable ever recorded, at an 79.5% sustainable mode share.
    - Taxi trips were up by 25%.
    - Truck volumes reduced by 37.5%, mostly within the mid-day peak period, while early morning volumes increased, indicating a positive response to the encouragement of businesses rescheduling their deliveries between 12AM and 6AM.

In summary, the results of the monitoring study **suggest the provision and uptake of transportation during the 2010 Winter Games was successful and a new "Olympic record" of a 24-hour 61% sustainable mode share into/out of the Downtown core was observed**. The Host City Downtown Monitoring Study documents the observed sustainable transportation behaviour during the 2010 Olympic Winter Games as a lasting legacy. The study is also an objective documentation that local residents and visitors can adjust to travel in a much more sustainable manner than normal.

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[2] The estimated 288% increase may have been affected by the following: The City did not collect walking and cycling data for the Seawall in November 2009 as part of its Downtown Screenline; Spectators taking transit to BC Place and GM Place on the SkyTrain were encouraged to get off at Main Street / Science World station and walk to the stadiums; Science World (Sochi 2014 House) and the adjacent lands of Concord Place to the north were both celebration sites during the Games, attracting many walking trips into and out of the Downtown across the Main Street screenline; One of the data collection days across the Main Street screenline included a spontaneous filming of a Stephen Cobert television show at the Science World area which attracted thousands of spectators (February 19th, 2010).

[3] Per footnote 2, as no cycling data was collected along the Seawall in November 2009, this may in effect reduce the total cycling during the Games by approximately10%, possibly resulting in only a total net increase of 10% from pre-Games conditions.

RECOMMENDATIONS

The following recommendations, for the City and its transportation partners in the Metro Vancouver region, suggest means to leverage the investment and legacy of 2010 Olympic Winter Games:

1. Continue monitoring the transportation system such that sound decisions can be based on empirical evidence and sound analyses, including the research of methodology refinements to reduce data collection uncertainties;
2. Utilize the rich database resulting from the Host City Downtown Monitoring Study to further investigate, examine, and test new and innovative initiatives and ideas to encourage and maintain sustainable travel, not just for the Downtown CBD, but with a focus to develop solutions that are portable to other parts of the City and Region;
3. Pursue the development of new Transportation Demand Management (TDM) measures that take advantage of the unique characteristics and opportunities of mega-events and large celebrations;
4. Further investigate the alteration of the Dunsmuir and Georgia Viaducts to revitalize the North False Creek land in a way that can also encourage and support sustainable travel and more overall person trips into and out of the Downtown core.

ACKNOWLEDGEMENTS

The Project Team would like to thank the City of Vancouver for approaching UBC to be part of the Games and to support the City's overall monitoring program for the 2010 Winter games, as well as allow UBC in meeting its research mandate to study and analyze data from such extraordinary events in the urban context.

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1. INTRODUCTION

1.1 PURPOSE OF THE PROJECT

This study was conducted for the City of Vancouver to monitor their Host City Olympic Transportation Plan, in partnership with TransLink, which provided funding contributions and Transport Canada which provided technical assistance. The primary goal of the study is to observe and quantify the changes in travel behaviour into and out of Downtown (CBD[4]) Vancouver during the 2010 Olympic Winter Games using in-the-field data collection techniques. The study is comprised of two different survey components. Firstly, the study collected a 24 hour Downtown Vancouver Modal Screenline count of all road users. Secondly, the study consisted of venue intercept surveys conducted in the vicinity of Downtown Olympic Venues. The Survey Period was from February 15th through to and including the 27th, with all surveys conducted on weekdays. The pre-Games datasets for the Downtown Screenline collected in November 2009, and Venue Intercept Surveys in 2007 and 2008 were conducted in partnership by the City of Vancouver, TransLink, VANOC and Transport Canada.

The transportation field data collected for the study will be a legacy to the Host City (City of Vancouver), the Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games (VANOC), the International Olympic Committee (IOC), and future Organizing Committees for Olympic Games (OCOGs). Furthermore, the data collected will be a valuable resource for the host Olympic and Paralympic Transportation Team (OPTT) partner agencies in the planning of large-scale events and in evaluating transportation concepts as the Metro Vancouver and Sea-to-Sky regions continue to move toward more sustainable modes of transportation.

1.2 POST-SURVEY PROJECT PHASES

After the surveys were conducted (Phase 1) as documented in the report *"Host City Olympic Transportation Plan Downtown Monitoring Study: Survey Design & Conduct",* the data collected was required to be processed (Phase 2) and summarized (Phase 3). These later two phases are the subjects of this report.

The Phase 2 Data Processing consisted of the following main components:

1. **Data Preparation, Reduction and Compilation:** As the screenline data was collected in a very detailed and unique way to ensure the highest quality data was collected during the 2010 Winter Olympic Games, a major step was in the reduction and compilation of the rich, yet disaggregated data, that were stored

[4] Central Business District

in individual data files, into a complete and single database. This process required complex data processing and validation procedures, consisting of the programming of logic checks and validation to ensure data quality was maintained through the reduction process. This process also allowed for an additional level of verification of the data collected that could only be performed once the datasets were fully combined. This verification was conducted through extensive manual and automated verification procedures. The result of this step was a refined and complete screenline dataset that best represents the traffic conditions during the Games.

As the Canada Line data collection employed unique methods due to the inaccessibility to the station platforms, the data was processed and eventually expanded to station count control totals to obtain an estimate of total Canada Line passenger volumes crossing the screenline. The intercept survey data was processed using similar techniques as that employed to process regional trip diary surveys.

2. **Data Imputation:** A 24 hour analysis is required to provide a complete summary of traffic in the Downtown core during the Games. As the data collected during the Games was not conducted over full 24 hour periods at all locations, the imputation of data was required using control total locations (locations with 24hr data collected), as well as volume profiles from data collected over automatic counters, and historical screenline data. This process required a number of heuristic methods and testing to ensure appropriate imputation. The result was a complete 24 hour Downtown screenline dataset.

The Phase 3 Data Analysis & Discussion consisted of:

3. **Data Analysis & Summary:** The resulting datasets was summarized as per traditional screenline data in hourly directional summaries for each Downtown screenline location. Intercept survey data was summarized using a number of queries such as total and percentage of trips by: residence location, screenline crossing mode, and other variables.

   The resulting data was analyzed, with comparisons to November 2009 Fall pre-Games conditions to provide an assessment of the 2010 Winter Games impact on traffic across the entire screenline, and by each screenline location. An analysis of the impact of the Games to the Downtown transportation was made with a discussion as to the implications of this impact to transportation planning and policy implications in the region.

The City of Vancouver and its partners performed similar data reduction, compilation, and imputation processes to summarize the November 2009 pre-games 24-hour dataset and UBC accepted the pre-Games data as provided in detailed summary tables.

This report documents the results of the monitoring study, summarising volume totals and mode shares crossing each screenline and location. Findings of the Event Venue Intercept survey are provided, finally followed by a discussion of key findings.

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2. SUMMARY OF SCREENLINE SURVEY RESULTS

2.1 PRE-GAMES SCREENLINE SURVEY

Volumes across the downtown screenlines were captured in November 2009. The resulting dataset describes the *Pre-Games* traffic conditions with which the *During-Games* conditions will be compared to. Although the Pre-Games data was collected in the Fall season whereas the During-Games data was collected in the Winter season, the differences may be negligible given the mild climate experienced during the 2010 Winter Games. Otherwise, the locations and time periods of data collection were similar for both pre and post surveys.

2.2 PRIMARY FINDINGS

The main results of the screenline survey are 24hour volume and mode share statistics for the following modes:

- Auto/Vehicle Drivers
- Auto/Vehicle Passengers
- Transit
- Walk
- Bike

across the following screenlines:

- North Shore/Burrard Inlet Screenline (Lion's Gate Bridge & SeaBus)
- False Creek Screenline (Burrard, Granville & Cambie St. Bridges, including Canada Line)
- Main Street Screenline[5] (Alexander, Powell, Cordova, Hastings, Pender, Keefer, Union, Quebec/SeaWall, and SkyTrain)
- Total of all Downtown Screenlines

in the following directions:

- InBound (entering Downtown)
- OutBound (leaving Downtown)
- Both Directions (2-Way)

During-Games results are compared to Pre-Game results to provide a quantitative estimate of the traffic impacts by mode and total person-trips. Furthermore, person-trips in automobiles or non-public transit vehicles are compared to person-trips in "sustainable modes" comprising of trips made in public transit, by foot, or by bicycle.

[5] Pre-Games counts included Dunsmuir & Georgia Viaducts and Expo & Pacific Boulevards, which were closed during the Games for security reasons.

2.2.1 DOWNTOWN SUMMARY

The main questions sought in the pre- and during-Games monitoring of the 2010 Winter Games were that of change in overall volume into and out of the Vancouver Downtown peninsula, and the change in modal choices by these travellers.

It was observed that a total of approximately **1.17 million** trips crossed into or out of the Downtown peninsula on an average 2010 Winter Games weekday -- **43.5% higher** than the weekday average of **813,000** trips before the Games. And over 61% of the trips made during the 2010 Winter Games were taken in more sustainable modes, with 50% of the trips made in public transit, 10% on foot, and 1% on bicycle . This is an 18 percentage-point increase from the pre-Games sustainable mode share of just over 43%. Subsequently, the trips made in automobiles or non-public transit vehicles accounted for just under **39%**, down 18-percentage-points from a pre-Games share of almost 57%. Overall, the absolute number of automobile/vehicle driver and passenger trips dropped by 8,700 trips to 453,950, whereas **sustainable mode trips doubled** from **350,000** trips pre-Games to **713,100** trips during-Games.

The two main reasons for travel choices during the 2010 Winter Games being more sustainable were the **drop in auto and vehicle driver volumes** by 15.8%, or an absolute reduction of almost 60,000 vehicles per day, and the **almost doubling of public transit ridership** (88.1% increase) that saw an additional 273,000 more riders added to a typical pre-Games ridership of 310,000.

Although the total number of vehicles crossing into and out of the Downtown decreased, vehicle passenger trips increased by over **50%** from 95,600 before the Games to 145,000 during the Games.

A significant change was observed in the walking trips, were total **walk trips increased up to 288%**[6] from just over 30,300 trips before the Games, to 117,600 trips during the 2010 Winter Games. Conversely, although cycling trips increased by up to 2,100 trips during

[6] The estimated 288% increase may have been affected by the following: The City did not collect walking and cycling data for the Seawall in November 2009 as part of its Downtown Screenline; Spectators taking transit to BC Place and GM Place on the SkyTrain were encouraged to get off at Main Street / Science World station and walk to the stadiums; Science World (Sochi 2014 House) and the adjacent lands of Concord Place to the north were both celebration sites during the Games, attracting many walking trips into and out of the Downtown across the Main Street screenline; One of the data collection days across the Main Street screenline included a spontaneous filming of a Stephen Cobert television show at the Science World area which attracted thousands of spectators (February 19th, 2010).

the Games, the share of bicycle trips dropped slightly from 1.2% to 1% during the Olympics.[7]

Table 1 provides a complete average weekday (24 hours) comparison between before and during Games travel conditions of person-trips into and out of the Downtown area.

Tables 2 and 3 provide similar summary statistics for the 24-hour in-bound and out-bound directions. It can be seen from these tables that the changes in volumes and mode shares are similar for both directions, as well as for the overall 2-way summary, as should be expected over a 24-hour period.

Figure 1 graphically shows the hourly in-bound and out-bound during and pre-Games person-trip volumes crossing into and out of the Downtown core.

Table 1. 24 hour – 2-Way Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	308,979	**26.5%**	367,018	**45.1%**	-58,039	-15.8%	**-18.7%**
Auto/Vehicle Passenger	144,970	**12.4%**	95,622	**11.8%**	49,348	51.6%	**0.7%**
Transit	583,599	**50.0%**	310,255	**38.2%**	273,344	88.1%	**11.8%**
Walk	117,598	**10.1%**	30,340	**3.7%**	87,258	287.6%	**6.3%**
Bike	11,936	**1.0%**	9,805	**1.2%**	2,131	21.7%	**-0.2%**
Total Person Trips	**1,167,083**	**100.0%**	813,040	100.0%	354,043	43.5%	
Auto/Veh. Mode Trips:	453,949	**38.9%**	462,640	**56.9%**	-8,691	-1.9%	**-18.0%**
Sustainable Mode Trips:	713,133	**61.1%**	350,400	**43.1%**	362,733	103.5%	**18.0%**

[7] Refer to footnote 6. Note that no cycling data was collected along the Seawall in November 2009. This may in effect reduce the total cycling during the Games by approximately10%, possibly resulting in only a total net increase of 10% from pre-Games conditions.

Table 2. 24 hour – InBound Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	155,050	**26.4%**	182,933	**45.1%**	-27,883	-15.2%	**-18.7%**
Auto/Vehicle Passenger	72,867	**12.4%**	47,294	**11.7%**	25,573	54.1%	**0.7%**
Transit	292,765	**49.8%**	155,921	**38.4%**	136,844	87.8%	**11.3%**
Walk	61,043	**10.4%**	14,240	**3.5%**	46,803	328.7%	**6.9%**
Bike	6,358	**1.1%**	5,138	**1.3%**	1,220	23.7%	**-0.2%**
Total Person Trips	**588,083**	**100.0%**	405,526	100.0%	182,557	45.0%	

Auto/Veh. Mode Trips:	227,917	**38.8%**	230,227	**56.8%**	-2,310	-1.0%	**-18.0%**
Sustainable Mode Trips:	360,166	**61.2%**	175,299	**43.2%**	184,867	105.5%	**18.0%**

Table 3. 24 hour – OutBound Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	153,929	**26.6%**	184,085	**45.2%**	-30,156	-16.4%	**-18.6%**
Auto/Vehicle Passenger	72,103	**12.5%**	48,328	**11.9%**	23,775	49.2%	**0.6%**
Transit	290,834	**50.2%**	154,334	**37.9%**	136,500	88.4%	**12.4%**
Walk	56,555	**9.8%**	16,100	**4.0%**	40,455	251.3%	**5.8%**
Bike	5,578	**1.0%**	4,667	**1.1%**	911	19.5%	**-0.2%**
Total Person Trips	**579,000**	**100.0%**	407,514	100.0%	171,486	42.1%	

Auto/Veh. Mode Trips:	226,032	**39.0%**	232,413	**57.0%**	-6,381	-2.7%	**-18.0%**
Sustainable Mode Trips:	352,967	**61.0%**	175,101	**43.0%**	177,866	101.6%	**18.0%**

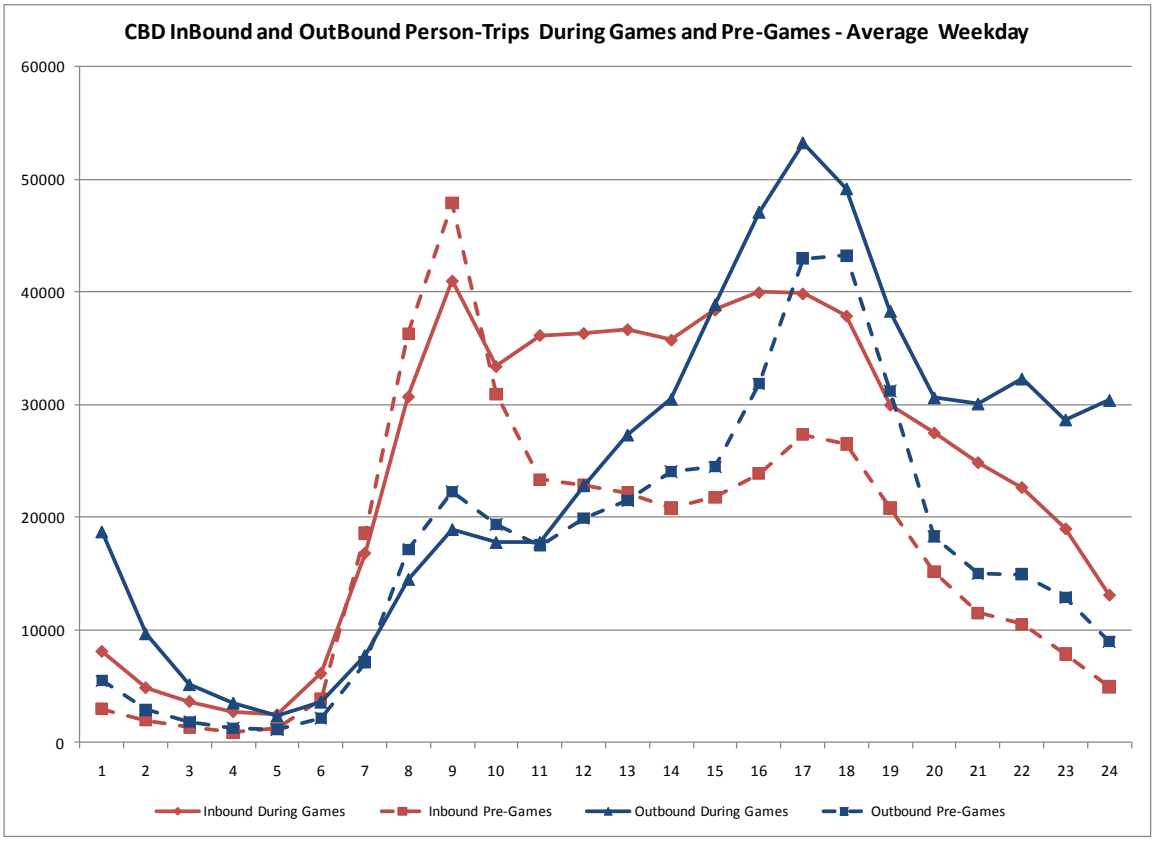

Figure 1. Average Games Weekday Person-Trips Crossing Downtown CBD Cordon

2.2.2 SUMMARIES BY SCREENLINE

Further analysis as to the changes in travel behaviour across specific screenlines during the 2010 Winter Games was made. Table 4 summarizes the volume and mode share changes across the North Shore / Burrard Inlet Screenline (Lion's Gate Bridge and SeaBus) over a 24-hour period in both directions. Auto/vehicle trips were still the majority of the trips, however dropping 16.6 percentage-points from 69.4% before the Games, to 52.8% during the Games. The main reason for this drop was the significant increase of vehicle passengers and transit riders, increasing by 151% and 132% respectively during the Games. In particular, transit ridership, which was half of the volume of automobile/vehicle drivers prior to the Olympics became the dominant mode during the Games, making up almost half (46.7%) of all person-trips crossing this screenline.

Table 4. NorthShore/Burrard Inlet Screenline 24 hour – 2-Way Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	53,653	**35.2%**	60,066	**58.9%**	-6,413	-10.7%	**-23.8%**
Auto/Vehicle Passenger	26,861	**17.6%**	10,699	**10.5%**	16,162	151.1%	**7.1%**
Transit	71,249	**46.7%**	30,593	**30.0%**	40,656	132.9%	**16.7%**
Walk	137	**0.1%**	81	**0.1%**	56	68.7%	**0.0%**
Bike	667	**0.4%**	510	**0.5%**	157	30.8%	**-0.1%**
Total Person Trips	**152,567**	**100.0%**	101,949	100.0%	50,618	49.7%	

Auto/Veh. Mode Trips:	80,514	**52.8%**	70,765	**69.4%**	9,749	13.8%	**-16.6%**
Sustainable Mode Trips:	72,053	**47.2%**	31,184	**30.6%**	40,869	131.1%	**16.6%**

Mode	% Share of Downtown Total		
	During Games	Pre-Games	Share Change
Auto/Vehicle Driver	17%	16%	1%
Auto/Vehicle Passenger	19%	11%	7%
Transit	12%	10%	2%
Walk	0%	0%	0%
Bike	6%	5%	0%
Total Person Trips	**13%**	**13%**	**1%**

Overall, the North Shore / Burrard Inlet Screenline comprised of 13% of person-trips crossing the Downtown cordon, unchanged during the 2010 Winter Games.

The False Creek Screenline consists of the Burrard, Granville, and Cambie Bridges, as well as the Canada Line. Approximately 41% of all Downtown-related person-trips crossed through this screenline, with the majority of the automobile/vehicle drivers (55% of all downtown) and passenger (53% of all downtown) trips crossing over these bridges to enter into and exit from the CBD.

As shown in Table 5, the dominant mode was transit at 43.7%, up from 34.9% pre-Games, followed by auto/vehicle drivers at 35.5%, down from 50.3% pre-Games.

A very significant relative increase was observed for walking trips, up 550% from 2,600 pre-Games, to almost 17,000 during the 2010 Winter Games. Bicycle trips more than doubled from 2,300 trips to 4,800 trips during the Games. However, walking and cycling trips made up for less than 5% of all trips crossing the False Creek Screenline.

Table 5. False Creek Screenline 24 hour – 2-Way Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	169,146	**35.5%**	163,850	**50.3%**	5,296	3.2%	**-14.8%**
Auto/Vehicle Passenger	76,943	**16.2%**	43,443	**13.3%**	33,500	77.1%	**2.8%**
Transit	207,950	**43.7%**	113,562	**34.9%**	94,388	83.1%	**8.8%**
Walk	16,967	**3.6%**	2,609	**0.8%**	14,358	550.3%	**2.8%**
Bike	4,814	**1.0%**	2,277	**0.7%**	2,537	111.4%	**0.3%**
Total Person Trips	**475,820**	**100.0%**	325,741	100.0%	150,079	46.1%	
Auto/Veh. Mode Trips:	246,089	**51.7%**	207,293	**63.6%**	38,796	18.7%	**-11.9%**
Sustainable Mode Trips:	229,731	**48.3%**	118,448	**36.4%**	111,283	94.0%	**11.9%**

Mode	% Share of Downtown Total		
	During Games	Pre-Games	Share Change
Auto/Vehicle Driver	55%	45%	10%
Auto/Vehicle Passenger	53%	45%	8%
Transit	36%	37%	-1%
Walk	14%	9%	6%
Bike	40%	23%	17%
Total Person Trips	**41%**	**40%**	**1%**

Table 6 summarizes the findings of the Main Street Screenline crossing before and during the 2010 Winter Games. With 46% of all trips into and out of the CBD crossing the Main

Street Screenline, the majority of these trips were made in public transit. Over 56% of trips were made on SkyTrain, West Coast Express, or bus, up from 43.1% pre-Games. Previous to the Olympics, auto/vehicle drivers were the second most dominant mode at 37.1%, however dropped 21.1 percentage-points to a 16% mode share during the Games to be surpassed by walking trips at 18.7% of the mode share.

Walking trips changed the most significantly of all modes, increasing by 263% from 27,650 pre-Games to over 100,000 during the Games[8]. A portion of these walk trips may have been early alightings from SkyTrain, crossing the Main Street Screenline on foot. Nevertheless, trips made by sustainable mode dominated this screenline at 76.4% of all trips, compared to 23.6% by automobile/vehicle. With over 50% of all trips having crossed this screenline prior to the Games, the over 24 percentage-point increase from already such a high sustainable mode split is significant.

Table 6. Main Street Screenline 24 hour – 2-Way Direction

Mode	During Games Volumes	During Games Share	Pre-Games Volumes	Pre-Games Share	Games-Time Difference in Volume	% Change in Volume	Mode Share Change
Auto/Vehicle Driver	86,180	**16.0%**	143,102	**37.1%**	-56,922	-39.8%	**-21.1%**
Auto/Vehicle Passenger	41,166	**7.6%**	41,485	**10.8%**	-319	-0.8%	**-3.1%**
Transit	304,401	**56.5%**	166,100	**43.1%**	138,301	83.3%	**13.4%**
Walk	100,495	**18.7%**	27,650	**7.2%**	72,845	263.5%	**11.5%**
Bike	6,455	**1.2%**	7,018	**1.8%**	-563	-8.0%	**-0.6%**
Total Person Trips	**538,697**	**100.0%**	385,355	100.0%	153,341	39.8%	
Auto/Veh. Mode Trips:	127,346	**23.6%**	184,587	**47.9%**	-57,241	-31.0%	**-24.3%**
Sustainable Mode Trips:	411,350	**76.4%**	200,768	**52.1%**	210,582	104.9%	**24.3%**

Mode	% Share of Downtown Total		
	During Games	Pre-Games	Share Change
Auto/Vehicle Driver	28%	39%	-11%
Auto/Vehicle Passenger	28%	43%	-15%
Transit	52%	54%	-1%
Walk	85%	91%	-6%
Bike	54%	72%	-17%
Total Person Trips	**46%**	**47%**	**-1%**

[8] See footnote 6.

2.3 SUMMARIES BY LOCATION

The following are 24-hour 2-way directional summary tables for each survey location.

Table 7. Lion's Gate Bridge 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	53,653	**50.3%**	100.0%	17.4%
Auto/Vehicle Passenger	26,861	**25.2%**	100.0%	18.5%
Transit	25,419	**23.8%**	35.7%	4.4%
Walk	137	**0.1%**	100.0%	0.1%
Bike	667	**0.6%**	100.0%	5.6%
Total Person Trips	**106,737**	**100.0%**	70.0%	9.1%

Auto/Veh. Mode Trips:	80,514	**75.4%**
Sustainable Mode Trips:	26,223	**24.6%**

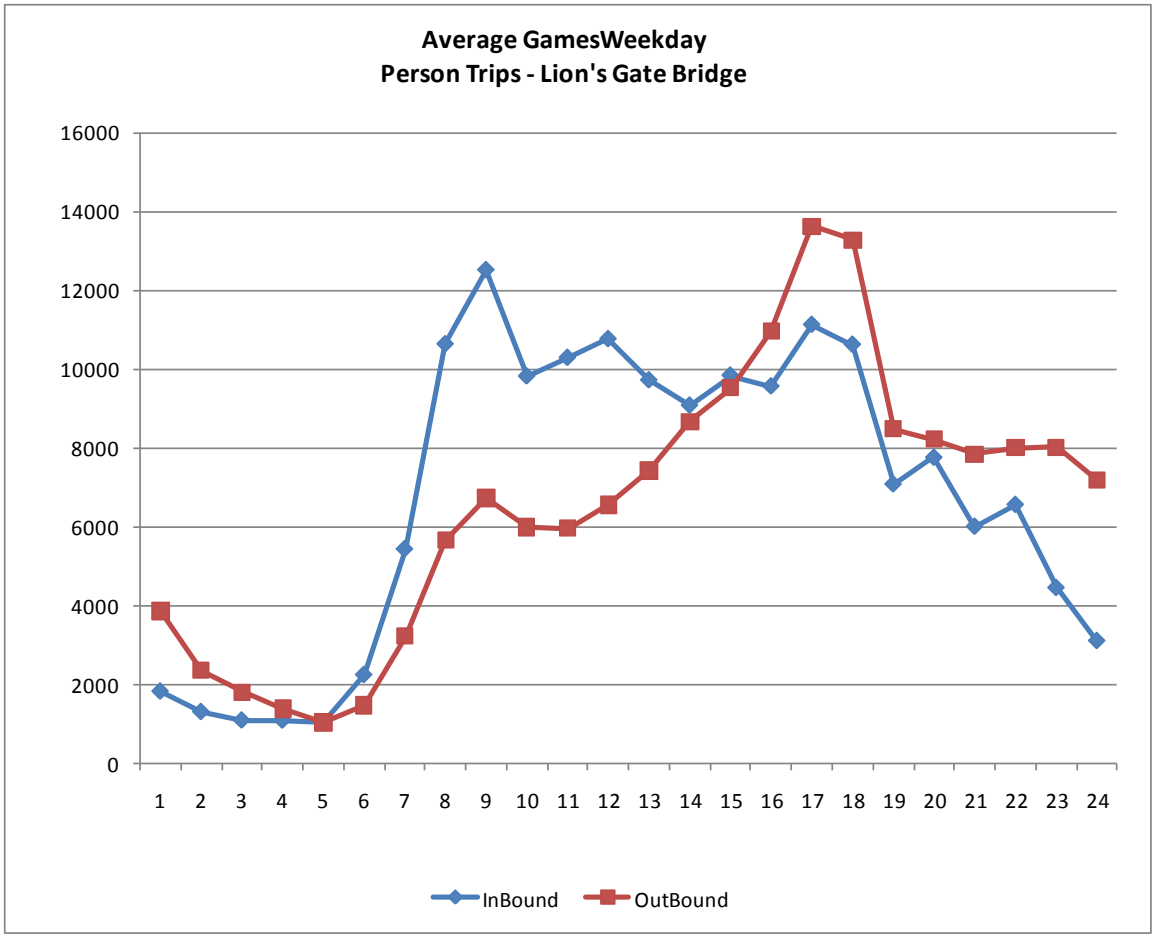

Figure 2. Average Games Weekday Person Trips Across Lion's Gate Bridge

Table 8. SeaBus 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	0	**0.0%**	0.0%	0.0%
Auto/Vehicle Passenger	0	**0.0%**	0.0%	0.0%
Transit	45,830	**100.0%**	64.3%	7.9%
Walk	0	**0.0%**	0.0%	0.0%
Bike	0	**0.0%**	0.0%	0.0%
Total Person Trips	**45,830**	**100.0%**	30.0%	3.9%

Auto/Veh. Mode Trips:	0	**0.0%**
Sustainable Mode Trips:	45,830	**100.0%**

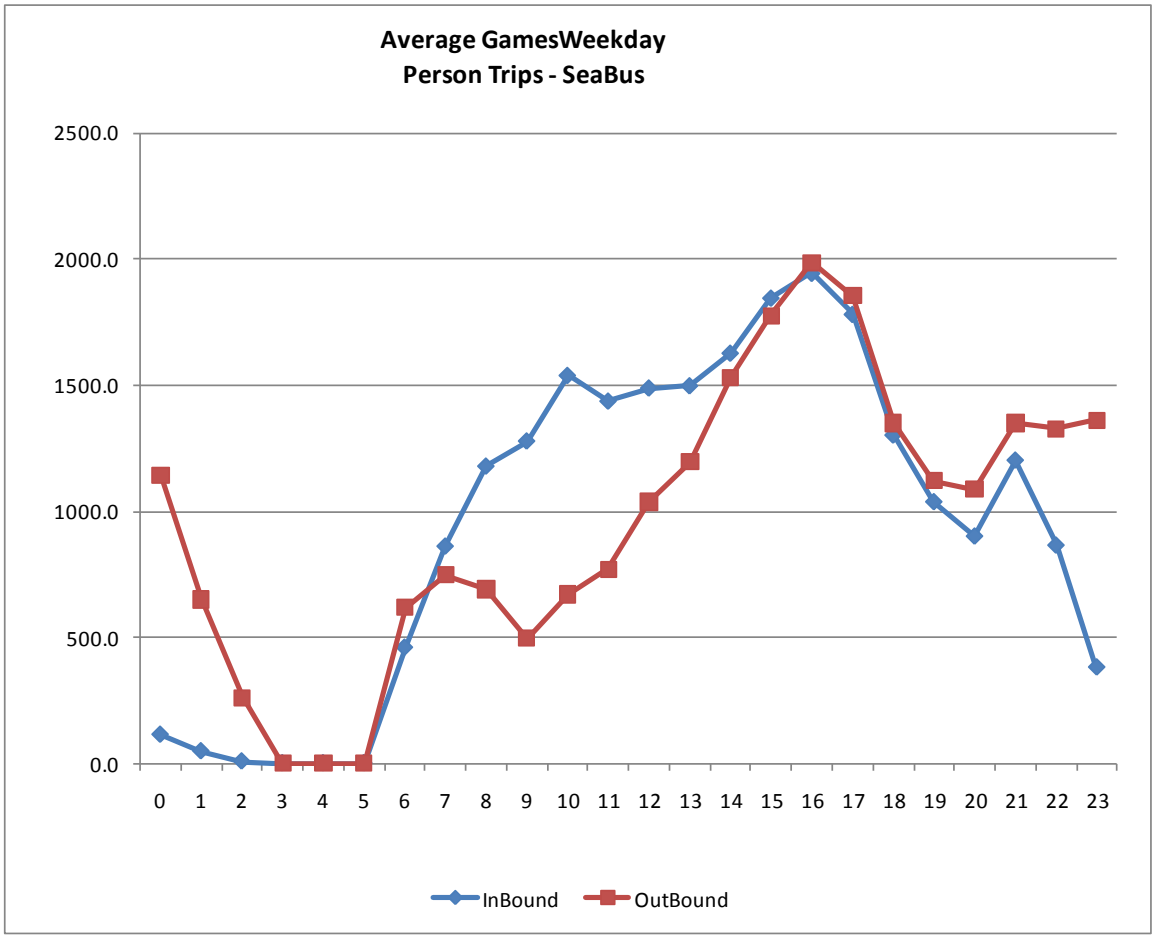

Figure 3. Average Games Weekday Person Trips Across SeaBus

Table 9. Burrard St. Bridge 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	58,191	**49.9%**	34.4%	18.8%
Auto/Vehicle Passenger	28,979	**24.9%**	37.7%	20.0%
Transit	22,939	**19.7%**	11.0%	3.9%
Walk	4,024	**3.5%**	23.7%	3.4%
Bike	2,376	**2.0%**	49.4%	19.9%
Total Person Trips	**116,509**	**100.0%**	24.5%	10.0%

Auto/Veh. Mode Trips:	87,170	**74.8%**
Sustainable Mode Trips:	29,339	**25.2%**

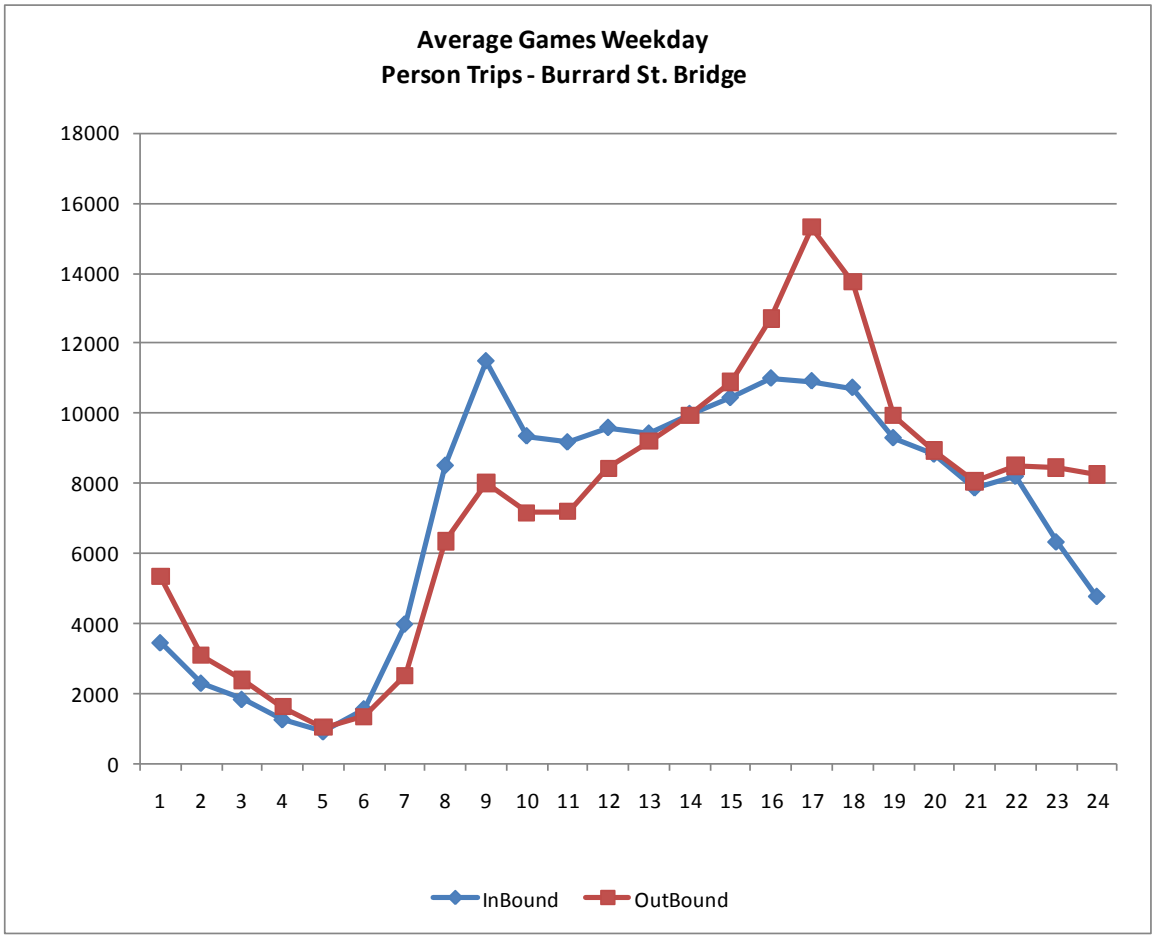

Figure 4. Average Games Weekday Person Trips Across Burrard St. Bridge

Table 10. Granville St. Bridge 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	58,567	**45.4%**	34.6%	19.0%
Auto/Vehicle Passenger	23,629	**18.3%**	30.7%	16.3%
Transit	42,273	**32.8%**	20.3%	7.2%
Walk	4,053	**3.1%**	23.9%	3.4%
Bike	358	**0.3%**	7.4%	3.0%
Total Person Trips	**128,880**	**100.0%**	27.1%	11.0%

Auto/Veh. Mode Trips:	82,196	**63.8%**
Sustainable Mode Trips:	46,684	**36.2%**

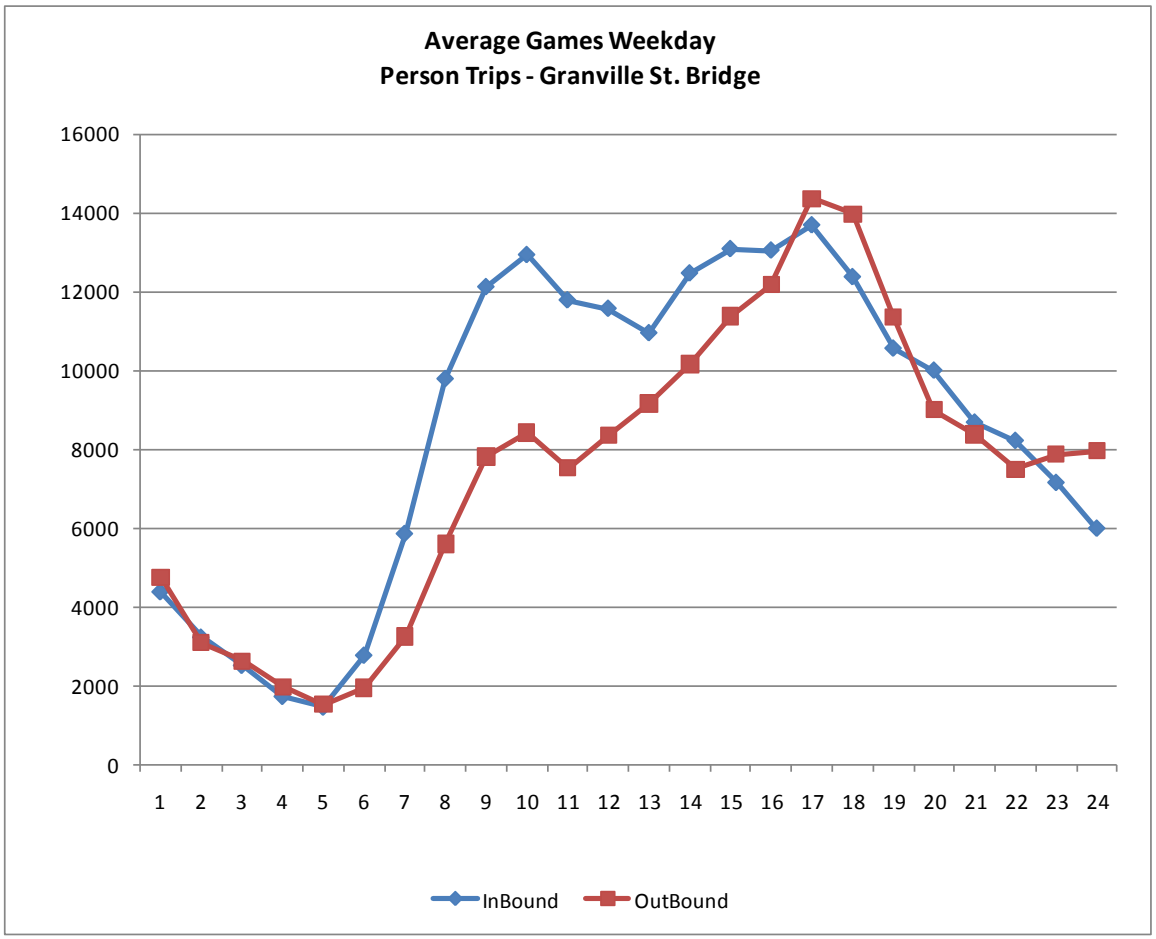

Figure 5. Average Games Weekday Person Trips Across Granville St. Bridge

Table 11. Cambie St. Bridge 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	52,388	**57.8%**	31.0%	17.0%
Auto/Vehicle Passenger	24,336	**26.8%**	31.6%	16.8%
Transit	2,992	**3.3%**	1.4%	0.5%
Walk	8,890	**9.8%**	52.4%	7.6%
Bike	2,080	**2.3%**	43.2%	17.4%
Total Person Trips	**90,686**	**100.0%**	19.1%	7.8%

Auto/Veh. Mode Trips:	76,724	**84.6%**
Sustainable Mode Trips:	13,962	**15.4%**

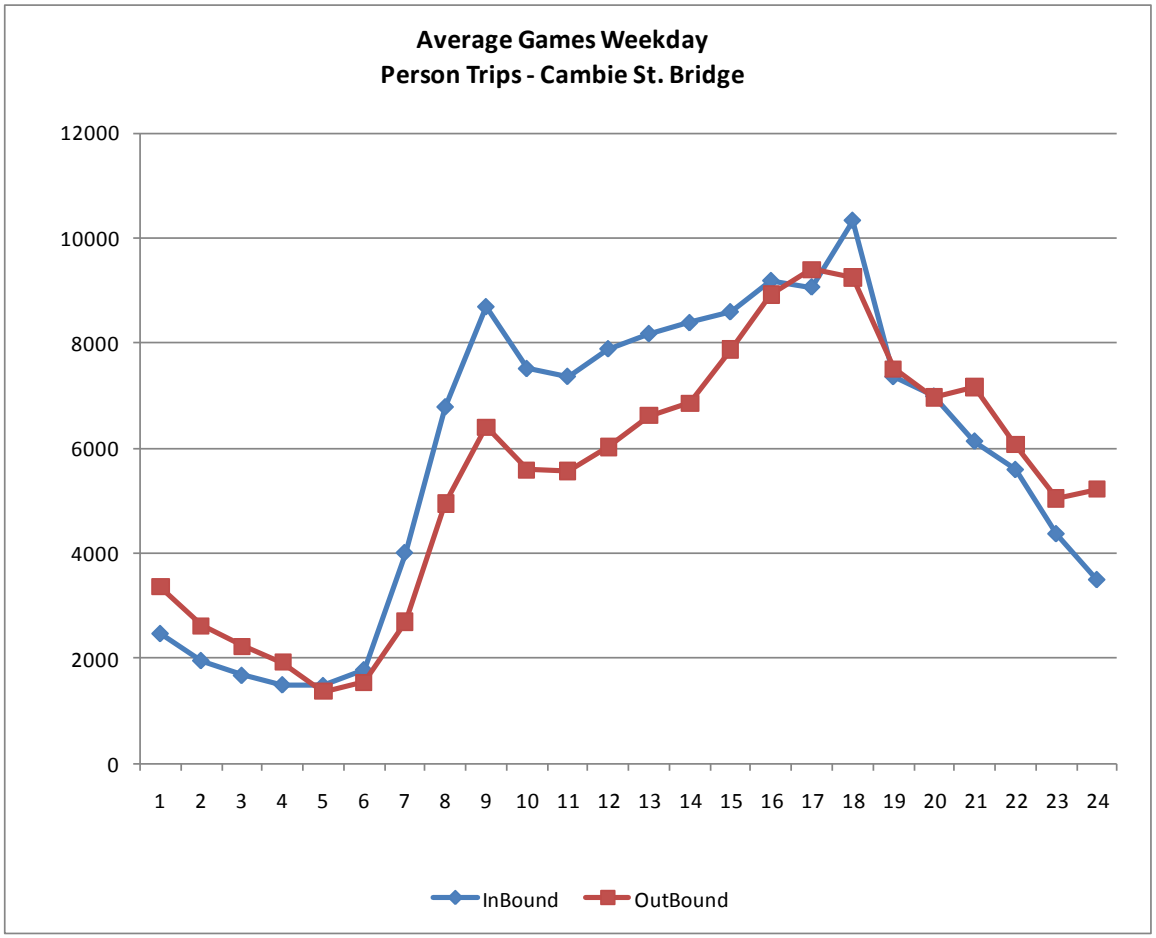

Figure 6. Average Games Weekday Person Trips Across Cambie St. Bridge

Table 12. Canada Line 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	0	**0.0%**	0.0%	0.0%
Auto/Vehicle Passenger	0	**0.0%**	0.0%	0.0%
Transit	139,747	**100.0%**	67.2%	23.9%
Walk	0	**0.0%**	0.0%	0.0%
Bike	0	**0.0%**	0.0%	0.0%
Total Person Trips	**139,747**	**100.0%**	29.4%	12.0%

Auto/Veh. Mode Trips:	0	**0.0%**
Sustainable Mode Trips:	139,747	**100.0%**

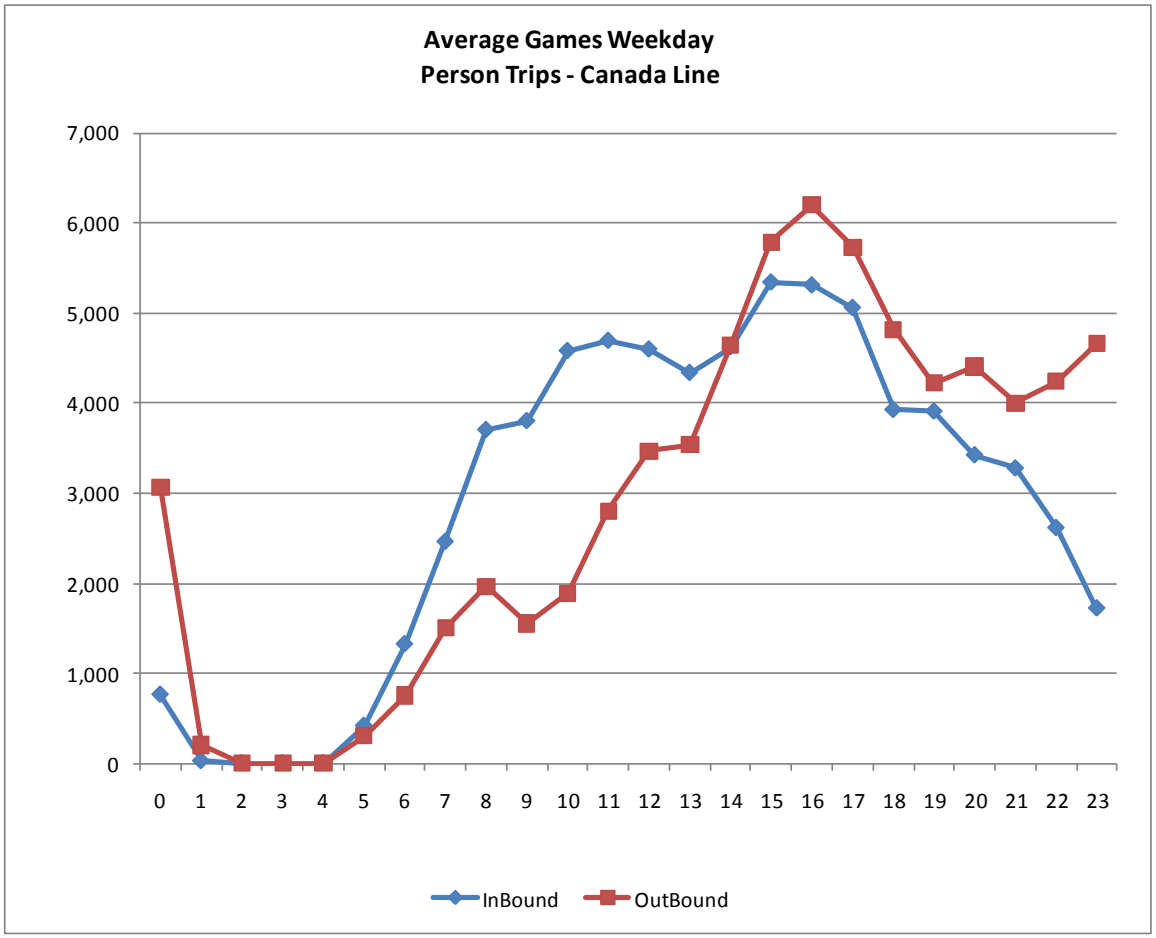

Figure 7. Average Games Weekday Person Trips Crossing on Canada Line

Table 13. Alexander St. 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	2,025	**38.3%**	2.3%	0.7%
Auto/Vehicle Passenger	592	**11.2%**	1.4%	0.4%
Transit	0	**0.0%**	0.0%	0.0%
Walk	2,307	**43.6%**	2.3%	2.0%
Bike	368	**7.0%**	5.7%	3.1%
Total Person Trips	**5,292**	**100.0%**	1.0%	0.5%

Auto/Veh. Mode Trips:	2,617	**49.5%**
Sustainable Mode Trips:	2,675	**50.5%**

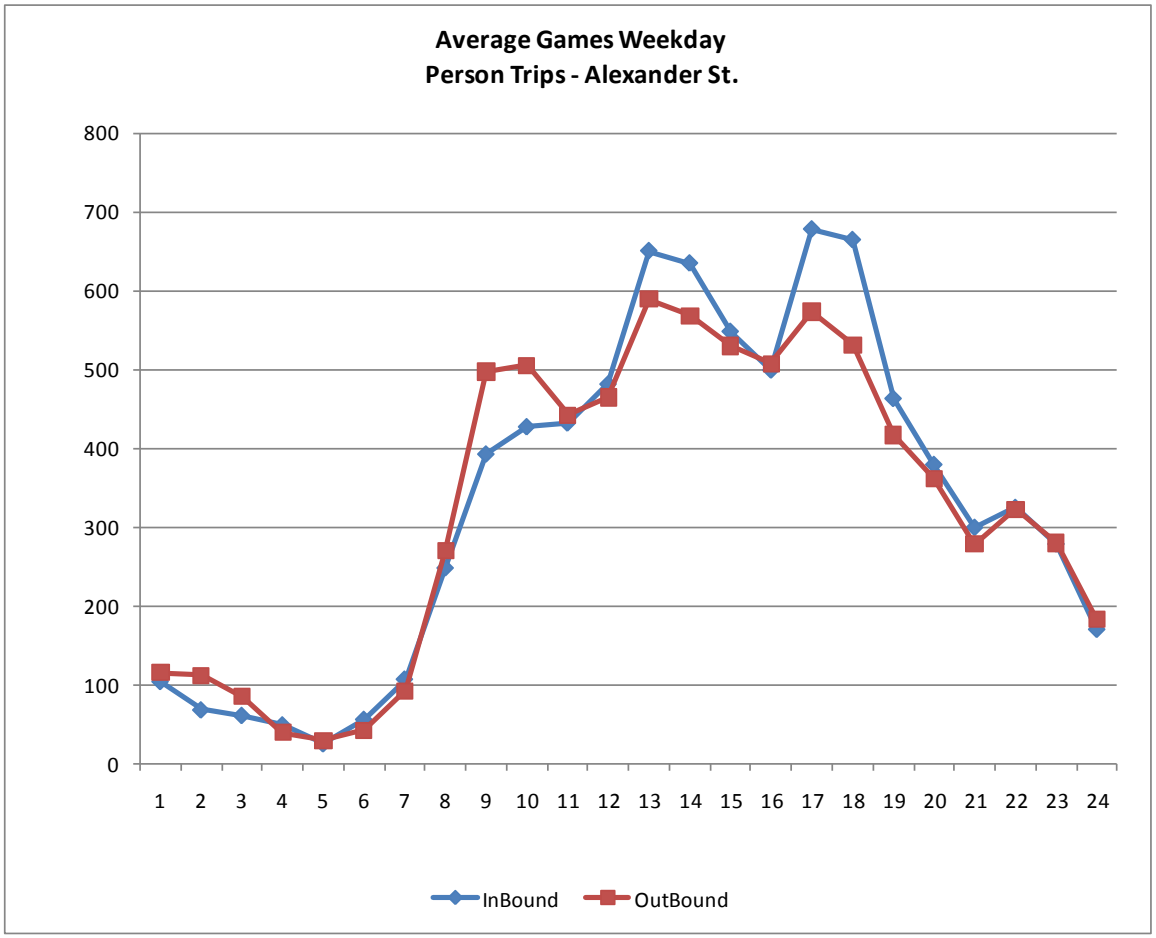

Figure 8. Average Games Weekday Person Trips Across Alexander St.

Table 14. Powell St. 24-hour 2-Way[9] Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	14,866	**59.9%**	17.2%	4.8%
Auto/Vehicle Passenger	6,554	**26.4%**	15.9%	4.5%
Transit	0	**0.0%**	0.0%	0.0%
Walk	3,198	**12.9%**	3.2%	2.7%
Bike	204	**0.8%**	3.2%	1.7%
Total Person Trips	**24,822**	**100.0%**	4.6%	2.1%

Auto/Veh. Mode Trips:	21,420	**86.3%**
Sustainable Mode Trips:	3,402	**13.7%**

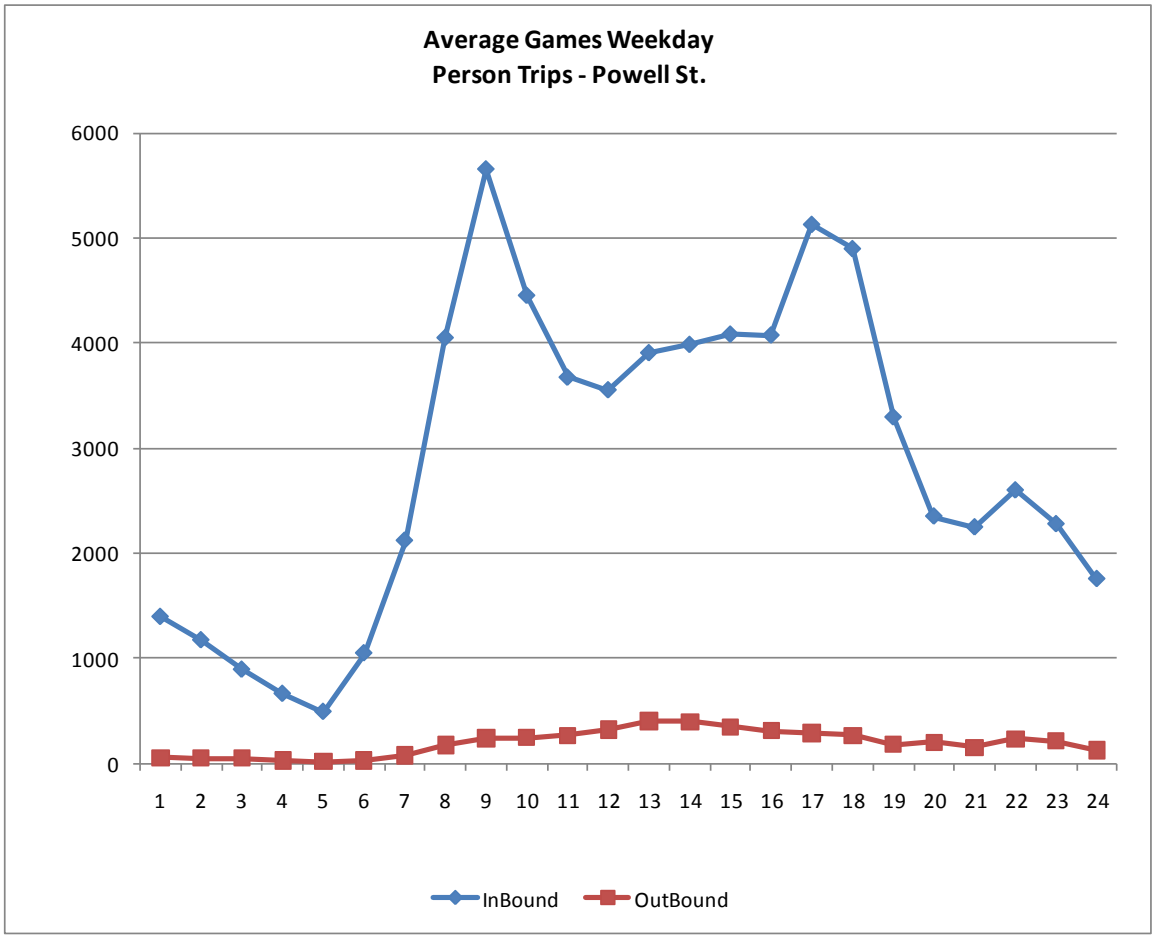

Figure 9. Average Games Weekday Person Trips Across Powell St.

[9] Powell St. operates as a 1-way westbound street, however pedestrians and cyclists travel in both directions.

Table 15. Cordova St. 24-hour 2-Way[10] Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	13,662	**43.8%**	15.9%	4.4%
Auto/Vehicle Passenger	5,774	**18.5%**	14.0%	4.0%
Transit	5,755	**18.5%**	1.9%	1.0%
Walk	5,710	**18.3%**	5.7%	4.9%
Bike	271	**0.9%**	4.2%	2.3%
Total Person Trips	**31,172**	**100.0%**	5.8%	2.7%

Auto/Veh. Mode Trips:	19,436	**62.4%**
Sustainable Mode Trips:	11,736	**37.6%**

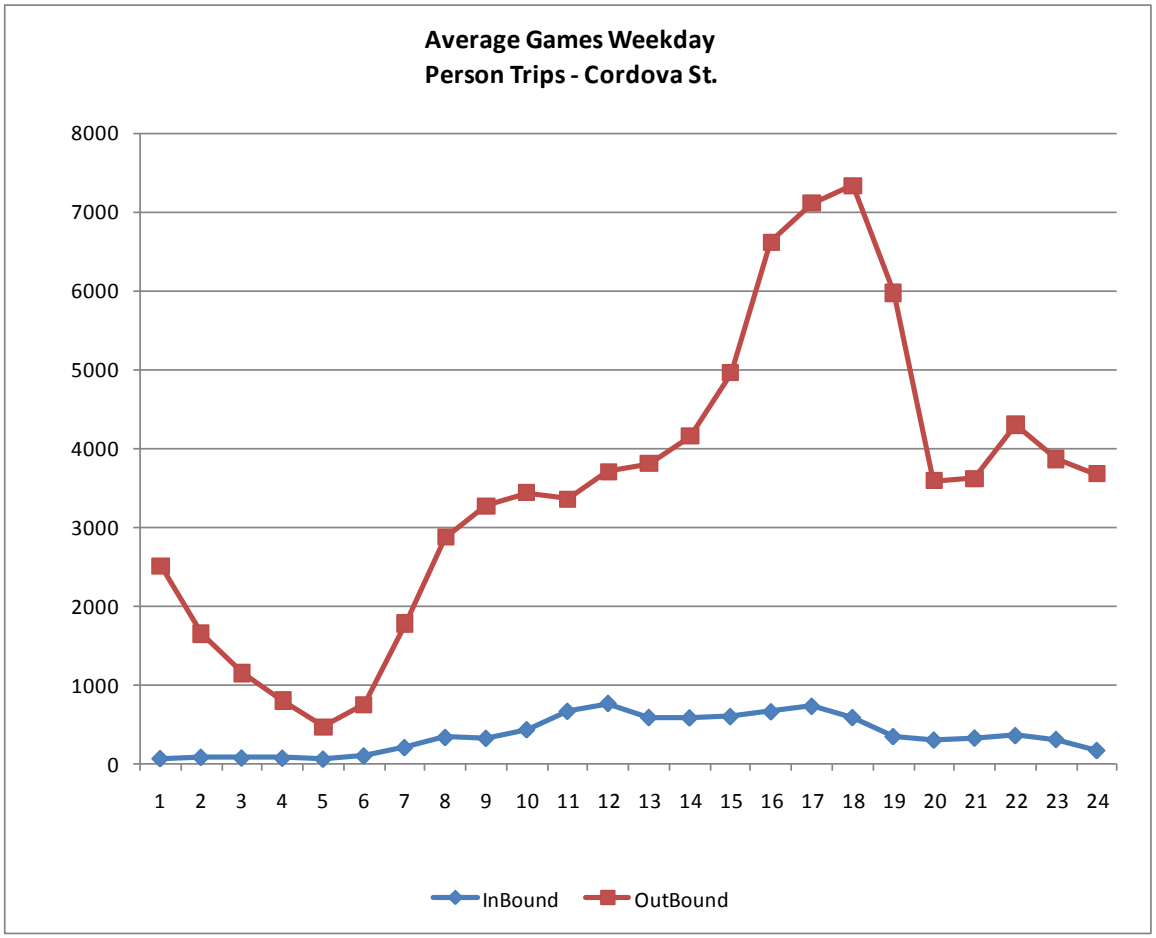

Figure 10. Average Games Weekday Person Trips Across Cordova St.

[10] Cordova St. operates as a 1-way eastbound street, however pedestrians and cyclists travel in both directions.

Table 16. Hastings St. 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	22,372	**25.7%**	26.0%	7.2%
Auto/Vehicle Passenger	12,626	**14.5%**	30.7%	8.7%
Transit	31,506	**36.2%**	10.4%	5.4%
Walk	19,928	**22.9%**	19.8%	16.9%
Bike	659	**0.8%**	10.2%	5.5%
Total Person Trips	**87,091**	**100.0%**	16.2%	7.5%

Auto/Veh. Mode Trips:	34,998	**40.2%**
Sustainable Mode Trips:	52,093	**59.8%**

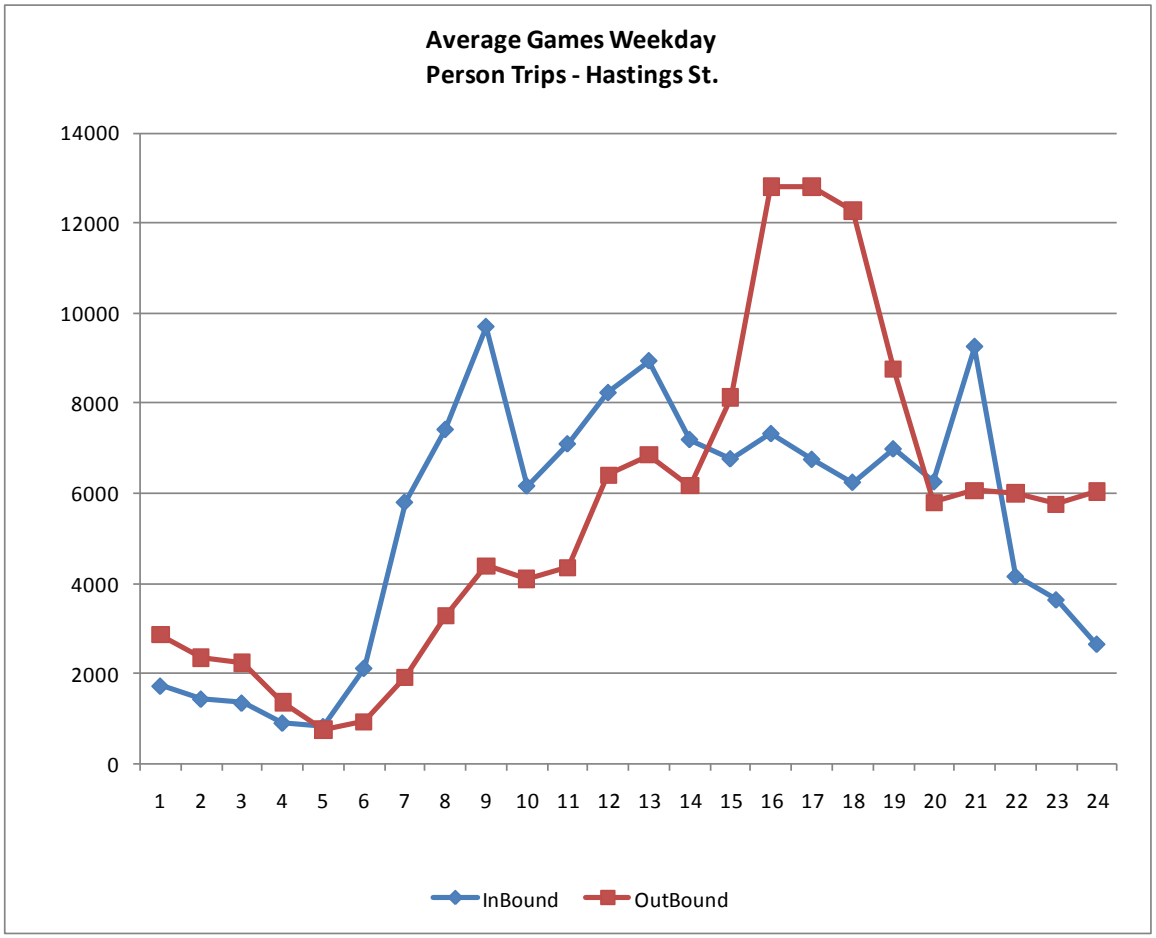

Figure 11. Average Games Weekday Person Trips Across Hastings St.

Table 17. Pender St. 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	20,644	**32.2%**	24.0%	6.7%
Auto/Vehicle Passenger	9,401	**14.7%**	22.8%	6.5%
Transit	23,479	**36.6%**	7.7%	4.0%
Walk	9,980	**15.6%**	9.9%	8.5%
Bike	585	**0.9%**	9.1%	4.9%
Total Person Trips	**64,089**	**100.0%**	11.9%	5.5%

Auto/Veh. Mode Trips:	30,045	**46.9%**
Sustainable Mode Trips:	34,044	**53.1%**

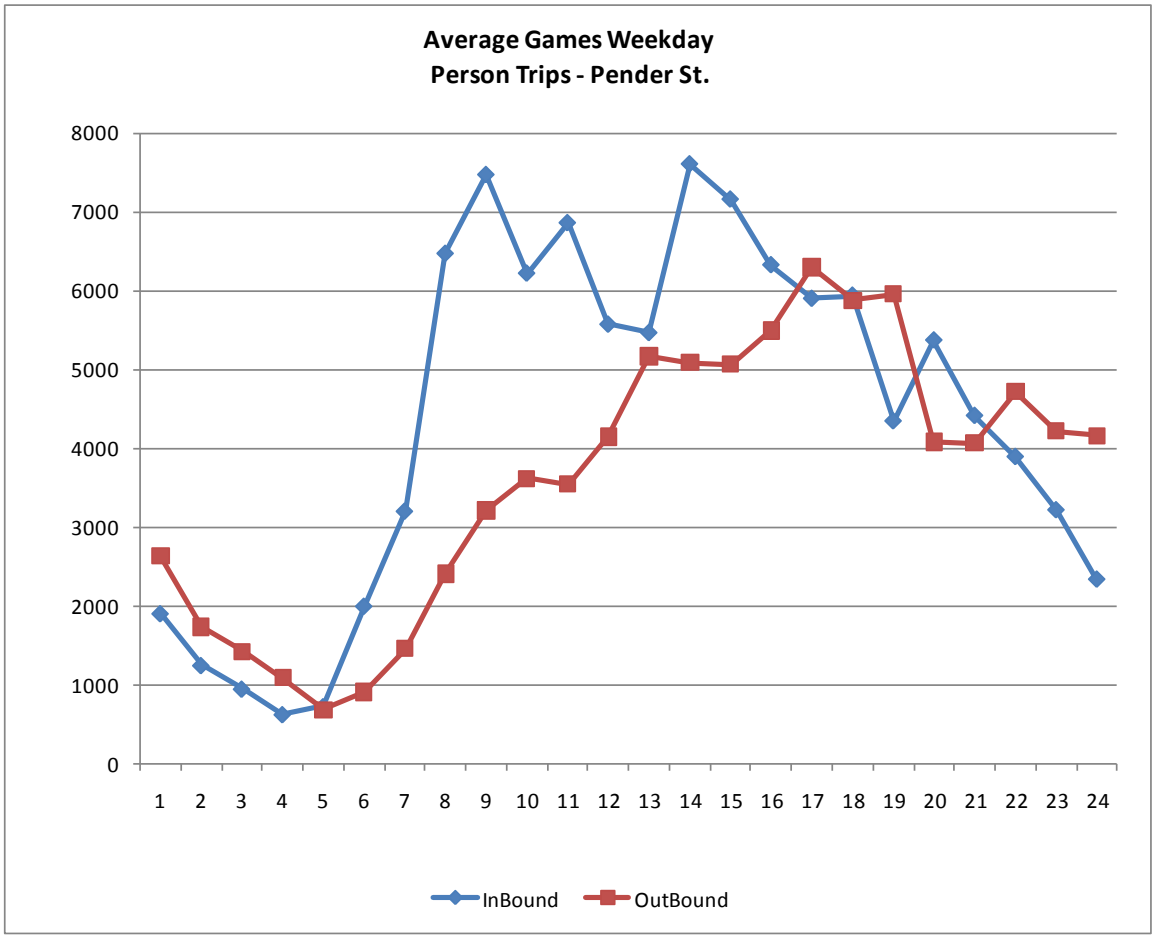

Figure 12. Average Games Weekday Person Trips Across Pender St.

Table 18. Keefer St. 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	9,634	**42.6%**	11.2%	3.1%
Auto/Vehicle Passenger	4,644	**20.6%**	11.3%	3.2%
Transit	0	**0.0%**	0.0%	0.0%
Walk	8,056	**35.7%**	8.0%	6.9%
Bike	260	**1.2%**	4.0%	2.2%
Total Person Trips	**22,594**	**100.0%**	4.2%	1.9%

Auto/Veh. Mode Trips:	14,278	**63.2%**
Sustainable Mode Trips:	8,316	**36.8%**

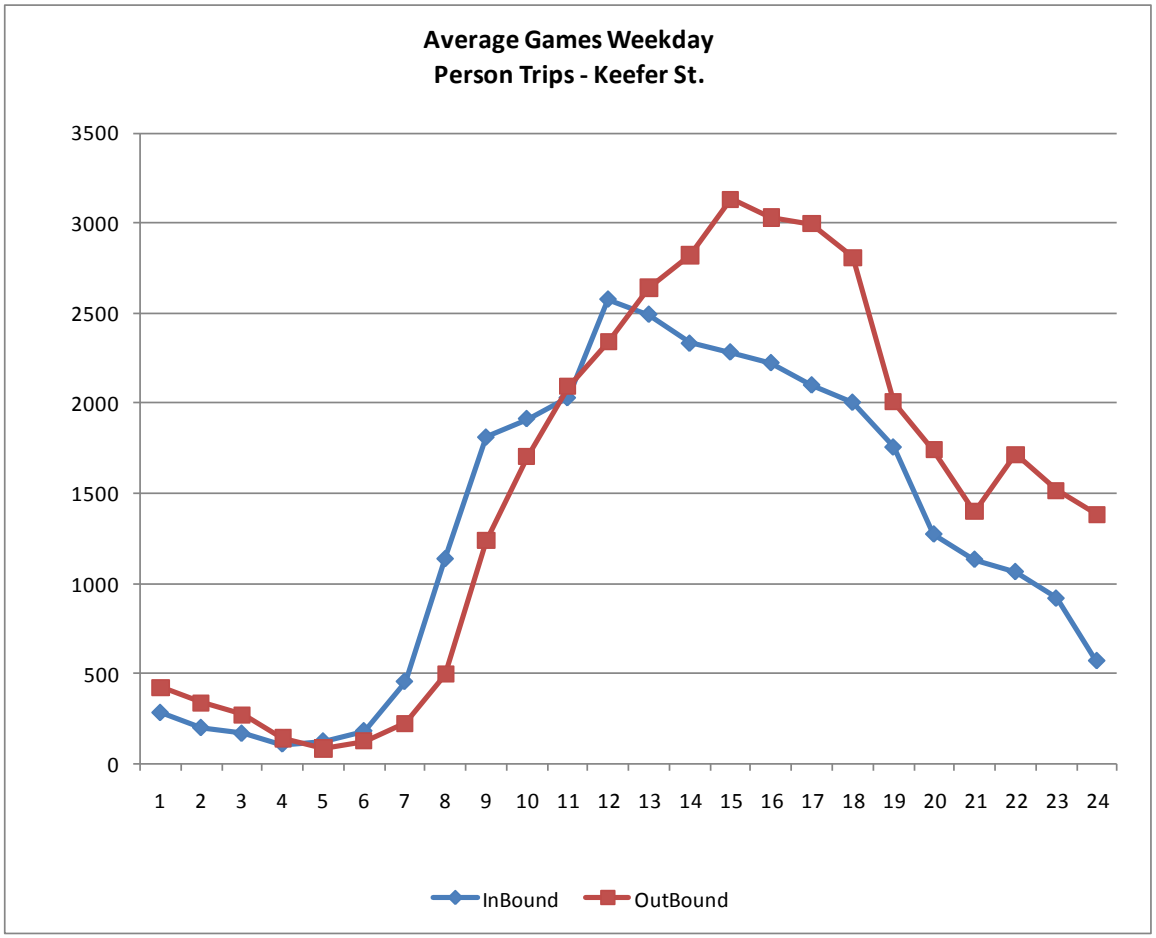

Figure 13. Average Games Weekday Person Trips Across Keefer St.

Table 19. Union St. 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	1,112	**25.1%**	1.3%	0.4%
Auto/Vehicle Passenger	494	**11.2%**	1.2%	0.3%
Transit	0	**0.0%**	0.0%	0.0%
Walk	1,273	**28.8%**	1.3%	1.1%
Bike	1,543	**34.9%**	23.9%	12.9%
Total Person Trips	**4,422**	**100.0%**	0.8%	0.4%

Auto/Veh. Mode Trips:	1,606	**36.3%**
Sustainable Mode Trips:	2,816	**63.7%**

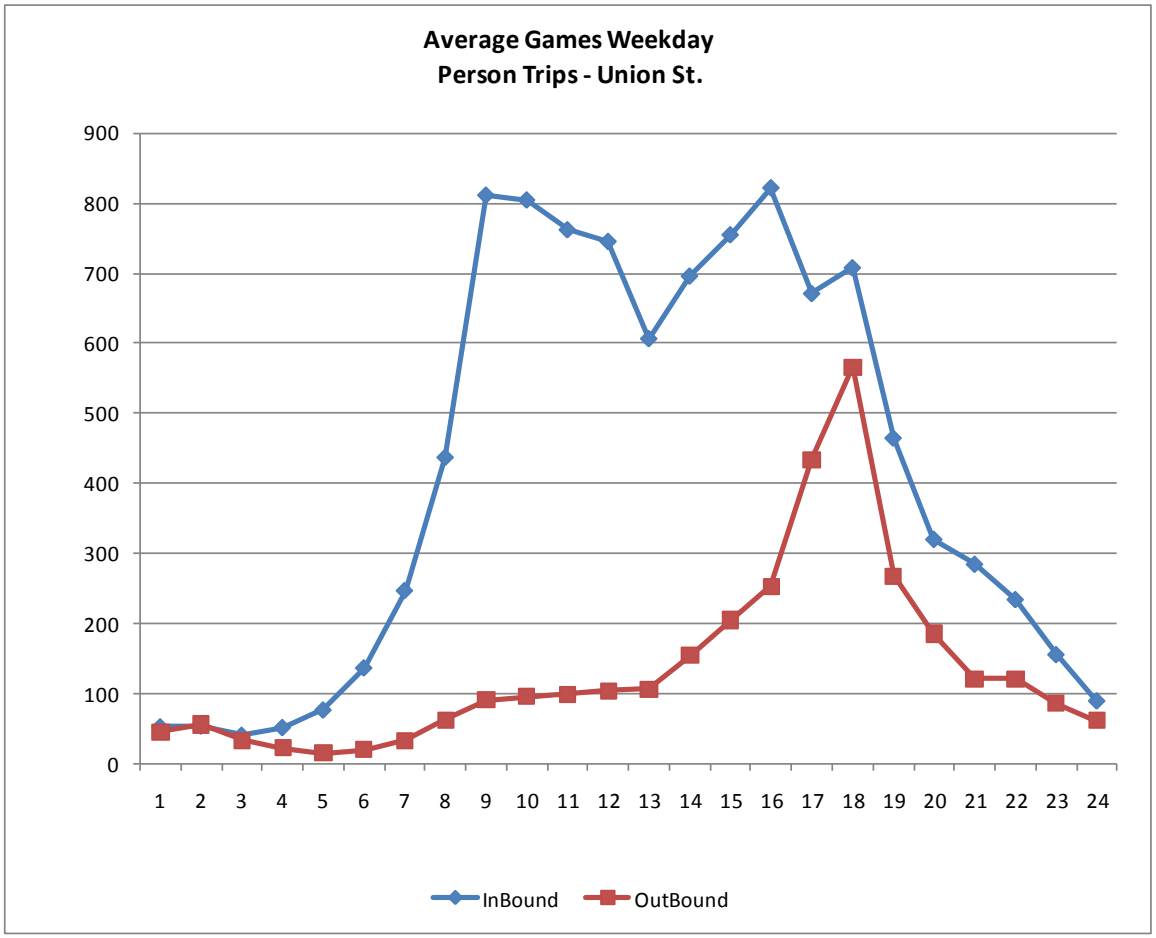

Figure 14. Average Games Weekday Person Trips Across Union St.

Table 20. Quebec St./SeaWall 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	1,865	**3.4%**	2.2%	0.6%
Auto/Vehicle Passenger	1,082	**1.9%**	2.6%	0.7%
Transit	0	**0.0%**	0.0%	0.0%
Walk	50,043	**90.1%**	49.8%	42.6%
Bike	2,564	**4.6%**	39.7%	21.5%
Total Person Trips	**55,554**	**100.0%**	10.3%	4.8%

Auto/Veh. Mode Trips:	2,947	**5.3%**
Sustainable Mode Trips:	52,607	**94.7%**

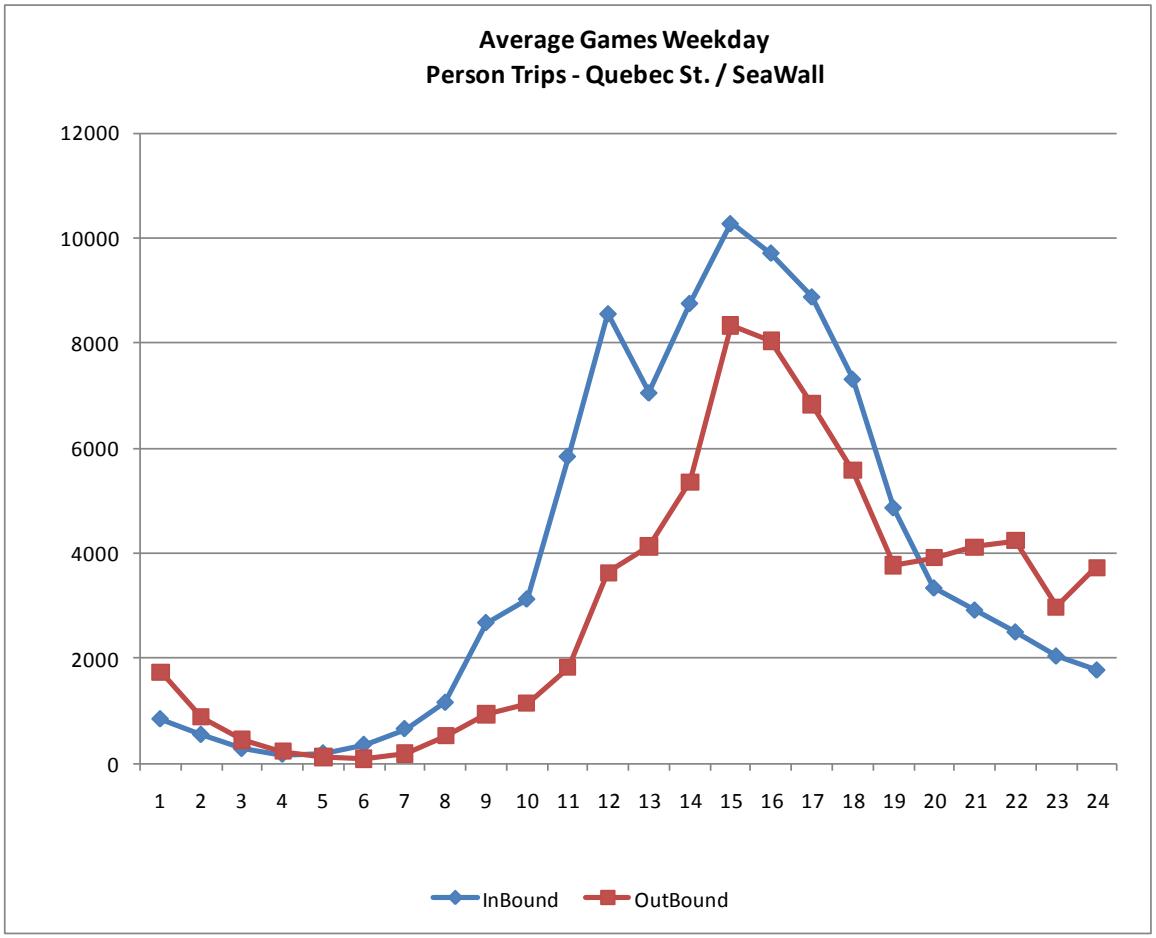

Figure 15. Average Games Weekday Person Trips Across Quebec St. / SeaWall

Table 21. SkyTrain 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	0	**0.0%**	0.0%	0.0%
Auto/Vehicle Passenger	0	**0.0%**	0.0%	0.0%
Transit	225,047	**100.0%**	73.9%	38.6%
Walk	0	**0.0%**	0.0%	0.0%
Bike	0	**0.0%**	0.0%	0.0%
Total Person Trips	**225,047**	**100.0%**	41.8%	19.3%

Auto/Veh. Mode Trips:	0	**0.0%**
Sustainable Mode Trips:	225,047	**100.0%**

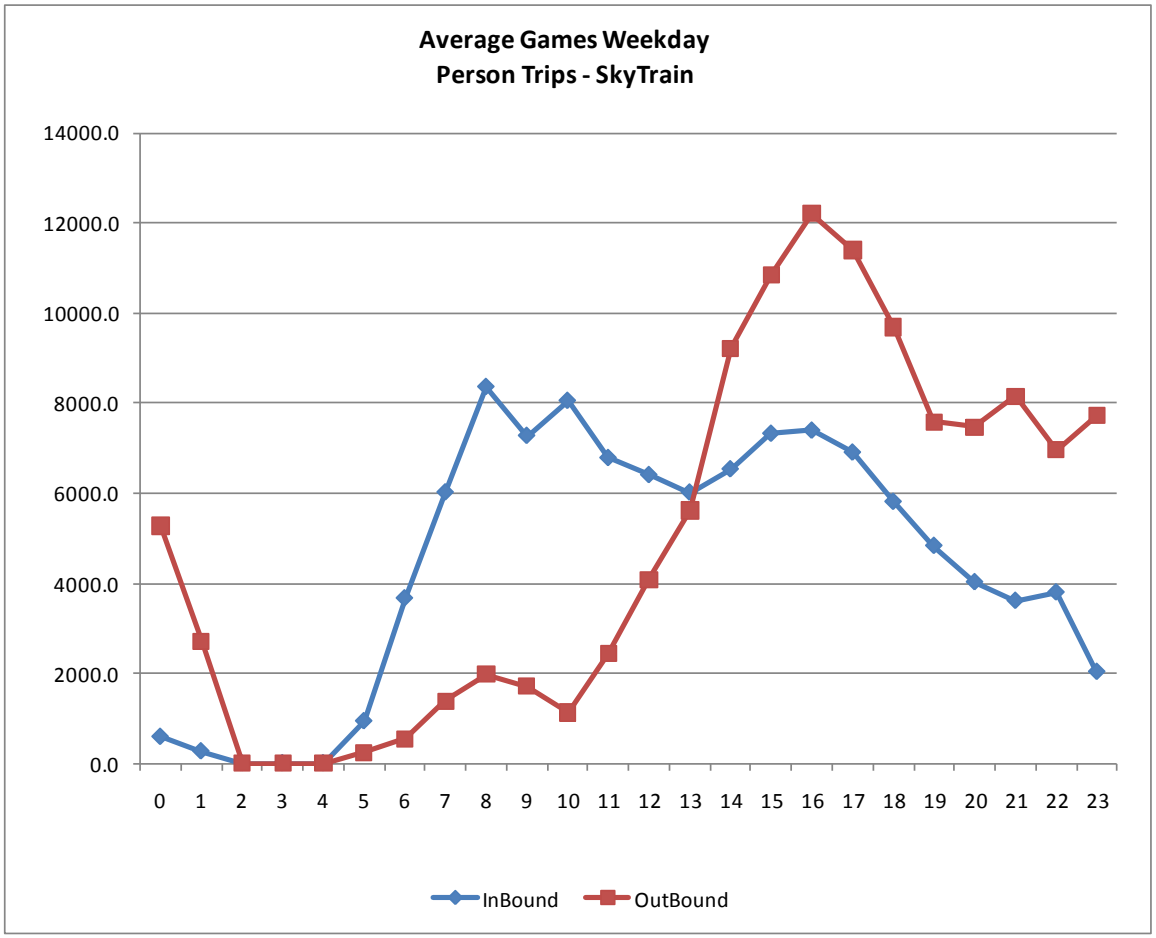

Figure 16. Average Games Weekday Person Trips Across SkyTrain

Table 22. West Coast Express 24-hour 2-Way Summary

Mode	Volume	Mode Share	% Share of Screenline Total	% Share of Downtown Total
Auto/Vehicle Driver	0	**0.0%**	0.0%	0.0%
Auto/Vehicle Passenger	0	**0.0%**	0.0%	0.0%
Transit	18,615	**100.0%**	6.1%	3.2%
Walk	0	**0.0%**	0.0%	0.0%
Bike	0	**0.0%**	0.0%	0.0%
Total Person Trips	**18,615**	**100.0%**	3.5%	1.6%

Auto/Veh. Mode Trips:	0	**0.0%**
Sustainable Mode Trips:	18,615	**100.0%**

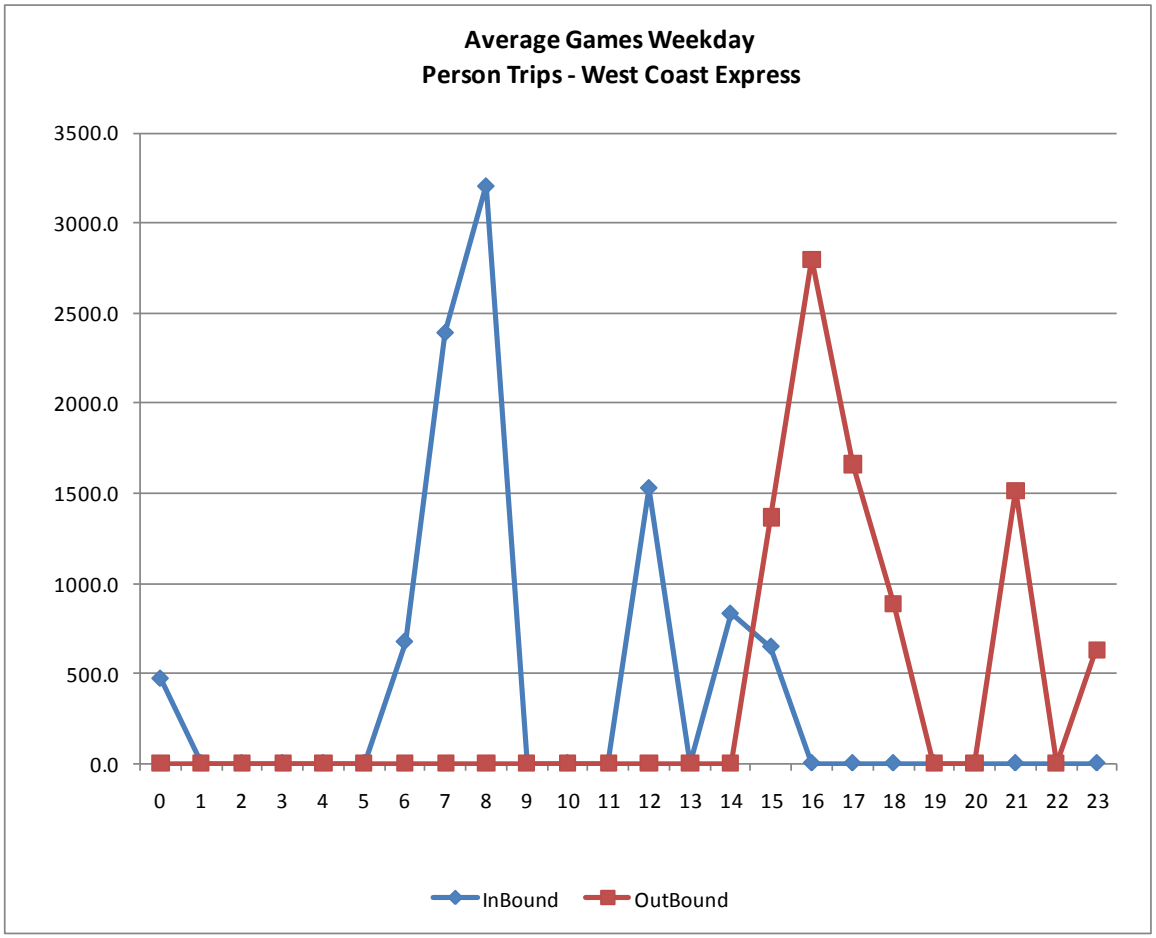

Figure 17. Average Games Weekday Person Trips Across West Coast Express

2.4 THEMATIC FINDINGS

The following are some observations of significant findings from location-specific analyses.

2.4.1 DUAL-NATURE OF CAMBIE BRIDGE

The dominant mode across all Downtown CBD bridges was the automobile/vehicle driver, ranging from a low 45.4% across Granville Bridge, to a high 57.8% over Cambie Bridge. Across Cambie Bridge, 84.6% of all person-trips were made in an automobile/vehicle, which is expected given the relatively low transit service over this bridge due to the Canada Line underneath it. Contrary to the high vehicle-related trips, over half of the walk, and 43% of the bike trips across the False Creek screenline were made across Cambie Bridge. This may have been due to the close proximity of the Cambie Bridge to both Downtown Stadiums and the LiveCity celebration sites to the north, as well as the Olympic Line street car station and Olympic Village to the south.

2.4.2 SIGNIFICANCE OF TRANSIT MODES

With 50% of all trips into and out of the Downtown area made on public transit during the 2010 Winter Games, transit played a key role in the transport of people during the Games.

Over 2/3 of transit trips crossed the False Creek Screenline via Canada Line, however this only accounted for just over 23% of all transit trips crossing into/out of the Downtown.

Across the Main Street Screenline, SkyTrain ridership accounted for almost 74% of all transit trips, and almost 39% of all transit trips into and out of the Downtown core – the highest of all transit modes. Bus ridership was the second highest transit mode taken, with over 26% of all transit trips on a bus.

SeaBus and West Coast Express accounted for the remaining transit shares at 7.9% and 3.2% of the total transit ridership, respectively.

2.4.3 MAIN STREET SCREENLINE – THE WALKING CORRIDOR

Approximately 85% of the total 117,600 walking trips crossing the Downtown cordon were made across the Main Street Screenline. Of this total of 100,495 walking trips, almost 50% were made at the Quebec St. and Sea Wall location. However, it is estimated a large portion of pedestrian traffic along Sea Wall originally arrived by SkyTrain, exiting from Main Street Station[11].

[11] See footnote 6.

Detailed results of the Screenline survey and comparison to the November 2009 survey are provided in the Technical Appendices report in tabular form.

3. SUMMARY OF EVENT VENUE INTERCEPT SURVEY RESULTS

3.1 PRE-GAMES AND OTHER SURVEYS

The 2010 Winter Olympic Games Event Venue Intercept survey were compared to previously conducted event venue intercept surveys that were used as pre-Games conditions. The similar pre-Games surveys were conducted by the City of Vancouver and various partners, for a GM Place sporting event[12], a BC Place concert[13], and a Celebration of Light event[14]. Although these events are different in nature and time-span, and have occurred in both Fall and Summer seasons, relatively large differences in observed statistics will provide greater assurance that changes have occurred and can be concluded during the Games.

3.2 PRIMARY FINDINGS

Total Sample of 2038 records over 5 events (2 hockey games, 1 awards celebration, 2 LiveCity events) at 3 locations (GM Place, BC Place, Yaletown LiveCity) was collected.

The main findings from the Event Venue Intercept Survey were the modal share of people attending the events, the distribution of locations where they crossed into Downtown Vancouver, the distribution of travelling group size, and pre-and post-event location types.

3.2.1 MODE SHARE

The mode while crossing into the Downtown area was recorded and the resulting data was summarized to provide the mode share distribution shown in Table 23, and graphically in Figure 18.

[12] Bunt & Associates Engineering (B.C.) Ltd., "GM Place Sport Event Transportation Survey", Prepared for City of Vancouver, January 14, 2008

[13] Bunt & Associates Engineering (B.C.) Ltd., "BC Place Concert Event Transportation Survey", Prepared for City of Vancouver, October 22, 2007

[14] Bunt & Associates Engineering (B.C.) Ltd., "Celebration of Light Transportation Survey", Prepared for City of Vancouver, January 25, 2008. Celebration of Light data only collected in the downtown (i.e. mode share results did not include any spectators in other areas outside of the downtown peninsula).

It can be seen that of the 12 types of modes, SkyTrain was the prevailing mode used to attend the events, with a 37.1% mode split, followed by automobile (drivers and passengers) at a 17.5% share[15], and then Canada Line with a 16.6% share.

Table 23. Downtown Cordon Crossing Mode Share (12 classification) by 2010 Winter Games Event Attendees

Mode	Samples	Mode Share
Auto Driver	318	15.6%
Auto Passenger	38	1.9%
SkyTrain	756	37.1%
Canada Line	338	16.6%
City Bus	169	8.3%
SeaBus	85	4.2%
WCE	32	1.6%
Walked	232	11.4%
Cycled	5	0.2%
Taxi/Limo	49	2.4%
Charter Bus	8	0.4%
VANOC Bus	5	0.2%
Other	0	0.0%
Total:	**2035**	**100.0%**

[15] A selection bias may have occurred as the survey respondent of a party that travelled together by automobile consisting of children would most likely have been an adult that may have been the driver. This would explain the *possibly* low auto passenger mode share of 1.9%. Therefore, the auto driver (15.6%) and passenger (1.9%) mode shares were combined together into a single auto mode.

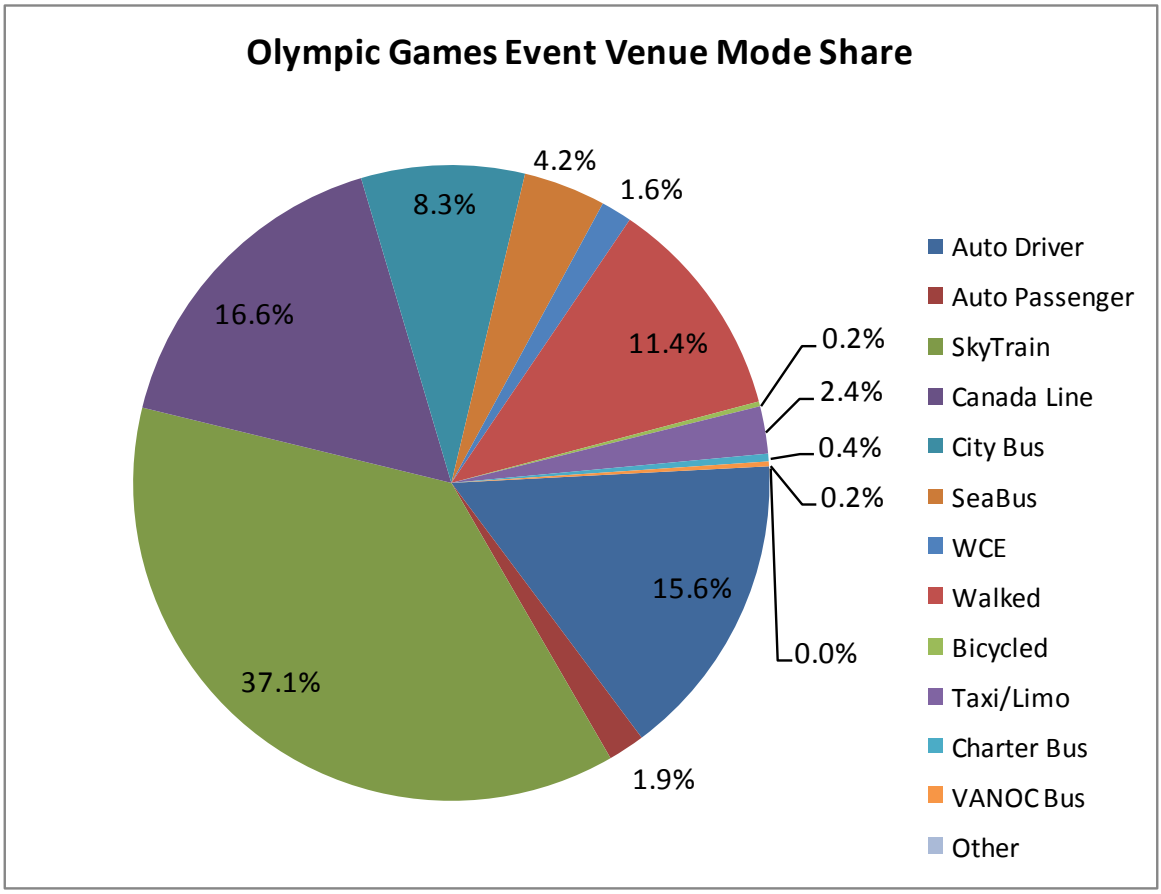

Figure 18. Event Venue Mode Share by 12 Mode Classification

Combining all the public transit modes, an overall transit mode share of 67.8% was observed. Walking and cycling accounted for 11.6% of the modes, with the remaining 3% of the mode share consisting of taxi/limo, charter bus and VANOC bus.

Comparing the 2010 Winter Olympic Games Event Venue mode shares to previous pre-Games events, the mode share categories were reduced to 8 classes common to all surveys conducted. Table 24 shows the 9-class mode share results of the pre-Games and 2010 Winter Games events. It can be seen that the auto mode (driver + passenger) was observed as high as 55.9% for a GM Place sporting event, and as low as 34.2% during a Celebration of Light event. Comparably, the 2010 Winter Games auto mode share was found to be 17.5, almost half of the lowest pre-Games events.

Comparing the 2010 Winter Games to similar events, specifically the GM Place Sports and BC Place Concert events, a reduction of 30.5 percentage-points was observed in automobile mode share during the 2010 Winter Games, with a subsequent increase of 36.5 percentage-points in the public transit mode share.

Table 24. Pre-Games and 2010 Winter Games Event Venue Mode Shares (8 classification)

Normalized Mode Share Categories	GM Place Sport Event	BC Place Concert Event	Celebration of Light Downtown	2010 Winter Games	2010 Winter Games Vs. Typical Events[16]
Car	55.9%	40.1%	34.2%	17.5%	-30.5%
Rail Transit	22.3%	25.6%	13.0%	55.3%	31.4%
City Bus	4.2%	8.7%	17.2%	8.3%	1.9%
SeaBus	0.8%	1.0%	0.7%	4.2%	3.3%
Charter Bus	1.2%	1.1%	0.5%	0.6%	-0.5%
Walk	11.6%	10.3%	27.6%	11.4%	0.5%
Taxi/Limo	4.0%	12.9%	1.9%	2.4%	-6.0%
Bicycle	0.0%	0.4%	2.6%	0.2%	0.0%
Other			2.3%		
	100.0%	**100.0%**	**100.0%**	**100.0%**	**0.0%**

Table 25 provides a more condensed 4-category mode share breakdown, similar to the traditional 5-category split. In this table, it can be seen that the combined automobile and taxi mode share dropped by 36.5 percentage-points during the 2010 Winter Games, while the combined transit and charter bus mode share increased by 36 percentage-points. Walking increased slightly by 0.5 percentage-points.

A final reduced summary shows that 20.5% of 2010 Winter Games event trips were made in non-transit vehicles, and conversely, 79.5% of trips were made in sustainable modes. This is a change of 37 percentage-points compared to the pre-Games average of previous sporting and music events of a split of 57.6% in non-transit vehicle trips, and 42.4% in sustainable modes.

Finally, a comparison of mode shares determined from the Screenline Survey can be made with the resulting mode share from the Intercept Survey. Table 26 provides this comparison using the traditional mode share categories. It can be seen that a drop of 10.7 and 7.5 percentage-points was observed in auto/vehicle driver and auto/vehicle passengers respectively in the Event Venue Intercept survey.

[16] Difference of 2010 Winter Games and the average of GM Place Sport event and BC Place Concert event (as these events were the most similar to the 2010 Winter Games sporting events, awards ceremony event, and LiveCity events that were surveyed).

Table 25. Pre-Games and 2010 Winter Games Event Venue Mode Shares (condensed classification)

Condensed Mode Share Categories	GM Place Sport Event	BC Place Concert Event	Celebration of Light	2010 Winter Games	2010 Winter Games Vs. Typical Events
Car+Taxi	59.9%	52.9%	36.1%	19.9%	-36.5%
Transit + Charter Bus	28.5%	36.4%	31.4%	68.5%	36.0%
Walk	11.6%	10.3%	27.6%	11.4%	0.5%
Bike	0.0%	0.4%	2.6%	0.2%	0.0%
Other			2.3%		
	100.0%	**100.0%**	**100.0%**	**100.0%**	**0.0%**

Reduced Summary	GM Place Sport Event	BC Place Concert Event	Celebration of Light	2010 Winter Games	2010 Winter Games Vs. Typical Events
In Non-Transit Vehicles	61.1%	54.0%	37.5%	20.5%	-37.0%
In Sustainable Modes[17]	38.9%	46.0%	62.5%	79.5%	37.0%

Subsequently, an increase of 18 percentage-points was observed in the intercept survey, of which the proximity of the rapid transit lines to the venues, and the inclusion of transit fares in event tickets to GM Place and BC Place, may have played a significant factor. The combination of walk and bike modes showed a negligible difference between the two surveys.

Table 26. Comparison of Mode Shares between 2010 Winter Games Screenline Survey and Event Venue Intercept Survey

Olympic Games Survey Method	Screenline Survey (InBound)	Event Venue Intercept Survey	Intercept Survey Difference
Auto/Vehicle Driver	26.4%	15.6%	-10.7%
Auto/Vehicle Passenger	12.4%	4.9%	-7.5%
Transit	49.8%	67.8%[18]	18.0%
Walk	10.4%	11.4%	1.0%
Bike	1.1%	0.2%	-0.8%
Total Person Trips	**100.0%**	**100.0%**	**0.0%**

[17] Sustainable modes comprised of public transit, walk, and bike trips. Other trip types were recorded for the Celebration of Light event however it is uncertain as to the sustainability of such modes and therefore redistributed accordingly.

[18] Ticketed events at BC Place and GM Place included transit fares in event tickets.

Figures 19 and 20 graphically show the differences in mode shares between the two survey types.

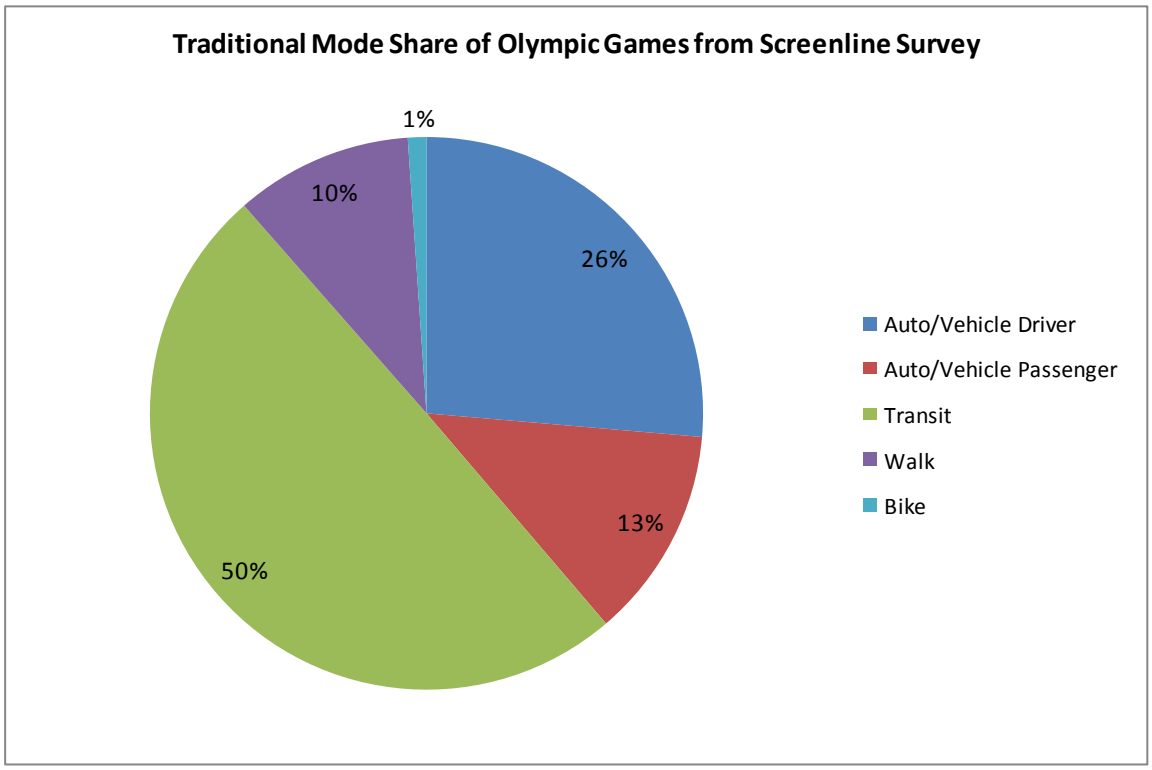

Figure 19. Event Venue Mode Share from Screenline Survey (InBound)

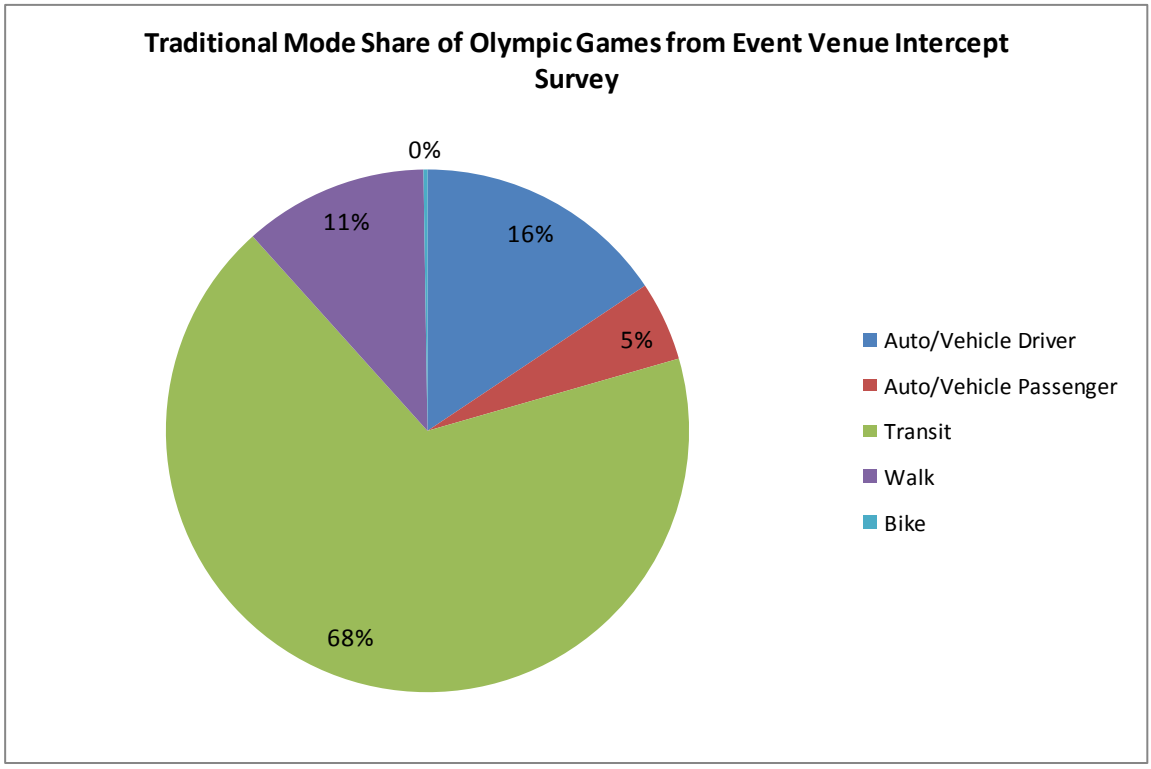

Figure 20. Event Venue Mode Share from Intercept Survey

3.2.3 Crossing Location

The location where event attendees crossed into the Downtown core was surveyed and Table 27 provides a summary of the breakdown of 1,761 samples that responded with a crossing location. The total person trips crossing by location was also determined from the Screenline Survey and Table 27 provides a comparative assessment of the differences in crossing location between the two surveys. The most significant differences were the higher use of SkyTrain and Canada Line transit modes, which was to be expected given the proximity of the venues the intercept surveys were conducted. Together, SkyTrain and Canada Line accounted for just over 62% of all known crossing locations.

Figure 21 provides a graphical breakdown of the Downtown cordon crossing locations observed from the Event Venue Intercept survey.

Table 27. Comparison of Downtown Cordon Crossing Location between 2010 Winter Games Screenline Survey and Event Venue Intercept Survey

Crossing Location	Screenline Survey Share	Intercept Survey Share	Intercept Survey Difference
Lion's Gate Bridge	9.1%	6.1%	-3.0%
Burrard Bridge	10.0%	4.5%	-5.5%
Granville Bridge	11.0%	5.4%	-5.6%
Cambie Bridge	7.8%	4.8%	-3.0%
Canada Line	12.0%	19.2%	7.2%
Alexander	0.4%	0.2%	-0.2%
Powell	2.1%	0.4%	-1.7%
Cordova	2.7%	0.4%	-2.3%
Hastings	7.5%	5.4%	-2.1%
Pender	5.5%	1.2%	-4.3%
Keefer	1.9%	0.5%	-1.4%
Union	0.4%	0.5%	0.1%
Quebec	4.8%	1.8%	-3.0%
SkyTrain	19.3%	42.9%	23.6%
WCE	1.6%	1.8%	0.2%
SeaBus	3.9%	4.8%	0.9%
Total:	**100.0%**	**100.0%**	**0.0%**

3.2.4 AVERAGE TRAVELLING GROUP SIZE

The distribution and average size of the number of people travelling together to event venues were observed. A weighted- average of 2.63 people per group was determined from the observations. Table 28 provides the results of the distribution of group sizes observed, and Figure 22 provides a histogram of the group sizes.

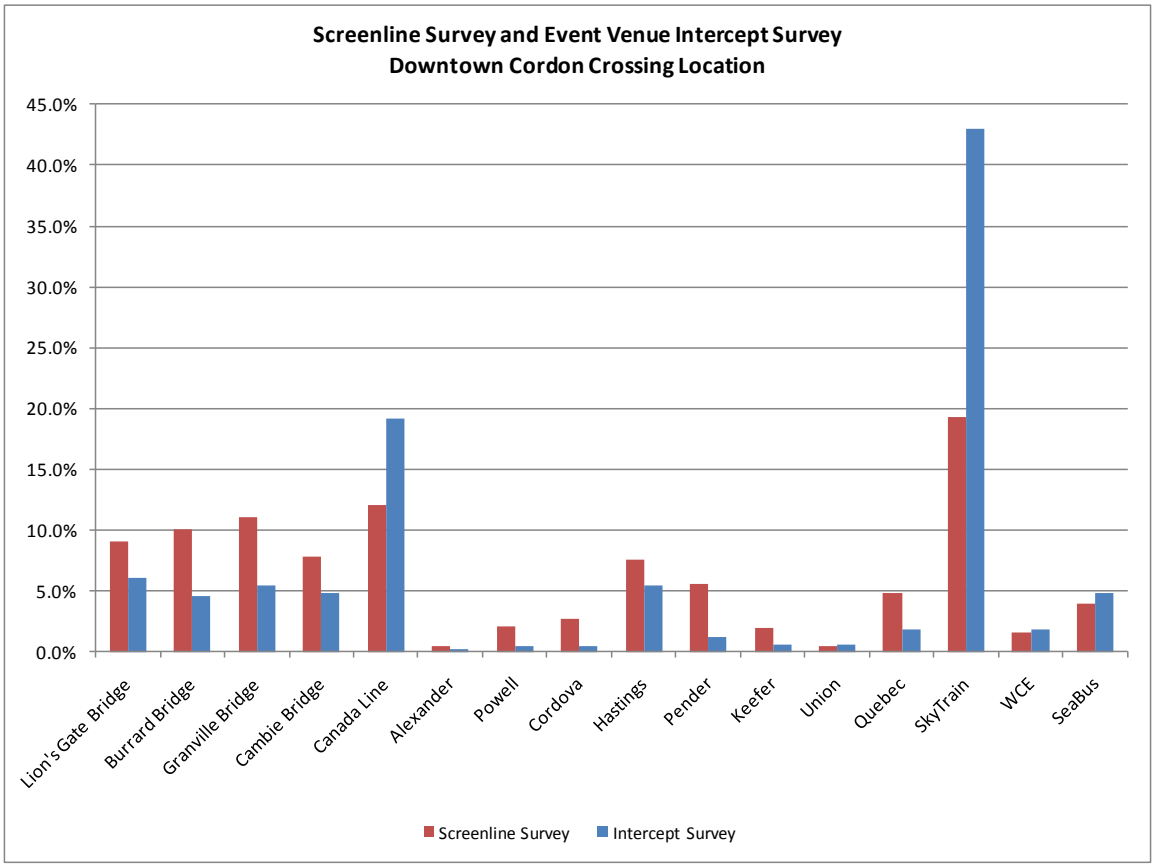

Figure 21. Graphical Comparison of Downtown Cordon Crossing Locations between the Screenline Survey and Event Venue Intercept Survey

Table 28. Average Travelling Group Size Attending Event Venues

	Group Size	Sample Size
	1	388
	2	884
	3	256
	4	313
	5	69
	6	44
	7	12
	8	18
	9	7
	10	6
	12	4
	13	1
	15	5
Avg Size /Total:	**2.63**	**2007**

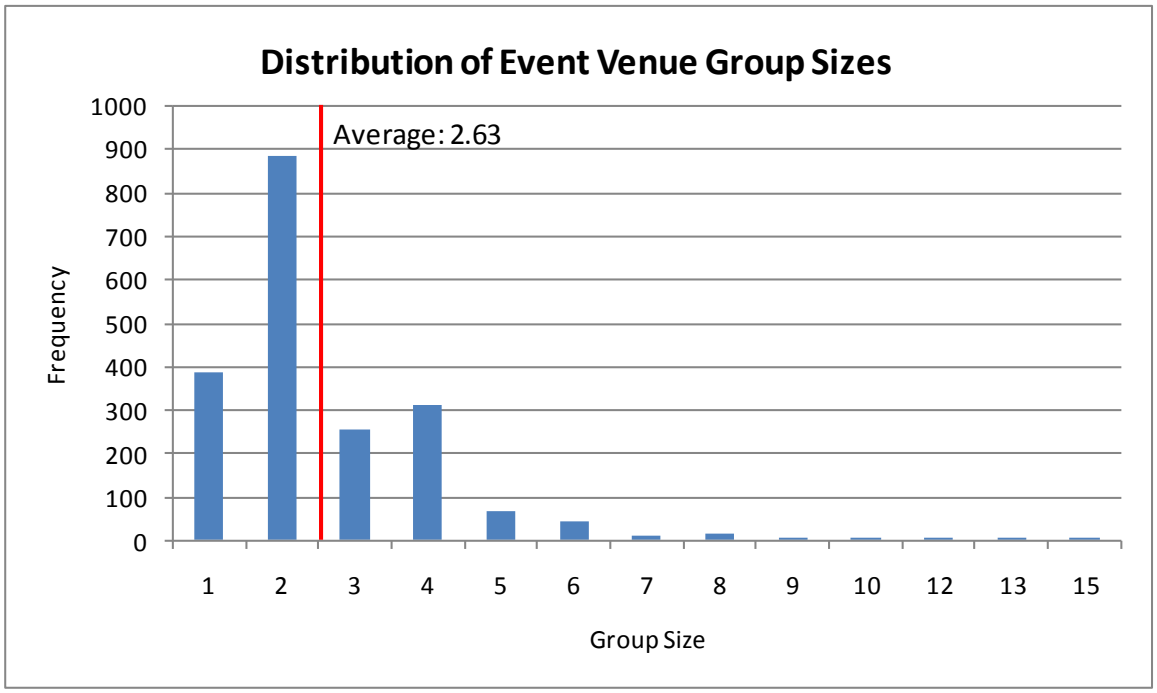

Figure 22. Distribution of Event Venue Group Sizes

3.2.5 Trip Start Origins

Intercept survey respondents were asked their location of residence ("home city") as well as their accommodation location the previous night, mainly for those who were not residents of the region. A total of 2032 answers were provided as to the location of residence, and are categorized into 5 classes shown in Table 29 and Figure 23. Table 30 and Figure 24 summarize the 1940 answers that were provided for the question of accommodation location.

Table 29. Breakdown of Location of Residence by Event Attendees

Residence Location	Sample Size	Percent Breakdown
Downtown	140	6.9%
Rest of the City of Vancouver	458	22.5%
GVRD (less Vancouver)	779	38.3%
FVRD	46	2.3%
Whistler	8	0.4%
External	601	29.6%
Total	**2032**	**100.0%**

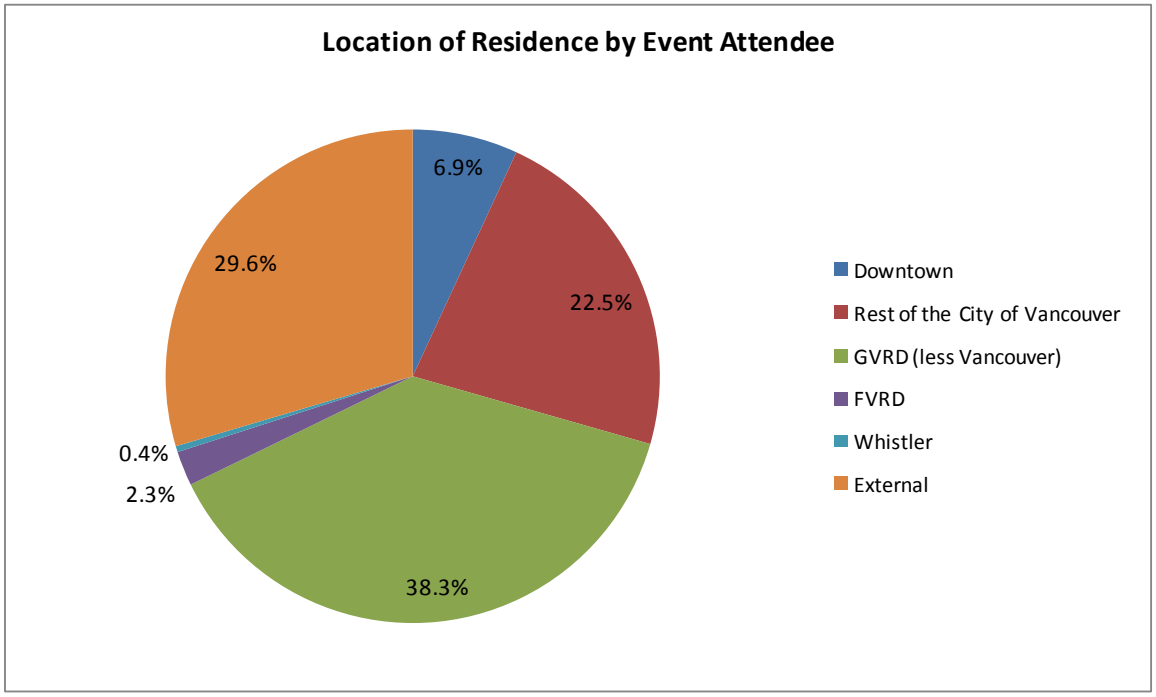

Figure 23. Breakdown of Location of Residence by Event Attendees

Table 30. Breakdown of Location of Accommodation by Event Attendees

Accommodation Location	Sample Size	Percent Breakdown
Downtown	150	7.7%
Rest of the City of Vancouver	685	33.7%
GVRD (less Vancouver)	948	48.9%
FVRD	52	2.7%
Whistler	14	0.7%
External	91	4.7%
Total	**1940**	**98.4%**

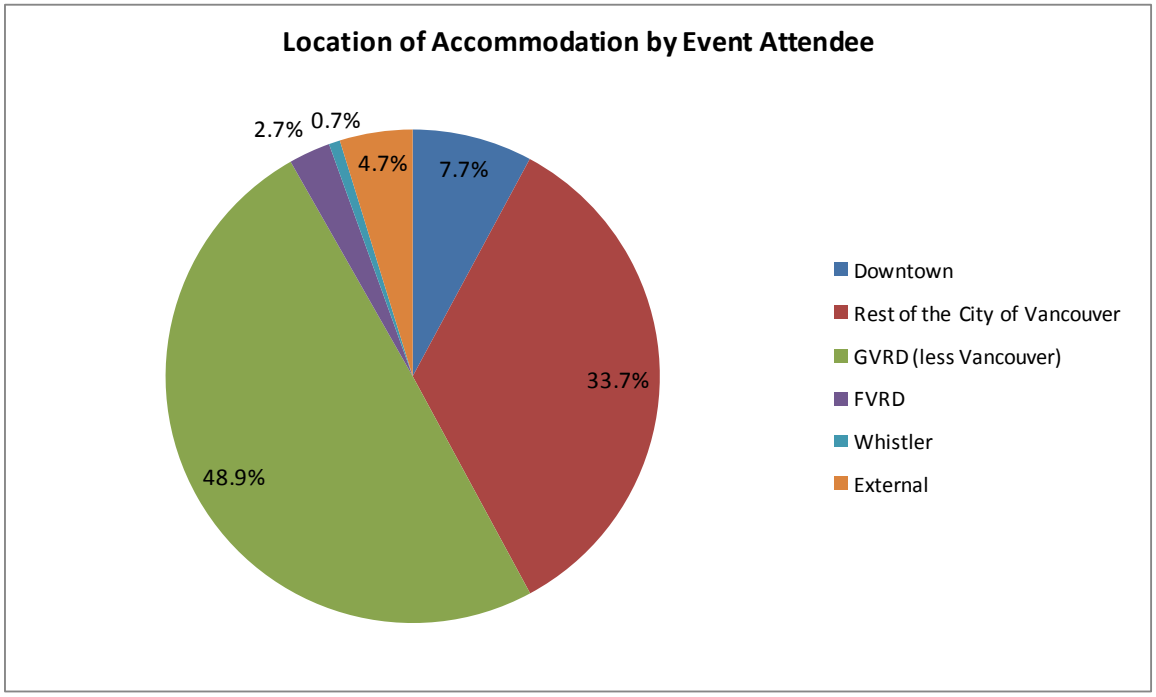

Figure 24. Breakdown of Location of Accommodation by Event Attendees

3.2.6 MULTI-MODE TRAVEL

An analysis of the number of modes taken to attend 2010 Winter Games events can provide a sense of the complexity in travel patterns. Table 31 and Figure 25 show that almost half of the trips were made using a single mode, with over 86% of trips using 1 or 2 modes. The remaining 14% took from 3 to 5 modes in order to attend the events, suggesting increased effort to attend the events and/or the efficiency in transferring between modes. Note that the definition of modes was based on the 12 mode classification, which comprised of 5 different public transit modes.

Table 31. Distribution of Multi-Mode Trip Types Attending 2010 Winter Games Venue Events

Multi-Modal Trip Type	Sample Size	Share
Single mode trips	978	48.1%
2 mode trips	776	38.1%
3 mode trips	250	12.3%
4 mode trips	27	1.3%
5 mode trips	4	0.2%
Total	**2035**	**100.0%**

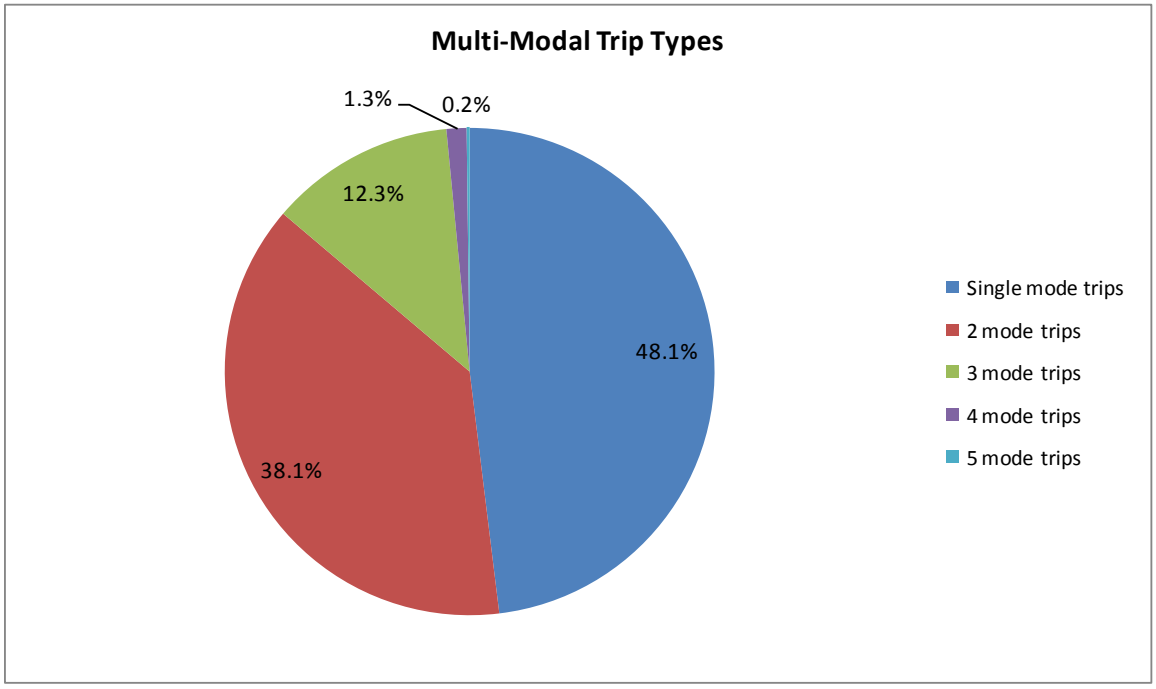

Figure 25. Distribution of Multi-Mode Trip Types Attending 2010 Winter Games Venue Events

3.2.7 Pre- and Post-Venue Origins and Destinations

2010 Winter Games Venue attendees surveyed were inquired regarding the location they originated from just prior to travelling to the venue, as well as the location they planned to go to after the event. Approximately half of the respondents provided an answer based on a 6 categories. Table 32 and Figure 26 summarize the pre-venue origin locations by type, showing that over half of the attendees came directly from their home or accommodation. 15% of respondents came from another celebration or Olympic site, and 13.4% responded to have just left a restaurant or bar.

Table 32. Pre-Venue Origin Location Type

Pre-Venue	Freq.	%
1 - Home/Accom.	586	53.7%
2 - Restaurant/Bar	146	13.4%
3 - Shopping	39	3.6%
4 - Celeb. / Olympic Site	164	15.0%
5 - Work/School	125	11.4%
6 - Other	32	2.9%
Total:	**1092**	**100.0%**

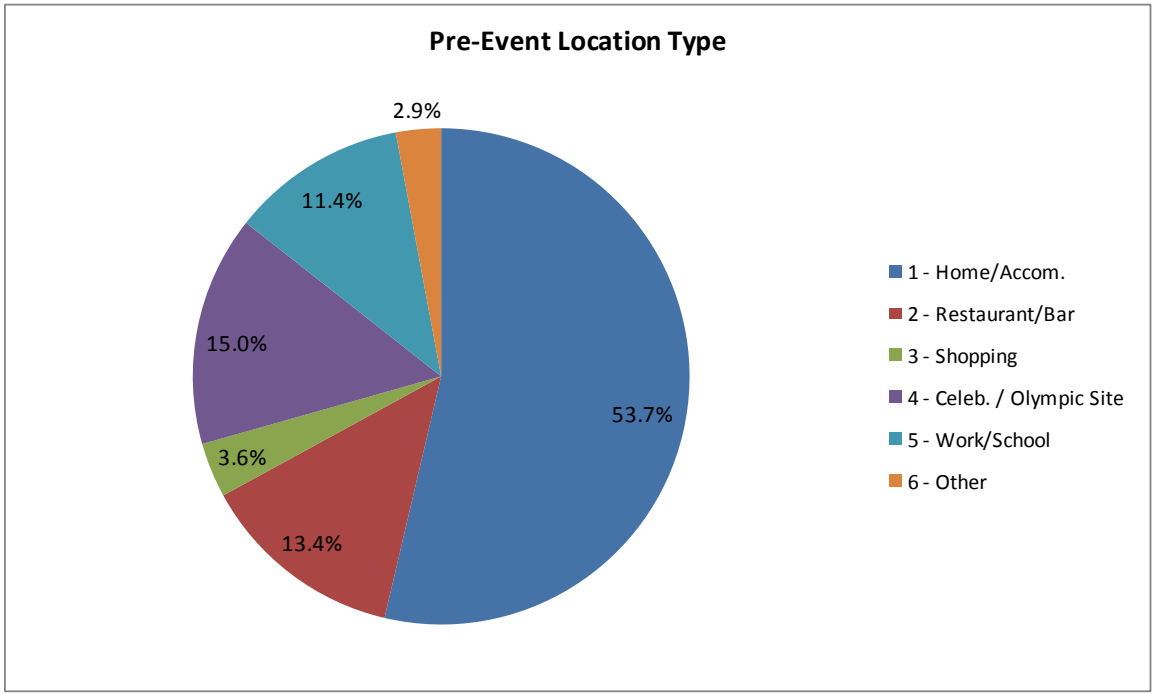

Figure 26. Breakdown of Pre-Event Origin Locations

As shown in Table 33 and Figure 27, the home/accommodation post-venue location was the top destination attendees planned to head towards after the event, at 45.6% of all destinations. Just over a quarter, or 26.1% of post-venue destinations were planned to be a restaurant or bar, followed by 21.8% planning to attend another celebration or Olympic site.

Table 33. Post-Venue Destination Location Type

Post-Venue	Freq.	%
1 - Home/Accom.	445	45.6%
2 - Restaurant/Bar	254	26.1%
3 - Shopping	12	1.2%
4 - Celeb. / Olympic Site	213	21.8%
5 - Work/School	8	0.8%
6 - Other	43	4.4%
Total:	**975**	**100.0%**

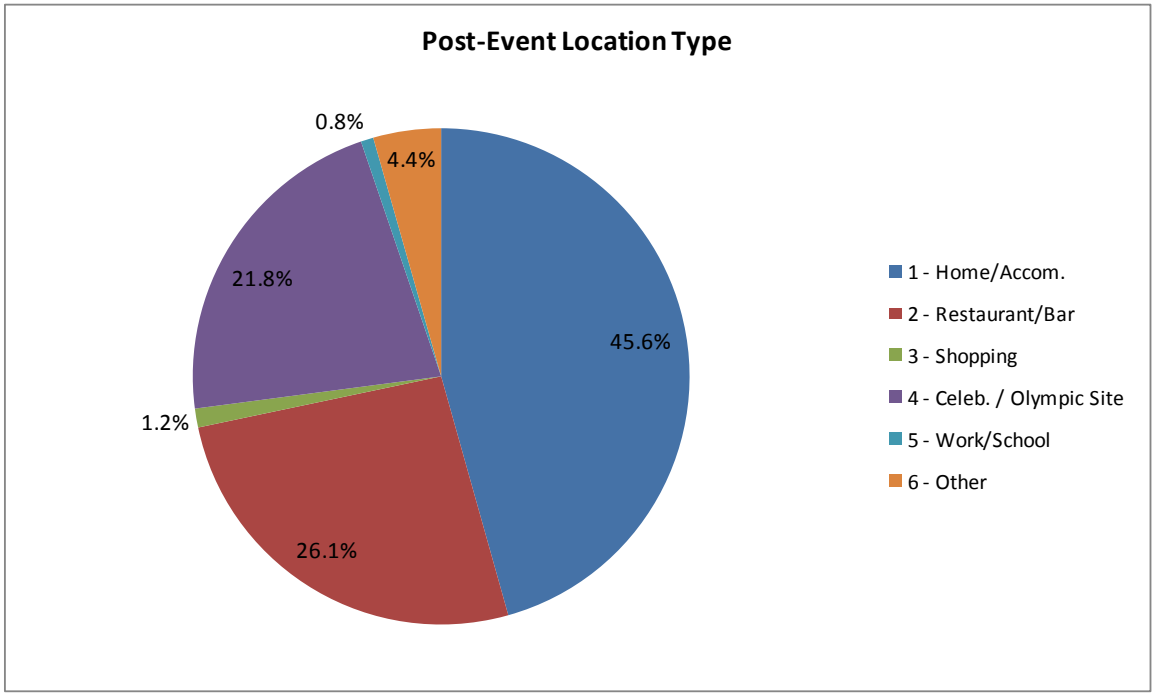

Figure 27. Breakdown of Post-Event Destination Locations

The Technical Appendices report provides further details of Event Venue Intercept Survey results.

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4. DISCUSSION

The Host City Olympic Transportation Plan Downtown Monitoring Study identified a number of significant findings in the changes of travel patterns during the 2010 Winter Games. Key findings and an evaluation of the Host City Olympic Transportation Plan are discussed, as well as implications for transportation planning and policy and possible new strategies that could be adopted in light of the findings.

4.1 KEY FINDINGS

4.1.1 "OLYMPIC RECORDS" SET

The results of the monitoring study found the travel behaviour during 2010 Winter Games set a new "record" for travel into and out of the Downtown CBD area. Although the total 2-way crossing of the Downtown cordon increased to an unprecedented 1.17 million trips during the Olympic Games, compared to nominal volumes of 813,000 trips, essentially the **net increase of over 350,000 trips was made in sustainable modes** comprising of transit, walk and bike trips. Overall the **total increase of person-trips across the Downtown cordon was 43.5%** during the Games compared to pre-Games conditions.

An increase of 88% transit ridership resulted in a change of transit mode share from an initially high 38.2% to a **record-setting 50%** over the typical 24hr weekday period during the Games.

Although comprising of just over 10% of total mode shares, **walking trips grew by a remarkable 288%, almost quadrupling** the total walking trips of 30,300 pre-Games to 117,600 during the Games[19].

The growth in sustainable modes came at the expense of auto and vehicle drivers, which saw a decrease of almost **16%** from 367,000 trips pre-Games to 309,000 during the Games. Overall, the **driver mode share reduced significantly from 45.1% pre-Games to 26.5% during the Games**.

4.1.2 TRAVEL TO AND FROM THE GAMES MOSTLY BY SUSTAINABLE MODES

Travel patterns by attendees to surveyed Olympic venue events were even more sustainable than that observed by the Screenline Survey, further suggesting the significant impact the Games had on the travel choice changes across the Downtown cordon. Overall, **the majority of travel in the Downtown CBD during the Games were taken in sustainable modes** (transit, walk, bike). Almost 2/3 or 61% of all trips were taken

[19] See footnote 6.

on sustainable modes, of which the majority were on transit. The remaining 38.9% were made in non-transit vehicles, of which 1/3 were passenger trips.

4.2 EVALUATION OF OLYMPIC TRANSPORTATION PLAN OBJECTIVES

Evaluating the transportation targets set by the City of Vancouver's Host City Olympic Transportation Plan[20] in light of the monitoring study findings proves to result in a range of successes.

4.2.1 CITY OF VANCOUVER HOST CITY OLYMPIC TRANSPORTATION PLAN TARGETS

The plan estimated that at least a 30% increase in travel demand would occur during the 2010 Winter Games, or a total of almost 1.06 million trips, if compared to pre-Games total of 813,000 trips. The plan identified the key to the success of the plan would be a reduction of vehicle trips by 30%. With approximately 462,600 or 57% of all trips crossing the Downtown cordon pre-Games in a non-transit motorized vehicle this would have been a reduction of approximately 138,800 vehicle trips. This would have also translated to a need for more than a doubling of trips (+109% increase) taken in sustainable modes from a pre-Games total of 350,400 to approximately 733,100. Therefore, an "indirect target" could be considered as a 100% increase of trips using sustainable modes.

4.2.2 TARGETS ACHIEVED INDIRECTLY

Therefore, how well did the Transportation Plan fare in light of the Host City Downtown Monitoring Study findings? Firstly, the estimated minimum 30% increase in travel demand was actually observed to be a 43.5% increase in demand. Secondly, auto and vehicle driver trips reduced by almost 16%. This is slightly more than half of the 30% reduction of vehicle traffic target during the Games. However, due to the significantly higher than estimated demand of travel across the Downtown cordon, the increase of trips by sustainable mode actually increased by just over 103%, effectively meeting the "indirect target" of doubling the number of trips on sustainable modes. Furthermore, with an average reduction of 31% of traffic in the inbound peak-period between 7AM and 9PM, and a similar average reduction of 28% in the outbound peak-period of 4PM and 6PM, the target of a reduction of 30% of traffic was met during the most congested time of the day.

The fact that the absolute number of vehicle volumes reduce at all during the Games is a significant achievement, let alone a drop of 16% over an entire average weekday.

[20] Host City Olympic Transportation Plan: Downtown Vancouver Roads and Transport for the 2010 Winter Games, City of Vancouver, Olympic Transportation Brach, Sept 2009 (2nd ed. Jan 2010)

Greater still, is the effective doubling of trips taken by sustainable modes—a significant achievement in itself.

4.2.3 PEDESTRIAN GOALS ACHIEVED

A goal of increased pedestrian activity was set by the Transportation Plan. With an observed increase up to 288%[21] of pedestrian volumes crossing the Downtown cordon, this goal can be concluded as being successfully achieved.

Supporting this finding, a separate external study[22] conducted by Simon Fraser University in the central CBD area before and during the Games revealed that there was a significant reduction of vehicular volume (-37%) travelling through the intersection of Bute St. and Robson St., with a corresponding increase in pedestrian volumes by 55%. This results of this study concludes that the pedestrian corridor established during the Games seemed to have made an impact in increased pedestrian traffic in central CBD. However, significant increases in other parts of the downtown area also show increases in pedestrian volumes with negligible changes to vehicular traffic[23].

4.2.4 CYCLING GOALS SLIGHTLY ACHIEVED

The Transportation Plan called for the increase in bicycle parking services and facilities for spectators or workforce at venues. This may have resulted in the up to 22% increase in the volume of bicycles crossing the Downtown cordon (as high as 11,900 trips from 9,800 pre-Games)[24]. However, this was not as significant as the changes in other modes and the cycling mode share dropped by 0.2 percentage-points from 1.2% pre-Games to 1.0% during the Games. Overall, the assessment is a success as a net increase in cycling volumes was observed given the Winter season the Games were conducted in.

4.2.5 SPECTATOR TRAVEL MODE GOALS ACHIEVED

As identified in Section 3, the travel mode choices made by the majority of Olympic venue event spectators were by sustainable modes, at higher rates than that of all people crossing the Downtown cordon. The success of the inclusion of transit fares in event ticketing may have proved to be a significant contributor to this achievement. However, even non-ticketed LiveCity events had equally high rates of sustainable mode shares, with Yaletown LiveCity events averaging 84% sustainable mode shares.

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[21] Refer to footnote 6.

[22] Vancouver 2010 Sustainability in Action for Seniors Research Study: Traffic Monitoring Study, Executive Summary, W. Wontah & C. Lim, March 2010

[23] Davie & Broughton observations resulted in a -4% decrease in vehicular volume and a 31% increase in pedestrian volumes.

[24] Refer to footnote 7.

4.2.6 TAXI DEMANDS INCREASED

The understanding that an increase in taxi and limousine services would be required was correct as the taxi/limousine vehicular volumes crossing the Downtown cordon had increased by 25% during the Games, from approximately 20,200 vehicle trips pre-Games, to 25,200 vehicle trips. Therefore the designation of taxi and limousine zones near venue entrances were likely successful initiatives.

4.2.7 GOODS MOVEMENT MORE EFFICIENT DURING GAMES

The efficient movement of goods and deliveries were deemed an integral part of the overall success of the 2010 Winter Games. Therefore, initiatives were put in place to encourage deliveries and truck movements to be made during off-peak periods, specifically between 12 midnight to 6am.

The results of the monitoring study suggest that the movement of light and heavy trucks not only reduced by 37.5%, from 6,700 trips pre-Games to 4,200 trips during the Games, but the majority of the decreases occurred during the peak truck period of mid-day. Table 34 highlights the changes in truck volumes during the 12 midnight to 6am period before and during the Games, showing a marked increase in volumes during the early morning period in spite of the overall 37.5% decrease in truck volumes over the 24 hour period.

Table 34. Change in Truck Volumes in the 12Am-6AM Period Before and During the Games

	12am-6am Truck Volumes		
Direction	**Pre-Games**	**2010 Winter Games**	**% Change**
In Bound	161	241	**49.7%**
Out Bound	108	273	**152.8%**
Total	**269**	**514**	**91.1%**

Figures 28 and 29 graphically show the reduction and shifting of truck volumes throughout a typical weekday during and pre-Games by direction of travel.

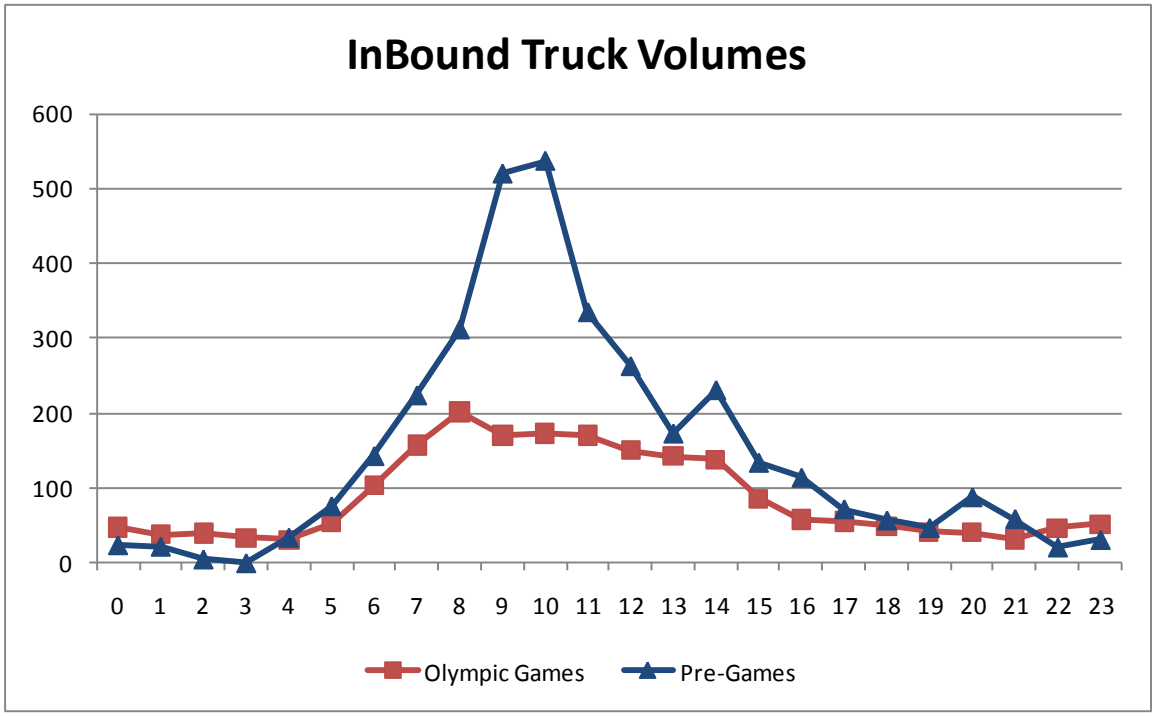

Figure 28. Change in InBound Truck Volumes Before and During the Games

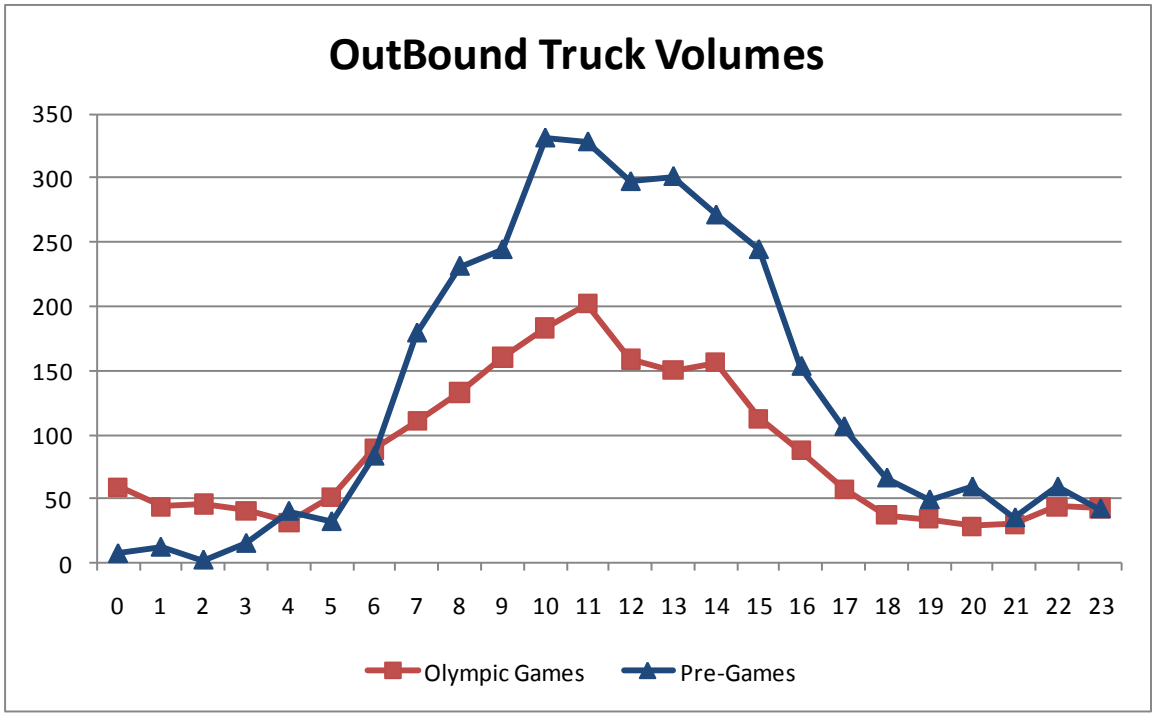

Figure 29. Change in OutBound Truck Volumes Before and During the Games

4.3 IMPLICATIONS FOR TRANSPORTATION PLANNING & POLICY

The monitoring of travel demands during the 2010 Winter Games provided an important contribution to the accountability of how the transportation planning for the Games was made, an evaluation of the achievement of targets and goals, and the resulting effectiveness of the initiatives. The resulting sustainable transportation behaviour during the Games will be part of a legacy of 2010 Olympic Winter Games, with this study providing an objective documentation of best-practices in the organization of transportation for future Olympic Games.

However, this monitoring study also provided an opportunity to measure the performance of the Host City's ability to extend and expand its policies during such an extraordinary event. In documenting the results and impacts of the Downtown Transportation Plan during the Games, the recording of a new benchmark in the region's ability to travel sustainably was observed.

Furthermore, the resulting details of the monitoring database allow for researchers and transportation professionals to investigate the nuances and patterns of the observed travel demand patterns relative to the transport supply provided during the games. From this repository, future mega-events can be more successfully planned.

Finally, the successes and lessons learned from the experience of the 2010 Winter Games will have a lasting legacy of positive accomplishment and greater understanding of travel behaviour and choice that can prove beneficial to the progressive establishment of transportation policies and plans.

4.4 PROPOSED STRATEGIES

So, where do we go from here? The 2010 Winter Games transportation legacy is more than just infrastructure or accomplishments. It is also a proof that sustainable travel by massive numbers of people can be achievable.

Based on the results of the monitoring study, the following are strategies and concepts of initiatives[25] that could be implemented, given now that there is proof that the majority of the people in the Lower Mainland can successfully travel in high-intensities of sustainable modes.

[25] These initiatives are examples identified to highlight applications of the findings of the survey. They are based on authors' professional experiences and personal observations during survey conduct,

4.4.1 LEVERAGE MAJOR EVENTS AND CELEBRATIONS TO ENCOURAGE SUSTAINABLE TRAVEL

The 2010 Olympic Winter Games proved that it is possible to leverage major events and celebrations to support and encourage sustainable transportation behaviour. The question is if it is possible to sustain this type of travel for the long-term, creating a lasting impact.

From the results of the Host City Downtown Monitoring Study, it could be deduced that the mixture of sustainable transportation initiatives and promotions, in combination with major "celebration" events, seem to be the "right formula" as a means to successfully encourage large numbers of people to continue to use or "try out for the first time" sustainable modes of travel. Associating positive "feel-good" events with the promotion of sustainable transportation may lead to a "rubbing-off" of the positive feelings from the events onto the perception and experience of sustainable transportation modes.

Positive experiences en-mass can affect people in a way that inspires them to be more cooperative, desiring to take part in a shared united celebration. For example, many people do not like standing for long periods of time, whether on transit or at a line-up. Yet, they may gladly stand for hours at a party. This suggests that possibly extending the celebration onto the transportation system essentially makes transportation part of the celebration, and therefore a positive experience. In essence, the celebration does not have to start at the venue, but can start on the way to the venue, and continue on the way back from the venue.

Therefore, a transportation demand management (TDM) initiative such as a "continue the party on the train/bus/walk/bike/carpool" campaign could be an effective yet subtle way to create positive experiences with sustainable transportation. Although most events are not as momentous as the 2010 Winter Games, examples of events that could be used to "continue the celebration back home" are Canada Day celebrations, and major sporting events such as the Grey Cup and Stanley Cup Finals.

4.4.2 THE "OLYMPIC ROAD DIET"

As elite athletes must consider carefully their diet, maintaining appropriate levels of proper food (supply) with their physical needs (demand), so too should the provision and management of transportation supply. The best performing system is not always one that is given the greatest supply, but one that utilizes just the required supply to support healthy demands. Such systems are cost effective, efficient, and sustainable. Likewise, transportation systems can be managed in such a way that leads to more "healthier" travel demands. The results of the 2010 Winter Games have shown that the local residents and visitors travelling into the downtown core can significantly change their travel behaviour to reduce the demand for unsustainable modes of travel and need for increased road space in the midst of significant increases in person-trips.

The Games proved that people travelling to and from the Downtown core can "do more with less". The efficient travel behaviours observed during the Winter Games across the Main Street Screenline—which had the highest transit, walking, and cycling mode shares, even in the midst of the unprecedented closure of the Dunsmuir and Georgia Viaducts--indicate that it is possible to reduce road capacity into the Downtown area. Much of this may have been made possible in part by the significant increase in transit capacity in the past decade, as well as the increase of the walking and bicycle friendly network in the CBD. However, a larger factor may be due to the accommodating nature of people. The term "traffic flow" implies behaviour similar to fluids, being able to divert and re-route, as well as change "phase", or, in this case change mode. So similarly, over time traffic flows adjust to new realities.

To this extent, an initiative comprising of a "graduated" closure of the viaducts could be made, or more specifically, the conversion of capacity from automobile capacity to sustainable mode capacity such as walking, cycling, and transit. The pilot conversion of one lane into a bike lane is a good example of such an initiative, allowing for traffic to adjust over time with the changes.

Initially, there may be opposition from motorists and local businesses regarding such initiatives. However, it has been shown that the travel behaviour of people and traffic adjust fairly quickly. Successful conversion and revitalization projects have occurred around the world, with examples ranging from the introduction of surface LRT lines in Leon, France, to South Korea where the Cheonggye Freeway was demolished to restore the original Cheonggyecheon River in the heart of downtown Seoul. What was considered a recipe for massive gridlock by the opposition turned out to be a celebrated attraction and urban park. The forewarned gridlock never materialised. Instead, traffic entering downtown Seoul decreased by 2.3%, with an increase in subway and bus ridership by 4.3% and 1.4%, respectively[26].

Such a concept may be considered infeasible and even costly with the possible demolition of the viaducts. However, as parts of the elevated Cheonggye freeway were left as a reminder of the corridor's history, the viaducts could be instead left intact and the super-structure used as the structural backbone of a re-development in the False Creek North / Chinatown area, where buildings could be built underneath the viaducts to house shops, restaurants, and businesses, with earth berms connecting the viaducts to allow for vertical and perpendicular access between the area and parallel overpasses. The lanes of the viaducts could be converted to bicycle and pedestrian lanes, with a tram line that could connect Commercial Drive to Denman Street through the viaducts.

[26] http://english.sisul.or.kr/grobal/cheonggye/eng/WebContent/index.html

Prior to the 2010 Winter Games, such an idea may not have been possible. However, with the precedent of "record" sustainable travel set by the Games, "radical" urban renewal and road capacity ideas may be more practicable than previously considered. Nevertheless, further research as to the potential designs and their impacts would be required.

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5. CONCLUSION

5.1 RESULTS AND FINDINGS

The City of Vancouver, in partnership with TransLink, VANOC, and Transport Canada, appointed the Civil Engineering Department of the University of British Columbia (UBC) to conduct the monitoring of transportation through the Vancouver Downtown peninsula during the 2010 Olympic Winter Games. UBC was well poised to take on this challenge given the expertise and experience available within the Civil Engineering Department, as well as access to the 84 engineering graduate and undergraduate student supervisors and surveyors hired to fulfill the relatively large study scope within the effective two-week window of the Games. The data comprised of 3 samples of 24hr and partial-day screenline counts of all travel entering or leaving the downtown area by all modes. Additionally, intercept surveys captured the travel behaviour and choices of spectators and participants of Downtown Olympic-related events.

The data was collected in a high-quality manner both in design and conduct, and this continued through to the cleaning, processing, imputation, and summary of the resulting data. The results of the Host City Downtown Monitoring Study will be part of the legacy of the 2010 Olympic Winter Games.

KEY FINDINGS

The key findings[27] from the Host City Olympic Transportation Plan Downtown Monitoring Study were:

- Approximately **1.17 million trips** crossed into or out of the Downtown peninsula on an average 2010 Winter Games weekday -- **43.5% higher than the pre-Games weekday average of 813,000 person-trips**.

- Overall, the majority of person-trips in the Downtown CBD during the 2010 Winter Games were taken in sustainable modes (transit, walk, bike). **Almost 2/3 or 61% of all trips were taken on sustainable modes**, of which the **majority were on transit** (50% of the 61% share).

- Overall, the absolute number of **vehicle driver trips dropped by 58,000 trips (16% decrease) and combined vehicle driver and passenger trips dropped by 8,700**

[27] Key findings are for an average 2010 Winter Games weekday in comparison to an average pre-games weekday in November 2009. The results are represented as total number of trips, only crossing into and out of the Downtown core.

trips (2% decrease), whereas **sustainable mode trips doubled from 350,000 trips pre-Games to 713,100 trips** during-Games.

- **Total walk trips to and from the Downtown core increased up to 288%**[28] from just over 30,300 trips before the Games, to almost 117,600 trips during the Games. Approximately **85% of all walking trips were made across the Main Street Screenline**. . A possibility of the high increase in walk trips may have been due to transit services at capacity at times and locations near Downtown.

- Based on the findings, the targets and goals of the Host City Olympic Transportation Plan were evaluated **and indications point towards all targets and goals being achieved**. Specifically:

    - Trips on sustainable modes more than doubled.
    - Pedestrian travel goals were overwhelmingly met.
    - Cycling volumes were higher than normal.[29]
    - Spectator travel to event venues were observed as the most sustainable ever recorded, at an 79.5% sustainable mode share.
    - Taxi trips were up by 25%.
    - Truck volumes reduced by 37.5%, mostly within the mid-day peak period, while early morning volumes increased, indicating a positive response to the encouragement of businesses rescheduling their deliveries between 12AM and 6AM.

In summary, the results of the monitoring study **suggest the provision and uptake of transportation during the 2010 Winter Games was successful and a new "Olympic record" of a 24-hour 61% sustainable mode share into/out of the Downtown core was observed**. The Host City Downtown Monitoring Study documents the observed sustainable transportation behaviour during the 2010 Olympic Winter Games as a lasting legacy. The study is also an objective documentation that local residents and visitors can adjust to travel in a much more sustainable manner than normal.

5.2 CHALLENGES AND LESSONS LEARNED

The project was not without challenges given the seasonal period and condensed timeframe from which to design, conduct, and assemble the data, as well as the complexity in processing, imputing and summarizing the resulting rich dataset. A number of lessons learned resulted from the study, which are identified to be considered for future recommendation:

[28] See footnote 6.

[29] See footnote 7.

- If possible, the collection of full 24hr data rather than partial datasets would provide a more robust dataset, as well as reducing the need to impute the data to obtain effective 24hr data. Actual vs. imputed data is always best for reliability, simplicity, and accuracy. At the very least counts should not be broken up throughout the day (e.g. 9 hour period of 600-900, 1100-1300, & 1500-1900), but collected in a single contiguous period (e.g. 16 hour period of 600-2200).

- Survey of this nature should be planned and commissioned well in advance, with at least a 6-8 month lead-time prior to survey conduct. A larger lead time will also allow for City and other agency staff to provide the necessary data, information, and support, as well as allow for the preparation of the data processing phase.

- The value of collecting the Games-time data was important, however the collection of the pre-Games data further increased this value by allowing for a "before-and-after" study to not only allow for the evaluation of the Host City Olympic Transportation Plan, but to provide insight into the dynamics of travel behaviour due to mega-events.

5.3 RECOMMENDATIONS

The following recommendations, for the City and its transportation partners in the Metro Vancouver region, suggest means to leverage the investment and legacy of 2010 Olympic Winter Games:

1. Continue monitoring the transportation system such that sound decisions can be based on empirical evidence and sound analyses, including the research of methodology refinements to reduce data collection uncertainties;
2. Utilize the rich database resulting from the Host City Downtown Monitoring Study to further investigate, examine, and test new and innovative initiatives and ideas to encourage and maintain sustainable travel, not just for the Downtown CBD, but with a focus to develop solutions that are portable to other parts of the City and Region;
3. Pursue the development of new Transportation Demand Management (TDM) measures that take advantage of the unique characteristics and opportunities of mega-events and large celebrations;
4. Further investigate the alteration of the Dunsmuir and Georgia Viaducts to revitalize the North False Creek land in a way that can also encourage and support sustainable travel and more overall person trips into and out of the Downtown core.