



ADMINISTRATIVE REPORT

Report Date: May 7, 2012
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Meeting Date: May 16, 2012

TO: Standing Committee on Planning, Transportation and Environment
FROM: General Manager of Engineering Services
SUBJECT: Pedestrian Safety Study & Action Plan

RECOMMENDATION

THAT Council receive for information the consultant's report on pedestrian safety, as attached in Appendix A.

REPORT SUMMARY

One of the priority actions in the *Greenest City 2020 Action Plan* is to 'develop and implement a Pedestrian Safety Study & Action Plan.' Making walking feel safe for all ages and abilities is a key strategy towards encouraging more people to walk, and will help to achieve the Green Transportation goal of having the majority of trips be by walking, cycling and transit by 2020.

Vancouver's Pedestrian Safety Study and Action Plan (herein referred to as "the study") was completed in March 2012 and is included in Appendix A. It examined where, when and how vehicle collisions involving pedestrians were occurring, who they involved, and actions that could be undertaken to improve pedestrian safety. The study also included a comparison to other cities and a review of engineering, education and enforcement measures.

Overall, the study found that pedestrian safety in Vancouver has generally been improving and that Vancouver performs well compared to peer cities. However, pedestrians are still vulnerable. While pedestrians are involved in less than 2 percent of all traffic accidents, pedestrians account for 45 percent of all traffic fatalities in Vancouver. Of particular note, 75 percent of collisions involving pedestrians occurred at intersections, largely occurring when vehicles turned left or right. Collisions were also more frequent between 3 and 8 pm, and during hours of darkness in the winter months.

Historically, the City has focused on the infrastructure and enforcement components of pedestrian safety. To complement these efforts, a greater emphasis must now be placed on education to encourage courteous and lawful road user behaviour. Building upon the experience gained from the City of Vancouver-led *People are Fragile* campaign that was launched in February 2012, it is recommended that the City continue to collaborate with ICBC, VPD, Coastal Health, BCAA and other organizations on targeted road safety awareness campaigns that aim to change road user behaviour, particularly around intersections. Details on the *People are Fragile* campaign are included in Appendix B. Such partnerships enable agencies to cross jurisdictional boundaries and to pool their networks, resources and expertise, thereby achieving a greater impact.

With regards to educating youth, both the City and the VPD work with the Vancouver School Board (VSB) on a number of initiatives related to road, cycling and pedestrian safety. Vancouver Fire and Rescue Services (VF&RS) has also identified an opportunity to incorporate pedestrian safety into their Fire Safety House Program that reaches all Grade 3 students each year. It is recommended that the City continue these efforts to teach courteous and lawful road behaviour from an early age, and seek additional avenues to reach secondary and post-secondary students.

Education is an ongoing process and the importance of road safety must be reiterated on a regular basis. Efforts in 2012 to change road behaviour will be funded through existing budgets, and future efforts will be incorporated into the annual budgeting process.

Enforcement also forms a key component of improving pedestrian safety and of supporting education efforts. The VPD has incorporated pedestrian safety into their Strategic Plan for 2012-2016, emphasizing enforcement during peak hours and at high pedestrian collision locations, as well as outreach to diverse communities. Similar to education, enforcement is an ongoing process and requires sustained efforts to affect change.

In terms of engineering, the study found that current infrastructure strategies used in Vancouver, such as countdown timers, pedestrian signals, corner bulges and raised crosswalks, are effective at improving pedestrian safety. The study recommended that these efforts continue, and that enhanced lighting and other engineering treatments be considered to address intersections with high numbers of collisions in hours of darkness and from turning vehicles.

Moving forward, the VPD and the City will be able to use the results of the study to prioritize efforts, focusing on the areas with the greatest concerns to achieve the greatest returns. The findings will also inform the Transportation 2040 Plan. Through the strengthened relationship as a result of this study, the City will continue to work closely with ICBC on safety initiatives.

Ultimately, it is anticipated that sustained efforts to improve pedestrian safety and to create a culture of courteous and considerate road behaviour will help to reduce the number of pedestrian injuries and fatalities and enhance Vancouver's reputation as a walkable city.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

In February 2010, Council adopted the long-term goals recommended in the Greenest City Action Team's report entitled *Vancouver 2020: A Bright Green Future*. The goal for Green Mobility was to make walking, cycling and public transit preferred transportation options, with a target of having the majority of trips (over 50%) be by foot, bicycle or public transit by 2020.

In July 2011, Council approved the *Greenest City 2020 Action Plan*. One of the highest priority actions for 2011-2014 under Green Transportation was to 'develop and implement a Pedestrian Safety Study & Action Plan,' and one of the key strategies for achieving the 2020 goals was to 'make active transportation choices such as walking and cycling feel safe, convenient, comfortable and fun for all ages and abilities.'

In response to a November 2010 Council motion, Engineering Services also reported to Council in July 2011 on immediate actions that were undertaken to improve pedestrian safety and accessibility. Council approved the 2011 City of Vancouver Road Safety Awareness Program (*People are Fragile* campaign), and the Pedestrian Safety Study and Action Plan was identified as a medium to long term action.

CHIEF CONSTABLE'S COMMENTS

The Vancouver Police Department is supportive of the Pedestrian Safety Study and Action Plan and is committed to being part of the solution in addressing road safety. The VPD will coordinate enforcement and education action with the City whenever appropriate, and when resources allow.

Enhancing road safety throughout the City of Vancouver remains as one of the top goals in the VPD's Strategic Plan for 2012-2016. The goal to reduce motor vehicle collisions that result in injury or death by 12.5% over the next five years can be achieved. This will be accomplished in part through the targeted enforcement of high-crash intersections and corridors as well as the targeting of high-risk behaviour of drivers; namely distracted driving, speeding and the impaired operation of vehicles.

In 2012, the VPD's Traffic Section is focusing its attention to the high-crash locations throughout Vancouver. By using data received from ICBC on a quarterly basis, strategic enforcement is directed to the worst intersections that have the highest number of collisions causing injury. Most of these intersections are historically known as high-collision zones; however, with the combined efforts of the City of Vancouver Engineering Services, ICBC and the media, it is hoped there will be a reduction in the incidence of serious collisions.

This past March, the Traffic Section launched a Pedestrian Safety Enforcement Campaign in co-operation with the Ministry of Justice, Police Services Division. The three-week long campaign had 265 officer hours dedicated to high-crash intersections and corridors and was a success that saw a total of 628 Violation Tickets issued over the three-week period. Police had contact with a total of 423 pedestrians and 169 information pamphlets were distributed. Of the 628 Violation Tickets served, 116 were to pedestrians, 86 were to cyclists and 426 were to drivers. This campaign was launched on the heels of the City of Vancouver's *People are Fragile* campaign that began in February 2012.

Enforcement and education are both important to pedestrian safety. The VPD continues to work with the City Engineering Services and ICBC to develop and deliver new forms of education designed to keep pedestrians safer. One of these initiatives is the creation of an information placard that can be mounted on any street lamp or post. This placard depicts the images of the three pedestrian signals, "walk", "flashing hand" and the "hand" with short captions that provide information as to what these signals mean. The VPD had direct input into the development and creation of this placard.

The VPD is utilizing community based programs, such as Speed Watch, to enhance road safety and awareness. As well, officers are using the ALPR (Automated Licence Plate Reader) vehicle to strategically identify and apprehend prohibited and disqualified or non-licensed drivers.

The VPD is committed to a high level of service to the community in reducing injuries to pedestrians.

ICBC'S COMMENTS - DIRECTOR OF ROAD SAFETY

"Since 1992, ICBC has partnered with the City on a vast number of traffic safety infrastructure investments that have helped reduce pedestrian and overall crashes in Vancouver. These include pedestrian signals, intersection corner bulges and pedestrian countdown timers. ICBC works with the City of Vancouver and Vancouver Police Department on awareness programs to make our roads safer for all types of road users. Everyone can do their part by making smart decisions, whether we're driving, walking or cycling."

- Fiona Temple, ICBC Director of Road Safety

VANCOUVER COASTAL HEALTH COMMENTS

Pedestrian injuries due to vehicle collisions are a serious, and preventable, public health problem in Vancouver. We are very pleased the City continues to press forward with a comprehensive strategy to protect the most vulnerable street users from motor vehicle injuries. This detailed report creates a strong base for action. There are a variety of excellent engineering recommendations that show great promise for making streets safer. As well, the measures used in the report provide a baseline to monitor and evaluate the success of the strategy's implementation.

In the future, we hope to work even more closely with the City in supporting effective pedestrian safety interventions and helping document their success. Our common goal: a safer and even more walkable Vancouver.

REPORT

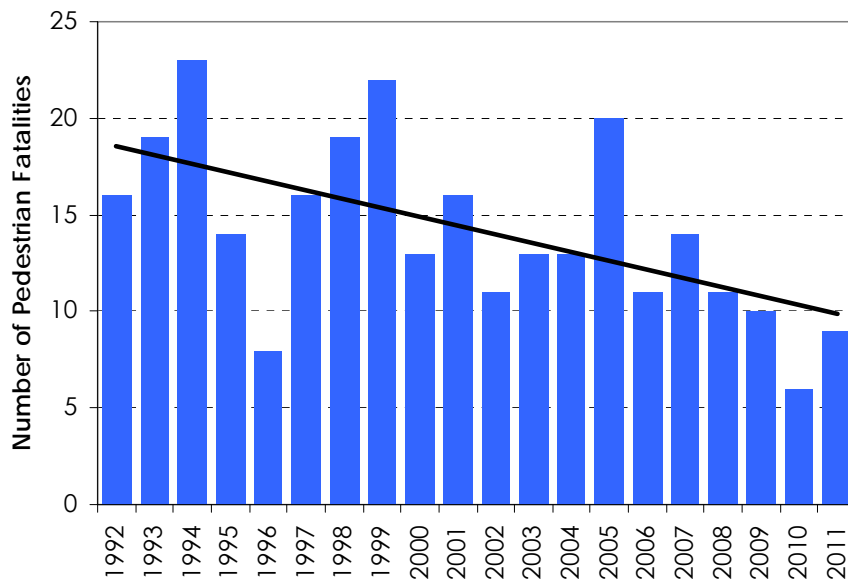
Background/Context

In July 2011, the City issued a request for proposals from consultants to undertake a Pedestrian Safety Study and Action Plan (herein referred to as “the study”). The study was to be modelled after *The New York City Pedestrian Safety Study & Action Plan* that was completed in 2010, which examined where, when and how pedestrian collisions were occurring, who they involved, and actions that could be undertaken to improve pedestrian safety.

Vancouver’s Pedestrian Safety Study and Action Plan was completed in March 2012 and is included in Appendix A. The study analysed pedestrian collision data provided by the Insurance Corporation of British Columbia (ICBC) and the Vancouver Police Department (VPD) for the years 2005 to 2010, and also included a comparison to other cities and a review of engineering, education and enforcement measures.

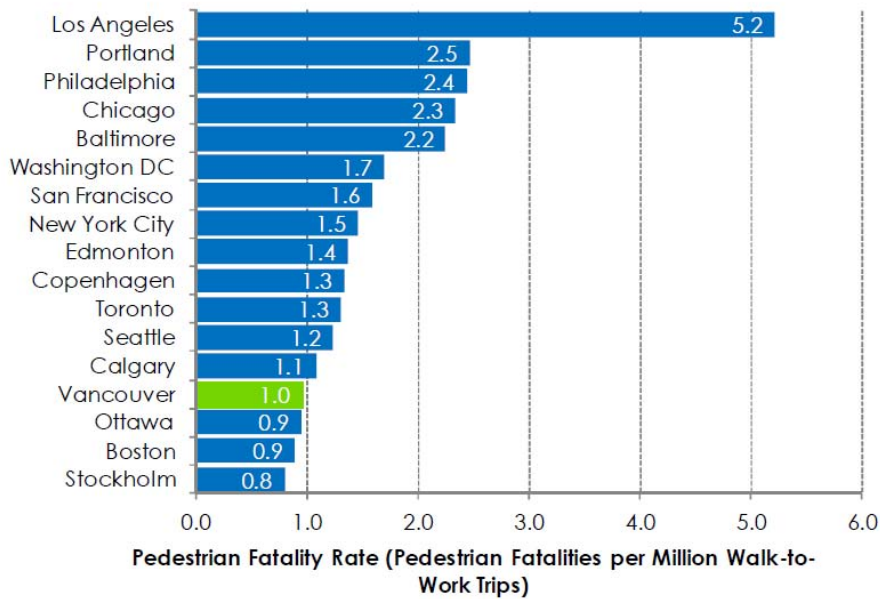
Overall, the study found that pedestrian safety in Vancouver has generally been improving and that Vancouver performs well compared to peer cities. As shown in Figure 1, the annual number of traffic fatalities involving pedestrians has generally been declining since 1992, even though the City’s population has increased by over 20 percent over the same period. Taking into consideration the number of people that walk to work, Figure 2 shows that Vancouver performs well compared to peer cities in North America and Europe, with only Ottawa, Boston and Stockholm having lower pedestrian fatality rates.

Figure 1. Pedestrian Fatalities per Year



Source: VPD

Figure 2. Pedestrian Fatalities: Vancouver Compared to Peer Cities

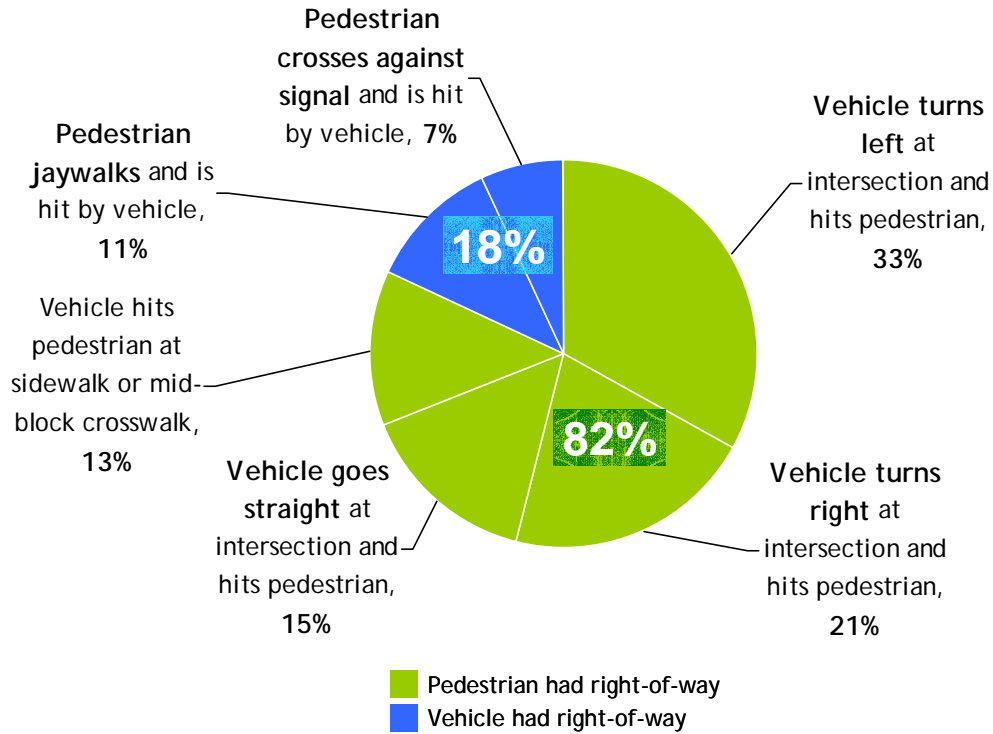


Sources: Statistics Canada, US Census Bureau, Statistics Sweden, StatBank Denmark, municipalities
 Walk-to-Work Trips = Employed Labour Force x Walk-To-Work Mode Share x 250 working days per year

In spite of these trends, pedestrians are still vulnerable. While pedestrians are involved in less than 2 percent of all traffic accidents, pedestrians account for 45 percent of all traffic fatalities in Vancouver. Taking into consideration injury severity, lost earnings, medical care, administration and impacts to others, the average societal cost of pedestrian collisions in Vancouver is approximately \$127 million per year. As such, education, enforcement and engineering efforts need to continue in order to improve pedestrian safety.

The analysis of pedestrian collision data highlighted intersections as a key area of focus, with 75 percent of pedestrian collisions occurring at intersections. As shown in Figure 3, the most common scenarios in which a pedestrian was struck involved vehicles turning left or right at intersections. Pedestrians jaywalking or crossing against the signal accounted for 18 percent of all collisions, emphasizing the need to focus more on the actions of the driver.

Figure 3. Pedestrian-Vehicle Interactions resulting in Collisions



Source: Vancouver’s Pedestrian Safety Study & Action Plan

The study also examined when pedestrian collisions occurred and who they involved. Pedestrian collisions most frequently occurred between 3 and 8 pm when there were higher levels of activity on the street. In the winter months, significantly more pedestrian collisions occurred during hours of darkness, likely due to shorter daylight hours and reduced visibility during adverse weather conditions. Young adults were more likely to be involved in pedestrian collisions resulting in injuries, and seniors were significantly more likely to sustain fatal injuries. Due to limitations with the data, factors such as speed, alcohol or cell phone use were not examined.

To effectively improve pedestrian safety, efforts must encompass the 3 E’s: education, enforcement and engineering.

Strategic Analysis

Historically, the City has focused on the engineering and enforcement components of pedestrian safety. To complement these efforts, a greater emphasis must now be placed on education to encourage courteous and lawful road user behaviour. The VPD reports that its members witness, on a regular basis, unsafe behaviour by all road users that put themselves and others at risk, and is in full support of further public education on road safety awareness. The City has started to enter this realm with the six-week *People are Fragile* campaign that was launched in partnership with ICBC and the VPD in February 2012. Details of the campaign are included in Appendix B.

The purpose of the awareness campaign was to emphasize that all road users are responsible for safety on the streets, and that practicing courtesy and adhering to traffic laws helps to prevent collisions, injuries and fatalities. Although the campaign was short, it raised public awareness of the importance of road safety, resulted in public feedback, and provided staff with valuable experience that can be used for future efforts.

Public feedback from the *People are Fragile* campaign was collected through social media, emails and an online survey. It included the following themes:

- Enforce and educate people on traffic laws
- Implement appropriate and realistic laws for road users
- Lower speed limits
- Conduct more road safety campaigns
- Focus on drivers
- Continue to install engineering measures to improve safety
- Provide better infrastructure to support active transportation
- Provide more incentives to use transit

Much of the public feedback is in alignment with the findings from the study.

Moving forward, it is recommended that the City continue to collaborate with ICBC, VPD and other organizations on road safety awareness campaigns that aim to change road user behaviour, particularly around intersections. The City has already been approached by the Community for Preventable Injuries as a potential partner, and other agencies such as Vancouver Coastal Health, TransLink, the RCMP and other municipalities may also be suitable partners.

Partnerships enable agencies to cross jurisdictional boundaries and to pool their networks, resources and expertise, thereby achieving a greater impact. It is recommended that the City play a supporting rather than a lead role in future campaigns, to leverage other agencies' experience and resources in the public safety education domain.

In addition to awareness campaigns, a number of efforts are underway with regards to educating youth on pedestrian safety. The City works with the Vancouver School Board (VSB) on the School Safe and Active Transportation Program to identify safe routes to school, and the VPD presents at school assemblies. Also, Vancouver Fire and Rescue Services (VF&RS) has identified an opportunity to reach all Grade 3 students each year by incorporating pedestrian safety into their Fire Safety House Program. It is recommended that the City continue these efforts to teach courteous and lawful road user behaviour at an early age, and seek additional avenues to reach secondary and post-secondary students.

Overall, education is an ongoing process and the importance of road safety must be reiterated on a regular basis. Efforts in 2012 to change road behaviour will be funded through existing budgets, and future efforts will be incorporated into the annual budgeting process.

Enforcement also forms a key component of improving pedestrian safety and of supporting education efforts. The VPD's Strategic Plan for 2012-2016 sets a goal to reduce motor vehicle collisions by 12.5 percent over the next five years and identifies actions that will help to improve pedestrian safety, including enforcement during peak hours and at high pedestrian collision locations, as well as increased outreach to diverse communities and the public as a whole. Similar to education, enforcement is an ongoing process and requires sustained efforts to affect change.

In terms of engineering measures, the study found that current treatments used in Vancouver, such as countdown timers, pedestrian signals, corner bulges and raised crosswalks, are effective at improving pedestrian safety and should continue to be implemented as part of existing programs. The study also suggested enhanced lighting at intersections with high night-time collisions, and other engineering measures to address collisions that occur as a result of left or right turning vehicles. Moving forward, the City will be able to use the results of the study to prioritize efforts, focusing on the areas with the greatest concerns to achieve the greatest returns. The findings will also inform the Transportation 2040 Plan.

Ultimately, efforts to improve pedestrian safety and to create a culture of courteous and lawful road user behaviour will be key to reducing the number of pedestrian injuries and fatalities and enhancing Vancouver's reputation as a walkable city.

Implications/Related Issues/Risk (if applicable)

Financial

The cost of the study was \$104,000, and the cost of the *People are Fragile* campaign was \$150,000.

From 2009 to 2011, the City spent approximately \$13.9 million per year on pedestrian and cycling-related infrastructure. For the 2012 to 2014 capital budget, the anticipated spend is approximately \$11.4 million per year.

For 2012, there are no recommendations to re-allocate additional funding towards education. For the 2013 and 2014 capital budgets, it is recommended that \$100,000 be allocated towards education and outreach during the annual budgeting process. Pedestrian safety will continue to be considered during the prioritization process for existing infrastructure programs.

Human Resources/Labour Relations

While no human resources issues are explicitly identified, enforcement is one of the key components of improving pedestrian safety.

Environmental

Improving the safety, convenience and comfort of the pedestrian environment is one of the key strategies aimed at encouraging more people to choose walking over other modes of transportation. This will help to achieve GCAP targets for Green Transportation, Clean Air and Lighter Footprint.

Other - Communications Strategy

Effective behaviour change campaigns require dedicated resources and sustained efforts in order to be meaningful. Corporate Communications will be involved in providing support towards targeted road safety awareness campaigns.

CONCLUSION

The consultant conducted an extensive analysis of pedestrian collision data in the development of Vancouver's Pedestrian Safety Study and Action Plan. A stronger emphasis on education is recommended, to build a courteous and considerate road environment. It is anticipated that improving pedestrian safety will help to achieve GCAP targets for Green Transportation, Clean Air and Lighter Footprint.

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pedestrian safety study

Summary Report





April 24, 2012

**CITY OF VANCOUVER
PEDESTRIAN SAFETY STUDY**

SUMMARY REPORT

Prepared by



In association with



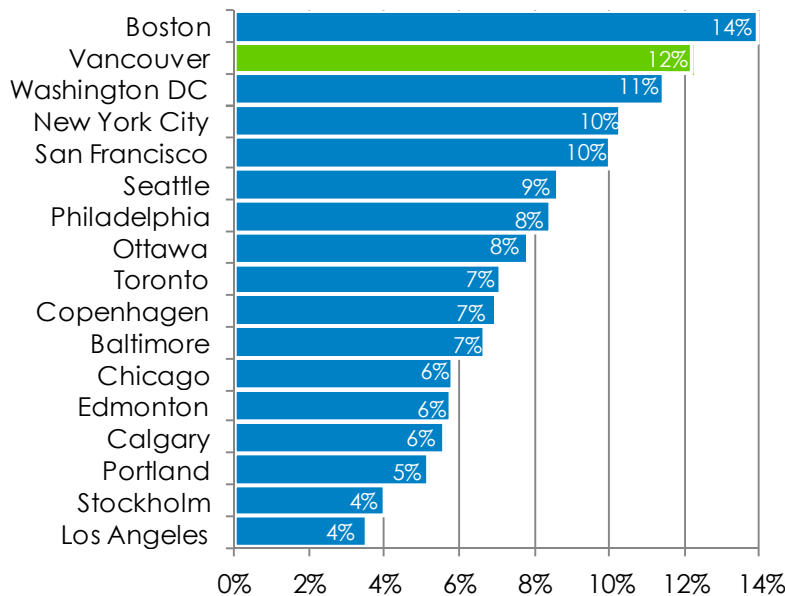
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University of British Columbia

USL File No. 1166.0010.01



Walking is the most fundamental form of transportation. Walking is part of every trip, whether that trip is made by car, transit, or bicycle. The City of Vancouver is committed toward making walking a safe, accessible and enjoyable experience for residents and visitors alike. Walking was identified as the top transportation priority in the City's 1997 Transportation Plan and subsequently in the 2002 Downtown Transportation Plan. In addition, the City's Greenest City Action Plan recognizes the role that walking can play in helping the City work to its goal of being the greenest city in the world by 2020, and sets a target that the majority of trips in the City of Vancouver (over 50%) will be made on foot, bicycle or public transit. Vancouver is renowned as a walkable city. In fact, walking currently accounts for over 12% of all trips to work made in the City of Vancouver – one of the highest walking mode shares among several Canadian and international 'peer cities', as shown in **Figure 1**.

Figure 1
Walking Mode Share of Work Trips in Canadian and International Peer Cities



Significant steps have been taken to improve pedestrian safety in recent years, including the installation of a number of engineering treatments such as intersection safety cameras, pedestrian countdown timers, speed reader boards, and corner bulges, among other things. The City also recently formed an Active Transportation Advisory Committee to advise on matters that encourage and enhance walking as a means of transportation, recreation and health.

The purpose of the Pedestrian Safety Study is to help the City gain a better understanding of the effectiveness of existing pedestrian safety treatments, and

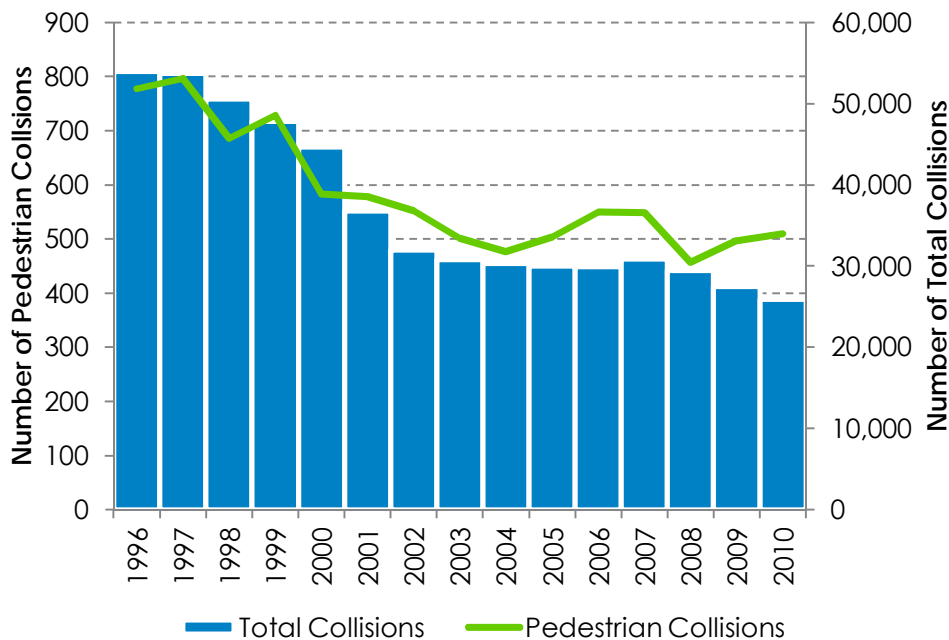
to help identify opportunities to improve pedestrian safety through engineering, enforcement and communication measures throughout the City.

This study involved an in-depth analysis of all reported collisions involving pedestrians in the City of Vancouver between 2005 and 2010. The analysis examined where collisions were occurring, when they took place, who was involved in the collisions, and how the collision occurred. The analysis was based on collision data provided by the Insurance Corporation of British Columbia (ICBC) and the Vancouver Police Department (VPD) as well as a variety of other datasets, including data regarding infrastructure, spatial, demographic, weather, and light conditions.

There were 3,066 reported collisions involving pedestrians between 2005 and 2010, equivalent to an average of 511 collisions involving pedestrians per year. In comparison, there was an average of 28,933 total reported traffic collisions over this period. As such, on average approximately 1.8% of all reported traffic collisions involved a pedestrian over this period.

Looking back beyond 2005, the number of overall traffic collisions as well as the number of pedestrian collisions have been steadily declining in the City of Vancouver, as shown in **Figure 2**.

Figure 2
Total number of collisions and pedestrian collisions (1996 – 2010)

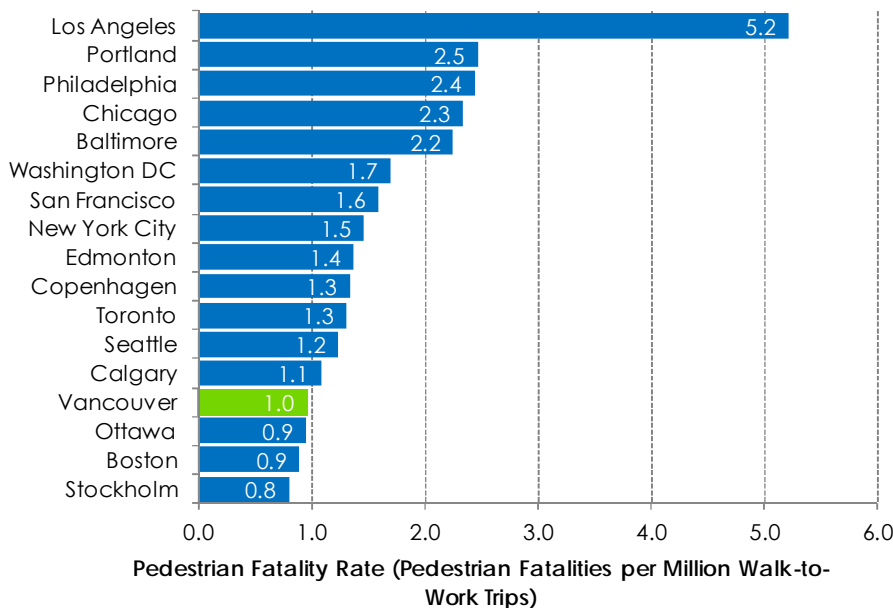


Based on ICBC data between 1996 and 2010, 2010 saw the fewest number of traffic collisions since 1996. This decrease in the number of collisions is notable, particularly because the City’s population increased significantly over this period. In fact, despite an increase in the City’s population of approximately 20% between 1996 and 2010, the total number of collisions in the City decreased by 52%, while the total number of collisions involving pedestrians declined by 34%. As a result, the annual pedestrian collision rate – defined as the number of pedestrian collisions per 100,000 residents – has been steadily declining since 1996.

Between 2005 and 2010, the City of Vancouver had an overall traffic fatality rate for all reported collisions of 3.3 fatalities per 100,000 residents. This is a relatively low fatality rate as compared to most other large communities in British Columbia, as well as other peer cities across North America and internationally.

When considering the number of pedestrian fatalities based on the overall number of walk to work trips, Vancouver has a pedestrian fatality rate of 1.0 pedestrian fatalities per million walk to work trips, which is relatively low compared to other peer cities, as shown in **Figure 3**.

Figure 3
Pedestrian Fatalities per Million Walk to Work Trips

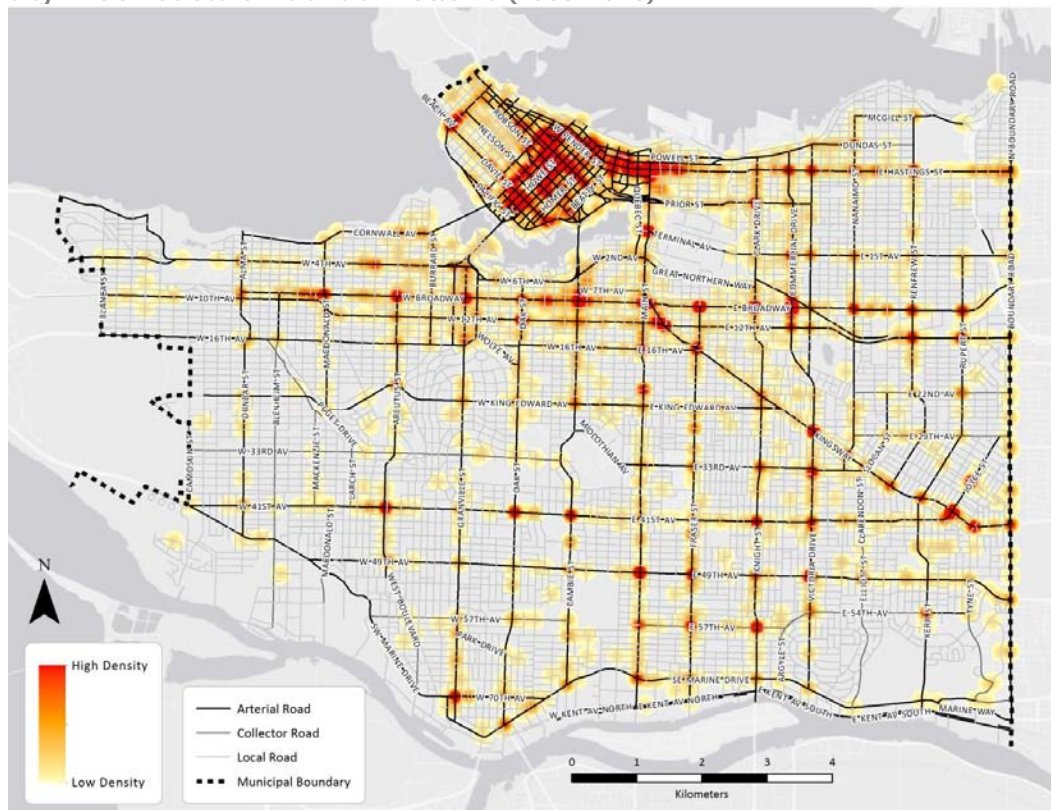


Traffic collisions are considered a global epidemic of staggering, but often overlooked consequences. A recent study by Transport Canada estimates that the annual cost of traffic collisions to the Canadian economy, including health care, environmental damage, lost productivity, and induced traffic congestion, is

\$CDN 62.7 billion – approximately 5% of the Canadian Gross Domestic Product (GDP). Although all road users are impacted by the cost of collisions, non-motorized and sustainable modes of travel such as walking and cycling suffer a higher level of risk because of their increased vulnerability. It is estimated that the average cost of a pedestrian collision in the City of Vancouver – including human consequences as well as other costs such as lost earnings, medical care, administration costs and other indirect costs – is approximately \$234,000. Based on the number of pedestrian collisions in the City of Vancouver between 2005 and 2010, the total cost of pedestrian collisions in the City of Vancouver over the five year period was in excess of \$760 million, or approximately \$127 million per year, although this has declined significantly since 2008 due to the decline in the number of pedestrian collisions since 2008.

Overall pedestrian collision patterns between 2005 and 2010 in the City of Vancouver are shown in **Figure 4**. The section below provides a brief summary of the key pedestrian safety issues that were identified based on the analysis of pedestrian collisions over the past six years in the City of Vancouver, including **WHEN** collisions took place, **WHO** was involved in the collisions, **WHERE** the collisions were occurring, and **HOW** the collision occurred

Figure 4
City-Wide Pedestrian Collision Patterns (2005-2010)

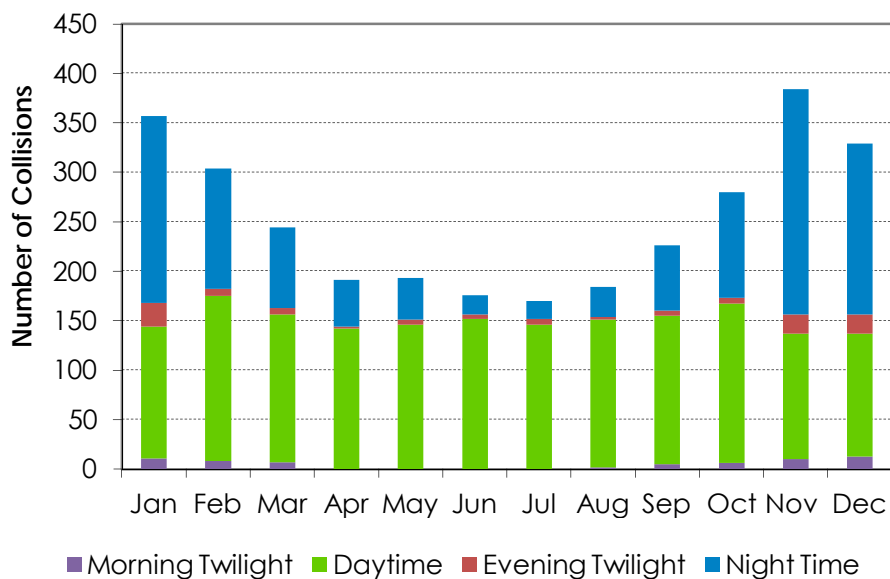


- **When**

- Nearly half of all pedestrian collisions occurred between November and February.
- Most of the increase in collisions in winter months can be attributed to the increase in nighttime collisions as a result of the shorter days and longer nights, as shown in **Figure 5**.

Figure 5

Total Pedestrian Collisions by Month and Light Conditions (2005 – 2010)

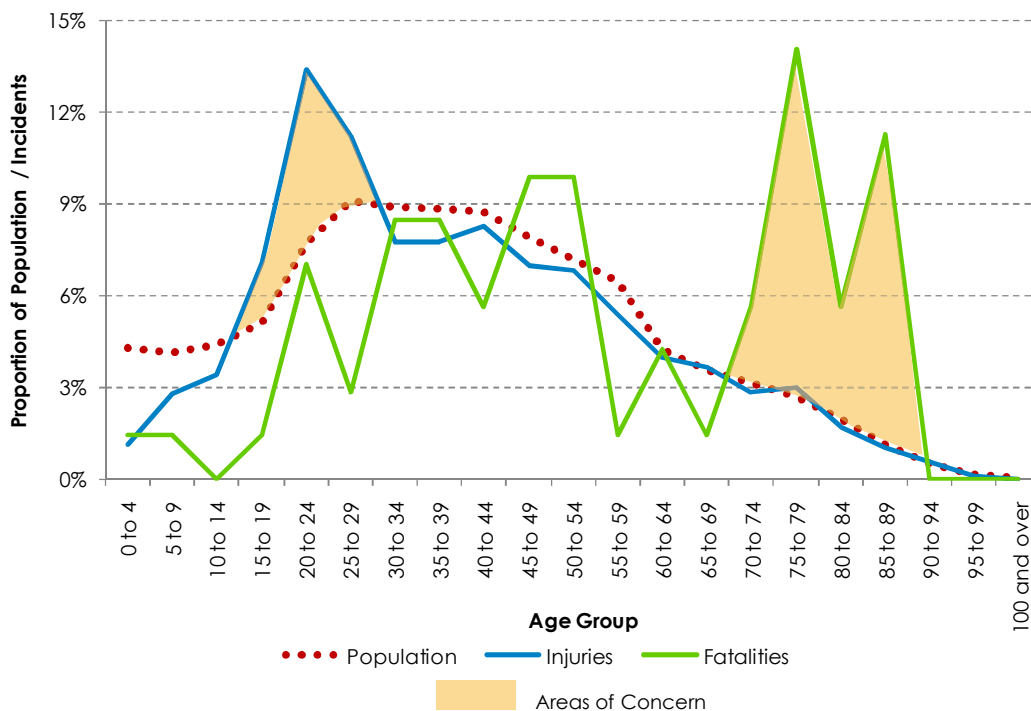


- January accounted for the highest proportion of pedestrian collisions resulting in fatalities.
- Pedestrian collisions were more likely to occur on weekdays.
- The highest proportion of pedestrian collisions occurred during the PM peak period (3:00 – 6:00pm)
- Although late night pedestrian collisions (12:00 – 6:00am) were relatively infrequent, they were nearly twice as likely to lead to a fatality compared with other time periods.
- Pedestrians were particularly vulnerable when it was both dark and rainy.

Who

- Young adults aged 20 to 29 are the most likely to be involved in a collision as a pedestrian. As shown in **Figure 6**, this age group is much more likely to be involved in pedestrian collisions resulting in injury than would be expected based on the population distribution. Collisions involving young adults are more likely to result in injury and less likely to result in fatality.
- As shown in **Figure 6**, collisions involving seniors are more likely to result in fatality. In fact, the proportion of pedestrian collisions resulting in fatalities is significantly higher than could be expected based on the population distribution.
- On a positive note, children aged 9 and under account for 15.4% of walking trips in Vancouver, but represent only 3.9% of pedestrian collisions.

Figure 6
Proportion of Pedestrian Injuries and Fatalities Compared to Overall Population Distribution



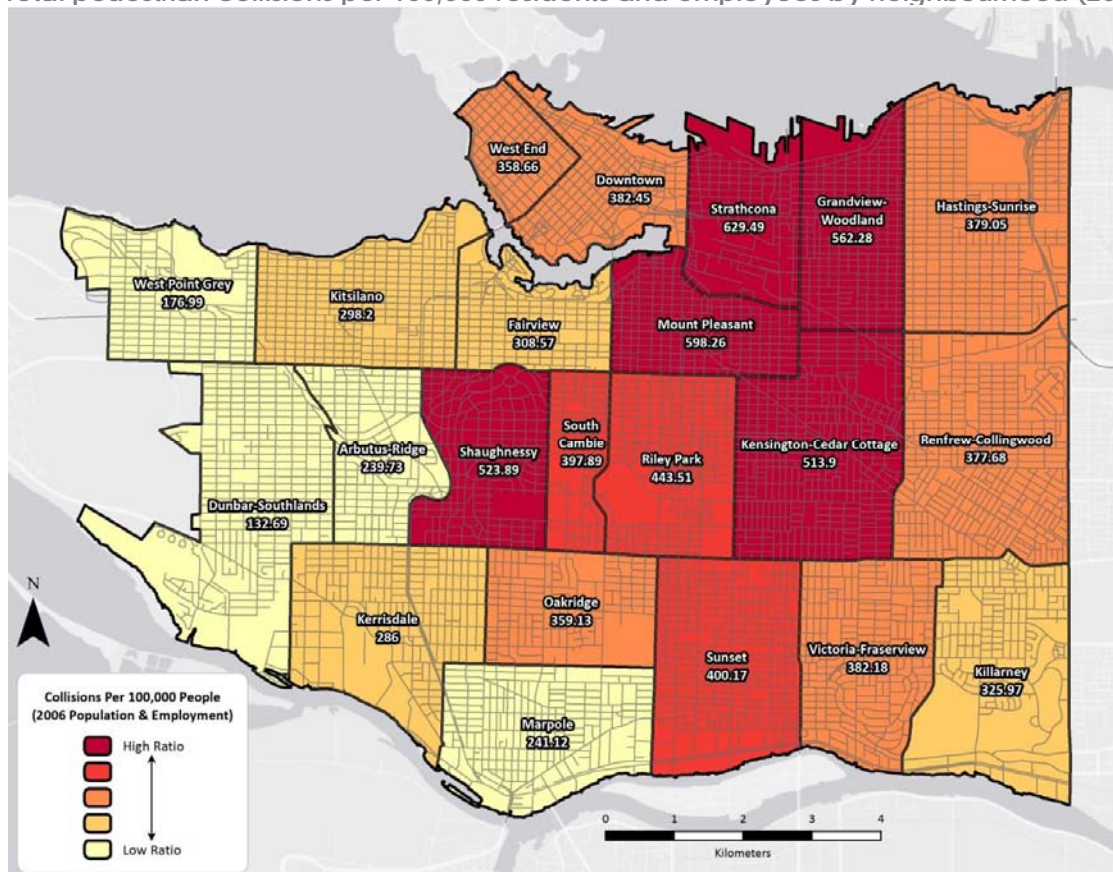
- There is a relatively even distribution of pedestrian collisions involving males and females.
- Males are somewhat more likely to be involved in a collision resulting in fatality, as 54.9% of all pedestrian fatalities involved males, compared to 45.1% females.

- Females aged 20 to 29 are more likely than males of the same age group to be involved in a pedestrian collision, as this age group accounts for 26.2% of collisions involving females compared to 22.7% of collisions involving males.

- **Where**
 - A significant number of pedestrian collisions occurred in the Downtown core and along Primary Arterial streets, such as Broadway, 12th Avenue, 41st Avenue, Kingsway, Hastings Street, Main Street, Fraser Street, Knight Street, and Commercial Drive, among others

 - The neighbourhoods with the highest number of pedestrian collisions per 100,000 residents and employees included Strathcona, Mount Pleasant, Grandview-Woodland, Shaughnessy, and Kensington Cedar Cottage, as shown in **Figure 7**.

Figure 7
Total pedestrian collisions per 100,000 residents and employees by neighbourhood (2005 – 2010)



- Approximately 75% of all pedestrian collisions were located at intersections.
- The majority of pedestrian collisions at intersections (61%) were at signalized intersections, even though signalized intersections only represent 3.6% of all intersections in the City.
- 21 locations were identified that had 11 or more pedestrian collisions over the six year period. All of these locations are located at intersections and were also located at an intersection with an arterial road. Seven of these locations were identified as Collision Prone Locations which present the highest risk for pedestrian collisions.

- **What & How**
 - The most common driver action in pedestrian collisions was a left turning movement.
 - The vast majority of collisions at intersections involved drivers failing to yield to pedestrians when pedestrians had the right-of-way.
 - One quarter of all pedestrian collisions took place at mid-block locations, where the pedestrian was either crossing the street at a mid-block crosswalk or a location without a traffic control, crossing a driveway or laneway, or was struck at the sidewalk or at a bus stop.
 - The top five pedestrian collision types listed below accounted for approximately two-thirds of all pedestrian collisions:
 1. Vehicle turns left while pedestrian crosses with right-of-way at signalized intersection (25.6% of known collision types);
 2. Vehicle turns right while pedestrian crosses with right-of-way at signalized intersection (17.1%);
 3. Pedestrian hit while crossing mid-block without a traffic control, or jaywalking (11.5%);
 4. Vehicle proceeds straight through while pedestrian crosses at stop sign or crosswalk (6.9%); and
 5. Pedestrian hit while crossing driveway or laneway (6.5%).

The study included a comprehensive review of the effectiveness of a range of types of engineering treatments that can be considered to improve pedestrian safety. This includes a review of measures commonly used in Vancouver as well as measures with limited or no current use in Vancouver, as shown in **Table 1**. The effectiveness of each treatment was assessed based on a comprehensive

literature review and by contacting staff at five peer cities in Canada and the Pacific Northwest (Calgary, Toronto, Seattle, Portland, and San Francisco).

Table 1
Relative Cost and Effectiveness of Pedestrian Treatments

Treatment	Relative Cost	Relative Effectiveness
Pedestrian Activated Signals	High	High
Corner Bulges	Moderate	Moderate
Speed Reader Boards	Moderate	Moderate-Low
Pedestrian Countdown Timers	Moderate-Low	Moderate
Crosswalks	Moderate-Low	Low
Pedestrian Scrambles	Moderate-High	High
Audible Pedestrian Signals	Moderate-Low	Moderate-Low
Leading Pedestrian Intervals	Low	Moderate
Left Turn Bays	Varies	Varies
Greenways	Varies	Varies
Crossing Guards	Moderate-Low	Moderate-Low
Yield to Pedestrian Signs	Low	Low
Raised Intersections	Moderate-High	Moderate-Low
Midblock Crossings	Varies	Varies
Raised Crosswalks	Moderate-High	Moderate
Separated vs Mixed Modes	Low	Moderate
New/Upgraded Intersection Lighting	Moderate	High

Based on the results of the collision analysis, the study identified the following 12 key pedestrian safety issues.

a. WHEN	Key Issue 1	Winter and Adverse Weather Conditions
	Key Issue 2	High Activity Periods
	Key Issue 3	Late Night
b. WHO	Key Issue 4	Senior Fatalities
	Key Issue 5	Young Adults
c. WHERE	Key Issue 6	Intersections
	Key Issue 7	Arterial Corridors
	Key Issue 8	Local Street Intersections
d. WHAT & HOW	Key Issue 9	Left Turning Vehicles at Intersections
	Key Issue 10	Right Turning Vehicles at Intersections
	Key Issue 11	Jaywalking
	Key Issue 12	Driver Failure to Yield

The Action Plan includes a description of each issue as well as engineering, education and enforcement countermeasures recommended to address each issue, as described below.

a. When

Key Issue 1 Winter and Adverse Weather Conditions

The collision data indicates that visibility is a key contributing factor in many pedestrian collisions. Pedestrian collisions are more common during the winter months, with the additional collisions largely taking place after dark. Days are shorter in winter and a greater percentage of pedestrian activity takes place during nighttime and adverse weather conditions. Strategies to address this issue include installing and upgrading lighting at key intersections and launching a road safety awareness campaign at the beginning of the winter season to remind pedestrians and motorists to exercise additional caution in dark and rainy conditions; remind motorists that safe speeds depend on weather and light conditions, not just the posted speed limit; and remind pedestrians to wear visible clothing in poor lighting conditions.

Key Issue 2 High Activity Periods

The highest proportion of pedestrian collisions occurs during the PM peak period between 5 and 7 pm. More generally, pedestrian collisions are most common between 3 and 8 pm, when pedestrian activity levels are high. The prominence of pedestrian collisions in the afternoon/evening peak period offers opportunities to efficiently improve safety, such as coordinating enforcement actions for speeding, jaywalking, and crosswalk yielding to occur more frequently during high activity periods and adjusting traffic signal timing during peak periods to provide additional time for pedestrians to complete crossings

Key Issue 3 Late Night

While pedestrian collisions are relatively uncommon late at night, when they do occur they are nearly twice as likely to result in a fatality as compared with other periods. With fewer cars on the road late at night, drivers are able to operate at higher speeds, contributing to increased collision severity. Because there are fewer pedestrians on the road during these times as well, motorists may be less likely to be looking for people walking. Potential pedestrian safety measures include installing and upgrading lighting at key intersections, installing speed cameras or implementing police enforcement on corridors where motorists tend

to speed, adjusting traffic signal timing to reduce the minimum green times for through movements, and developing a road safety awareness campaign aimed at minimizing drunk driving/walking.

b. Who

Key Issue 4 Senior Fatalities

Older pedestrians are less likely to survive a pedestrian collision. For Vancouver residents to successfully rely on walking or public transportation as they age, it is essential that the transport system be pedestrian friendly and forgiving of mistakes in judgment and changes in walking speed that occur naturally. There are a number of ways to improve safety for seniors, including evaluating the presence of safe crossing facilities throughout the City and particularly areas with higher concentrations of seniors, conducting outreach to seniors, developing a safe routes for seniors program, and setting enforcement priorities for speeding and crosswalk yielding that include areas where seniors are more likely to be present.

Key Issue 5 Young Adults

Young adults aged 20 to 29 are over-represented in pedestrian collisions and are the age group most likely to be involved in a pedestrian collision. While not available in the data, young people may also be more likely to be under the influence of alcohol while walking, which can impair their ability to make good decisions about safe walking and crossing behaviour. Pedestrian safety measures include a road safety awareness campaign targeted towards young drivers and pedestrians, enforcement actions focusing on places where young people tend to congregate, and a safe routes to school program to instill road safety knowledge at an early age.

c. Where

Key Issue 6 Intersections

The majority of pedestrian collisions in the City of Vancouver take place at intersections. Twenty-one intersections experienced 11 or more pedestrian collisions over the past six years, and seven intersections in particular were identified as Collision Prone Locations. Recommended pedestrian safety measures include pedestrian countdown timers, road safety awareness campaigns, and crosswalk enforcement.

Key Issue 7 Arterial Corridors

The majority of both intersection and mid-block pedestrian collisions take place on primary and secondary arterial streets. Furthermore, pedestrian collisions tend to be concentrated along a number of arterial corridors in the Downtown core as well as along corridors such as Broadway, 12th Avenue, 41st Avenue, Kingsway, Hastings Street, Main Street, Fraser Street, Knight Street, and Commercial Drive, among others. The study recommended that the City undertake a corridor pedestrian safety strategy by evaluating groups of intersections along arterial corridors and considering 'packages' of complementary mitigation measures to deal with primary collision types identified in the What & How Section. Potential treatments could include left turn bays/left turn signals at major cross-streets, or pedestrian signals/greenways/restricted left turns at minor traffic streets and major pedestrian corridors. A multi-agency approach is recommended that complements engineering treatments with police enforcement actions and road safety awareness campaigns aimed at arterial roadway users (i.e., at bus stop shelters).

Key Issue 8 Local Street Intersections

The majority of collisions in the City occur on arterial streets or at intersections with arterial streets. As a result, collision patterns on local streets become underrepresented in City-wide analyses. Although the vast majority of collisions on local streets are isolated incidents with only one reported collision over this period, 20 locations have been identified at local street locations with at least two reported collisions over this period. Potential pedestrian safety measures on local streets include a range of traffic calming measures such as corner bulges and raised crosswalks.

d. What & How

Key Issue 9 Left Turning Vehicles at Intersections

The most common pedestrian collision type includes a left turning vehicle at an intersection. Most of these left turning collisions occur at signalized intersections and involve a pedestrian crossing with the right of way (i.e., with a walk signal). This is to be expected, as traffic signal phasing typically allows the pedestrian crossing phase to run simultaneously with the through and permitted turning movements on the parallel street segment. There are a number of measures that can reduce potential conflicts between pedestrians and left turning vehicles:

- Leading Pedestrian Intervals give pedestrians an advanced walk signal, allowing them to clearly establish their right of way in the crossing before vehicles are given a green light.
- Left turn bays can be implemented at intersections where there is room for a dedicated left turn lane. Left turn bays provide a dedicated space for vehicles to make a left turn, allowing them to concentrate on making a safe turn with less pressure from following vehicles.
- Left turn movements can be given their own protected phase separate from the pedestrian walk phase. Left turns can also be prohibited at all times or at certain times of day at certain high collision intersections or at minor cross-streets to allow the turning movement to occur at a more appropriate location.
- A road safety awareness campaign can be directed at both drivers and pedestrians, reminding them to look out for each other at intersections.
- Enhanced enforcement by police can focus on intersections with high numbers of pedestrian collisions.

Key Issue 10 Right Turning Vehicles at Intersections

Collisions involving right turning vehicles are the second most common type of pedestrian collision. Similar to collisions involving left turning vehicles, most of these collisions occur at signalized intersections when the pedestrian is crossing with the walk signal. Actions to reduce potential conflicts between pedestrians and right turning vehicles are similar to those cited in above. In addition, right turn on red movements can be restricted at select intersections where this type of collision is common.

Key Issue 11 Jaywalking

The third most common type of pedestrian collision (11.5%) occurred where pedestrians were attempting to cross the street at a mid-block location without an intersection control. Potential pedestrian safety measures can include additional mid-block crossing facilities based on crossing demand and collision history, a “cross at the corner” road safety awareness campaign to remind pedestrians to cross at intersections or other dedicated crossing facilities, crossing guards, adjusting signal timing, and police enforcement at known jaywalking locations.

Key Issue 12 Driver Failure to Yield

Failure to yield refers to cases where a driver fails to yield to a pedestrian that is crossing the street at a signalized intersection with the right-of-way, at a stop sign, or at a marked or unmarked crosswalk. Strategies to address failure to yield collisions include red light cameras, enhanced enforcement, and a “pay attention” road safety awareness campaign.

Based on the actions identified for each of the twelve key issues identified above, the Action Plan identifies the following high priority measures that are anticipated to be particularly effective to address the identified pedestrian safety issues:

- **Minimize conflicts between motorists and pedestrians at intersections**
 - Continue to install countdown signal timers as standard practice for new signals and at high pedestrian collision intersections as resources permit.
 - Continue to install corner bulges and raised crosswalks on local streets.
 - Upgrade lighting at intersections with high night-time pedestrian volumes and/or collisions.
 - Assess high pedestrian collision intersections and consider installation of the following:
 - Leading pedestrian intervals
 - Left turn bays as well as protected or prohibited left turns
 - Increased pedestrian walk and clearance intervals
- **Improve visibility at night**
 - Improve lighting to enhance visibility at key intersections.
- **Use road safety awareness campaigns to target behaviour related to common collision types**
 - Road safety awareness campaigns can be developed in partnership with other agencies such as ICBC and the Vancouver Police Department to focus on:
 - Increased risk of pedestrian collisions at night and in adverse weather conditions
 - Safe walking and driving by young adults

- High incidence of conflicts between drivers and pedestrians at intersections
- Safe driving and crossing behaviour on arterial corridors
- **Work with police to target enforcement actions to improve pedestrian safety**
 - The City of Vancouver can partner with the Vancouver Police Department to tailor enforcement actions to occur:
 - During high pedestrian activity periods
 - At high collision intersections
 - Along high collision corridors

The improvement of pedestrian safety within the City of Vancouver will require the involvement and coordination of a number of agencies involved in pedestrian-related infrastructure, operations, services, and enforcement. These include the City of Vancouver, ICBC, Vancouver Police Department (VPD), the BC Ministry of Health (MoH), TransLink, and the Vancouver School Board (VSB). In addition, other stakeholders, such as the Vancouver Area Cycling Coalition (VACC) and the British Columbia Automobile Association (BCAA), could play a role in identifying needs, education and advocacy. Each of these agencies can contribute to pedestrian safety through four general areas:

1. Provision of primary data and information;
2. Planning/engineering/operations;
3. Communication; and
4. Enforcement.

Each of the agencies could take on either a lead or supporting role in these areas, working together in cooperation to plan, deliver, and evaluate strategies to improve pedestrian safety.

It is recommended that pedestrian collision data from various agencies be harmonized and include injury severity to enable a more robust analysis in the future and to facilitate the planning and evaluation process.

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systems

On February 7, 2012, the City of Vancouver, in partnership with ICBC and the Vancouver Police Department, launched a new six-week safety awareness program to raise the profile of common yet inconsiderate, risky and illegal behaviours that cause serious harm to pedestrians, cyclists and motorists. The program was approved as part of the July 13, 2011 report to Council on *Improving Pedestrian Safety and Accessibility*.

The *People are Fragile* program's purpose was to increase general public awareness of specific risky and illegal behaviours, and shift people towards more considerate behaviour and adherence of traffic laws to prevent collisions, injuries, and fatalities. The program focused on three of the most common yet inconsiderate, risky, and illegal behaviours observed in and around intersections, where the majority of collisions take place. They are:

- Pedestrians jaywalking
- Cyclists running stop signs
- Motorists failing to yield to pedestrians in both marked and unmarked intersections

The program messaging emphasized that the responsibility for safer streets belongs to all of us, not just one road user group, and depends on people practicing courtesy and awareness of their surroundings.

The public awareness program was launched with a media event at the corner of Burrard and Georgia streets with spokespeople from City Council, the VPD and ICBC. Over the six-week project, *People Are Fragile* featured advertising in transit shelters, transit stations, on buses and downtown outdoor TV screens. As shown in Figure B1, the ads depicted people as fragile porcelain figurines who put themselves at risk by engaging in dangerous behaviours on roadways. The awareness program also included sidewalk writing at 10 busy locations where a high incidence of jaywalking has been observed and utilized social media, a dedicated website with information and a survey, and public education and enforcement actions by VPD officers watching for behaviours dangerous to road safety.

Figure B1. People are Fragile Campaign Posters



The program received support from Vancouver Coastal Health and the Community for Preventable Injuries as well as from ICBC and VPD. The experience gained and feedback received during this year's short program will help inform future City road safety awareness programs. Engineering and Corporate Communications recommend planning future road safety programs well in advance and in close collaboration with our external partners.