

ADMINISTRATIVE REPORT

Report Date:May 30, 2013Contact:Jerry DobrovolnyContact No.:604.873.7331RTS No.:10055VanRIMS No.:08-2000-20Meeting Date:June 12, 2013

TO: Standing Committee on City Finance and Services

FROM: General Manager of Engineering Services

SUBJECT: Transportation 2040 - 2013 Active Transportation Corridor Implementation

RECOMMENDATION

- A. THAT Council approve the following Active Transportation Capital Projects, as described in this report, at a cost of up to \$2,950,000, for construction in 2013:
 - i. Union Street Upgrade Gore Avenue to Carrall Street and to the Seawall (\$700,000);
 - ii. Canada Line Bridge Pedestrian and Bicycle Connection (\$750,000); and
 - iii. North End of Cambie Street Bridge to Beatty Street (up to \$1,500,000).

Source of funds to be \$2,245,000 from the Council approved 2013 Capital Budget for Active Transportation Corridors and Spot Improvements and \$705,000 from TransLink.

B. THAT Council authorize the Director of Legal Services to prepare amendments to Street and Traffic By-law No. 2849 and Parking Meter By-law No. 2952 as outlined in Appendix E to provide flexibility in the design and implementation of cycling improvements throughout the City and to remove Union Street from Main Street to Quebec Street from the truck route network.

REPORT SUMMARY

This report describes two active transportation corridor projects and one major active transportation spot improvement that are ready for construction in 2013, and provides updates on other projects currently underway. The three projects are specifically identified in the Transportation 2040 Plan five-year cycling implementation map. The projects were selected because they address critical gaps in the walking and cycling network, improve safety in locations with a high number of collisions, enhance mode shift through improvements in areas with high existing or potential demand and connect to important destinations. The implementation of these projects is a step forward in reaching the City's

sustainable transportation mode share goals for walking and cycling and the elimination of traffic-related fatalities.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

The Greenest City Action Plan (2011) includes a 2020 mode share target that at least half of all trips in the city are on foot, bike, or transit. Providing safe and convenient walking and cycling facilities are identified as key measures to help reach this target.

The Transportation 2040 Plan (2012) identifies walking and cycling as the City's highest transportation priorities and sets transportation guiding policy and priorities.

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS *

City Manager and General Manager recommend approval.

REPORT

Background/Context

The City of Vancouver's Transportation 2040 Plan envisions an efficient transportation system to support a thriving economy, a healthy, safe, accessible and vibrant city, and an improved natural environment. Specific targets include having two-thirds of all trips in Vancouver by sustainable modes by 2040 and eliminating traffic-related fatalities. The projects outlined in this report support the high-level goals and specific targets of the Transportation 2040 Plan.

Transportation 2040 includes visions to make walking 'safe, convenient, comfortable, and delightful' and to make cycling 'safe, convenient, comfortable, and fun' for people of All Ages and Abilities (AAA), including seniors and children. The Cycling in Cities research from the University of British Columbia concludes that cyclists, and potential cyclists, prefer bicycle routes that are fully separated from vehicle traffic or are on local streets that have traffic calming to reduce the amount of vehicle traffic.

To address safety concerns, the City recently completed a pedestrian safety study. Recommendations from this study are already being implemented, with targeted spot improvements and new design considerations to improve safety throughout the city. A Cycling Safety Study is now underway and will be completed this year. In addition to study recommendations, staff use ICBC collision data to prioritize locations for safety improvements, whether a spot or corridor improvement.

A recent study from Harvard¹ concluded that cycle tracks (referred to as separated bike lanes in this report) are not only the preferred infrastructure for cyclists, but are also safer than cycling on roads. The research included a study of 19 newly constructed separated bike lanes in the United States and found that bicycle/vehicle crash rates declined following construction. More specifically, in New York City, three streets that had protected bike lanes

¹ Lusk, Anne C, Morency, Patrick, Miranda-Moreno, Luis F, Willett, Walter C, Dennerlein, Jack T (2013). Bicycle Guidelines and Crash Rates on Cycle Tracks in the United States. *American Journal of Public Health.* Published online ahead of print May 16, 2013.

installed saw the number of crashes with injuries decrease by 30% to 62%, despite an increase in the number of cyclists.

Specific to Vancouver, staff in 2012 reported a decrease of approximately 20% in all collisions (vehicles, cyclists and pedestrians) on Hornby Street and Dunsmuir Street after implementation of the separated bike lanes. Based on publicly available data from ICBC, this safety performance has continued through 2012. A more detailed analysis on collisions will be undertaken as part of the Cycling Safety Study.

Transportation 2040 also highlights the importance of building walk and bike routes that are direct and intuitive and take people where they want to go. The projects outlined in this report provide direct connections to important destinations such as shopping areas and transit stations, and to existing regional walking and cycling infrastructure.

Recent data from TransLink's Trip Diary shows that more people in Vancouver are choosing sustainable transportation modes. From 2008 to 2011, the overall number of walking trips in the City increased by almost 50,000 trips, increasing the walking mode share from 15.4% to 17.0%. During the same period, cycling was the fastest growing transportation mode with 40% growth in the number of trips, nearly 20,000 more trips citywide, increasing the cycling mode share from 2.9% to 3.8%.

Demographic data from the Trip Diary show that there has been particular growth in the number of girls and women choosing to walk and cycle. A higher proportion of girls and women walking and cycling is seen to be an indicator of the quality and safety of a City's infrastructure. Specifically, in 2011, 41% of all bicycle trips in Vancouver were done so by girls and women. In comparison, the Canadian average in 2006 (based on C*ensus Journey to Work*) estimated that 30% of all cycling trips were made by girls and women, while other North American cities, such as Portland, measured 31% (2012) and San Francisco, measured 28% (2011) of all trips. Appendix A provides a further breakdown of this information and additional demographic data on specific cycling routes in Vancouver.

Strategic Analysis

The City has long been developing an off-street bicycle network that is designed for people of all ages and abilities, beginning with the Seawall around Stanley Park and False Creek. In recent years, the City has focused much of its effort on developing a local street bike network, with many routes that are comfortable for a broad spectrum of the population. However, some of these routes carry high motor vehicle volumes or are not entirely located along quieter streets. Moreover, until the recent development of the Downtown separated bicycle lanes there were no routes accessing the Downtown Peninsula or on commercial streets that could be considered comfortable and sufficiently safe for people of all ages and abilities to consider biking.

The Transportation 2040 Plan includes a five-year cycling implementation map highlighting priority corridors based on existing or potential demand, critical gaps in the network, high collision areas, and connections to key destinations such as schools, community centres, major transit stations and commercial high streets. Through more detailed consultation and design work, staff recommend minor changes to the approved short-term priorities map. Figure 1 below reflects these changes.



Figure 1 - Five-Year Cycling Implementation Map (June 2013)

The following discussion details seven projects emerging from the five-year cycling implementation map, including multiple spot improvements, some of which are being recommended for 2013 construction, while others are provided for information only.

1. Comox-Helmcken Greenway (for information only)

The Comox-Helmcken Greenway connects Stanley Park to False Creek and will fill an important gap in the Downtown active transportation network. Section 1 from Stanley Park to Hornby Street was approved by Council in December 2012 with construction to be completed in June 2013. Development of Section 2 from Hornby Street to the False Creek Seawall is a medium term priority, but will take additional time due to the complexity of the project.

2. Point Grey-Cornwall Corridor (for information only)

The Point Grey-Cornwall corridor addresses a critical gap in the existing all ages and abilities Seawall network, improves commuter cycling connections to the Burrard Bridge and addresses a number of high cycling collision locations. Consultation on detailed designs is currently underway with staff planning to report back to Council with a final design in July 2013. If approved, construction of the corridor could begin later in 2013.

3. Commercial Drive (for information only)

The Commercial Drive Corridor serves an area with some of the highest existing and potential bicycle ridership, and would serve a busy commercial high street with important destinations and would address several high collision locations. As part of the Grandview-Woodland community planning process, extensive community conversations are taking place on a number of topics, including transportation. The plan is scheduled to come to Council by the end of 2013 and will provide guidance for a more specific active transportation corridor consultation regarding the Commercial Drive Corridor in 2014.

4. <u>Union Street Upgrade - Gore Avenue to Carrall Street and to the Seawall</u> (*Recommendation A.i*)

The Union Street Upgrade, from Gore Street westward, will make cycling on the Adanac Bikeway safer and more comfortable for people of all ages and abilities. The project addresses a 'weak link' on one of Vancouver's busiest bike routes, carrying an estimated 4000 cyclists per day in the summertime of 2013, and will significantly improve connections between the Adanac local street bikeway, the Seawall, the Carrall Street Greenway, and the Dunsmuir Viaduct separated bike lane. The project consists of pedestrian improvements and updated intersection designs, and will upgrade existing painted bike lanes and shared use lanes into mostly separated bike lanes.

The project requires a full vehicle closure of Union Street west of Main Street and changes to parking regulations on Union Street and Main Street, with no net loss of parking spaces. Staff have consulted with multiple stakeholders including, but not limited to: TransLink, the goods movement industry, the Chinatown BIA, local businesses and residents.

Staff have particularly worked with businesses on the 200 block of Union Street, who were concerned about an initial concept to make this block of Union Street one-way for vehicles, and the loss of half of the parking on their block. Staff have responded by recommending a two-way vehicle street where bicycles and cars share a single eastbound vehicle lane with a separated bike lane going west, and by adding new vehicle parking on Main Street (see Appendix B). This change also requires an eastbound vehicle closure east of Gore Avenue to decrease through vehicle volumes on this block of Union Street, which has caused some vehicle access concerns with adjacent residents.

In the spring of 2013, staff completed a parking study which showed an average of 42% parking occupancy on the block. The recommended design includes a loss of 20 parking spaces on the 200 block of Union Street; however, approximately 50 parking spaces will be added on Main Street between Georgia Street and National Avenue to more than offset the loss. Many of the businesses appreciated the design change based on their comments and the offset of vehicle parking, though some businesses continue to be concerned about parking loss on the 200 block.

At public open houses and through the online comment form people expressed concerns that the recommended shared eastbound vehicle/bicycle lane on the 200 block of Union Street does not provide adequate separation and will not be attractive to less confident cyclists. This concern is acknowledged and staff will monitor the success of this approach carefully over the coming months; the design proposed is clearly a balance between our AAA goals and the need to consider the needs of the new businesses in an area of the city where local economic development is a high priority. The cycling and walking improvements have been designed using temporary materials wherever possible to minimize costs and maintain flexibility to fit with the need to reevaluate the outcomes as well as with the long-term future of the viaducts and other transportation routes in the area.

5. <u>Canada Line Bridge Pedestrian and Bicycle Connection</u> (*Recommendation A.ii*)

The Canada Line Bridge Connection project will provide an all ages and abilities active transportation connection linking Richmond via the Canada Line pedestrian-cyclist bridge with the existing Cambie Street separated bike lane north of SW Marine Drive. Project details are included in Appendix C. This is a change from the plan shown in Transportation 2040, which identified a proposed 2013 connection to the Ontario Bikeway. Due to the inability to secure the necessary right-of-way along the Kent Avenue South alignment, it is not possible to develop the path to Ontario Street at this time. Staff will continue to work on the eastern connection to Ontario Street and a western connection to Heather Street with implementation projected for 2015 to 2017. Refer to Figure C1 in Appendix C.

The current design includes a new sidewalk and separated bike lanes on Kent Ave North between Ash and Cambie Streets, and a separated bike lane on Cambie Street to SW Marine Drive. The design requires removal of approximately 35 unregulated parking spaces on Cambie Street in an industrial area, and the prohibition of right turns from eastbound SW Marine Drive to Cambie Street, and from northbound Cambie Street to SW Marine Drive. Staff have consulted with TransLink, local businesses and the neighbourhood on these proposed changes and recommend that the improvements are approved for construction later this year.

6. <u>North End of Cambie Street Bridge to Beatty Street</u> (*Recommendation A.iii*)

As described to Council on April 24, 2013 at the False Creek Bridges update, staff recommended improving walking and cycling access to the east sidewalk of the Cambie Street Bridge from downtown this year. The east sidewalk is a busy cycling facility (data from 2012 indicates summer use at over 2000 cyclists per day). The recommended walking and cycling improvements, identified in Appendix D, which include a two-way separated bike lane from the north end of the Cambie Bridge to Beatty Street, will provide a significantly improved connection between the shared pathway on the bridge with the existing painted bike lanes on Beatty Street. This spot improvement was initially planned for 2014, but it is recommended that it be advanced to 2013 to address the safety concern of cyclists riding on the sidewalk to access the Cambie Street Bridge. In May 2013, up to 75 people per hour have been observed riding on the sidewalk.

7. <u>Richards Street Buffered Bike Lane - Robson Street to Drake Street</u> (for information only)

Richards Street was identified as a short term priority in the Transportation 2040 Plan. Staff plan to paint wider crosswalks and bike lanes buffered from motor vehicle traffic by parked cars between Robson Street and Drake Street, following the repaying of Richards Street this summer. To do this, the existing bike lane and parking on the west side of the street will be switched, such that the bike lane will be next to the curb. This will require a minor reduction in vehicle parking along the corridor (less than 10%) to ensure adequate visibility between motorists and cyclists at intersections and driveways. The remainder of Richards Street will be continued to be reviewed in coming years as identified in the five-year plan.

Proposed By-law Changes (Recommendation B)

Through the continued implementation of separated bike lanes in the City, staff have identified some necessary amendments to the Street and Traffic By-law and Parking Meter By-law to give clarity as to how these bike lanes operate. An amendment to the truck route network is also necessary as part of the Union Bikeway Upgrade project. Appendix E outlines these recommended (Recommendation B) changes.

Spot Improvements (for information only)

To reach our 2040 goals and move toward a AAA cycling network citywide, spot improvements on our existing network are also required. Spot improvements are prioritized based on safety data, public complaints and on opportunities to make improvements as part of other street work. Staff are currently reviewing the entire bikeway network and noting locations in need of improvements. Spot improvements will continue to be prioritized over the coming years as they often will require less investment and can make large sections of the existing network safer and more comfortable with localized changes. The level of consultation depends largely on the type of the intervention that is being considered and staff are developing a process to ensure we adequately capture the neighbourhood opinion.

Following Council approval in 2009, six trial bikeway enhancements, primarily traffic diverters, were installed on various bikeways throughout the City. The intent of these projects was to have quick implementation with accelerated consultation, making several bike routes feel safer by decreasing vehicle volumes. The accelerated consultation resulted in minimal public engagement and the projects were poorly understood by the public, resulting in a high number of phone calls and emails. Based on this experience, staff have significantly enhanced public engagement when planning such changes.

In terms of the goals of these projects, extensive traffic monitoring was undertaken related to the results of the diversionary calming measures that were implemented through this program. Two of the six locations have been removed (per Council approval in June 2012) because traffic impacts on adjacent schools were deemed unacceptable. The remaining four locations have met the initial objectives of reducing traffic on the selected bikeways. Although traffic initially increased on many parallel streets near the diverters, it has since declined on most streets to near pre-implementation volumes. As a result, along with enhancements to our public process for future spot improvements on our bike network, staff will be moving to permanently construct the traffic calming diverters at the following locations (see Figure 2):

- Ontario Street and 41st Avenue;
- Angus Drive and W 41st Avenue;
- King Edward Avenue and Heather Street;
- Ontario Street and E 29th Avenue (to be modified to be compatible with the Hillcrest/Riley Park Master Plan).

In addition to enhanced public engagement, staff will also be taking the following matters into consideration as we make these changes permanent and move ahead with future spot improvements (see Appendix F for full discussion):

- Undertake additional analysis on potential consequences before implementation
- Assess a range of alternate options and potential consequences, particularly when considering diversionary measures for streets carrying over 2000 vehicles per day
- Consider implementing permanent measures at the outset to reduce the potential for violations and to reduce ongoing maintenance requirements
- Wherever possible, use measures that are self-enforcing to reduce potential violations
- Use more visually appealing materials so as not to detract from the community



Figure 2 - Bikeway Enhancement Locations

Implications/Related Issues/Risk (if applicable)

Financial

As shown in the table below, the three recommended projects will cost up to \$2.95 million; source of funding to be \$2.25 million from the Council-approved 2013 Capital Budget for Active Transportation Corridors & Spot Improvements, and \$0.7 million from TransLink.

Recommended Projects	CoV Funding	TransLink Funding	Total Funding
Union Street Upgrade	\$370,000	\$330,000	\$700,000
Canada Line Bridge Pedestrian and Bicycle Connection	\$375,000	\$375,000	\$750,000
North End of the Cambie Street Bridge	Up to \$1,500,000	na	Up to \$1,500,000
Total	Up to \$2,245,000	\$705,000	Up to \$2,950,000

For the North End of the Cambie Street Bridge to Beatty Street project, staff are currently working with Coast Mountain Bus Company on the proposed design and will refine the scope of work and finalize the detailed cost estimate prior to project commencement.

Oversight of these capital projects will be coordinated through the quarterly Capital Budget reporting process.

As part of the recommended projects, it is contemplated that there will be a net reduction of 5 to 10 metered parking spaces resulting in forgone parking meter revenue of approximately \$35,000 per year. Street parking will be assessed upon completion of the projects to determine whether more or less parking meters are appropriate.

Other than the impact on parking meter revenue, there will be no material change in the operating budget as a result of the recommended projects.

Environmental

These projects encourage more and safer walking and cycling, bringing significant social, health, and environmental benefits. By addressing gaps or deficiencies in the existing walking and cycling networks, they will encourage increased use of existing infrastructure, and more and safer walking and cycling generally. They increase access to green space by linking parks and other recreational places. They promote a culture of 'everyday cycling' by better linking everyday destinations with the existing network. These projects will help the City reach its Greenest City goals of half of all trips by sustainable modes by 2020 and our Transportation 2040 Plan goals of two thirds of all trips by sustainable modes by 2040.

Legal

These projects necessitate changes to the Street and Traffic By-law and Parking Meter By-law as outlined in Appendix E to provide flexibility in the design and implementation of cycling improvements throughout the City. Also, as part of the Union Street Upgrade project, a change to the truck route network, identified in the Street and Traffic By-law, is required.

CONCLUSION

To reach Transportation 2040 sustainable mode share and safety targets the City must invest in critical pedestrian and cyclist infrastructure. The projects laid out in this report have been identified through the Transportation 2040 Plan as high priorities because they address critical gaps in the cycling and walking network, improve locations with a high number of collisions, serve areas with high existing or potential walking and cycling and connect to important destinations. To move toward Transportation 2040 targets and to build an inclusive city that is accessible to people of all ages and abilities, staff recommend the construction of the projects identified in this report.

Analysis of TransLink's Trip Diary and Vancouver Demographic Cycling Data

Recent data from TransLink's Trip Diary shows that more people in Vancouver are choosing sustainable transportation modes, see Table A1. From 2008 to 2011, the overall number of walking trips in the City increased by almost 50,000 trips, increasing the walking mode share from 15.4% to 17.0%. During the same period, cycling was the fastest growing transportation mode with 40% growth in the number of trips, nearly 20,000 more trips citywide, increasing the cycling mode share from 2.9% to 3.8%. Overall, from 2008 to 2011, the total sustainable transportation mode share increased from 40% to 44%, moving Vancouver closer to its Greenest City and Transportation 2040 goals.

Mode of Travel	Total Trips			% of total Trips	
	2008	2011	Change	2008	2011
Walk	247,500	295,400	47,900	15.4%	17.0%
Bike	47,100	66,500	19,400	2.9%	3.8%
Transit	351,100	403,700	52,600	21.8%	23.3%
Total Sustainable	645,700	765,600	119,900	40%	44%
Motor Vehicle	931,300	943,100	11,800	57.9%	54.3%
Other	31,100	26,600	-4,500	1.9%	1.5%
Total	1,608,100	1,735,300	127,200	100%	100%

The research and analysis are based on data from TransLink and the opinions expressed do not represent the views of TransLink

Table A1: 24 hour Trips Originating in City Vancouver

Demographic data from the Trip Diary, see Table A1, shows that there has been particular growth in the number of girls and women choosing to walk and cycle. The number of cycling trips made by girls and women from 2008 to 2011 nearly doubled whiles the number of walking trips increased by 25%. A higher proportion of girls women walking and cycling is seen to be an indicator of the quality and comfort of a City's infrastructure.

Specifically, in 2011, 41% of all bicycle trips in Vancouver were done so by girls and women. In comparison, the Canadian average in 2006 (based on C*ensus Journey to Work*) estimated that 30% of all cycling trips were made by women, while other North American cities, such as Portland, measured 31% (2012) and San Francisco, measured 28% (2011) of all trips.

		Total 2008 Trips	Total 2011 Trips	% Increase
	Male	117500	132800	13%
Walking	Female	130000	162600	25%
	% Female of all Trips	53%	55%	
	Male	33100	39500	19%
Cycling	Female	14000	27000	93%
	% Female of all Trips	30%	41%	

The research and analysis are based on data from TransLink and the opinions expressed do not represent the views of TransLink

Table A2 - TransLink 2008 and 2011 Male and Female Breakdown for Walking and Cycling

Chart A1 below compares the Trip Diary results to summer weekday data collected on various streets throughout the City. Generally the percentage of female cyclists on a particular street depends on the type of facility provided. On some local street bikeways, such as Ontario Street and 10th Avenue, the total percentage of females is greater than the citywide average. However, on busy vehicle streets with no bicycle facilities, such as the Point Grey Road / Cornwall Corridor or Commercial Drive, lower than the average is measured. In 2010, the users of the Hornby Street painted bike lane were 28% females of all adult riders. Shortly after construction of the separated bike lanes, this increased to 32% females, and the year following, in 2012, this increased to 37%.

The demographic split on Burrard Bridge of 33% girls and women did not change following the introduction of separated bike lanes over the bridge in 2009, though total volumes of cyclists did increase. It is believed that the improvements along the corridor have increased overall ridership, but the gender split has not changed due to difficult connections at either end of the bridge. It is expected that improvements at each end of the bridge, planned for implementation over the next 5 years as identified in the Transportation 2040 Plan, would extend the use of the bridge to a broader range of users, including a higher percentage of women, children and seniors. The Canada Line Bridge currently has a low percentage of the bridge and the land use of the area.



Chart A1 - Female Cyclists as a Percentage of all adult cyclists on Vancouver Streets

Union Street Upgrade - Gore Avenue to Carrall Street and to the Seawall

Budget: \$700,000 Source of funds: 2013 Active Transportation Corridors and Spot Improvements Cost sharing: \$330,000 (TransLink - BICCS)

Background/context

The Union Street Upgrade, on the Adanac Bikeway, will create new cyclist connections to the Seawall, Carrall Street and Dunsmuir Viaduct separated bike lanes, making cycling safer and more comfortable for people of all ages and abilities. This project will address significant known safety concerns; it will improve the level of service for the thousands of cyclists that already use the route, and it will provide connections between important routes in the City's cycling network. The project consists of pedestrian improvements and improved intersection designs, as well as upgrading existing painted bike lanes and shared use lanes into mostly separated bike lanes.

The Adanac Bikeway was constructed in 1993 as one of the first local street bikeways in Vancouver and is now one of the busiest. Extending from Downtown Vancouver to Boundary Road, where it connects to Burnaby's Francis Union Bikeway, it is an important piece of the region's cycling network. Most of the bikeway is located on residential streets with relatively low vehicle volumes, but Union west of Gore is an exception; classified as a Regional Truck Route, it carries approximately 5000 vehicles per day. This section of Union Street poses a safety risk to cyclists and is inconsistent with other cycling facilities in the vicinity.

Transportation 2040 identifies the entire Adanac Bikeway as a priority route with improvements to be completed by the end of 2017, while the section on Union west of Gore is identified for improvements to be completed in 2013. Transportation 2040 prioritized this section because of existing safety concerns; high existing cycling demand; and, network connectivity. The intersection of Union and Main is a top cyclist collision location (source: ICBC, 2006 to 2011), and has the highest number of cyclist/vehicle collisions along the Adanac Bikeway. East of Main, Union carries an estimated 4000 cyclists per day in the summertime. As a comparison, the summertime bicycle volumes on Burrard Bridge and the Dunsmuir separated bike lanes are 5000 and 2000 cyclists per day, respectively.

While the future of the Georgia and Dunsmuir Viaducts has not yet been determined, there is an immediate need to improve the safety and connectivity of our existing bikeway network. To accommodate future decisions, the proposed cycling and walking improvements are designed using temporary materials wherever possible to minimize cost and maintain flexibility to adjust to the long-term future of the viaducts and other projects in the area.

Goal

Upgrade the section of the Adanac Bikeway on Union west of Gore to make it safer, more comfortable and more convenient for cyclists of all ages and abilities.

Objectives

- 1. Improve safety for all road users at the intersection of Union and Main.
- 2. Provide a connection for cyclists of all ages and abilities to the existing cycling network in the area (Carrall Street, Dunsmuir Viaduct and the Seawall all provide cycling facilities which meet the needs of cyclists of all ages and abilities).
- 3. Improve pedestrian facilities where feasible in the project area.
- 4. Introduce more bike parking facilities west of Gore.

Proposed design

The extents of the project are shown in Figure B1, and the proposed changes to Union, Expo and Quebec are described below.



Figure B1 - Union Street Upgrade Project Extents

Walking Improvements

- Open the south crosswalk at the intersection of Main and Union
- Repurpose the existing asphalt bike path on the south side of Union from Main to Quebec as a pedestrian sidewalk
- Improve pedestrian curb ramps at Main and Union
- Improve crosswalks and signal timing at Quebec and Pacific
- Provide separated bike lanes, which is expected to decrease the number of cyclists riding on sidewalks (data from Hornby Street shows that providing separated bike lanes decreased the number of cyclists riding on sidewalks by up to 80%)

Cycling Improvements

Reallocation of Vehicle Travel Lanes

Staff analyzed traffic volumes in the project vicinity and determined that there is sufficient capacity to replace some vehicle travel lanes with separated bike lanes. It is proposed that the separated bike lanes be installed by replacing the following vehicle travel lanes:

- Expo Boulevard from Union to Carrall one westbound vehicle lane
- Quebec Street from Keefer to Union one northbound vehicle lane
- Quebec Street from Union to Pacific- one southbound vehicle lane

Traffic Diverters

To improve safety and comfort of cyclists on this portion of the Adanac Bikeway, three traffic diverters are recommended.

1. Full vehicle closure of Union west of Main

The intersection of Main and Union is a top cyclist/vehicle collision location. The closure of Union west of Main is recommended to address the existing safety conflicts; this closure results in limited impact to vehicle access. The closure will also require a change to the Street and Traffic By-law to remove the 100 block of Union Street from the Truck Route Network (Appendix E). TransLink, Port Metro Vancouver and the BC Trucking Association were consulted and support the change.

2. Partial vehicle closure of Union east of Gore

A partial closure of Union east of Gore is proposed, to reduce eastbound vehicle volumes on Union between Main and Gore where it is recommended to have cyclists and motorists share a single lane. Union from Dunlevy to Gore would become a one-way westbound street for vehicles, and a two-way street for cyclists. It is anticipated that this closure would also decrease the number of vehicles shortcutting on Union through the Strathcona neighbourhood. There are currently approximately 1200 eastbound vehicles a day on the 200 block of Union Street; it is anticipated that the proposed partial closure would reduce eastbound traffic by approximately one-third.

3. Right in/right out diverter at the laneway on Union east of Main The laneway east of Main at Union is a recognized vehicle/bicycle conflict area. The proposed right in/right out diverter would restrict access to/from the laneway, improve safety and alleviate the congestion on Union which results from eastbound vehicles turning into the lane.

Changes to Vehicle Parking

The proposed project requires that a number of parking regulations be amended, resulting in the removal of:

- approximately 20 unregulated parking spaces on the 100 block of Union Street (between Quebec Avenue and Main Street)
- 20 metered parking spaces on the 200 block of Union Street, and
- 6 spaces on 300 Union Street, east of Gore Avenue.

Staff reviewed parking regulations in the surrounding neighbourhood and identified locations where approximately 50 on-street parking spaces can be added on Main Street between Georgia and National. As a result, there is no net loss of parking in the neighbourhood. In addition, there are more than 150 commercial off-street parking spaces within one block of the Main and Union intersection.

Parking studies of the 200 block of Union Street show that current street parking (39 metered spaces) is not fully utilized. Parking data collected every September from 2010 to 2012 showed parking was approximately 50% occupied. At the request of businesses, additional data was collected over a single week between April 30 and May 5, 2013, showing a less than 50% parking occupancy average on the block (see Table B1). This block is inconsistent with other streets in Chinatown which are often closer to 90% occupied.

	Parking Occupancy (%)		
Time of Day	Weekday Weekend		
Morning (9:00am)	19%	18%	
Mid-day (12:30pm)	55%	76%	
Afternoon (3:30pm)	45%	36%	
Evening (7:30pm)	58%	41%	
AVERAGE	44%	43%	

Table B1: Average Parking Occupancy on 200 Union Street (April 30 to May 5, 2013)

Consultation

Staff consulted with the following internal and external stakeholders:

- City of Vancouver Active Transportation Policy Council
- Vancouver Park Board
- Vancouver Fire and Rescue Services
- BC Hydro
- TransLink
- BC Trucking Association, Port Metro Vancouver and Gateway Council
- Chinatown BIA
- Individual businesses along the 200 block of Union Street, and
- the general public, via two (2) public open houses

With the exception of comments received from some businesses on the 200 block of Union, and the Active Transportation Policy Council comments from the above groups are addressed in the proposed design.

Businesses on 200 block of Union

In advance of the public open houses, staff invited all business owners to two separate meetings. These meetings were attended by a mix of businesses owners, property owners, and BIA representatives; approximately 12 individual businesses were represented. In general, the businesses supported the goals of the project, but expressed concerns about how the project may impact their businesses.

At the first meeting, staff presented a proposed design for 200 Union Street which recommended making the block one-way westbound for motor vehicles, constructing two large bicycle parking corrals, retaining vehicle parking next to businesses and, providing two one-way separated bicycle lanes. This option would have retained 14 parking spaces on the 200 block and would have preserved the busiest motor vehicle direction on the street. Many of the businesses expressed concerns regarding; loss of vehicle access as a result of the one-way street, loss of parking and making changes before a the viaducts plan is completed.

Based on this feedback, staff revised the design to the current recommendation, which includes changing the eastbound separated bicycle lane into a shared bicycle/vehicle lane. A partial street closure at Gore and Union was added to decrease thru vehicle volumes on this block to make it more comfortable for cyclists of all ages and abilities. The street would also be signed as 30km/hour. To respond to concerns over parking losses, staff have identified Main Street as a location where up to 50 parking spaces could be added and minimized proposed bicycle corrals to maintain 19 parking spaces on the block (14 originally proposed).

Staff propose that the shared bicycle/vehicle lane be monitored after implementation to determine whether the design achieves the objective of providing an all ages and abilities cycling connection and be modified if necessary.

Active Transportation Policy Council

The recommended design was presented to the Active Transportation Policy Council Projects Subcommittee. The Council was satisfied with the project goals to improve walking and cycling, but expressed concern that the shared eastbound bicycle/vehicle lane from Main Street to Gore Avenue may not meet the criteria for all ages and abilities cycling.

Public Open Houses

Staff held two public information sessions on May 11 and May 15 in the vicinity of the project area, with more than 100 people attending. In general, attendees were supportive of the project. A comment sheet was available at the information sessions and online, with 113 filled out. A summary of the most common comments is provided below:

• Most people felt that the proposed design met the stated goals of the project to improve safety for all road users and to make cycling and walking more comfortable.

- Some people expressed concerns over particular aspects of the design including:
 - The shared lane between Main Street and Gore Avenue will not provide enough comfort for new cyclists who are worried about cycling in traffic, which may be discourage them from cycling;
 - The treatment varies from block to block which might confuse new cyclists;
 - The removal of parking may have a negative impact on some small and/or newly established businesses on Union Street; and,
 - The bikeway upgrades may result in gentrification of the neighbourhood.
- Other comments received include:
 - The bikeway upgrades will make the community more attractive and vibrant and encourage cyclists and pedestrians to visit and shop in the neighbourhood;
 - Traffic calming measures will reduce the number of cars on the roads lowering pollution from vehicle exhaust;
 - Construction of the bikeway should be done in a way to minimize the inconvenience to road users;
 - o Greenery/shade trees are required on Adanac Street and Union Street; and,
 - Sidewalks on Powell, Cordova, Jackson, and Gore Avenue need to be widened.

Canada Line Bridge Pedestrian and Bicycle Connection

Budget: \$750,000 Source of funds: 2013 Active Transportation Corridors and Spot Improvements Cost sharing: \$375,000 (TransLink - BICCS)

Background/context

In August 2009, the Canada Line Pedestrian-Bicycle Bridge opened, providing a pedestrian and cyclist crossing of the Fraser River that is completely separated from motor vehicles. The north access ramp from the bridge is on Kent Avenue South, immediately south of the Canadian Pacific Railway (CPR) tracks. During the planning and design and of the bridge, City staff worked with TransLink to try to extend the bridge north of the rail tracks to avoid having pedestrians and cyclists navigating an at-grade rail crossing. Due to budgetary and design constraints, this was not possible.

There is an existing network of bikeways in the area of the Canada Line Bridge, but they do not extend all the way to the bridge itself. The bikeways are:

- Kent Avenue Bikeway on-street; begins in the City of Burnaby and extends to Ontario Street (about 800m short of the Canada Line Bridge)
- Ontario Bikeway on-street; north-south route, ending at Kent Avenue South
- Heather Bikeway on-street; north-south route, ending at Kent Avenue North
- Cambie Street Separated Path off-street shared path; east side of Cambie, from 63rd Avenue to SW Marine Drive

Kent Avenue North is a narrow right-of-way with heavy industrial traffic. There are limited sidewalks, and those that exist are narrow and next to traffic. Temporary connections from the Canada Line Bridge to nearby bikeways and the Marine Drive Canada Line Station were installed when the bridge opened, consisting of crosswalks and cross bikes, makeshift sidewalks, sharrows and directional signage. While the temporary measures designated a connection from the Canada Line Bridge to the Heather and Cambie Street bikeways and the Canada Line Station, they are constructed from temporary materials and do not offer a walking or cycling environment that addresses the needs of pedestrians and cyclists of all ages and abilities.

Bicycle count data summarized for April 2013 shows up to 600 cyclists per day crossing the bridge during the week, and up to 1,000 cyclists per day using the facility on weekends.

Goals/objectives

Create a walking and cycling route from the Canada Line Bridge to the existing bikeway network and the Marine Drive Canada Line Station that is comfortable for pedestrians and cyclists of all ages and abilities.

Proposed design

In consultation with stakeholders and in consideration of space considerations and available street rights-of-way, staff propose:

- A shared pedestrian/cyclist path on Kent South, from the Canada Line Bridge to Ash
- Two-way separated bike lane and a sidewalk on the north side of Kent North from Ash to Cambie
- Two-way separated bike lane on the east side of Cambie from Kent North to SW Marine Drive
- Vehicle right turn bans from northbound Cambie Street to SW Marine Drive and from eastbound SW Marine Drive to Cambie Street.

The proposed design would provide a direct link for cyclists to access the existing separated bike lanes on Cambie north of SW Marine Drive and an improved connection for pedestrians to access the bus loop and Canada Line station at SW Marine Drive. Figure C1 provides an overview of the route.





Figure C1 - Canada Line Bridge Connections Project Extents

Due to space restrictions on Kent Avenue North and the high level of industrial traffic, staff do not currently recommend constructing cycling facilities along Kent Avenue North to connect to the Ontario Street and Heather Street Bikeways. Staff will continue to explore options to acquire rights-of-way on Kent Avenue South to connect these bike facilities to the Canada Line Bridge in the future.

Consultation

Staff presented the concept design to the Active Transportation Policy Council in November 2012; support for the project was expressed through the following motion:

THAT the Active Transportation Policy Council (ATPC) supports the development of new comfortable and safe routes connecting to the Canada Line bridge and supports the suggestion of sidewalks on Kent Avenue. The ATPC is pleased to see concrete plans for a separate cycling facility from the bridge along Cambie Street to Marine Drive. The ATPC recommends to Council:

THAT these new routes need to be connected to existing facilities in order to make them practically useful for most cyclists and pedestrians. These additional connections should include but not be limited to:

- a) A new route along Kent Avenue connecting the bridge to the Heather Street and Ontario Street bikeways.
- b) Extending the path along Cambie Street to connect with the North Arm Trail Greenway.

Consultation with businesses, residents and other stakeholders was completed in April 2013.

- All businesses on Cambie St between SW Marine Drive and Kent Ave N were invited to a stakeholder meeting to learn more about the recommended design; staff also met with the individual businesses who requested a separate meeting. Four businesses attended the stakeholder meeting.
- Two open house meetings were held to present detailed information about the recommended design, and to receive feedback for Council's consideration. Thirty people attended the open houses.
- Additional notifications were sent to the residents who live on Cambie St south of Marine Drive, and staff offered to meet with individuals who requested additional information.
- A total of 17 written comment forms were received.

The comments received were generally positive and supportive of the recommended design, but some concerns were also expressed:

- Some people expressed concern about the inconvenience which will result from banning right turns at Cambie Street.
 - Staff conducted traffic counts at this intersection and determined that the turns that will be restricted can be accommodated on neighbouring streets.
- Several people expressed concern about the current parking and stopping behavior on Cambie Street associated with Canada Line Station passenger drop off and pick up, and disruptive use of the lane adjacent Cambie Street, including illegal parking and stopping; they were concerned that this project would result in an escalation of the existing problems.

- Staff have discussed the concerns with Parking Enforcement personnel and are working on a strategy to augment parking enforcement in this location.
- Several people expressed concern about the crossing of Kent Ave N and that a traffic signal or some other type of special crosswalk should be installed.
 - Staff investigated the option of providing a pedestrian and cyclist activated signal and determined that it was not warranted as there are sufficient gaps in traffic, at reasonable intervals, to enable pedestrians and cyclists to cross.
 - Staff also considered installation of a special crosswalk, with flashing amber lights, but referred to recent literature which suggests that, although perceptions of safety increase, they do not improve real safety, as they may create a false sense of security which can result in riskier behaviour.

Staff consulted with TransLink and considered bus operations in the design. Coast Mountain Bus Company requested that stop signs be installed at the bus loop exit, for cyclists traveling in the separated bike lanes on Cambie Street. Citing experience with separated bike lanes elsewhere, staff do not recommend installation of stop signs for cyclists.

North End of Cambie Bridge to Beatty Street

Budget: \$up to \$1,500,000 (detailed estimate to be completed) Source of funds: 2013 Active Transportation Corridors and Spot Improvements

Background/context

As part of the City's new cycling spot improvement program, staff intend to implement significant upgrades to the walking and cycling connection between the north end of the Cambie Bridge and Beatty Street. This project will address an existing constraint where we cannot currently meet the City's long-term goal of making cycling safe and comfortable for people of all ages and abilities.

Two-way cycling is permitted on the east sidewalk of the Cambie Bridge, but there is currently no legal way for people to cycle southbound from Beatty Street, which has bicycle lanes and connects to the downtown cycling network, to the bridge. The east sidewalk of the Cambie Bridge regularly has over 2000 cyclists per day in summer months, with up to 75 people in one hour counted cycling on the sidewalk from Beatty Street to the bridge in May 2013. Northbound, there is a narrow lane against the curb, which has never been designated for bicycles.

As well, the sidewalk from the bridge to Expo Boulevard is too narrow to accommodate the high volume of two-way cyclists, pedestrians and transit passengers using the bus stop just south of Expo Boulevard. The existing configuration requires cyclists to ride through the bus stop zone between the curb and shelter and has very awkward transitions on and off the street near Expo Blvd.

Goals/objectives

Provide a AAA cycling connection between the existing Cambie Bridge east sidewalk and Beatty Street, which is identified in Transportation 2040 for upgrades within the next five years.

Proposed design

The project includes the construction of a two-way separated bicycle lane between the north end of the bridge and Beatty Street, as illustrated below. The bus stop will be relocated to the north side of Expo Boulevard, and includes a fully accessible bus stop platform. The separated bike lane will be raised past the bus stop and include a marked pedestrian crossing to provide accessibility and to encourage people on bikes to yield to bus passengers crossing to and from the bus stop.

A small number of metered parking stalls on Beatty Street north of Smithe Street will be removed to improve visibility and to facilitate a marked left-turn bay for southbound cyclists accessing the new separated bike lane to the bridge.



Figure D1: Recommended design for the north end of the Cambie Street Bridge

Consultation

Staff have presented this concept to and received endorsement from the Active Transportation Policy Council Projects Subcommittee. Staff have also met with local businesses and the property manager in the affected block, as well as the Yaletown Business Improvement Association, and have distributed a notification letter to residents and businesses in the broader area. No significant concerns have been identified. TransLink and Coast Mountain Bus Company have also reviewed and approved the relocation of the bus stop.

Proposed By-law Changes for Separated Bike Lanes

As separated bike lanes are being implemented more frequently throughout Vancouver, staff recognize the need to amend the Street and Traffic By-law and Parking Meter By-law to give clarity as to the manner in which these bike lanes operate. Specifically, the by-laws should be amended to allow for bike lanes to be constructed between the sidewalk and parked cars. In addition, the Union Upgrade Project requires a minor change to Vancouver's truck route network.

Street and Traffic By-law

For the Street and Traffic By-law, the required changes to the By-law relate to jaywalking, the distance a vehicle is parked away from the curb and the truck route network.

Subsection 12(2) of the Street and Traffic By-law states that: "No pedestrian shall jaywalk on City streets."

The Street and Traffic By-law defines the term "Jaywalk" as:

"Jaywalk" means to cross a roadway, not being a lane, at any place which is not within a crosswalk and which is less than one block from an intersection at which traffic control signals are in operation."

Separated bike lanes are considered part of the roadway in the Street and Traffic By-law.

The implication of this subsection and definition is that pedestrians that are crossing a separated bike lane to access a vehicle parked adjacent to the bike lane may be contravening subsection 12(2). In other words, they may be jaywalking.

To clarify the By-law in regards to this issue, staff recommend changing the definition of "jaywalk" to exclude separated bike lanes. This would allow pedestrians to freely cross separated bike lanes to access vehicles adjacent to the lanes. However, pedestrians will still have to abide by subsection 12(1), which states that:

"Every pedestrian crossing a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection, shall give the right-of-way to all vehicles upon the roadway."

Another minor update required to the Street and Traffic By-law is subsection 18.1(c), which states that the curbside wheels of a parked vehicle must be within 30 cm of the curb or the edge of the roadway. Staff recommend that this subsection be updated to ensure that vehicles can also be parked within 30 cm from the curb, planter, median or painted line that delineates the separated bike lane and the portion of roadway intended for motor vehicles.

As part of the Union Upgrade Project a change to the Street and Traffic By-law Schedule B is required due to changes to the Regional Truck Route Network. Item 55 of the truck route network: "Union Street: from Gore Avenue to Quebec Street" should be changed to "Union Street: from Gore Avenue to Main Street".

Parking Meter By-law

The required By-law change is related to the definition of a metered parking space.

The Parking Meter By-law defines a metered space relative to the pole a parking meter rests upon and the curb. In situations where a parking meter is adjacent to a separated bike lane, there is the potential for the metered space to be interpreted as an area within the separated bike lane as opposed to the intended parking space, which is adjacent to the curb, planter, median or painted line that delineates the separated bike lane and the portion of roadway intended for motor vehicles.

Accordingly, staff recommend that the definition of a metered space in the Parking Meter Bylaw be amended to define a metered space relative not only to the curb, but to the curb, planter, median or painted line that delineates the separated bike lane and the portion of roadway intended for motor vehicles.

Bikeway Enhancements

Budget: \$200,000 (part of ongoing spot improvement program) Source of funds: 2013 Active Transportation Corridors and Spot Improvements

Background/context

On June 2, 2009, Council approved the enhancement of existing City bikeways through:

- the addition of traffic calming measures to reduce traffic volumes and speeds;
- the reduction of speed limits on local bikeways to 30 km/h; and
- limiting the addition of new driveways on existing and planned bikeways.

The approval of these measures predated the adoption of *Transportation 2040*, but they are consistent with the direction of the new Transportation Plan to make cycling safe, comfortable, convenient and fun for people of all ages and abilities.

Following Council approval of these bikeway enhancements, staff implemented trial diversionary calming measures (mostly median barriers) at six locations through the city. The intent of these measures was to reduce non-local traffic volumes on the affected bikeways to make cycling safer and more comfortable. The program also provided an opportunity to learn more in the lead up to *Transportation 2040* about how additional diversionary measures would function in a variety of bikeway conditions (e.g., with a range of different existing traffic levels). The locations were selected based on the following general criteria:

- Higher than desirable traffic volumes on the bikeway;
- History of complaints from road users and nearby residents about safety and comfort on the bikeway;
- Lack of other diversionary traffic calming measures on the bikeway in the area;
- Feasibility of implementing physical measures within the existing street;
- Presence of existing signal infrastructure allowing for easier implementation; and
- Presence of adjacent schools affected by higher traffic volumes and speeds.

It should also be noted that a variety of other improvements were implemented on the existing bikeway network through this program. These included new traffic circles and curb bulges, signage and pavement markings, and traffic signal upgrades, among others.

The trial diversionary measures were implemented in 2010 and 2011 with advance notification to residents and schools within the affected areas. Residents were invited to provide feedback on the implementation plans, but no additional consultation was undertaken before measures were installed. Council approval of the bikeway enhancement program in June 2009 gave staff the discretion to make these measures permanent where neighbourhood impacts could be managed and to report back on measures that generated significant public concern.

Through this report, staff are providing Council with an update on all of the diversionary calming measures that were implemented through this program, including traffic monitoring results and lessons learned by staff that will contribute to an improved public process for undertaking future spot improvements on the bikeway network. On Council direction in 2012,

two of the initial six diversionary measures have since been removed because they led to substantially increased traffic in front of two elementary schools. As outlined in the following sections, staff intend to proceed with making the remaining four measures permanent, recognizing the overall cycling safety and comfort benefits on these bikeways.

Consultation

The bikeway enhancement program was undertaken with Council support for an accelerated public process. The intent was to enable relatively quick implementation of measures that would have a high likelihood to improve comfort and safety on our bikeways. In the past, individual traffic calming measures had typically been subject to neighbourhood surveys to determine level of support. The City's general policy was to require at least 60% support from survey respondents within an area affected by the traffic calming measure.

However, it is increasingly recognized that bikeways generate benefits that go well beyond individual neighbourhoods, so impacts on access and traffic patterns and public response to diversionary measures at a localized level need to be balanced against broader positive outcomes for reaching the City's long-term mode share, liveability, and safety goals.

Although most of the original measures have been successful in contributing to the City's long-term goals to build a safe and comfortable cycling network, it must be acknowledged that this modified approach has been challenging for both staff and the general public. This program generated a significant volume of phone and e-mail correspondence for staff response. We received significant feedback from most locations that the approach taken to notification and limited opportunity for public input was frustrating and not inclusive. We acknowledge that there were shortcomings in this accelerated public process.

This provides us with an opportunity to learn and to adjust our approach to similar projects in the future. As an outcome of *Transportation 2040*, the City is now undertaking a more comprehensive and systematic spot improvement program for the City's cycling network. Future spot improvement projects similar to these enhancements will first be analyzed by staff for overall alignment with our goals and possible unintended consequences, and will be undertaken with a higher level of public engagement and opportunity for feedback. This will be balanced with the recognition of the City-wide and regional benefits realized with the provision of a safe, comfortable and convenient cycling network that accommodates people of all ages and abilities. Therefore, impacts on other streets will likely occur to achieve these broader *Transportation 2040* goals, but they will typically be manageable.

Summary of Outcomes & Next Steps

The implementation of these six diversionary traffic calming measures on existing bikeways gave staff the opportunity to learn from and adapt different processes to address traffic and safety issues on our cycling network.

Key lessons learned from this process include the following:

• The City should undertake a more in-depth review of potential consequences before implementation of diversionary measures. In particular, potential impacts on other vulnerable road users, such as young students and seniors, must be considered thoroughly.

- Installation of isolated diversionary measures on streets carrying more than 2000 motor vehicles per day is challenging and may not achieve the City's goals for traffic volume and comfort on bikeways. Traffic demands on these streets may be so high that more extensive interventions, or alternate cycling treatments (such as separated bike lanes) or routings, may be necessary. Impacts of traffic diversion to other streets can also be challenging to manage.
- On streets with moderate volumes (approximately 1000-2000 vehicles per day before implementation), impacts on parallel streets generally subside over time and are often manageable. There may be immediate concerns with increased traffic on parallel streets, but traffic volumes tend to stabilize to a manageable level. Modest increases in volume on other streets need to be balanced against the citywide and regional benefits gained from providing a safe and comfortable cycling network.
- Benefits on a bikeway may be localized, depending on the community destinations in the vicinity. Sustained benefits extending over longer bikeway segments may be more difficult to achieve where regionally significant destinations (such as hospitals and large community centres) have direct access to/from bikeways.
- Diversionary traffic calming measures located within neighbourhoods are often violated as a result of less overall public surveillance. Certain measures, such as partial closures, medians and right-in/right-out diverters, are more likely to be violated by motorists when there is less traffic in the vicinity. More self-enforcing measures, such as full closures and diagonal diverters, are less likely to be violated in residential areas.
- Temporary calming measures may, in some cases, be easily violated. Some measures, particularly right-in/right-out diverters, are relatively easy to violate, even when located at major intersections. It is preferable to implement permanent measures that reduce the likelihood of violations. In most cases, it is less costly to implement permanent measures, even if it means removal, due to increased maintenance costs.
- If temporary measures are used, they should be implemented with visually appealing materials. Residents are justifiably proud of their neighbourhoods and want traffic control measures to integrate well with existing infrastructure. Traffic calming measures, even temporary ones, should be designed to contribute to the public realm rather than detract from it.

The lessons learned from this program are now being integrated into the more formalized bikeway spot improvement program (Action C 1.2.4 from *Transportation 2040*), which seeks to address safety "hotspots" and emerging safety, comfort, and bicycle capacity issues on the existing cycling network. This program will incorporate more robust analysis and public engagement strategies to mitigate the concerns arising from the 2009 bikeway enhancements program. The new spot improvement program arising from *Transportation 2040* will include similar measures to those used for this earlier program (i.e., diversionary measures), but staff will integrate the key lessons described above into our new processes for implementing future measures on the bikeway network.

The tables below provide a more detailed summary for each of the six locations implemented through the bikeway enhancements program, outlining key features, outcomes, lessons and action plans.

E 45th Avenue (Ridgeway Greenway)

Two diversionary measures were implemented on E 45th Avenue:

- Right-in/right-out diverter on the west leg of the Rupert Street intersection; and
- Bicycle-permeable median on Elliott/Clarendon Street.

Table 1: Summary of Outcomes for Right-In/Right-Out Diverter at E 45th Ave and Rupert St

Measure	Outcome	Evaluation
Traffic volume on bikeway	71% reduction, but volume remained	Positive
	above 1000 veh/day	
Traffic speed on bikeway	No change	Neutral
Traffic volume on parallel street(s)	129% increase on E 44 th Ave	Negative
Traffic speed on parallel street(s)	No change	Neutral
Overall neighbourhood traffic	Significant reduction	Positive
Impact on pedestrians, schools	129% increase in traffic at front of	Negative
	Weir Elementary School	
Frequency of illegal manoeuvres	Very high, but likely could be	Negative
	addressed with permanent measure	
Resident/stakeholder concerns	Moderate negative response	Negative
Summary & Key Lessons		

This measure had a very beneficial impact on the bikeway in terms of traffic reduction (from almost 4000 veh/day to approximately 1100 veh/day west of Rupert Street), but volume remained above desirable levels. This is likely because the street was carrying such high volumes before implementation that even more aggressive calming techniques would have been necessary to achieve the City's volume targets. As well, the ease with which motorists could violate the measure likely contributed to volumes remaining relatively high. This suggests that the busiest local street bikeways (greater than 2000 veh/day before implementation) may be overly challenging to calm effectively without much more extensive interventions and without unacceptable impacts on other streets. With this and similar right-in/right-out diverters at arterial streets, we have learned that they are relatively easy to violate and should generally be considered only after other more self-enforcing measures have been evaluated or should incorporate additional features to discourage violations.

The impact of diversion resulting from this measure on the adjacent elementary school was unacceptable, with traffic volumes more than doubling in front of the school despite the addition of turn restrictions on to E 44th Ave during the school peaks. Ultimately, the high level of diversion to the E 44th Avenue - fronting Weir School - led to the decision in mid-2012 to remove this measure.

Action Plan

Per Council approval in May 2012 (RTS 9554), the **diverter was removed** in Fall 2012. Since that time, curb bulges were constructed on each side of Rupert Street at this intersection to improve pedestrian conditions. West of this location, curb bulges and two raised pedestrian crossings were also constructed on E 45th Ave at Vivian and Earles Streets.

Traffic volumes on the bikeway west of Rupert Street were recently measured at approximately 2700 veh/day, compared to 1100 veh/day with the diverter but still lower than the pre-implementation volume of 3900 veh/day. Therefore, despite the outcome, there has been an overall neighbourhood benefit from this trial program.

Recognizing that the Ridgeway Greenway is again carrying high traffic volumes that make it uncomfortable for people of all ages and abilities, the City is also implementing a local connector bikeway on E 46th Avenue and through Killarney Park.

Measure	Outcome	Evaluation
Traffic volume on bikeway	64% reduction, but volume remained above 1000 veh/day	Positive
Traffic speed on bikeway	No change	Neutral
Traffic volume on parallel street(s)	120% increase on E 46 th Ave east of	Negative
	Clarendon St	
Traffic speed on parallel street(s)	No change	Neutral
Overall neighbourhood traffic	Significant reduction	Positive
Impact on pedestrians, schools	30% increase in traffic at front of	Negative
	Waverley Elementary School	
Frequency of illegal manoeuvres	Moderately high, with safety	Negative
	concerns (U-turns on arterial street)	
Resident/stakeholder concerns	Significant negative response,	Negative
	particularly from residents	
	northwest of intersection (where	
	access was already challenging) and	
	on E 46 th Ave	

Table 2: Summary of Outcomes for Bicycle-Permeable Median at E 45th Ave and Elliott/Clarendon St

Summary & Key Lessons

This measure had a very beneficial impact on the bikeway in terms of traffic reduction (from 4000 veh/day east of Elliott/Clarendon Street to approximately 1500 veh/day), but volume remained above desirable levels. Similar to the diverter at Rupert Street just to the east, this is likely because the street was carrying such high volumes before implementation that even more aggressive calming techniques would have been necessary to achieve the City's volume goals. This suggests that the busiest local street bikeways (greater than 2000 veh/day before implementation) may be overly challenging to calm effectively without much more extensive interventions and without unacceptable impacts on other streets.

The impact of diversion resulting from this measure on the adjacent elementary school, and on E 46th Avenue in general, was unacceptable, with traffic volumes increasing 30% in front of the school. There were also concerns about the safety of students walking to and from the school. Ultimately, the high level of diversion to E 46th Ave – fronting Waverley School – led to the decision in mid-2012 to remove this measure.

Action Plan

Per Council approval in May 2012 (RTS 9554), the **diverter was removed** in Fall 2012. Since that time, curb bulges were constructed at the intersection to improve pedestrian conditions. East of this location, curb bulges and two raised pedestrian crossings were also constructed on E 45th Ave at Vivian and Earles Streets.

Traffic volumes on the bikeway east of Elliott/Clarendon Street were recently measured (April 2013) at 2600 veh/day, compared to 1500 veh/day with the diverter but still down from the 4000 veh/day before the barrier was installed. Between Vivian and Earles Streets (midway between Elliott/Clarendon Street and Rupert Street), the traffic volume is now approximately 3000 veh/day. Therefore, despite the outcome, there has been an overall neighbourhood benefit from this trial program.

Recognizing that the Ridgeway Greenway is again carrying high traffic volumes that make it uncomfortable for people of all ages and abilities, the City is also implementing a local connector bikeway on E 46th Avenue and through Killarney Park.

Ontario Greenway

Two diversionary measures were implemented on Ontario Street:

- Bicycle-permeable median at E 29th Avenue/Peveril Avenue; and
- Bicycle-permeable median at 41st Avenue.

Table 3: Summary of Outcomes for Bicycle-Permeable Median at Ontario St and E 29th/Peveril Ave

Measure	Outcome	Evaluation
Traffic volume on bikeway	19% reduction, but volume remains above 1000 veh/day two blocks from diverter	Positive
Traffic speed on bikeway	No change	Neutral
Traffic volume on parallel street(s)	Some increase, including 120% increase on James Street, but all remaining well below 1000 veh/day; since Riley Park Community Centre closure, James Street volume has declined 25% from peak	Neutral
Traffic speed on parallel street(s)	No change	Neutral
Overall neighbourhood traffic	No change	Neutral
Impact on pedestrians, schools	Reduced traffic near major pedestrian access to Hillcrest Community Centre	Positive
Frequency of illegal manoeuvres	Moderate violations, with safety concerns expressed by residents	Negative
Resident/stakeholder concerns	Mixed response	Neutral
Summary & Key Lessons		

This measure has had a moderately beneficial impact on the bikeway in terms of traffic reduction (from over 2000 veh/day north of E 28th Avenue to 1700 veh/day). In the immediate vicinity of the diverter, volumes are lower. The primary public concerns relate to increased traffic on James Street, one block to the east of Ontario Street, and to violations of the diverter (U-turns, illegal left turns, and motorists driving through gaps in the barrier). Although traffic initially doubled on James Street, it has declined 25% from its peak since closure of the Riley Park Community Centre. Concerns remain about speeds on James Street and in the lane between James and Ontario Streets, although data show no change in speeds.

A key lesson from this installation is that violations tend to be an issue at diverters located in residential neighbourhoods. This tends to be a less significant issue where diverters are located at arterial streets, because violations are visible to more people and additional traffic on the arterial makes it more challenging. Therefore, more self-enforcing, permanent installations may be considered where violations may be expected to occur.

Traffic volumes further from the barrier remain well above 1000 veh/day, showing that benefits of this installation have been fairly localized and that it can be challenging to reduce traffic near major community destinations like Hillcrest. Staff are satisfied that diversionary measures on Ontario Street will be of benefit to the greenway; however measures in other locations may produce better results.

Staff intend to make a diversionary measure in this general area permanent, pending the outcome of the Hillcrest/Riley Park Master Plan, Little Mountain redevelopment planning, and further consultation on developing Ontario Street as an all-ages-and-abilities cycling route (as highlighted in *Transportation 2040*). Until then, staff intend to leave the temporary measure in place but may make further

adjustments to address violations.

Measure	Outcome	Evaluation
Traffic volume on bikeway	27% reduction	Positive
Traffic speed on bikeway	No change	Neutral
Traffic volume on parallel street(s)	Modest increase, but all streets	Neutral
	remain below 1000 veh/day	
Traffic speed on parallel street(s)	No change	Neutral
Overall neighbourhood traffic	Slight reduction	Neutral
Impact on pedestrians, schools	Reduced traffic at front of Van	Positive
	Horne Elementary School; safer	
	pedestrian crossing of 41 st Ave	
Frequency of illegal manoeuvres	Few reported	Neutral
Resident/stakeholder concerns	No significant response	Positive

Summary & Key Lessons

This measure has had a modest benefit to the bikeway (volume reduced from 1200 veh/day to 900 veh/day south of 41st Avenue), but the pre-implementation traffic volume was already lower than at the other five trial locations. The measure was implemented in response to requests from residents south of 41st Avenue after a temporary right-in/right-out was installed on the north leg of the intersection as part of the Canada Line traffic management plan. The width of 41st Avenue made it relatively easy to install.

There has been almost no public response to this measure.

Action Plan

Staff intend to make this measure permanent in 2013 with a standard poured concrete median and new pedestrian curb ramps.

Heather Bikeway at W King Edward Ave

At this intersection, a bicycle-permeable median was implemented by closing the existing gap in the landscaped median on W King Edward Avenue.

Table 5: Summary of Outcomes for Bicycle-Permeable Median at Heather St and W King Edward Ave

Measure	Outcome	Evaluation
Traffic volume on bikeway	38-43% reduction on bikeway, with	Positive
	volume south of King Edward	
	remaining above 1000 veh/day	
Traffic speed on bikeway	Slight reduction	Positive
Traffic volume on parallel street(s)	Substantial increase on some	Neutral
	streets, but all remain at or below	
	1000 veh/day	
Traffic speed on parallel street(s)	Slight reduction on most measured	Positive
	streets	
Overall neighbourhood traffic	Slight reduction	Neutral
Impact on pedestrians, schools	Safer pedestrian crossing of King	Positive
	Edward Ave (fewer conflicts)	
Frequency of illegal manoeuvres	Few reported	Positive
Resident/stakeholder concerns	Modest negative response	Neutral
Summary & Key Lessons		

This measure has had a beneficial impact on the bikeway in terms of traffic reduction (from over 2000 veh/day to 1350 veh/day south of W King Edward Avenue). North of the diverter, volumes dropped to approximately 700 veh/day on Heather Bikeway. South of the diverter, volumes remain above desirable levels on the bikeway, likely because there remains an access to BC Women's and Children's Health Centre from Heather Street. This driveway will eventually be closed to public access as the hospital redevelops, which staff anticipate will have a beneficial impact on the bikeway.

Volumes on parallel north-south streets increased, with the biggest impact observed on Ash Street, one block to the east. Nonetheless, volumes remain at or below 1000 veh/day on Ash Street. Closure of the hospital access at Heather Street will likely benefit Ash Street south of W King Edward Avenue.

Much of the public response relates to perceptions of increased traffic speeds and volumes on other streets in the area, and to the visual impact of the temporary barrier. Data actually show slight reductions in speeds on other local streets and on Heather Street itself. Staff acknowledge that the temporary barriers used at this location are obtrusive and unattractive. For future projects, staff would seek out other, less obtrusive temporary infrastructure that makes a more positive contribution to the public realm.

The presence of the wide, landscaped median at this location presented a significant opportunity to simply close the gap at Heather Street to motor vehicles. This will provide an increase in green space and a wide refuge for both pedestrians and cyclists.

Action Plan

Staff intend to make this measure permanent in 2013, with a wide landscaped median consistent with existing median on W King Edward Ave.

Staff also intend to reorient existing stop signs on Heather St at W 24th Ave from north-south orientation to east-west orientation.

We are also continuing to work with BC Women's and Children's Health Centre on the planned closure of the hospital driveway on Heather Street.

Angus Drive at W 41st Ave (Cypress Bikeway)

At this intersection, a bicycle-permeable median was implemented.

Table 6: Summary of Outcomes for Bicycle-Permeable Median at Angus Drive and W 41st Ave

Measure	Outcome	Evaluation
Traffic volume on bikeway	42-73% reduction	Positive
Traffic speed on bikeway	Moderate reduction	Positive
Traffic volume on parallel street(s)	Moderate increase, but most remain well below 1000 veh/day	Neutral
Traffic speed on parallel street(s)	Slight reduction	Positive
Overall neighbourhood traffic	Slight reduction	Neutral
Impact on pedestrians, schools	Safer pedestrian crossing of W 41 st	Positive
Fraguancy of illogal manageurras		Noutral
riequency of megal manoeuvies	added to address	Neutrai
Resident/stakeholder concerns	Significant negative response	Negative
Summary & Key Lessons		

This measure has had a very beneficial impact on the Cypress Bikeway (Angus Drive) in terms of traffic reduction (from 1400 veh/day south of W 41st Avenue to approximately 400 veh/day). North of the diverter, volume is now approximately 900 veh/day, down from 1600 veh/day.

Volumes on parallel north-south streets increased after implementation, but have since declined back to near pre-implementation volumes. All local streets measured in the area are now carrying less than 1000 veh/day, some much less than 500 veh/day.

This measure generated substantial negative public response after implementation, particularly from residents on parallel north-south streets, who observed higher volumes on streets perceived to be too narrow to accommodate any increase in traffic. Staff organized and attended two public meetings in July 2011 to give residents an opportunity to express their concerns. Staff committed to additional data collection and added collection locations based on public feedback. The traffic data compiled in the subsequent collection phase are as reported above.

In addition to concerns about volumes and speeds, there are also concerns about safety around the barrier, at nearby intersections, and in the neighbourhoods north and south of W 41st Ave. Staff analysis indicates that there has been no notable change in collision frequency on W 41st Avenue since implementation of the barrier. Staff recognized particular safety concerns at the intersection of W 37th Avenue (Ridgeway Greenway) and Marguerite Street, analysis of which confirmed conflicts associated with traffic circle operations. In response and in coordination with utility work in the area, crews have since removed the traffic circle that was previously at the intersection. Curb bulges will be installed at the intersection when further utility work is complete.

Another significant public concern relates to the visual impact of the temporary barrier. Staff acknowledge that the temporary barriers used at this location are obtrusive and unattractive. For future projects, staff would seek out other, less obtrusive temporary infrastructure that makes a more positive contribution to the public realm.

Action Plan

Staff intend to make this measure permanent with a standard poured concrete median.

Timing of final construction is subject to completion of Metro Vancouver water main project along Angus Drive, currently anticipated in late 2013 or 2014 (subject to Metro Vancouver scheduling). Until then, staff intend to leave the temporary measure in place.