



Burrard Bridge Renewal and Transportation Improvement Project



Transportation Association of Canada
2018 Sustainable Urban Transportation Award Submission

Nominee: Ross Kenny, P.Eng.
February 21, 2018

Background

The City of Vancouver has very ambitious environmental, social and economic agendas, guided by a comprehensive set of long-term strategies that includes the Greenest City 2020 Action Plan and Transportation 2040. Both documents set the following transportation goal: that 50% of trips in 2020 be made by walking, cycling and transit, up from 40% in 2008. Given that this goal was reached in 2015, City Council recently adjusted the goal to 55% by 2020.

Burrard Bridge is one of three City-owned bridges that cross False Creek, a body of water separating the high-density downtown core and medium-density neighbourhoods to the south. It is currently the busiest Active Transportation crossing in Metro Vancouver, with about 10,000 trips per day on foot and bicycle (summer volume).

Burrard Bridge was opened in 1932 as a six-lane vehicular bridge with sidewalks on both sides. The bridge was built in the Art Deco style and City Council included it on the City's Heritage Register in 1986. Over the years, the City has completed a series of rehabilitation projects and upgrades to keep the bridge safe and functional. These types of investments will continue in the future.

The role of the bridge has evolved over the years, primarily in response to accommodating a growing number of cyclists using the bridge. Prior to 2009, people walking and cycling shared the sidewalks on both sides of the bridge. As the number of people crossing the bridge using active transportation grew, the shared sidewalk increasingly became a safety hazard for pedestrians and cyclists. Safety was a particular issue for people cycling, as they were directed to ride in a narrow area adjacent to motor vehicle traffic and a minor error (or conflict with a pedestrian) could cause them to fall off the sidewalk onto the roadway. In 2009, the City reallocated a southbound travel lane from general purpose traffic and prohibited pedestrians from using the east sidewalk in order to create a protected bicycle lane in each direction. Since then, walking and cycling volumes have increased significantly with cycling growing by over 30%.

In July 2015, after extensive public engagement, City Council approved a permanent solution that converts a northbound travel lane to a protected bicycle lane and reinstated the east sidewalk for pedestrians. The bridge structure on the north end was widened to maintain current vehicle capacity and the intersection of Burrard St and Pacific St was redesigned as a protected intersection to improve the safety of all road users.

Evaluation Criteria Alignment

Sustainable Transportation

The City's long range transportation plan, Transportation 2040, is about more than just mobility. The plan includes a number of goals that fall under the three pillars of sustainability. Together they address the challenges Vancouver faces and support an economically, environmentally and socially sustainable city.

The Burrard Bridge is a major gateway between Downtown Vancouver and the western part of the city, directly connecting two of the largest employment districts in the Province. It is one of the busiest active transportation corridors in the city with over 10,000 walking and cycling trips on a busy summer day. It also carries approximately 55,000 motor vehicles, 13,000 transit passengers, and 500 trucks on a typical day.

Social

Walking and cycling upgrades to the Burrard Bridge facilitates and encourages active lifestyles by providing people of all ages and abilities with comfortable and affordable options to travel throughout the city. The project also addresses existing safety issues on the bridge and in the intersection, contributing to the City's efforts of eliminating all traffic-related fatalities.

Economy

The Burrard Bridge, one of three major bridges crossing into the Downtown Vancouver peninsula, enables the exchange of goods and services throughout the city. It also supports the local economy by providing inexpensive transportation options that make it easier for households to go car-lite or car-free. Lastly, the Burrard Bridge and its supporting Seawall is a tourist destination on its own and upgrades to the bridge will continue to support the city's role as an international destination, major port and the Asia-Pacific gateway.

Environment

Transportation 2040 sets a mode share target of having at least two-thirds of all trips made on foot, bike and transit by 2040. In 2009, the City reallocated a southbound travel lane and the east sidewalk to create protected bike lanes. In 2014, the City constructed its first protected intersection at the south end of the Burrard Bridge. Since then, total annual cycling trips across the Burrard Bridge has increased by over 30%. With new safety improvements to the bridge and the north intersection now completed, the City is expecting walking and cycling trips to further increase and the number of kilometres travelled by Vehicle (VKT) to decrease, reducing fuel consumption and emissions. The project also maintains the existing tree canopy and will be planting 60 additional trees at the intersection and in the surrounding block, contributing to a greener and more sustainable environment.

Degree of Innovation

The Burrard Bridge Renewal and Transportation Improvement Project provide safety improvements for all road users. For decades, the City researched how to accommodate safe cycling on the bridge. Options included widening the entire bridge to maintain the same number travel lanes, sidewalks and protected bike lanes. The City also studied the feasibility of a separate cycling bridge across False Creek or adding a raised platform above the sidewalk. All of these options would have been more costly and would have impacted the historic character of the bridge.

Recognizing that congestion is controlled by the intersections and not the number of lanes on the bridge itself, the City reallocated a northbound travel lane to a protected bike lane and widened approximately 100m of the 859m bridge on the north to accommodate a protected intersection and existing vehicle volumes. A micro-simulation model determined that the impact of converting a northbound travel lane to a protected bike lane had minimal impact to motor vehicle travel times while the project significantly increasing the people carrying capacity.

The new protected intersection at Burrard St and Cornwall St, the second in Vancouver, is expected to improve safety and reduce collisions at the City's second-highest collision location.

Transferability to other Canadian Communities

Communities across Canada are encouraging sustainable transportation by providing people with safe walking and cycling options through the reallocation of road space. The project provides an example of how the City is able to achieve win-win for all road users by providing a comfortable and desirable place for people to walk and cycle while maintaining existing vehicular capacity and improving the safety of the intersection.

Added Value

Through the Burrard Bridge project, The City partnered with Vancouver Heritage Foundation, Royal United Services Institute, and Veterans Affairs Canada to restore and relight the original memorial braziers installed on the bridge in honor the of sacrifices made by Canadian soldiers.

The City also partnered with Vancouver Coastal Health to install suicide means prevention fencing and crisis phones on the bridge as key measures to help prevent suicides.

Project Components

Walking and Cycling Improvements

In July 2015, after extensive public engagement, City Council approved a permanent solution that will provide more space for pedestrians and cyclists, so that both user groups have safe and comfortable spaces as they travel over the bridge. The project converts a second vehicular traffic lane to a 2.5 m wide bicycle lane and reintroduces pedestrians to the east sidewalk for improved walking connectivity, particularly for destinations on the east side of the bridge, and provides enhanced public views of False Creek for people walking.

The intersection improvements also include new physically separated bike facilities that extend at least 1 block in all directions from the bridge. These new facilities will better connect the Burrard Bridge to the downtown for people cycling and provide an opportunity to extend the protected cycling network further into the downtown in the future.

Transit and Motor Vehicle Improvements

According to the Insurance Corporation of British Columbia, the intersection of Burrard St and Pacific St on the north end of the bridge has been the second-highest collision location in the City of Vancouver for several years. The most frequent collision types include rear end collisions in the right-turn channel onto the bridge, along with collisions between vehicles merging onto the bridge and southbound vehicles.

To address the safety concern and improve travel time reliability, the intersection of Burrard and Pacific was completely redesigned with the removal of the slip lanes on and off the bridge, and replaced with protected signal phasing for all modes. With the exception of a low-volume westbound to northbound right turn, all movements would be signalized to eliminate conflict between vehicles and people walking and cycling. It is anticipated that this will significantly reduce collisions of all types.

In order to maintain current motor vehicle capacity through the Burrard-Pacific intersection, dual right turn lanes onto and off of the bridge were included in the redesign. To do this, the structure was widened by cantilevering the sidewalks on the outside of the existing. Based on micro-simulation traffic modelling, the overall impact to motor vehicle travel times is expected to be negligible.

Accessibility

Places to rest along the bridge, tactile treatments and fencing to direct visually impaired pedestrians at transition points, minimal grade changes and signals that meet current accessibility standards in Vancouver were included in the project.

Cultural Heritage and Means Prevention Fencing

The Burrard Bridge is one of the most important heritage structures in the City of Vancouver, and is significant for its Art Deco design and sculptural embellishments. Through the project, the City partnered with Vancouver Heritage Foundation, Royal United Services Institute, and Veterans Affairs Canada to restore and relight the original memorial braziers installed on the bridge in honor the of sacrifices made by Canadian soldiers. New LED pedestrian scale lighting, mimicking the original lighting installed in the 1930s was included.

Based on input from the public, stakeholders and in particular the Vancouver Coastal Health (VCH) Medical Health Officer, the City installed suicide means prevention fencing and crisis phones to help prevent suicides.

Conclusion

Transportation 2040 and the Greenest City 2020 Action Plan identify that a mode shift toward walking, cycling, and transit is critical to accommodate regional population growth and to meet our environmental targets. The recent Burrard Bridge project addresses a major gap in the walking network by once again allowing walking on both sides of the bridge. In addition, the proposal greatly improves comfort, convenience, and safety for people walking and cycling across the bridge by upgrading the Burrard and Pacific intersection and providing new or improved connections to the existing walking and biking networks, all while ensuring that transit and good movement are not compromised.

To retain the existing tree canopy, most trees were preserved, including a large Cypress tree that was likely planted shortly after the opening of the bridge in 1932. Over 60 new trees will be planted at the intersection and surrounding blocks.

The project represents a bold initiative to create a Green Transportation solution: creating safe and comfortable walking and cycling routes by reallocating road space in a dense urban environment while supporting current trips over the bridge and respecting the heritage value of the Burrard Street Bridge.

Appendix

Select pages have been uploaded from the open house materials uploaded as an appendix. The full document can be found at: <http://vancouver.ca/files/cov/burrard-bridge-pacific-street-intersection-upgrades-open-house-information-displays.pdf>.



Burrard Bridge Renewal and Transportation Improvement Project Appendix



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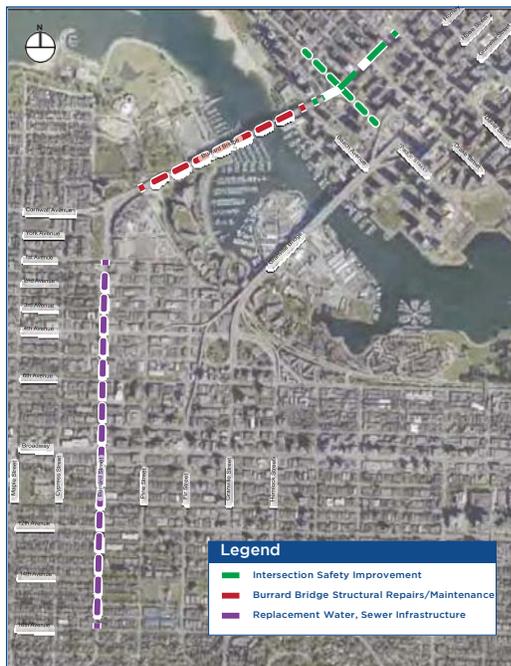
1 Welcome

We want to hear from you!

The City of Vancouver will carry out **necessary structural repairs and maintenance** to the Burrard Bridge in 2016/17.

In coordination with this work, we are proposing **safety improvements** at the Burrard and Pacific intersection, **improved connections** that enable people to walk on both sides of the bridge, and **replacement of aging sewer and water infrastructure**.

We are sharing information about construction impacts, and would like input on the design details as we finalize the plan.



Bridge repairs and intersection improvements include:

- Replace bridge railings and light fixtures, and repair sidewalks
- Improve safety for all users at the Burrard-Pacific intersection
- Enable walking on both sides of the bridge
- Improve walking and biking connections at the Burrard-Pacific intersection

Your feedback will help us refine the final design. Staff will report to City Council this summer on what was heard, along with a recommended design and implementation plan.

All the information shown today is available on our website at: vancouver.ca/burrardbridgenorth.

② Project Overview

Project Goals

The project will deliver needed **repairs** to ensure the Burrard Bridge is in good condition for many years to come.

We also propose **safety improvements** at the Burrard-Pacific intersection and **improved connections** that allow people to walk on both sides of the bridge. Doing this work at the same time will reduce overall disruption and is more cost-effective.

Key Objectives

- Make necessary repairs on the Burrard Bridge, including replacement of the railings, sidewalks and light fixtures
- Make the intersection of Burrard Street and Pacific Avenue safer for everyone, including people walking, cycling, and driving
- Enable walking on both sides of the bridge (currently not permitted on east side)
- Improve walking and biking connections
- Maintain motor vehicle capacity across the bridge
- Minimize construction impacts by coordinating required repairs with safety improvements and utility work
- Respect the heritage value of the bridge
- Maintain access to nearby businesses and residents during and after construction

1. Make Critical Repairs



Figure A



Figure B

The Burrard Bridge is more than 80 years old, and critical repairs are needed to keep it in safe condition. The first round of repairs took place in 2013-14 and included replacement of bearings and expansion joints. This round includes replacement of the crumbling railings (Figure A) and more.

2. Improve Safety

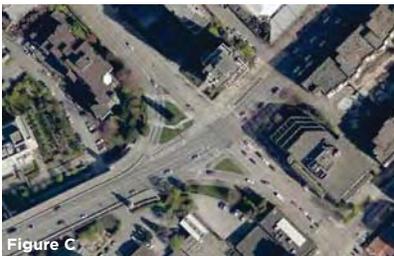


Figure C



Figure D

The Burrard-Pacific intersection (Figure C) is the second highest collision location in the city, and can be uncomfortable to access on foot or by bike. The proposed design would make it safer and more comfortable by making it more like the new protected intersection at Burrard-Cornwall (Figure D).

3. Improve Connections



Figure E



Figure F

At present, people are not allowed to walk on the east side of the bridge. The proposed design would allow walking on both sides of the bridge by making the east side (Figure E) more like the west side (Figure F).

3 In a Nutshell

10 things to know

1. The Burrard Bridge is **more than 80 years** old and major repairs are needed to keep it in good condition
2. Major safety upgrades are required to the Burrard-Pacific intersection, the **second highest collision location** in the city
3. Aging sewer and water infrastructure on Burrard St between 1st & 16th Ave and between Pacific St & Davie St **needs replacement**
4. To minimize overall disruption and reduce costs, we will **coordinate** all this work
5. Motor **vehicle flow will be maintained** by adding right turn lanes at the Pacific intersection and by widening about 100 metres of the bridge at the the intersection
6. People will again be able to **walk on both sides of the bridge**. This will be achieved by **converting a northbound travel lane** on the centre portion of the bridge and by widening the bridge at the Pacific intersection
7. All changes will **respect the heritage value** of the bridge
8. Parking will generally be **maintained**
9. During construction, **access will be maintained** across the bridge for all road users, but delays should be expected
10. The work will begin in **early 2016** and will take up to **20 months to complete**

4 Context

The western gateway to Downtown Vancouver

The Burrard Bridge is a major gateway between Downtown Vancouver and the western part of the city.

Tens of thousands of people walk, bike, take transit, and drive across the bridge every day.

The bridge is also important for moving goods and services, and is designated as a truck route.

A typical summer weekday can see over:

- 55,000 motor vehicles
- 13,000 people using transit
- 10,000 people walking or biking
- 500 trucks

Photo: Conrad Olson, Flickr

Transportation 2040 Plan

Overview

Improvements to the Burrard Bridge were **approved in principle** as part of the Transportation 2040 Plan, which was adopted by Council in 2012.

Directions include

- Improve safety: eliminate transportation related fatalities
- Increase green transportation: make at least two-thirds of all trips on foot, bike, or transit by 2040
- Make walking and cycling safe, convenient, and comfortable for people of all ages and abilities
- Manage the road network efficiently for all road users



Photo: Gord McKenna, Flickr

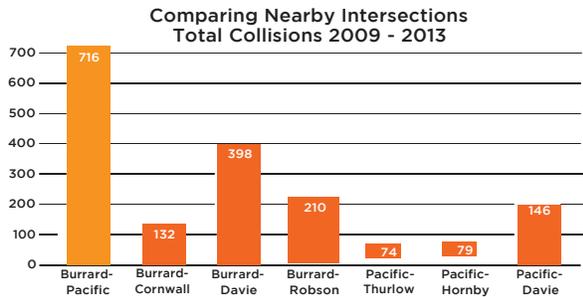
Improvements to the Burrard Bridge are timely since:

- The Burrard-Pacific intersection is the second highest collision location in the city
- There is a major gap in the walking network, as walking is currently not permitted on the east side of the bridge
- Required maintenance creates an opportunity to improve safety and enhance walking and cycling connections while accommodating existing motor vehicle demand

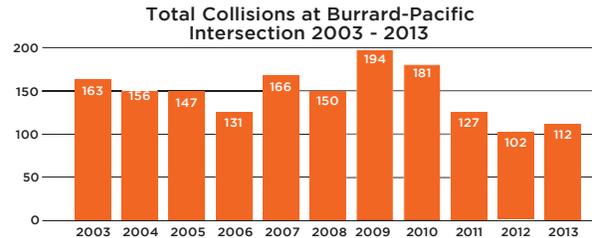
8 Improving Safety

Addressing a Collision Hotspot

The Burrard-Pacific intersection is the second highest collision location in the city.



While total number of collisions has fallen somewhat since protected bike lanes were added in 2009, it remains a high collision location.



Source: ICBC

Designing for Improved Safety



We've already made some safety improvements to the Burrard-Pacific intersection.

One issue has been southbound drivers illegally turning right from Burrard onto Pacific, colliding with people cycling straight who have the right-of-way. In 2012 we extended the 'nose' of the median to make illegal right hand turns more difficult.

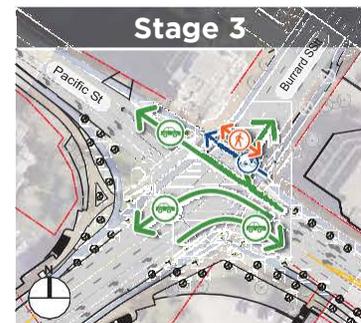
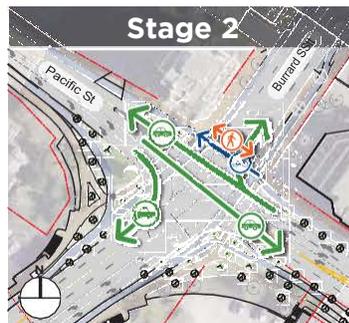
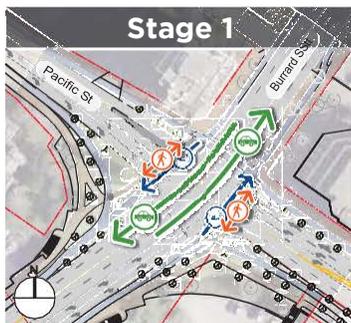
Reported bicycle-motor vehicle collisions at the intersection fell from 13 in 2011 to 4 in 2013 with the help of changes like this.

The proposed design will greatly improve safety by creating a protected intersection, similar in concept to the recently rebuilt Burrard-Cornwall intersection.

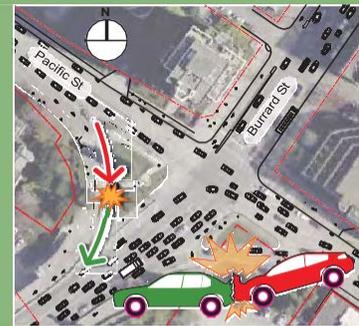
Key features include:

- Removing the slip lanes
- Creating protected signal phases for different road users and turn movements
- Increasing separation between people walking, biking, and driving

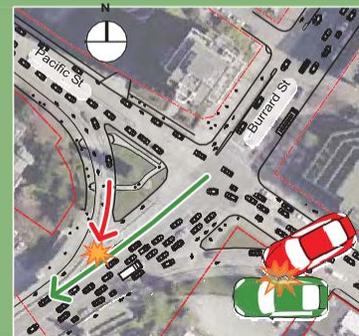
The traffic signal phasing could be as follows:



Frequent types of collisions



Eastbound drivers turning right from Pacific onto the bridge and rear-ending other vehicles in the slip lane



Eastbound drivers turning right from Pacific onto the bridge and sideswiping other vehicles

10 Heritage Value

Respecting a heritage landmark

- The Burrard Bridge opened on July 1, 1932 and is one of Vancouver's most iconic structures
- City staff worked with the heritage community to ensure the proposed design achieves the needed safety and structural improvements while also respecting the bridge's heritage significance



History, importance, and heritage features

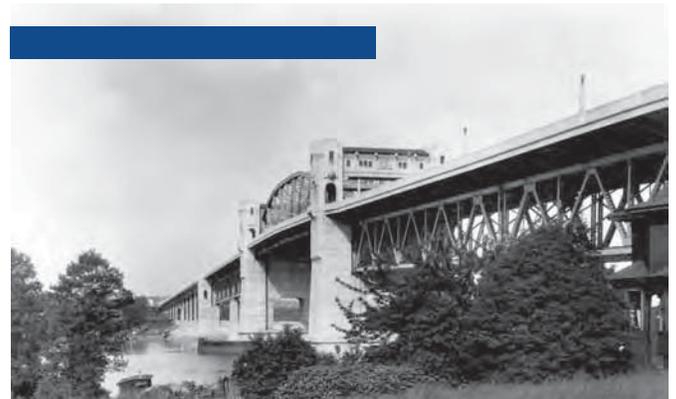
A gateway to False Creek and a key connection to downtown



- Vancouver's first high-level bridge, allowing uninterrupted flow of both marine and road traffic
- Features rivetted steel trusses both above and below the bridge deck

An important landmark

- One of Vancouver's most important examples of Art Deco style
- A defining skyline element from both the land and water
- Masonry piers extend into massive concrete towers connected by elaborate overhead galleries



Character-defining elements



- Shuttered concrete handrails offer panoramic views at roadspeeds at around 50 km/h
- Pylons at each end of the bridge feature neon-lit flaming torches, a memorial to the First World War
- Rehabilitation will allow for future reintroduction of heritage lighting poles and fixtures

11 Traffic and Parking

Maintaining traffic flow

- The completed project will have **minimal impacts** on motor vehicle travel times
- During the busiest time of the day, average travel times for motor vehicles travelling through the Burrard-Pacific intersection are predicted to be about the same
- Travel times through the intersection will become **more reliable**, since each movement will have dedicated signal time
- Projected impacts to travel times for various routes are highlighted below

Before & After Travel Times for Select Routes (PM Peak)



Solid bars indicate current travel time. Dotted bars indicate projected travel times once the project is complete. Travel times are for the PM peak period, which is the busiest time of day for the bridge. Projected travel times are based on modelling completed by independent consultants.

Preserving access and parking

- Access to all businesses, residences, and other destinations will be maintained
- Laneway access south of Pacific Street between Hornby and Howe will be modified due to changes to the street slope
- About 5 parking spots will be removed over the entire 6-block project area
- During and after construction, the City will monitor parking occupancy and adjust regulations if necessary to help maintain access for customers and deliveries

12 Walking & Biking

Safer and more convenient walking connections

The bridge is a busy walking corridor. Between 2,000 and 3,000 people cross each day on foot.

Prior to 2009, people walking and biking were forced to share a busy sidewalk, resulting in many conflicts. Safety and comfort improved after 2009 when people cycling were provided separate space; however people are no longer permitted to walk on the east side, making the bridge less convenient for some trips.

The proposed design will enable people to comfortably walk on both sides of the bridge, with fewer road crossings for trips beginning or ending east of the bridge.

Re-opening the east sidewalk



Walking is not permitted on the east side today



The proposed design includes separate walking and biking paths on both sides of the bridge

At present, people are not allowed to walk on the east side of the bridge, adding a lot of inconvenience to some trips. A walking trip from from the southwest corner of Hornby-Pacific to Granville Island requires six road crossings, for example.

By allowing walking on both sides of the bridge, and by creating a protected intersection, the new design would reduce the number of road crossings for the same trip to zero.

A safer and more connected bike network

The bridge is one of the busiest bike corridors in the region, seeing around 7,000 cycling trips on a typical summer weekday in 2014.

Major improvements for cycling have been made in recent years. With each improvement, the number of people riding across the bridge grew significantly.

The proposed design will further enhance cycling by making the Burrard-Pacific intersection safer and more convenient, and by improving connections to existing routes in the downtown.



Photo: Kathleen Corey, Flickr

In the first full year after the 2014 Burrard-Cornwall intersection improvements were made, the number of cycling trips across the bridge grew more than 25% to over 1.3 million annually.

