City of Vancouver:
Seaside Greenway Completion Project
Burrard Bridge to Jericho Beach

Transportation Association of Canada
Award Submission Package
(Sustainable Urban Transportation Award)

Introduction

In 2014, the City of Vancouver upgraded walking and cycling connections between the Burrard Bridge and the west side of Vancouver through the Kitsilano neighbourhood. The striking changes illustrated by enclosed photos include the reconfiguration of the south end of the Burrard Bridge (Appendix A), a new bikeway on York Avenue (Appendix B), and the completion of the Seaside Greenway (Appendix C), internationally known as the "Seawall", between Kitsilano and Jericho Beach parks by converting waterfront Point Grey Road from a busy arterial street into a quiet local street bikeway.

To close a gap in the 28-km Seaside Greenway, 10,000 or more daily through trips by motor vehicles were redirected from Point Grey Road to parallel streets with spare capacity. The greenway now follows Vancouver's waterfront from the convention centre along Coal Harbour on Burrard Inlet, around Stanley Park, past West End beaches, through parks and promenades around False Creek, between Olympic Village and Granville Island, and ultimately along a chain of parks on English Bay linked by the repurposed Point Grey Road. In addition to physical changes, including the connection of two previously bisected parks, Point Grey Road has dramatically changed in character and function as the ratio of bicycle traffic to motor vehicles has increased by 100 times. A typical weekend in August 2014 saw nearly 5000 daily walking and cycling trips along Point Grey Road past Volunteer and Tatlow Parks, while typical motor vehicle volumes are around 500 trips per day.

At the southern end of the Burrard Bridge, the intersection of Burrard Street and Cornwall Avenue was completely reconfigured. A sprawling combination of slip lanes and sub-intersections was replaced with a simple T intersection. For walking and cycling, five crossings of 16 traffic lanes were reduced to two crossings of 12 traffic lanes. Discontinuous painted bike lanes along two streets were replaced by four protected bike lane connections in the first North American implementation of a Dutch-style "protected intersection" for bicycle traffic. As a result,

Burrard Bridge monthly bicycle volumes have broken the previous all-time record for each month since April 2014 by up to 20% over previous records. By the end of 2014, a record 1.2 million bicycle trips had been recorded for the year (in contrast to previous years averaging 1.0 million annual bicycle trips), and a new digital count display is now in place to publicly track ridership.

Connecting Point Grey Road to the Burrard Bridge is a next-generation local street bikeway on York Avenue, featuring protected bike lanes, bicycle signals at each end, and alternating one-way streets to reduce motor vehicle volumes and speeds. Together, these changes have substantially improved local walking and cycling opportunities and enhanced sustainable transportation connections for people of all ages and abilities from Vancouver's western neighbourhoods into its downtown core.

Development and Enhancement of Sustainable Urban Transportation

The three component projects all encourage more and safer active transportation, resulting in significant social, health, and environmental benefits. By addressing gaps or deficiencies in the existing walking and cycling networks this project greatly increases the safety, convenience, and use of existing infrastructure. Changes to the intersection of Burrard Street and Cornwall Avenue reduced both motor vehicle speeds and the complexity of walking and cycling crossings. The projects enhanced cycling routes, provided walking improvements at an elementary school and filled a decades-old gap in the iconic 28-km Seaside Greenway between downtown and Vancouver's western beaches.

Each of the component projects was fundamentally about access. The Seaside Greenway on Point Grey Road extends waterfront access to people of all ages and abilities, not only for walking or cycling, but to people taking transit, driving, or even living nearby. Previously, many neighbours would not have attempted to cross Point Grey Road or enjoy parks with the noise and disruption of heavy traffic, ranging from 10,000 motor vehicle trips per day east of Alma Street to 18,000 east of Macdonald Street. Where motor vehicle parking was removed, effort was focused on identifying and improving options for people with limited mobility; for example, space within a nearby public parking lot was designated for patrons of a local seniors centre.

The new bikeway on York Avenue provides a missing link in the cycling network between the Burrard Bridge and the adjacent Kitsilano

neighbourhood, previously requiring a detour along eight uphill blocks to the nearest local street bikeway or four blocks out of direction to a narrow, indirect, and crowded multi-use path. The intersection at Burrard and Cornwall extended the walking and cycling comfort of the Burrard Bridge to connect into neighbourhood streets. Bicycle volumes on the Burrard Bridge, the primary connection from downtown Vancouver to the project area, were consistently at 1.0 million bikes trips per year from 2010 through 2013. In 2014, the year of project completion, the bridge saw 1.2 million bike trips, an important step towards Vancouver's 2040 goal of two-thirds of all trips taken by walking, cycling, and transit.

Through the reallocation of existing road space, each of the component projects was cost efficient. The Seaside Greenway on Point Grey Road took advantage of excess motor vehicle capacity on nearby W 4th Avenue between Macdonald and Alma Streets. The new bikeway on York Avenue consisted primarily of a few traffic diverters, while the section of protected bike lane worked within existing curb alignments. Although the intersection at Burrard and Cornwall was completely reconstructed, it reduced the amount of road space at the intersection by half an acre (2000 m^2) and continues to support the reallocation of road space on the Burrard Bridge for bicycles. If the improvements for walking and cycling were to be achieved without the reallocation of road space, each project would have been politically difficult, cost-prohibitive, and potentially physically impossible.

Along Point Grey Road, curbs were only relocated where necessary and the street was paved only where pavement quality was particularly poor or unsuitable for bicycle riding, and other areas were patched in recognition that future utility work will require repaving. The York Bikeway, likewise, retains the vast majority of curb alignments and pavement, even where the new protected bike lane and alternating one-way streets were added. Protected bike lanes were installed on Cypress Street without changes to existing pavement or curbs. City of Vancouver construction crews recycle aggregate where possible to minimize the amount of new material and transportation required during paving.

In addition to the environmental benefits of encouraging walking and cycling, each of the three projects added and dramatically improved parks and green spaces. Together, the projects planted 97 new trees, converted 2850 m^2 of paved surface to green space, significantly reduced the amount of paved surface at Burrard and Cornwall, added planted medians on York Avenue, Stephens Street, and Point Grey Road,

and extended Volunteer and Tatlow Parks into what was formerly roadway.

Innovation

The previous configuration of the Burrard/Cornwall intersection was complex and circuitous for people on foot, requiring up to five roadway crossings to cross the intersection. The new design is a great example of how quality multi-modal design can efficiently and safely incorporate walking, cycling, transit, and motor vehicles. The intersection protects vulnerable road users using Dutch design principles, which separate people walking and cycling from motor vehicles using corner refuge islands and protected signal phasing for all modes. The result is one of the most complete multi-modal intersections in North America.

The use of completely protected signal phases removed all permissive turning conflicts between people driving, cycling, and walking through the intersection, with separate indications for each of the six possible motor vehicle movements, two bicycle crossings, and two crosswalks. While this necessitated prohibiting motor vehicle turns on red, the careful allocation of lanes to specific turning movements and lack of any conflicts with people walking or cycling means the available signal time can be used much more efficiently, minimizing rush hour queuing and congestion. Additionally, a less complicated intersection with a smaller footprint reduced the length of crossings and required minimum and clearance signal phases. As a result, traffic flows smoothly and more safely through an intersection with 25% fewer lanes for motor vehicle traffic.

The reallocation of road space was also used to create a new bikeway on York Avenue, and, most dramatically, to complete the Seaside Greenway on Point Grey Road. The City of Vancouver has had some experience using traffic calming to transform arterial streets in residential areas to low-volume local streets, such as Chilco Street in the West End and the Central Valley Greenway along Grandview Highway North. These previous successes helped encourage the City and validate high-level calculations, model outputs, and engineering judgement. Although the proposal was contentious, including a record number of speakers to Council, previous projects have found that it is often more difficult to reallocate parking space than travel space. By preventing through motor vehicle travel completely, walking and cycling goals could be met with limited impacts to local access and parking.

Analysis of impacts to motor vehicles relied on hundreds of individual vehicle counts and dozens of intersection turning movement counts, as well as a projection of how motor vehicle traffic would redistribute on to the network based on an EMME model.

Study area data collection also included dozens of before and after counts of people walking and cycling, including age and gender demographics and intersection turning movements. Manual counts were conducted over 12-hour periods on weekdays and weekends to capture a full picture of how walking and cycling ridership varied, especially in locations where automatic counters could not be used (such as in mixed traffic). Several permanent automatic bicycle count stations have now been installed, including a custom installation at the south end of the Burrard Bridge featuring a display of daily and annual total bicycle ridership.

Many of these new bicycle count stations were operational by August 2014. On Point Grey Road west of Macdonald Street, counters recorded daily averages of 2700 midweek and 3300 weekend bicycle trips in August 2014. Midweek manual counts before the project typically showed a few hundred bicycle trips (one sample count from August 2012 indicated approximately 600 trips in one day), and overall the results suggest at least a tripling in bicycle ridership.

More than 50 public open houses, stakeholder workshops, and local resident/business group meetings were held as part of the formal two-phase consultation process, but additional feedback was received during the development of the city-wide transportation plan and between Council approval and the completion of construction. Design changes arising through consultation included wider sidewalks between a park and seniors centre, an additional walking and cycling traffic signal, an innovative residential garage design to avoid a parking bay, additional sidewalks, changes to the alternating one-way street pattern, and raised crosswalks adjacent to an elementary school. Changes during and after main construction included a connection between the protected bike lane and adjacent elementary school, measures to provide additional visibility at intersections, the relocation and minimization of signs to improve views for people walking, the installation of additional bollards, and a shorter private driveway that increased green space while better accommodating emergency response.

In recognition of wide-ranging improvements for all modes of transportation, an innovative package of funding sources was developed that leveraged $3.5 million from the City of Vancouver’s 2012-2014

Capital Plan for Active Transportation Corridors to fund the total $12 million project cost including:

- $4.3 M in Development Cost Levies
- $1.0 M from the TransLink Major Road Network and Bike Program
- $1.8 M from funding sources for new and upgraded signals
- $0.5 M from funding sources for transit improvements
- $0.9 M from funding sources for new and upgraded sidewalks, curb ramps, and local streets

Transferability to other Canadian Communities

The redesigned Burrard/Cornwall intersection incorporates several distinct design elements that are, on their own, not unusual in Canada. Although the details of their combination are unique to North America, many jurisdictions will already have experience with elements including:

- Reconfiguration or normalization of large intersections with slip-lanes and other infrastructure favouring high speed travel into compact and intuitive intersections favouring walking and cycling safety, comfort, and convenience
- Introduction of protected signal phasing to eliminate permissive signal conflicts between people driving motor vehicles, people walking, and (less commonly) people cycling
- Provision of corner or median refuges for people waiting to cross on foot or (less commonly) bicycle

Similarly, many jurisdictions will be familiar with basic traffic calming principles, though their application to busier arterial streets such as Point Grey Road is not as common.

The design elements used, particularly the walking and cycling components of the new Burrard/Cornwall intersection, are some of the first of their kind built in North America. Their successful application in Vancouver proves that these formerly European design approaches can be used in Canada, and that they transcend any differences in culture.

- Unidirectional and bidirectional protected bike lanes on and along arterial streets and busier local streets
- Traffic calming through the use of alternating blocks of one-way street for motor vehicle traffic (with bicycle traffic exempted)
- Traffic calming through the expansion of parks and green spaces into street dedication and conversion of roadway to bicycle path

- Green surface treatment to identify conflict areas between bicycle and motor vehicle traffic, and to serve as passive wayfinding

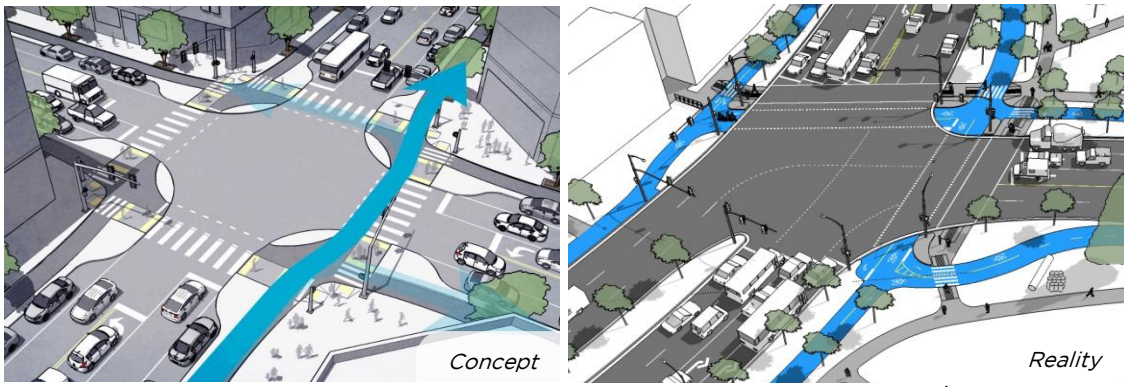
The projects also demonstrate the value of continual network monitoring, both to identify opportunities to reallocate road space, but also to make ongoing adjustments to traffic signal timings.

The wide-ranging public consultation process also gives other communities a sense of an appropriate level of public engagement for a larger active transportation project, with two phases of open houses and more than 50 meetings with interested members of the public and business community. Some more innovative components included a business intercept survey, resident workshops focused on particular blocks, and a parallel public process to engage students from local elementary and high schools.

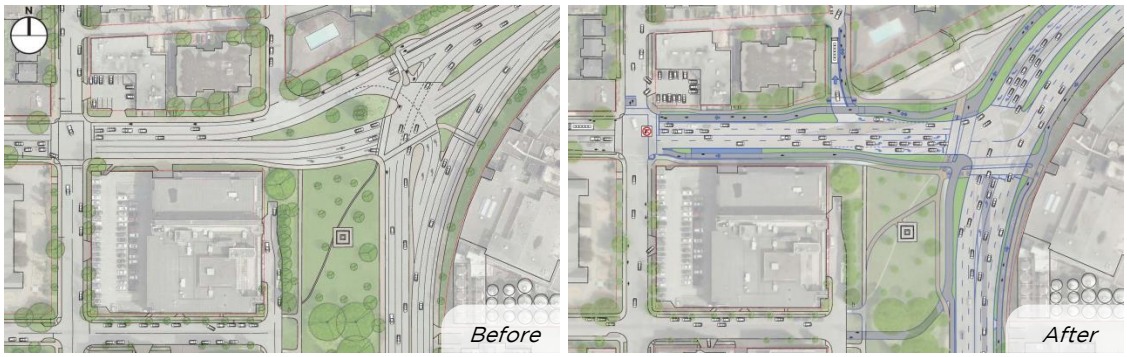
Added Value

The project was featured in an on-line video that has received substantial social media attention in Vancouver and across North America: http://vimeo.com/kathcorey/seacycles

Appendix A: South End Burrard Bridge Improvements



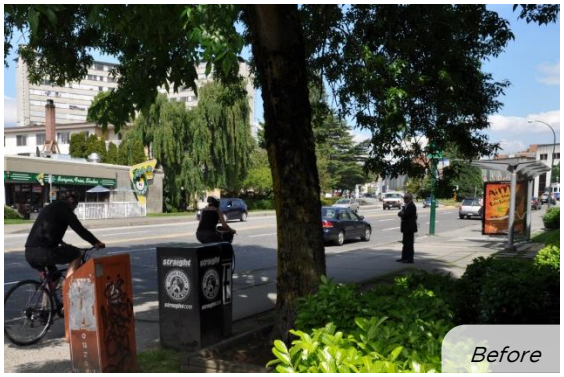
Comparison of Nick Falbo's Protected Intersection concept to Burrard/Cornwall

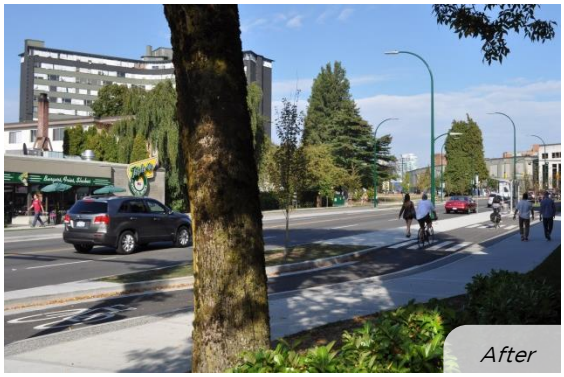


Normalization of Burrard/Cornwall intersection in plan view

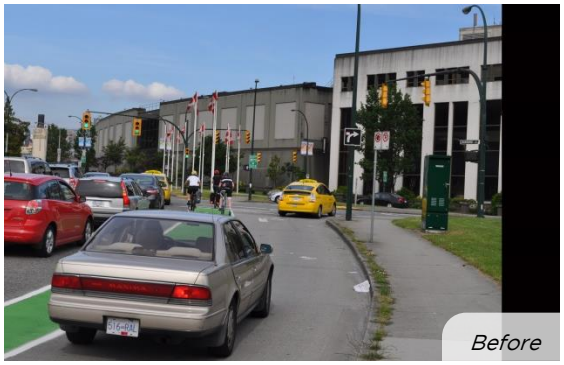
Long, multi-stage crossings to simple, short crossings of Cornwall Avenue

Westbound painted bike lane to protected bike lane on Cornwall Avenue



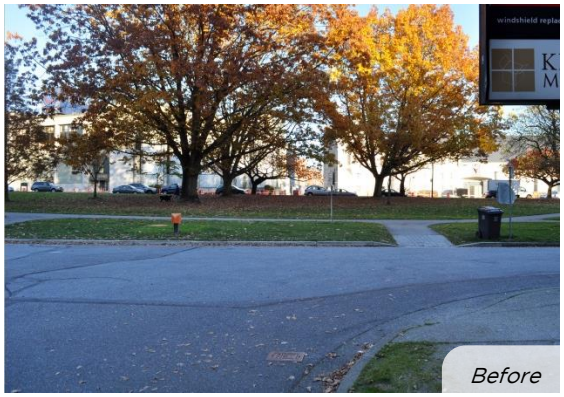


Sidewalk riding to eastbound protected bike lane on Cornwall Avenue

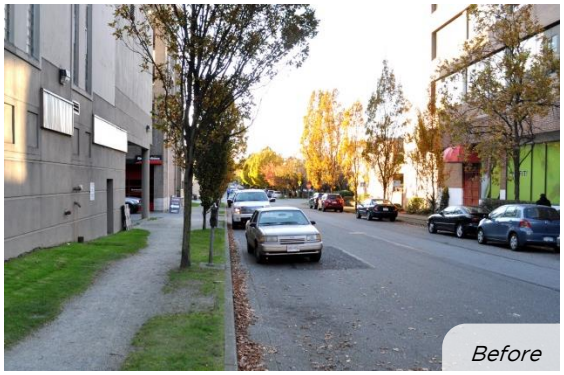


Painted bike lane between traffic lanes to protected signal at Burrard Street

Appendix B: York Avenue Bikeway



New paths for walking and cycling connecting to York Avenue



New protected bike lane and sidewalk on York Avenue

Appendix C: Seaside Greenway on Point Grey Road

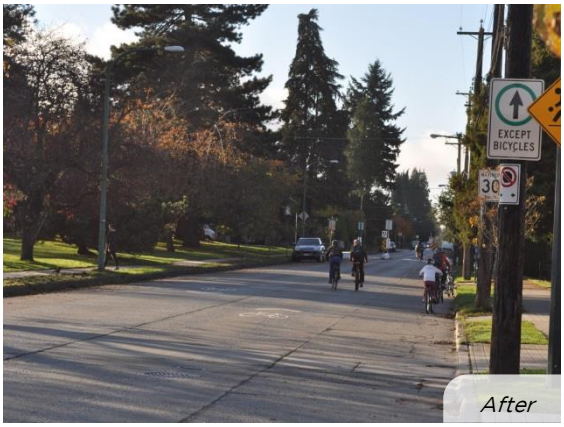
New walking and cycling only connection to York bikeway at Stephens

New protected bike lane on arterial Point Grey Road west of Trafalgar

Elimination of signalized intersection at Point Grey Road and Macdonald

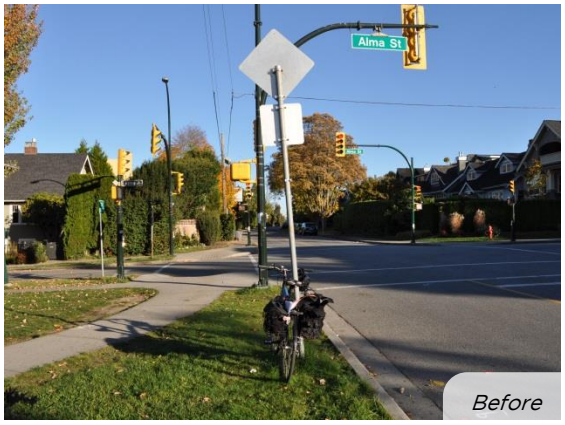
New walking and cycling only section of Point Grey Road west of Macdonald

Extensions of Volunteer and Tatlow Parks to connect across Point Grey Road

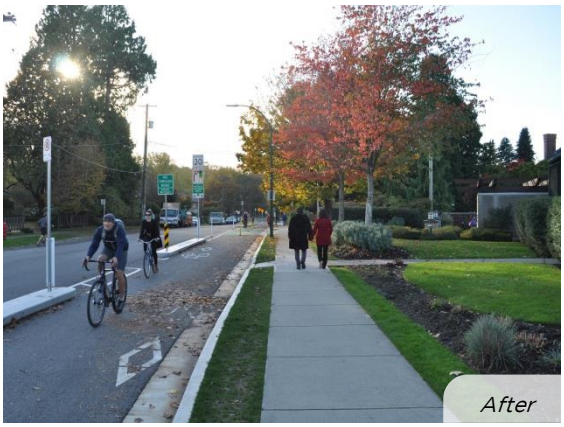


Newly traffic-calmed Point Grey Road west of Trutch Street

New contra-flow bike lane and one-way Point Grey Road for motor vehicles



New walking and cycling crossings to replace traffic signal at Alma



New protected bike lane and sidewalks on Point Grey Road at Wallace