Supports Item No. 2
CS&B Committee Agenda
February 4, 2010

CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Report Date:	January 21, 2010
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Meeting Date:	February 4, 2010

TO: Standing Committee on City Services and Budgets

FROM: General Manager of Engineering Services

SUBJECT: Separated Bike Lanes in Downtown

RECOMMENDATION

A. THAT a separated bike lane be constructed on the Dunsmuir Viaduct at a cost not exceeding $300,000; source of funds being the 2009 Streets Basic Capital Budget (Bike Network), including a monitoring and evaluation program with a report back to Council regarding the results.

B. THAT separated bike lanes, connecting the Burrard Bridge and Dunsmuir Viaduct to the central business district, be approved in principle with a report back to Council in the spring regarding the results of public consultation on the design and alignment.

COUNCIL POLICY

In 1995, Council adopted the City of Vancouver Greenways Plan with an overview of the proposed Vancouver Greenways system, descriptions of the two major components (City Greenways and Neighbourhood Greenways) and an implementation strategy.

In 1997, Council approved the City of Vancouver Transportation Plan that identified cycling as one of the City's top transportation priorities. The Plan proposed a network of Downtown bike lanes.

In 1999, Council adopted the Bicycle Plan, which identified 12 action items to improve cycling in Vancouver, including a network of commuter and recreational bicycle routes throughout the City.

In 2002, Council approved Vancouver's Downtown Transportation Plan, which emphasized the need for safer and more convenient cycling facilities in the Downtown to provide direct connections to key destinations.

In April 2005, Council approved the Community Climate Change Action Plan that identified the critical importance of encouraging and supporting active transportation if Vancouver is to meet its greenhouse gas reduction target for 2012.

In April 2009, Council received the Mayor's Greenest City Action Team's Quick Starts Report, which recommended early actions the City can take to help Vancouver become the greenest city by 2020, including ways to increase the attractiveness of cycling, such as a network of protected bike lanes on existing bike routes.

In October 2009, Council received the Mayor's Greenest City Action Team's strategy Vancouver 2020 A Bright Green Future which encourages the City to explore opportunities to add protected bikeways in the downtown.

SUMMARY

In response to GCAT, the *Cycling in Cities* study, outstanding items from the Vancouver Transportation Plan and the Downtown Transportation Plan, discussions with local cycling groups and the Bicycle Advisory Committee, and experiences from other cities, staff have developed plans for implementing separated bike facilities in Vancouver. The separated bike lanes would be in the Downtown. The separated bike lanes proposed for the Downtown are expected to be popular with commuter and recreational cyclists alike.

Experience from other cities suggests that separated bike lanes are effective in attracting more people to cycling. Various studies report that separated bike lanes are perceived as safer than on-street bike facilities (shared routes, painted bike lanes, local street bike routes) and that this is at least part of the reason why they attract a portion of the population who would not otherwise cycle. Separated bike lanes are also among the most requested type of bike facility in Vancouver. The expectation in Vancouver is that by implementing separated bike facilities the City will encourage more people of all ages and abilities to cycle for transportation and recreation.

Separated bike lanes are planned on the Dunsmuir Viaduct and in the downtown to connect the central business district (CBD) from the Burrard Bridge and the Dunsmuir Viaduct. The separated bike lanes on the Dunsmuir Viaduct are proposed for implementation during 2010 in coordination with other City work. The results of public consultation regarding the CBD connections will be reported back to Council in the spring.

The separated bike lane on Dunsmuir Viaduct would consist of relocating the existing concrete gravity barriers from the south side of the Viaduct to the north side. This would provide a two-way separated bike facility and maintain two westbound travel lanes into Downtown.

A separated bicycle facility between the Burrard Bridge and the Dunsmuir Viaduct would provide a necessary connection to the central business district. It is recommended that staff report back to Council on the alignment and design of the CBD links following public consultation.

PURPOSE

The purpose of this report is to seek Council approval to construct a separated bike facility on the Dunsmuir Viaduct, complete with an evaluation and monitoring program and associated costs, and to seek Council approval in principle for separated bike lanes within the downtown to connect to the CBD, complete with a public consultation process and follow-up report.

BACKGROUND

The most recent plans guiding bicycle planning in the City of Vancouver are the Greenways Plan (1995), the Transportation Plan (1997), the Bicycle Plan (1999), and the Downtown Transportation Plan (2002). The City of Vancouver Transportation Plan (1997) and the Bicycle Plan (1999) require updating since most of the initiatives have been implemented. Two outstanding initiatives are the Helmcken-Comox Greenway and connecting the Seaside Route. The updates to the plans will draw upon cycling strategies set out at the regional level: Transport 2040 and, once approved, the updated Regional Growth Strategy and Regional Cycling Strategy.

The 2006 Canadian Census reported that Vancouver's bike to work mode share increased to 4% - the highest of Canada's largest cities and second highest for all Canadian cities (Victoria has the highest with 6%). Vancouver now boasts over 400 lane-km of bike facilities (see Figure 1).

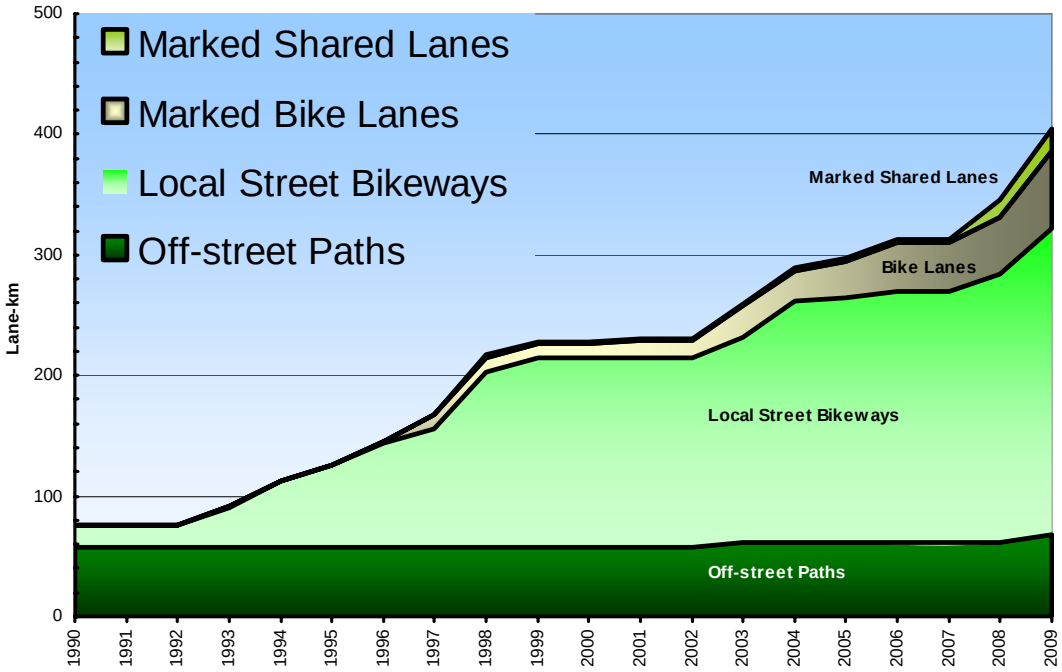

Figure 1: Bicycle network development 1990 – 2009 in Vancouver

The City of Portland, which also has a bike to work mode share of 4% (USA 2005 Census), recently looked at how to make cycling a more widespread and mainstream mode of transportation. Their findings showed that cyclists fell into four categories: the "strong and the fearless", the "enthused and confident", the "interested but concerned", and the "no way no how". These categories correspond to approximately 0.5%, 7%, 60%, and 33% of Portland's population, respectively.

The study also identified a correlation between the types of cyclists in each category and age and gender. The "strong and fearless" and the "enthused and confident" were largely composed of men between the ages of 20 and 50. Portland concluded that to attract more people to cycling they would need to address perceptions about personal safety, targeting the "interested but concerned": children, older adults, and women.

Researchers at the University of British Columbia recently conducted a research program to investigate which types of cycling facilities attract people to use bicycles as a mode of transportation in Vancouver. This program, called *Cycling in Cities*, consisted of an opinion survey that concluded that the top three route types to encourage cycling are: paved off-street paths; paths next to major streets separated by a barrier (i.e. separated bike lanes); and residential streets marked as bike routes, with traffic calming (i.e. local street bikeways). Vancouver's cycling network includes each of these facilities, but is largely made up of local street bikeways and off-street paths.

GCAT recommended that Vancouver implement a network of separated bike lanes on existing bike routes to increase the attractiveness of cycling as a mode of transportation. Staff have received similar requests from the public and the Bicycle Advisory Committee (see attached letter). This report focuses on separated bike lanes in the downtown and staff will investigate separated bike lanes on other existing bike routes at a later time.

DISCUSSION

Separated bike lanes are perceived to be safer and more satisfying to cyclists than cycling next to traffic (shared lane or local street bikeway). The experience of other cities suggests that perception of safety is essential to attracting people to cycling. The City of Copenhagen, with a bike-to-work mode share of 36% (City of Copenhagen), has set "a sense of security" as a guiding principle to its Cycle Policy:

> "A sense of security is the cyclist's subjective perception of the risk of being run over. This perception may be based on direct experience of dangerous situations in traffic or merely a purely subjective emotion.
>
> The feeling that 'biking is dangerous' may mean that the cycling potential is not fully realized…The proportion of people who feel unsafe when cycling in traffic increases as practical experience decreases…The fact that most of those who do not cycle at all feel that cycling is unsafe, is a crucial factor in their rejection of cycling as a means of transport."
>
> - Copenhagen's Cycle Policy 2002-2012

However, actual safety is very different than the perception of it. The safety of a cycling facility is objective and quantifiable; it is the number of cyclist casualties per cycled kilometre. Overall, the risk of injury to the individual decreases as more people cycle since there are fewer collisions (Copenhagen's Cycle Policy 2002-2012).

The City of Copenhagen commissioned a series of studies to evaluate the perceived risk and safety of separated bike lanes. The results showed that separated bike lanes had a "20 percent increase in bicycle traffic mileage and a decrease of 10 percent in motor vehicle traffic mileage" (Bicycle Tracks and Lanes: a Before-After Study - Jensen, 2007). Cyclists felt most secure on separated bike lanes and least secure in mixed traffic. However, cyclists' safety at intersections worsened with the installation of separated bike lanes. The study

concluded that separated bike lanes had positive results on the feelings of security, but negative effects on road safety.

Copenhagen continues to construct separated bike lanes because as more people cycle, they get daily exercise and their quality of life improves.

> "Studies have found that the exercise from cycling for a half hour daily increases mean life expectancy one to two years, and outweighs the additional cycling accident risk by a factor of twenty."
>
> - Livable Copenhagen: The Design of a Bicycle City (Nelson and Scholar, 2007)

The City of Copenhagen has developed a figure showing the type of bicycle facility recommended for a roadway based on the vehicle volume and speed of that roadway (see Figure 2). For example, in Copenhagen the recommended bicycle facility for a street posted at 50 km/h with 10,000 vehicles per day would be a cycle track. Copenhagen's experience has shown that separating vehicles and bicycles will be more expensive to construct and maintain, but will be more comfortable for cyclists. They have also found that "if cycle lanes are not wide enough, they can be less safe than mixed traffic situations" since cyclists cannot maneuver accordingly (Livable Copenhagen: Design of a Bicycle City – Nelson and Scholar, 2007). Effort must be taken to ensure car speeds remain adequately low in mixed traffic conditions where separation is not provided.

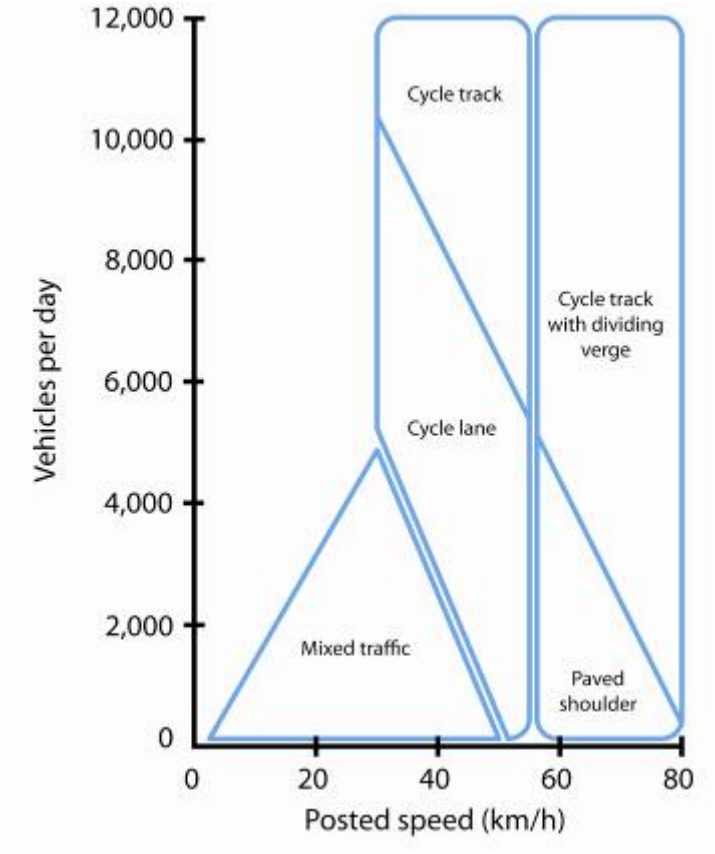

Figure 2: Cycling facilities in Copenhagen depending on vehicle volume and speed (adapted from Collection of Cycling Concepts - Jensen, 2000)

Separated Bike Lanes in Vancouver

The existing bike network in Vancouver is extensive, more than 400 lane-km, and includes many types of facilities: off-street routes, marked bike lanes, shared lanes, local street bikeways with traffic calming, and separated bike lanes (see Figure 3).

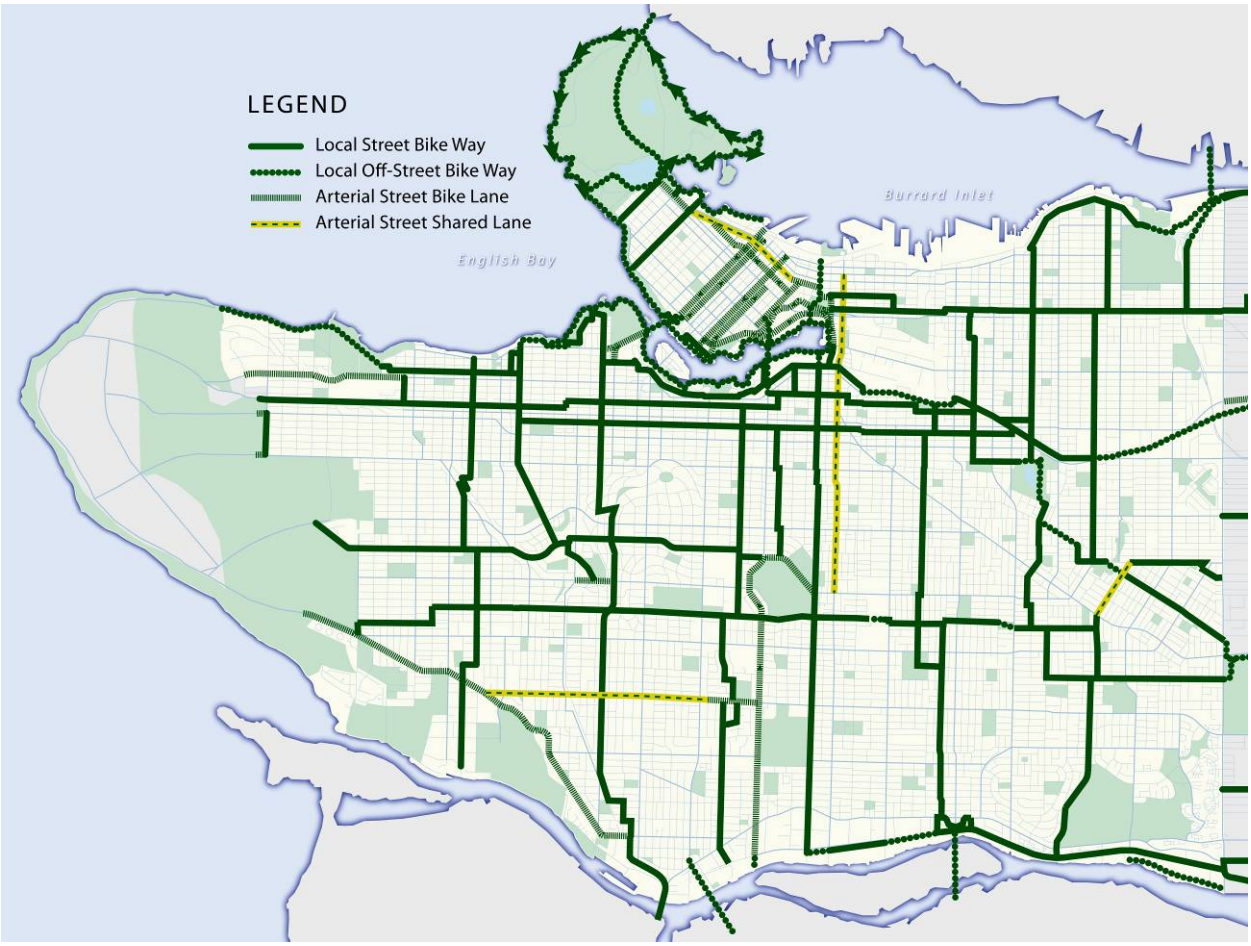

Figure 3: Vancouver cycling route network

The UBC research program, *Cycling in Cities*, investigated which types of cycling facilities attract people to use bicycles as a mode of transportation in Vancouver. The opinion survey concluded that the top three route types to encourage cycling are: paved off-street paths; paths next to major streets separated by a barrier (i.e. separated bike lanes); and residential streets marked as bike routes, with traffic calming (i.e. local street bikeways). When viewing Vancouver's cycling route network through the lens of the survey results there are some gaps that stand out (see Figure 4). The largest gap is in the downtown.

Figure 4: Vancouver's modified cycling route network - showing only the three preferred route types from the Cycling in Cities Opinion Survey

Neighbourhood street bikeways with traffic calming are not possible in the central business district. The Helmcken-Comox Greenway, approved in principle, is an exception. When constructed it will provide an east-west connection through the downtown and it will be one of the top three preferred cycling route types (see Figure 5). Staff will investigate whether the Helmcken-Comox Greenway is a candidate for separated bike lanes.

Figure 5: Helmcken-Comox Greenway as part of Vancouver's modified cycling route network – showing only the three preferred route types from the Cycling in Cities Opinion Survey

The nature of the downtown limits opportunities to provide off-street routes through it. Many downtown streets are arterials, with vehicle volumes above 5,000 vehicles per day and speeds between 30 and 50 km/h. Currently, the bike network in the downtown consists of marked bike lanes, but these are not one of the top three preferred cycling route types. Apart from the Seaside Route, the existing network in the Downtown is primarily oriented to experienced cyclists and is not attractive for all types of cyclists (i.e. Interested but Concerned group). To attract the majority of the population not currently cycling, separated bike lanes are the only viable option for a preferred bike facility connection in the downtown.

Implementing separated bike lanes in Vancouver will require reallocation of street space from other uses. Since most of Vancouver's streets have only minimum travel lane widths, separated bike lanes can only be achieved by either removing parking, eliminating general traffic lanes, changing the street function (e.g. making a two-way street into a one-way street), or a combination of all three. Regardless of the implementation approach taken, consideration will be given to both the transporation and liveability implications of any street space reallocation.

When referring to the 2008 bike count data (see Figure 6), the routes most used by cyclists to enter/exit the downtown are the Burrard Bridge and the Adanac Route. There is a need to better connect these two routes with the central business district (CBD). Possible alignments may include streets that already have marked bike lanes (Dunsmuir, Burrard, and Hornby Streets) or a combination of these streets.

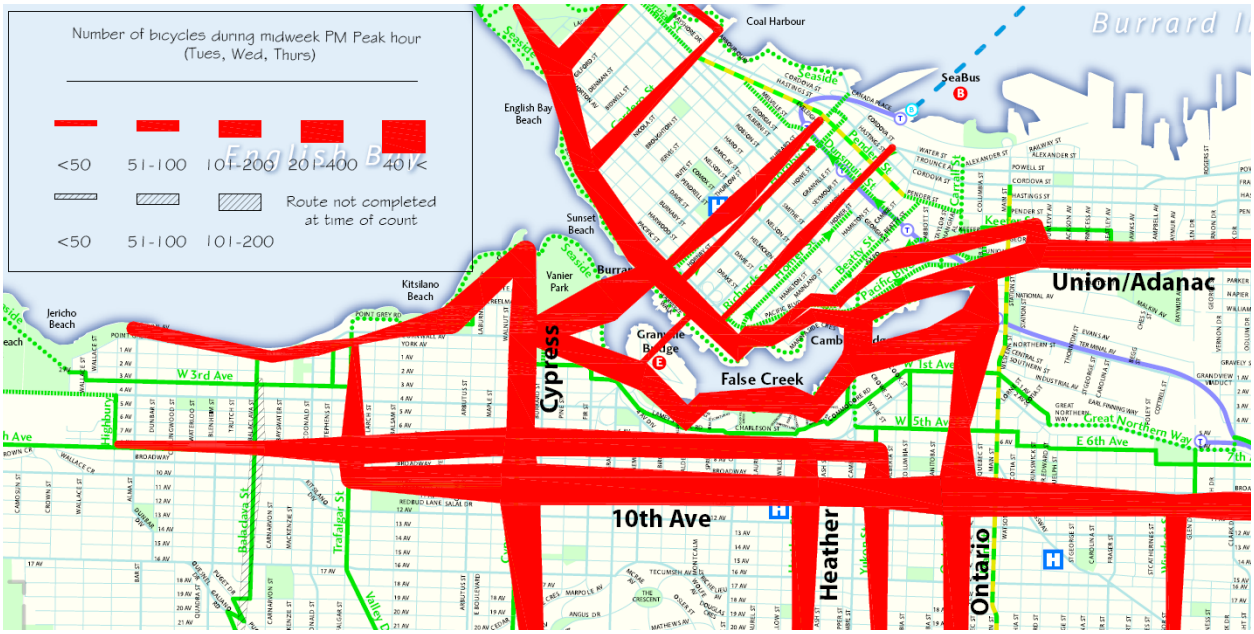

Figure 6: 2008 PM Peak Bike Count Map

Selection Criteria

The selection criteria used to identify streets for separated bike lanes included: gaps in the modified cycling route network that shows only the top three preferred route types from the Cycling in Cities survey (refer back to Figure 5); existing bike routes in the downtown that are not one of the three preferred route types; streets that avoid or minimize conflicts with existing transit and truck routes; and the cycling routes most used by cyclists to enter/exit the downtown (refer back to Figure 6). In light of this, separated bike lanes are being recommended on the Dunsmuir Viaduct to connect the Adanac Route with the Downtown and on Dunsmuir, Burrard, Thurlow, and/or Hornby Streets to connect the Dunsmuir Viaduct and the Burrard Bridge to the central business district. Adding more separated bike lanes to Vancouver's cycling network has the potential to significantly increase the attractiveness of cycling.

Dunsmuir Viaduct (Beatty Street to Main Street)

The Dunsmuir Viaduct aligns well with the desired cycling route between the Adanac Route and the central business district. A number of westbound cyclists from the Adanac Route have been observed using the road space on the viaduct to access the Downtown, despite the volume and speed of traffic. Other criteria that make the viaduct a good candidate for a separated bike facility are that there are no intersections, except at the ends of the viaduct (Main Street and Beatty Street), and there is no impact on parking or local access.

The Dunsmuir Viaduct was designed to accommodate three westbound travel lanes. Today, there are concrete gravity barriers in the south travel lane of the Dunsmuir Viaduct, reducing the capacity from three to two westbound lanes into the Downtown (see Figure 7). These barriers were installed on the viaduct to facilitate construction of the Spectrum/Costco development. That project is complete and the barriers can be removed at any time. There is a 2.5m space between these barricades and the south extent of the viaduct; this space is unusable by pedestrians and cyclists. Currently, a small number of cyclists use the 1.2m pedestrian space on the north side of the viaduct to access the Downtown from the Adanac Route. This space is narrow: only one wheelchair can use it at a time and a cyclist cannot turn a bike around in it.

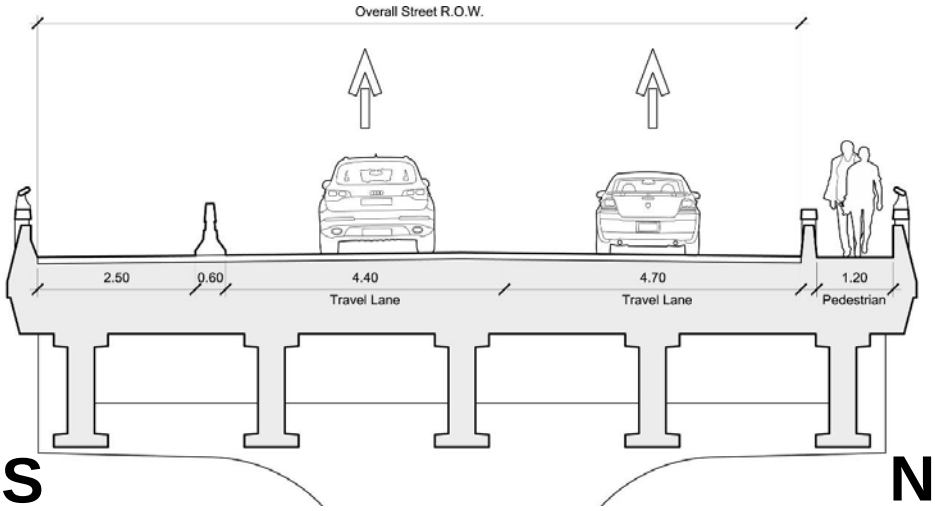

Figure 7: Existing cross-section of Dunsmuir Viaduct (looking west)

The viaduct width is sufficient to support the existing traffic demand, two westbound travel lanes, and a two-way separated bike facility (see Figure 8). By relocating the concrete gravity barriers from the south travel lane of the viaduct to the north travel lane, a two-way bike facility would be created, providing cyclists a connection to and from the Downtown and the Adanac Route. Staff recommend that the bi-directional separated bike lane be on the north side of the viaduct to allow cyclist movements to remain on the right-hand side of the vehicle travel lane. This facility location also makes access to/from the viaduct at Main Street and Beatty Street more intuitive for cyclists. In addition, this configuration makes installing the permanent facility on the north side of the viaduct feasible.

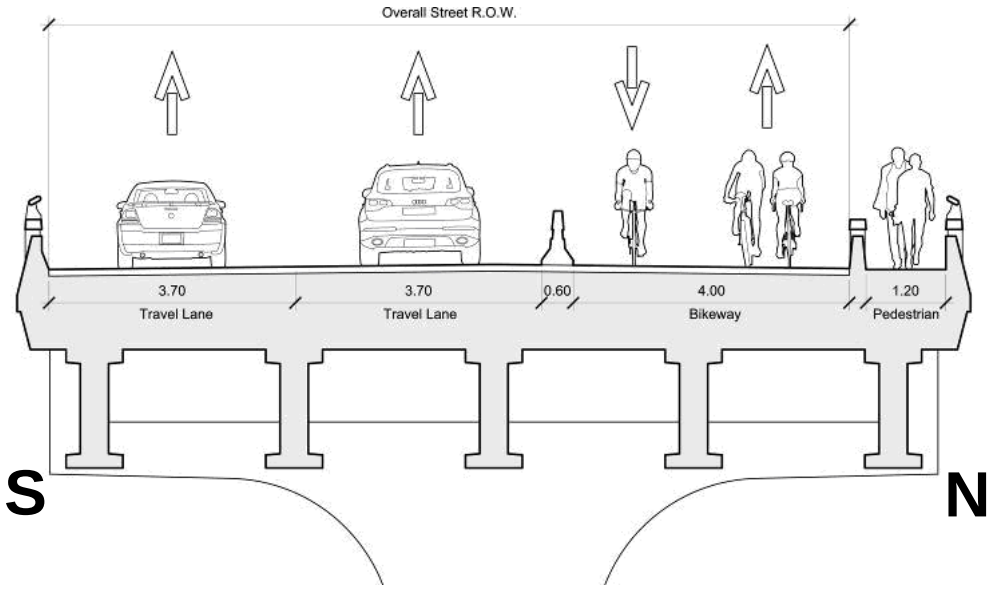

Figure 8: Proposed cross-section of Dunsmuir Viaduct (looking west)

The temporary separated bike facility would be constructed by moving the existing concrete barriers from the south side of the viaduct to the north side following the Closing Ceremonies of the Olympic Games since the Dunsmuir Viaduct will be closed until March 2, 2010, due to security requirements. Some additional barricades would be necessary on the ramp and near Beatty Street to complete the separated bike lane the length of the viaduct.

Adjustments would be required to the paint lines that delineate travel lanes and those for merging vehicles from Main Street. Staff tested and observed that reducing the length of the merge lane on the ramp from Main Street to the viaduct did not have a significantly negative effect on merging patterns or on queue lengths for the dual left turn bays on Main Street. Other adjustments may include changing how the intersections at Beatty and Main Streets operate. Details of the configuration will continue to be refined in response to conditions at the intersection at Main and Beatty Streets.

With the implementation of this facility, cyclists would travel the length of the Dunsmuir Viaduct without conflicts with motor vehicle traffic. The provision of a separated bike facility will appeal to both recreational and commuter cyclists travelling to/from the Downtown.

Links to the CBD from Burrard Bridge and Dunsmuir Viaduct

With separated bike lanes on the Dunsmuir Viaduct and the Burrard Bridge, the next step will be to connect these two facilities to the central business district (CBD). There are existing marked bike lanes on westbound Dunsmuir Street, southbound Burrard Street, and northbound Hornby Street that make implementation of a separated bike facility in this corridor attractive and feasible.

The east-west connection between the Dunsmuir Viaduct and the CBD would be Dunsmuir Street, which is already designated as a bike route. There is a series of options that need to be explored in more detail for the north-south connection between the Burrard Bridge and the central business district. These include (but are not limited to) a one-way northbound separated bike facility on Hornby Street with a one-way southbound separated bike facility on Thurlow Street and two one-way separated bike facilities on Burrard Street.

Each connection needs to be investigated further with public consultation to identify conflicts with transit, space requirements, and potential parking loss. Both the east-west and north-south connections will be reported back to Council after these issues have been explored further.

Monitoring and Evaluation

A separated bike facility on Dunsmuir Viaduct would provide empirical data regarding:

- The effects on motorized traffic;
- The change in cycling and traffic volumes along the corridor; and
- Any capacity or safety issues that become apparent concerning cyclists or vehicles.

A minimum six-month demonstration would allow for monitoring of street operations through three seasons, a range of weather conditions, and special events. After which, the permanent design could be developed.

If approved, staff would develop a program to monitor cyclist and vehicle traffic on the Dunsmuir Viaduct before and during the demonstration. The program would include travel times and volumes of vehicles and bicycles. As with other elements of the demonstration, the monitoring plan would be subject to modification as needed during the implementation period. Information collected would be used to assess the effectiveness of these measures and guide modifications.

FINANCIAL IMPLICATIONS

The estimated cost of implementing a separated bike facility on the Dunsmuir Viaduct is $300,000:

Dunsmuir Viaduct	300,000
Total	**$300,000**
CBD Links	To be determined

It is proposed that funding be provided from the Streets Basic Capital Accounts – Bike Network. Consideration will also have to be given to the operational impact of this cycling infrastructure in the development of subsequent years operating budgets. Traffic barriers are

expected to have salvage value and/or ongoing use by the City after the permanent facilities are installed.

The removal of parking spaces from the Burrard, Dunsmuir, Thurlow, and/or Hornby Streets and the relocation of loading zones for the CBD connections would result in a loss to the City's operating budget. However, this loss could be reduced by using different facility designs (i.e. different types of physical separation) at specific locations. The report back to Council regarding the results of public consultation on the design and alignment for the CBD connections will identify the extent of the loss to parking and the operating budget.

PERSONNEL IMPLICATIONS

Staff time will be required to meet design, construction, and monitoring objectives. The magnitude of the monitoring and communications tasks, combined with staff commitments to other projects, including the 2010 Winter Games, mean that additional staff or outside resources will be needed. The duration of this additional staff requirement will be greater than that of the immediate separated bike lane instalment to accommodate pre-implementation planning and post-implementation assessment.

IMPLEMENTATION PLAN

Staff would develop a detailed implementation plan that accommodates special events, such as the Vancouver Folk Festival and Celebration of Light.

Following a public information meeting, it is expected that the bike lanes on the Dunsmuir Viaduct would begin immediately following the Olympic Games period. The bike lanes could continue in this manner until the permanent facility design has been determined. Staff would report back to Council as needed regarding the results of the temporary bike facility.

Staff would conduct public consultation with residents and businesses of Dunsmuir, Burrard, Thurlow, and Hornby Streets in 2010 to refine the separated bike lane designs for connections to the CBD as identified in this report. The design details of the CBD links would be reported back to Council in the spring.

CONCLUSION

In response to GCAT, the *Cycling in Cities* study, outstanding items from the Vancouver Transportation Plan and the Downtown Transportation Plan, discussions with local cycling groups and the Bicycle Advisory Committee, and experiences from other cities, staff have developed plans for implementing separated bike facilities in Vancouver. These include one on the Dunsmuir Viaduct and a connection to the central business district from the Dunsmuir Viaduct and the Burrard Bridge. These separated bike facilities would provide the opportunity to evaluate the issues related to separated bike lanes in Vancouver.

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