



## CITY OF VANCOUVER

### ADMINISTRATIVE REPORT

Report Date: May 31, 2005  
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Meeting Date: June 28, 2005

TO: Standing Committee on Transportation and Traffic

FROM: General Manager of Engineering Services and Director of Current Planning

SUBJECT: Burrard Bridge Sidewalk Capacity Improvements  
for Pedestrians and Cyclists

#### RECOMMENDATION

- A. THAT Council approve advancing the design of outward sidewalk widening, except at the towers (i.e. pinch points), to the final design stage, and staff report back on a recommended consultant team for undertaking final design of outward widening of the Burrard Bridge sidewalk, and on funding requirements.
- B. THAT staff report back regarding the viability of HOV lanes on the Burrard Bridge.
- C. THAT staff enter into negotiations with the Province of British Columbia and the Squamish Nation to acquire additional easements and/or rights-of-way to allow for proposed and future bridge modifications and maintenance.

#### CONSIDERATION

In addition to the Recommendations to advance the sidewalk widening design, Council may wish to pursue further study of an under-slung bike path. In such a case, the General Manager of Engineering Services and the Director of Current Planning provide Consideration items D and E in addition to Recommendations A through C.

- D. THAT staff report back on a recommended consultant team for undertaking preliminary design development of an under-slung bike route on the Burrard Bridge that is consistent with the transportation capacity, safety, and heritage

principles established for the bridge, and which meets navigational requirements to be established by Transport Canada.

- E. THAT staff pursue approval from Transport Canada for an under-slung bike route on the Burrard Bridge.

### **GENERAL MANAGER'S COMMENTS**

Improvements to the pedestrian and cycling facilities on Burrard Bridge would be important additions to the transportation network in this area, and would represent a very real application of Council's policies. The steps outlined in this report will move these needed improvements forward while respecting the heritage values of the Burrard Bridge.

The recommended outward sidewalk widening option meets all the transportation goals for this bridge. It provides the needed improvements for pedestrians and cyclists without compromising transit service, and it minimizes aesthetic impacts to the bridge.

An under-slung bike path option may provide similar benefits to pedestrians and cyclists and would not increase traffic congestion, slow goods movement or affect transit service. However, it may not be technically feasible, may not be approved by Transport Canada, and has still undefined impacts on the aesthetics of the bridge. Given that this option is still favoured by some, Council may wish to continue to pursue its feasibility, cost and benefits while work on the final design of the recommended option proceeds. Staff would then report back for a final decision between these two options prior to a financial commitment to start construction.

Staff and consultants have examined in great detail the likely effects of many lane re-allocation options and concluded that they would increase traffic congestion, slow goods movement and degrade transit service. Therefore, none of these options can be recommended. If, however, Council chooses to proceed with a lane re-allocation despite the staff recommendation, such an arrangement should be implemented on a trial basis, to confirm its effects on transit service, goods movement and surrounding neighbourhoods. An appropriate resolution would be:

- F. THAT staff implement a trial closure of the two curb lanes of the Burrard Bridge between Cornwall Street and Pacific Avenue, to provide bicycle lanes on the bridge, for a period of twelve months, with funding of \$400,000 provided from Streets Capital Account No. 30007372 - Burrard Bridge Pedestrian & Cycling Improvements, and that staff report back at the end of the trial period.

### **CITY MANAGER'S COMMENTS**

The City Manager notes that the recommended option provides for the needed improvements for pedestrian and cyclists while not reducing bridge traffic capacity access to and from the Downtown, and minimizes aesthetic impacts.

It is important to undertake the improvements as soon as possible to reduce pedestrian/cyclist conflicts.

Further, consideration of the under bridge option is unlikely to yield an acceptable design solution.

Therefore, the City Manager RECOMMENDS that Council approve only Recommendations A, B and C.

## **COUNCIL POLICY**

Walking and cycling are the City's highest priorities in the transportation system, followed immediately by transit.

Council supports the provision of pedestrian and cycling facilities that encourage the use of non-motorized travel for commuting and recreational purposes.

Council has endorsed a long-term strategy for improving pedestrian and cycling crossings of False Creek, which includes the following policies related to the Burrard Bridge:

- Improve the safety and capacity of pedestrian and cycling routes along the three False Creek bridge corridors (Burrard, Granville and Cambie).
- Identify and include street, bridge end, and Seawall connections as part of any proposed improvements to the bridges.
- Favour solutions that optimize usage, safety, quality of trip, cost, and minimize negative impacts on traffic, heritage, urban design and neighbourhoods.
- Undertake major improvements to the pedestrian and cycling environment on the deck or upper level of the Burrard Bridge first, Granville corridor second, and Cambie corridor third, with a report back to Council for confirmation of these priorities after completion of the work on the Burrard Bridge.

Council approved the Downtown Transportation Plan, which has as a guiding principle for developing bike lanes "to minimize the impact on the transportation network by avoiding the removal of traffic lanes".

## **SUMMARY**

The Burrard Bridge carries half the cyclists and pedestrians crossing False Creek. Growth in walking and cycling on this bridge has been significant in recent years, and the original sidewalks no longer provide the capacity needed to meet the City's transportation goals.

The Burrard Bridge, which was opened in 1932 and has remained largely unchanged since, is a valued heritage resource.

Over the past several years, staff and consultants have investigated a wide range of options for improving the walking and cycling environment on or near the Burrard Bridge. The options still under consideration are:

- Outward sidewalk widening
- Lane re-allocation
- Under-slung bike path

Outward sidewalk widening can meet all the City's transportation goals for the Burrard Bridge, at some cost to heritage conservation. An option which excludes widening at the towers has the least heritage impact. Staff recommend advancing this option to the final design stage.

Lane re-allocation can meet objectives for walking and cycling, but not without increasing traffic congestion, slowing goods movement and degrading transit service across the bridge. This option is not recommended.

An under-slung bike path may meet the City's transportation goals for the Burrard Bridge. However, the viability, aesthetic impact and cost of such an option cannot be established without further study.

## **PURPOSE**

The purpose of this report is to document investigations into a variety of options for improving the walking and cycling environment on the Burrard Bridge and to seek Council's approval of a plan to advance the design of improved sidewalk facilities on the Burrard Bridge.

## **BACKGROUND**

### **FALSE CREEK PEDESTRIAN AND CYCLIST CROSSING STUDY**

In 2000, Council approved a consultant study to review the feasibility of False Creek crossing options for pedestrians and cyclists and their associated costs and impacts. The key findings of this report related to the Burrard Bridge were:

1. The Burrard Street Bridge should be given the highest priority for improvement.
2. Those improvements should be at the bridge deck level either through widening the sidewalks outside the existing railing or narrowing the roadway.

The consultant recommended that further design work be pursued in the form of a "deck level of Burrard Bridge" study. The goal of the study would be to examine deck level options to determine a permanent solution that would address the short and long term transportation needs along the corridor.

See Appendix A for more detail.

### **BURRARD BRIDGE HERITAGE STUDY**

To assist in the option review process, the Burrard Bridge Heritage Study was also undertaken. Key findings of that study included:

1. The bridge was designed as both a functioning bridge and as a civic monument. It was designed to perform as a ceremonial "roadgate" between the west side of Vancouver and the downtown, and as a "seagate" between False Creek and English Bay.
2. Because the bridge has maintained its integrity and its stature as a significant civic monument, proposed changes should respect its original heritage and urban design values wherever possible.

To guide and evaluate alterations to the Burrard Bridge, the consultant defined the bridge's heritage values as well as the principles and parameters that should be followed in the design of any improvement options.

## 2002 STAFF REPORT

In 2002, staff recommended a strategy for making improvements to the pedestrian and cycling environments across False Creek, which identified the Burrard Bridge as the highest priority and which favoured solutions that optimize usage, safety, quality of trip, cost, and minimize negative impacts on traffic, heritage, urban design and neighbourhoods.

Staff noted that whatever improvements are made to the pedestrian and bicycle facilities on the Burrard Bridge must be considered permanent and long term. It is reasonable to expect that these improvements will meet transportation needs in this corridor for the next 50 years.

Staff did not support narrowing the roadway to 5 lanes for the following reasons:

1. A narrowed roadway may not serve the long term transportation needs of this corridor to and from downtown because it would reduce service for transit, goods movement vehicles, and general purpose traffic and limit future flexibility for transit and other sustainable transportation modes.
2. Widening the sidewalks inward by 1.5 m or providing 1.5 m bike lanes may not adequately resolve the existing pedestrian and bicycle issues.

Staff endorsed further development of outward sidewalk widening along with other options at the deck or upper level of the Burrard Bridge which might better address heritage concerns. Council approved staff's recommendations and approved a consulting contract to complete the recommended design work.

See Appendix B for more detail.

## RIGHT-OF-WAY

The Burrard Bridge occupies road right-of-way and several parcels of land. Most of these parcels are owned by the City or are the subject of Provincial Crown leases to the City. One parcel is owned by the Province and another by the Government of Canada for the sole use and benefit of the Squamish Nation as Reserve land. Any options which widen the bridge or affect the clearance beneath the bridge in these parcels will require the approval of the Squamish Nation, the federal government and/or the provincial government.

See Appendix C for more detail.

## MARINE TRAFFIC

Construction of works in False Creek is governed by the federal Navigable Waters Protection Act. Any changes to False Creek bridges which would affect navigation must be approved by Transport Canada. Their representatives have in the past said that they would not entertain any proposals which would reduce the existing vertical or horizontal clearance of the waterway. They have recently said they may be willing to consider options which would provide existing clearances for larger vessels when required, subject to advanced notice, but would reduce clearances at other times. Transport Canada requires consultation and that a user survey be conducted regarding usage and scheduling of openings. These must accompany an application submission.

## CURRENT CONDITIONS

Today, between 8000 and 9000 people cross the Burrard Bridge every hour in peak periods. Approximately half are alone in their cars, one in five is travelling with others in cars (i.e. car pools), one in five is in a bus, and one in ten is walking or cycling.

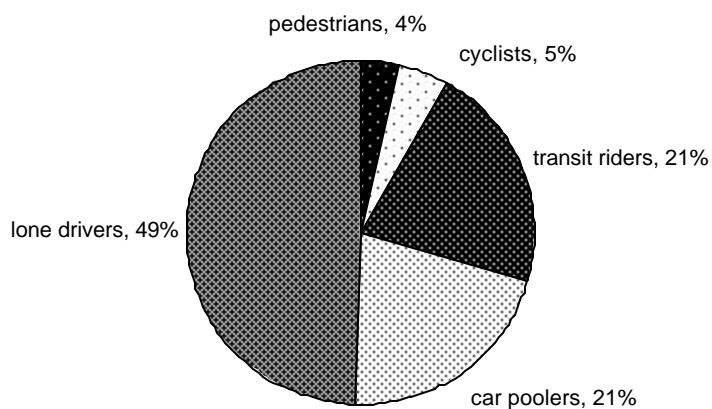


Figure 1 - Burrard Bridge Peak Hour Travel Mode (2004 estimates)

In recent years, walking, cycling and transit use have seen significant growth on the Burrard Bridge. Walking and cycling volumes increased 30-40% between 1996 and 2001, and transit ridership increased about 20% in the same period. TransLink continues to improve service on routes using this bridge.

Cycling and walking on Burrard Bridge represent half the pedestrians and cyclists crossings of False Creek.

## FUNDING

The 1994-1996 and 2003-2005 Capital Plan plebiscites approved borrowing authority for pedestrian and cyclist improvements to the Burrard Bridge. An existing balance of \$11.7 million is available for this work. The 2003-2005 Capital Plan plebiscite also approved \$2.4 million for repair or replacement of the existing railings.

Estimates noted in this report are based on 2002 construction costs. They are valid for comparative purposes but may not accurately reflect actual costs at the time of construction.

## OBJECTIVES

### TRANSPORTATION

The transportation goal of this project is to improve pedestrian and cycling facilities on the Burrard Bridge to support the City's sustainability goals by encouraging people to adopt alternative transportation modes including walking, cycling and transit.

Accordingly, changes to the Burrard Bridge sidewalks should do the following:

- Increase bridge capacity for pedestrians and cyclists
- Improve, or at least maintain, transit service
- Minimize impacts on goods movement, high occupancy vehicles and other bridge users
- Meet Canadian guidelines for new cycling facilities
- Accommodate high volumes of cyclists and pedestrians
- Serve recreational and commuter cyclists
- Accommodate in-line skaters and emerging sustainable transportation modes
- Address existing safety concerns

To meet the walking and cycling objectives would require a 6.0 m widened sidewalk or a new 3.1-3.7 m separated bike facility. See Appendix D for more detail.

### HERITAGE

Few changes have been made to the Burrard Bridge since it was opened in 1932. The original street lights were replaced some time ago to meet contemporary lighting standards and the towers were painted in the 1980s. The original concrete railings are in poor condition and must be replaced to ensure safety. From the perspective of heritage conservation, the ideal treatment for the bridge would be restoration of the original lamp standards and repair or sympathetic replacement of the railings.

In this context, most if not all options for modifying the bridge are less than ideal. Some are worse than others. The Burrard Bridge Heritage Study established a framework for evaluating the impact of proposed changes. It identified seven character-defining elements of the "seagate", the entrance to False Creek, and twelve character-defining elements of the "roadgate", the entrance to downtown from the west side.

### OTHER OBJECTIVES

Some of the options may affect local neighbourhoods and navigation in False Creek. Any negative consequences must be assessed.

## ALTERNATIVES/OPTIONS

### OUTWARD SIDEWALK WIDENING

Following up on the recommendations of the False Creek Pedestrian and Cyclist Crossing Study, staff and a consultant team evaluated a wide range of options for providing additional sidewalk capacity at the deck or upper level of the bridge.

See Appendix E for more detail

Out of this evaluation process emerged the recommended sidewalk widening option. This treatment provides a 6 m sidewalk with railing treatments similar to the original railings (see Figure 2). The 6 m sidewalks would narrow to pass through the existing 2.3 m portals. In discussions with stakeholders, this treatment has often been called the “pinch point” option.



Figure 2 - Outward sidewalk widening, except at the towers (piers 3 & 4)

This option provides ample space for high volumes of pedestrians and cyclists as well as inline skaters, and meets all of the transportation criteria. The existing six traffic lanes would remain, thus maintaining transit operations at today's level of service and leaving open options for bus/HOV lanes or other future transit improvements.

Figure 3 shows a possible treatment of 6 m wide sidewalks, with a 1 m buffer from the curb, a 2.5 m wide bike lane and a 2.5 m wide pedestrian path.





Figure 3 - Buffer zone, 2.5 m bike path and 2.5 m pedestrian path

The narrowing of 6 m sidewalks to pass through the existing portals would create a location where pedestrians and cyclists would need to exercise additional caution. The hazard this location would present is less than at a typical intersection. The distance between these “pinch points” and adjacent intersections is greater than between typical intersections elsewhere in the city.

A full-length widening option was also considered, but is not recommended because it would require significant alterations to the bridge towers.

The Burrard Bridge Heritage Study identified seven character-defining elements of the “seagate”, including two primary elements, the concrete piers (i.e. towers) and concrete handrails. The recommended option, which avoids widening at the towers, would affect only the concrete handrails. The handrails, which must be replaced for safety reasons, would be relocated outward and would have limited affect on the appearance of the “seagate” (see Figure 2). Most significantly, the original towers would remain untouched.

The Burrard Bridge Heritage Study also identified twelve character-defining elements of the “roadgate”. Two of these twelve elements, the concrete handrails and the perceived width of the roadway, would be affected by outward sidewalk widening (see Figures 4 and 5).



Figure 4 - Existing roadgate



Figure 5 - Roadgate with sidewalk widening, except at towers

This sidewalk widening option has been estimated to cost \$13 million.

Because it widens the bridge over land not owned by the City, this sidewalk widening option would require acquisition of additional land or rights-of-way from the Province and the Squamish Nation.

#### LANE RE-ALLOCATION

In 2003, Council requested that staff revisit the possibility of re-allocating existing vehicle lanes on the bridge as cycling space. A number of options were investigated which would reduce the number of vehicle lanes on the bridge from the existing six to either five or four, without widening the sidewalks to the outside. See Appendix F for more detail.

Computer simulations of traffic behaviour were done to determine the likely effect of such bridge modifications. Traffic signal operations in these computer models were based on optimizing signal timing for each lane configuration, not on current signal operations.

All the various five lane options fail to meet minimum Canadian guidelines for cycling lane width or fail to provide sufficient sidewalk width to meet long-term walking and cycling needs. All these options would interfere with transit operations, slowing bus operations in at least one direction along this busy transit corridor, as well as adding to traffic congestion in Kitsilano and/or West End neighbourhoods.

The four lane options would allow for the construction of pedestrian and cycling facilities which would meet long-term walking and cycling demand and would conform to Canadian guidelines for cycling and mixed-use facilities. Like the five lane options, these options would interfere with transit service, slowing bus operations in both northbound and southbound directions, as well as adding to traffic congestion in Kitsilano and West End neighbourhoods.

Transit trip times, which are currently about 10 minutes in the peak direction and 5 minutes in the off-peak direction, would increase to nearly 20 minutes in both directions. Annual transit operating cost would increase by \$1-2 million. The economic cost of lost time to transit riders alone would be over \$1 million annually.

The 4-lane/6-lane hybrid options mitigate the effect of reduced number of vehicle lanes, but not significantly, and not to the point where transit travel times across the bridge would not be unacceptably increased.

Two alternative treatments for the pedestrian and bicycle facilities were developed for a 4 vehicle lane option. The first was to widen the existing sidewalks into the existing curb lanes, with pedestrians and cyclists continuing to share the sidewalks. The second was to convert the curb lanes to road-level bike lanes with a physical barrier between cyclists and vehicular traffic. This second option (see Figure 6) was overwhelmingly preferred by cyclists and pedestrians who provided feedback.



Figure 6 - Road-level bike lane concept

This lane reduction option would cost under \$1 million. This excludes the cost of repairing the existing railings, a cost that is included in the sidewalk widening cost estimates.

#### UNDER-SLUNG BIKE PATH

Among the options reviewed early in the sidewalk capacity study were ones which proposed new bike paths be added below the existing sidewalks and road deck. These options were discarded because they would compromise navigation and due to concerns that users may avoid such a facility due to safety concerns. An option which maintained most of the navigational clearance was eventually discarded for aesthetic and other reasons.

This option was revived when it became clear that the other options did not meet all the transportation and heritage objectives established for the bridge. A more straightforward treatment for an under-slung bike path was developed, albeit one that did reduce navigational clearance. If the clearance reduction were limited to 6 m, most of the vessels frequenting False Creek could continue to pass under the bridge. Like the recommended sidewalk widening option, this option uses an architectural treatment in keeping with the existing Art Deco bridge (see Figure 7).

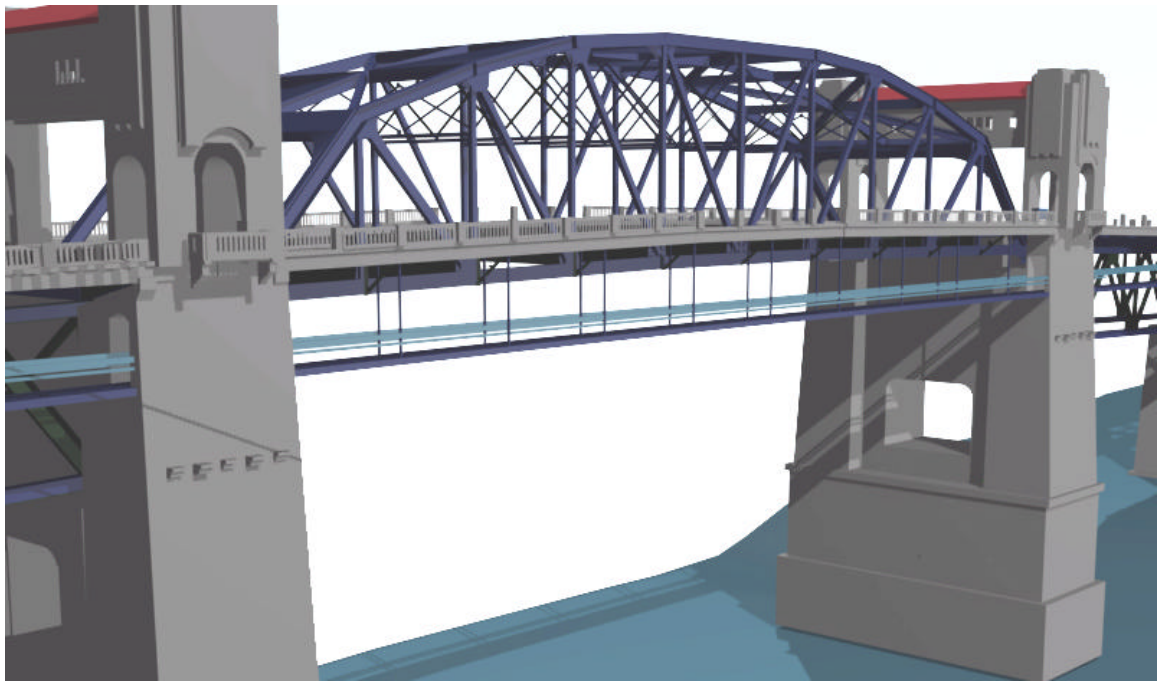


Figure 7 - Under-slung bike path concept

The figure above shows a fixed structure. Transport Canada has told the City it would not accept such a treatment, but has suggested that a facility which could be opened temporarily to accommodate large vessels may be acceptable.

This under-slung option meets the minimum design guidelines, and it is preferred by many in the heritage community to the outward sidewalk widening options. Many cyclists consider this to be a viable solution. However, it does not address some concerns expressed by the Police Department regarding surveillance and emergency access. Fire and Rescue staff believe such a treatment could be workable. It may be unattractive to some potential users due to safety concerns.

This option has only been developed at a conceptual level. Unlike the sidewalk widening options, which have been subject to engineering review to confirm that they can be built, this option may or may not be technically feasible.

No cost estimates have been developed for this option. However, based on the estimates developed for the sidewalk widening options, it is reasonable to assume that fixed under-slung bike paths would cost in the order of \$15 million. A movable system would be more expensive than a fixed facility. This option would likely require funding beyond the \$12 million currently available.

Because it would widen the bridge near the bridgeheads and reduce clearance elsewhere over land not owned by the City, this option would require acquisition of additional land or rights-of-way from the Province and the Squamish Nation. The amount of land required may be less than that needed for sidewalk widening.

To fairly compare this option with other options requires answering a number of questions, including:

1. What navigational clearances would be acceptable to the False Creek boating community and Transport Canada?
2. Is a movable under-slung bike path buildable?
3. What would such a facility look like and what would its impact be on heritage elements of the bridge?
4. How much would such a facility cost to build and operate?

Further study would be required to answer these questions.

## NEW BRIDGE

The False Creek Pedestrian and Cyclist Crossing Study investigated a number of options for new pedestrian/cyclist bridges across False Creek. None of these were advanced passed the initial list of options for a variety of reasons. More recently, Council requested that staff investigate new bridge options in the vicinity of the Burrard Bridge.

Locations on both sides of the Burrard Bridge were investigated. Only one proved feasible, albeit with significant impacts on Vanier Park, Sunset Beach Park and the neighbourhood around Bute Street. Building a bridge at this location would cost at least \$50 million, well beyond the available \$12 million funding, and is therefore not recommended.

## CURB-SIDE RAILING

An option which has often been suggested is the addition of a railing at the curb. While this may address the most extreme safety concerns, it would reduce the space available for pedestrians and cyclists and increase conflicts between these user groups. It does not meet any of the transportation objectives of this project and is opposed by heritage advocates and is therefore not recommended.

## PUBLIC CONSULTATION

All the options which staff have reviewed have been subject to thorough public consultation.

Appendix G lists consulted stakeholders and summarizes the opinions of the various stakeholder groups.

There is broad support for outward sidewalk widening. Opposition to this approach comes primarily from the heritage advocacy community and from residents who live immediately adjacent the bridge. Concerns have been expressed by the staff of the adjacent YMCA Beach Avenue Daycare.

Support for lane re-allocation comes from cyclists, environmental advocates, heritage advocates, and local residents who believe this approach will reduce traffic volumes. Opposition comes from TransLink, the downtown business community, seniors and disabled advocates, and local residents who believe this approach will increase traffic congestion and travel times.

Support for the under-slung bike path comes from those that would like to see a clear separation of cycling and pedestrian routes, including seniors and disabled groups and some pedestrians and cyclists. It is also seen more favourably than outward sidewalk widening by the heritage community. It is opposed by the boating community. Transport Canada, the Police Department, and the staff of an adjacent daycare have concerns that may or may not be resolvable through design.

## **FINANCIAL IMPLICATIONS**

The 1994-1996 and 2003-2005 Capital Plans approved funding for pedestrian and cyclist improvements to the Burrard Bridge. An existing balance of \$11.7 million is available for this work. In addition, \$2.4 million is available for repair or replacement of the existing railings.

Cost sharing opportunities exist with senior governments. Sidewalk widening and under-slung bike paths are good candidates for TransLink's Bicycle Infrastructure Capital Cost Sharing (BICCS) program. TransLink is unlikely to provide funding for a lane re-allocation option because of the expected negative effects on transit.

Outward sidewalk widening includes relocation of the railings as part of the work, and therefore has \$14.1 million available funding. This option has been estimated to cost \$13 million to build. Detailed design for this option can be done within available funding limits.

A fixed under-slung bike path would likely cost approximately \$15 million. A movable facility would be more expensive. Additional capital funding would likely be required to build such a facility. Further design for this option could be done within available funding limits.

The outward sidewalk widening and under-slung bike path options would require acquisition of additional land or rights-of-way beneath and beside the bridge.

## **CONCLUSION**

No option exists which meets all the objectives identified for the Burrard Bridge.

- The status quo does not support the City's goals for sustainable transportation.
- Outward sidewalk widening compromises heritage features of the bridge.
- Lane re-allocation will increase traffic congestion, slow goods movement and degrade transit service.
- An under-slung bike path will compromise navigation, presents security and access concerns, may not be feasible, and would likely require additional capital funding.

Outward sidewalk widening is the only option that meets all the City's transportation objectives and is known to be acceptable to Transport Canada and to be buildable. Of the two sidewalk widening options, the one which leaves the towers intact (i.e. pinch point), has significantly less heritage impact. Staff recommend advancing this option to final design.

An under-slung bike path may also meet all the City's transportation objectives, but further study would be required to confirm whether such an arrangement is structurally feasible, what its impact on heritage elements of the bridge would be, and whether it could be made acceptable to Transport Canada.

## FALSE CREEK PEDESTRIAN AND CYCLIST CROSSING STUDY

In July 2000, City Council approved a consultant study to review the feasibility of False Creek crossing options for pedestrians and cyclists and their associated costs and impacts. A number of factors had led to this study, including:

- Increased residential densities around False Creek.
- Greater interest by the public to walk or cycle across False Creek.
- Increased pedestrian and cyclist demand on the Burrard Bridge has led to increased conflicts between the two modes. While short term operational treatments have been implemented to enhance the shared environment on the bridge, a more permanent long term solution needs to be developed and implemented.

The public, consultant team and staff initially identified 37 potential options that might improve pedestrian and/or cyclist crossings across False Creek.

A screening process was developed to reduce the list of 37 to a more workable number, recognizing that options not short-listed could be studied in the future. The screening process reviewed each option against the study objectives and feasibility and then assessed the options against six broad categories:

- Usage
- Quality of Trip
- Cost
- Traffic Impacts
- Neighbourhood Integration
- Urban Design/Appearance

This produced in a short list of 7 crossing options and 11 associated access or connectivity improvements.

Because the study's scope allowed for only a limited number of options to be carried forward for detailed study, the two Cambie Bridge options were deferred to a future study. Five options, three on the Burrard Bridge and two on the Granville Bridge, received more detailed study. These were:

- Burrard Bridge Outward Sidewalk Widening (B1)
- Burrard Bridge Inward Sidewalk Widening (lane reduction) (B2)
- Burrard Bridge Low-level Crossing (B3)
- Granville Bridge Mid-level Suspended Crossing (G1)
- Granville Bridge Bike Lanes (lane reduction) (G6)

The consultants completed their work in November 2001, reviewing in significantly more detail the five crossing options identified above. The consultant's key findings related to the Burrard Bridge were:

1. The Burrard Street Bridge Corridor should be given the highest priority for improvement.
2. Those improvements should be at the bridge deck level either through widening the sidewalks outside the existing railing (B1) or narrowing the roadway (B2).

These findings were based on the following observations:

- Pedestrian and cycling demand along the Burrard Street Bridge Corridor is and will continue to be the highest of the three bridge crossing corridors.
- Safety issues persist on the bridge deck sidewalks which must be addressed.
- Commuter pedestrian and cycling demand, which is overall higher than recreational demand, is best served at the bridge deck level rather than a low level option under the bridge.

In light of these, the Consultant recommended that further design work be pursued in the form of a "deck level of Burrard Bridge" study that would, in recognition of the heritage sensitivities, "marry" the talents of an engineer and an architect to come up with acceptable design solutions. The goal of the study would be to examine both deck level options to best determine a permanent solution that solves both the short and long term transportation needs along the corridor.



## 2002 STAFF REPORT

In March 2002, staff reported to Council, consolidating the work of consultants and staff's own investigations. Staff recommended that an overall long term strategy for making improvements to the pedestrian and cycling environments across False Creek be supported by Council. The elements of this strategy are:

- Improve the safety and capacity of pedestrian and cycling routes along the three bridge corridors (Burrard, Granville and Cambie)
- Identify and include street, bridge end, and Seawall connections as part of any proposed improvements to the bridges
- Favour solutions that optimize usage, safety, quality of trip, cost, and minimize negative impacts on traffic, heritage, urban design and neighbourhoods
- Support and encourage a role for water-borne transportation to serve the diverse travel needs
- If feasible, that the deck level or upper level of the Burrard Bridge be the first to be structurally modified to increase pedestrian and cycling capacity, followed by a study of improvements in the Granville corridor and then a widening of the west sidewalk of the Cambie Bridge.
- That staff review options to improve pedestrian and cycling facilities on the deck of the Granville Bridge.
- That widening of the west sidewalk of the Cambie Bridge be done as part of the study of the redevelopment of SE False Creek
- That staff report back to Council upon completion of the physical work on the deck level of Burrard Bridge to re-confirm the scope and timing of subsequent priorities to improve the pedestrian and cycling environment across False Creek.

Staff concluded that the Burrard Bridge should be the highest priority for improvements to pedestrian and cycling environment and capacity. They stated that existing high pedestrian and bicycle demand on the Burrard Bridge and safety issues that persist due to the limited width and shared usage of the sidewalk need to be addressed. They noted that future increases in demand will only exacerbate these existing capacity and safety issues.

Staff concurred with the consultant's conclusion regarding low level crossing on the Burrard Bridge. They agreed that it could work well for recreational users as it connects the north and south seawalls, but that the priority for improvements should be at the deck or upper level of the bridge where the higher volume commuter pedestrian and cyclist trips demand is.

The public also agreed that the Burrard Bridge should be the highest priority for pedestrian and cycling improvement, and that any changes should be sensitive to the heritage aspect of the bridge. Heritage Vancouver is strongly opposed to any option that could potentially alter the appearance or integrity of the bridge.

While the public consultation in this study did not capture opinions from the motorist segment of the public, a 1995 survey determined that 7 in 10 bridge users would prefer maintaining the existing 6 lanes on the bridge and widening the bridge outward as opposed to reducing the number of lanes on the bridge from 6 to 5.

Staff noted that whatever improvements are made to the pedestrian and bicycle facilities on the Burrard Bridge must be considered permanent and long term. It is reasonable to expect that these improvements will meet transportation needs in this corridor for the next 50 years.

Staff did not support option B2, which would narrow the bridge deck from 6 lanes to 5 for the following reasons:

1. Narrowing the bridge by one vehicle lane may not serve the long term transportation needs of this corridor to and from the Downtown Peninsula in terms of:
  - preserving existing road capacity and future flexibility for transit and/or vehicular traffic (e.g. the installation of bus/HOV lanes or future rapid transit becomes problematic if only one lane is left for general purpose and goods movement vehicles)
  - reducing the level of service for transit, goods movement vehicles, and general purpose traffic crossing the bridge.
2. Widening the sidewalks inward or providing bike lanes may be problematic and not adequately resolve the existing pedestrian and bicycle issues:
  - The 1.5 metre bike lane widths would not provide room for faster cyclists to pass slower cyclists without encroaching into the adjacent vehicle lane, and the 1.5m additional sidewalk widths do not provide enough capacity with the existing sidewalk width to allow for the separation of pedestrians and cyclists.
  - The modest increase in width may not provide sufficient capacity for future increases in pedestrian and cyclist demand.
  - The effectiveness of using the area through the centre of the bridge must be questioned. Cyclists would be riding between relatively fast moving vehicles and the centre span structure. This would be a very poor quality of trip for many users. It is likely many would choose to stay on the outside of the centre span structure, on the existing sidewalk, thus not resolving the existing situation.

Staff did endorse further development of option B1, outward sidewalk widening, and added a recommendation to investigate other options at the deck or upper level of the Burrard Bridge which might better address heritage concerns.

Specifically, staff recommended "the development of a more detailed and technical design that will provide additional sidewalk capacity at the deck or upper level of Burrard Bridge at the same time maintaining the existing six lanes for vehicle traffic. The goal of this step is to select a preferred design alternative and to then proceed to construction...The scope of work would include undertaking design of the deck or upper level design solutions on the Burrard Bridge including the outward extension of the sidewalks (3 metres on each side) and alternatives that are consistent with the transportation capacity, safety, and heritage principles as outlined in this report."

In March 2002 Council approved staff's recommendations and in May 2002 they approved a consulting contract to complete the recommended design work.

## **BRIDGE RIGHTS-OF-WAY**

The Burrard Bridge occupies road right-of-way and several parcels of land. Most of these parcels are owned by the City or are the subject of Provincial Crown leases to the City. One parcel, immediately south of the Aquatic Centre, is owned by the Province.

Another parcel, south of Vanier Park, was a rail yard when the bridge was built and was owned by the CPR between the late 1800's and 2000. Prior to construction of the bridge, the CPR and the Government of Canada granted permission to build on this land. In 2002, the BC Court of Appeal affirmed a decision of the BC Supreme Court, returning this land to the Government of Canada for the sole use and benefit of the Squamish Nation as Reserve land. In 2003, the Court of Appeal clarified its decision and in 2004 the City learned that neither the CPR nor the Government of Canada had attempted to appeal those decisions to the Supreme Court of Canada.

Any options which widen the bridge or affect the clearance beneath the bridge in these parcels will require the approval of the Squamish Nation, the federal government and/or the provincial government.

The City has recently entered into discussions with the Squamish aimed at establishing a government-to-government relationship as the City has done with the Musqueam Indian Band. Issues related to the Burrard Bridge will be discussed as part of broader discussions related to exploring a co-operative relationship between governments.

## DESIGN GUIDELINES

The Transportation Association of Canada has established guidelines for new cycling facilities in Canada. Some of the relevant guidelines which apply to the Burrard Bridge are listed below. These minimum dimensions assume single-file cycling (i.e. moderate volume, no passing) and incorporate required clearances to drop-offs and vertical obstructions. They do not accommodate shared use by inline skaters.

Minimum on-road bike lane width	2.1 m (includes clearance to curb)
Minimum sidewalk bike lane width	2.5 m (includes clearance to curb)
Minimum separated (e.g. under-slung) bike path width	2.7 m (includes clearances to railings)

Allowing cyclist to pass one another and providing sufficient capacity for high volumes of cyclists requires wider lanes.

Preferred on-road bike lane width	3.1 m (includes clearance to curb)
Preferred sidewalk bike lane width	3.5 m (includes clearance to curb)
Preferred separated (e.g. under-slung) bike path width	3.7 m (includes clearances to railings)

European guidelines suggest a minimum lane width of 2.6m where inline skating co-exists with cycling.

There are no Canadian standards for sidewalk width. US sources suggest 1.8m to 2.1m is required for two individuals to comfortably pass, and 2.4m to 2.6m is required for an individual to pass a couple walking abreast.

Preferred sidewalk pedestrian width	2.5 m
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2.6m is, perhaps not coincidentally, the width of the existing sidewalk.

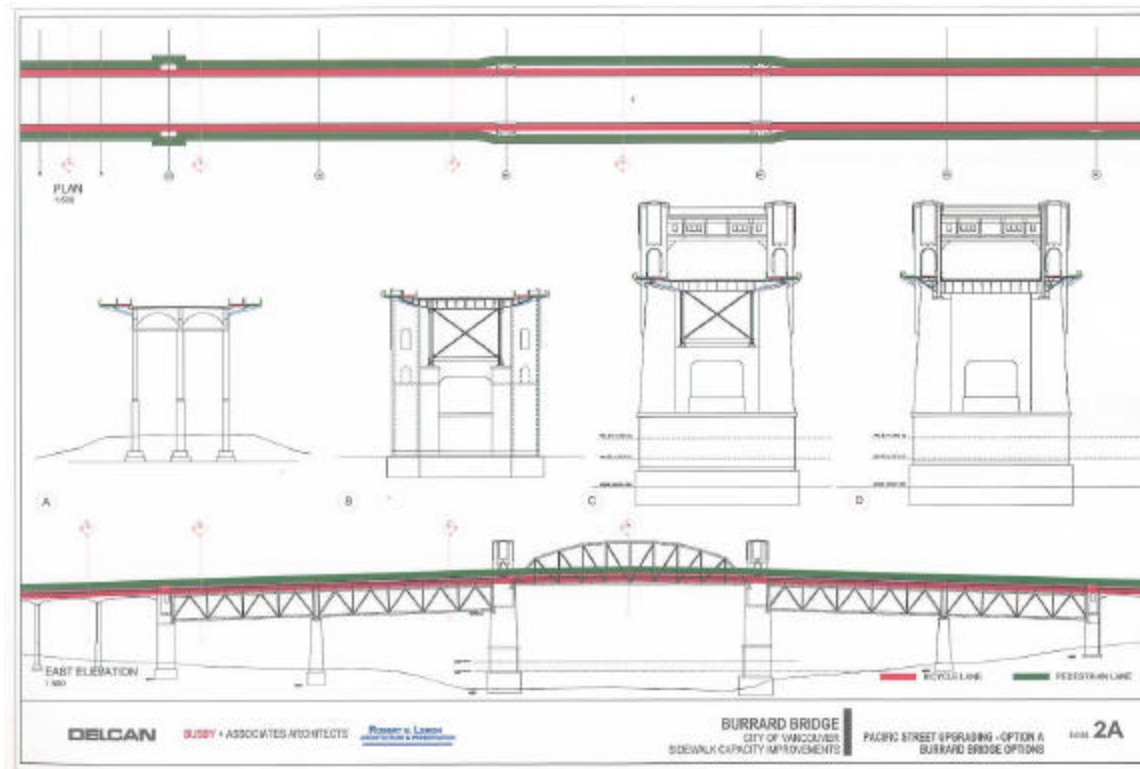
## DEVELOPMENT OF SIDEWALK WIDENING OPTIONS

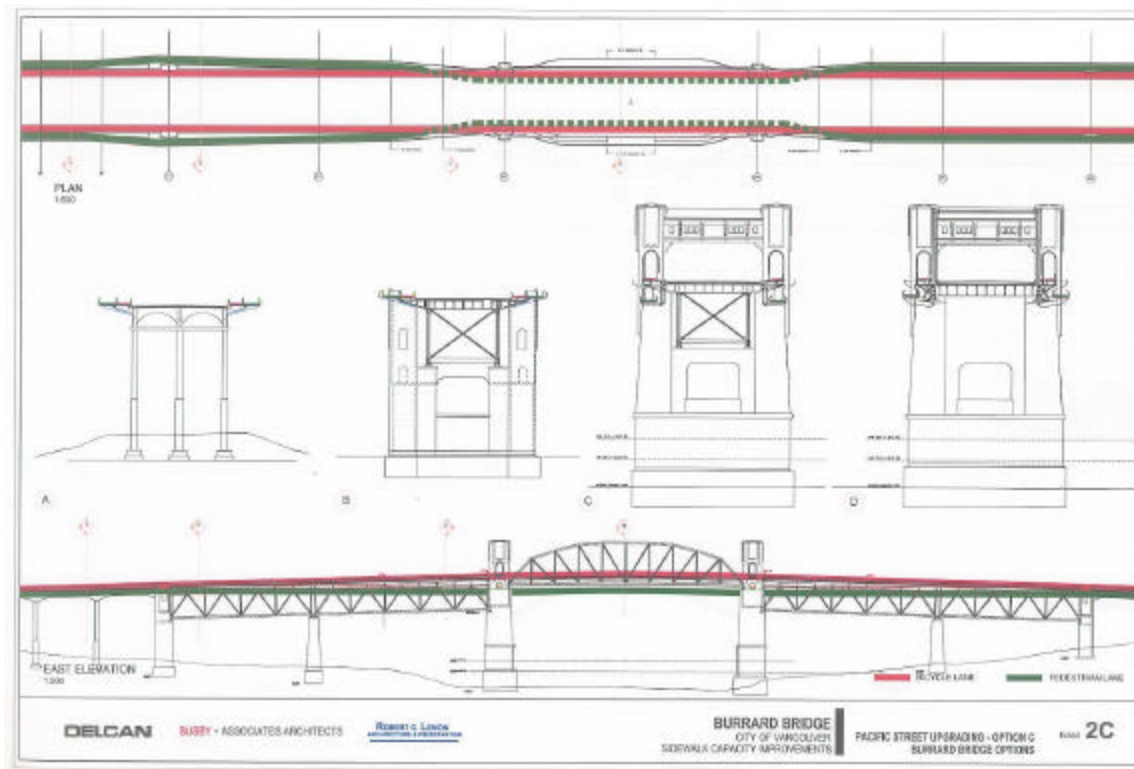
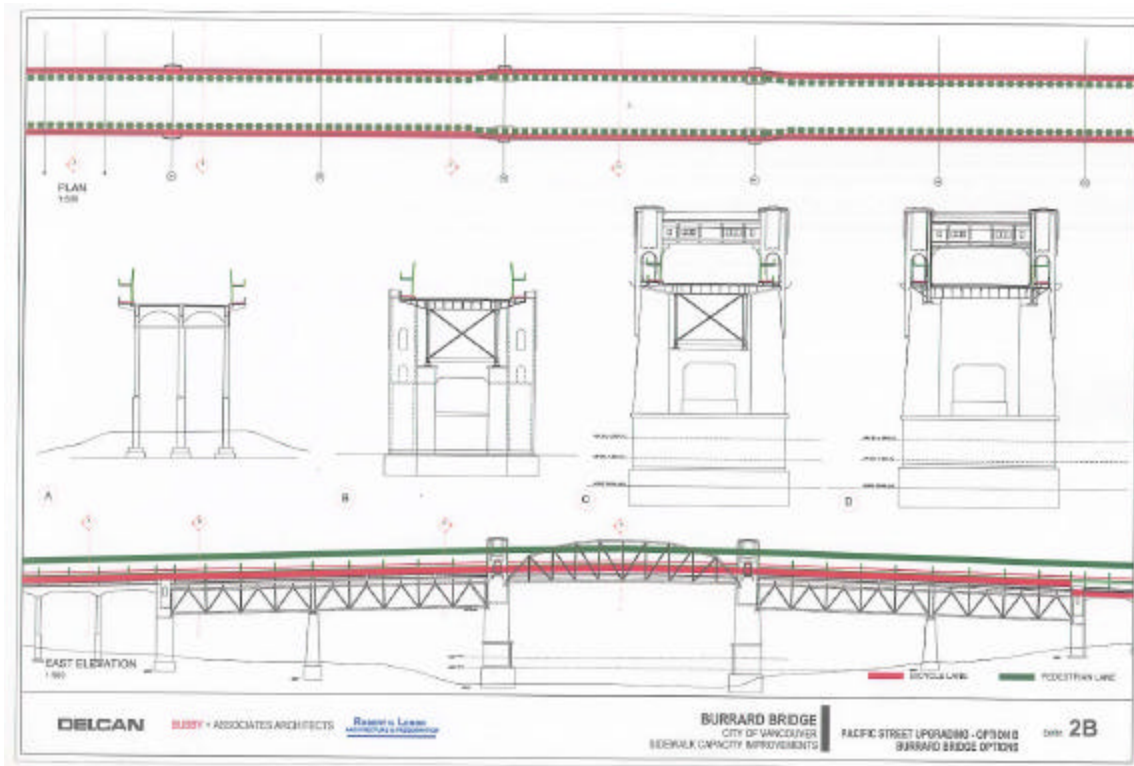
Following up on the recommendations of the False Creek Pedestrian and Cyclist Crossing Study, staff and a consultant team evaluated a wide range of options for providing additional sidewalk capacity at the deck or upper level of the bridge. These included:

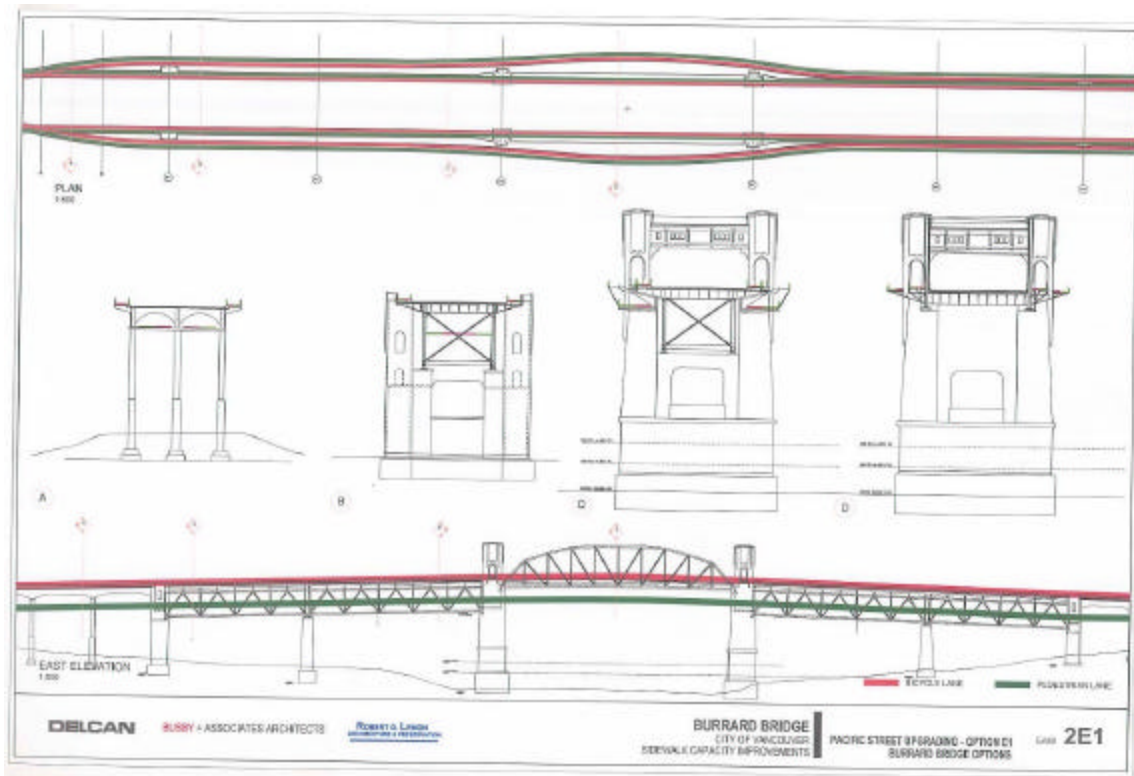
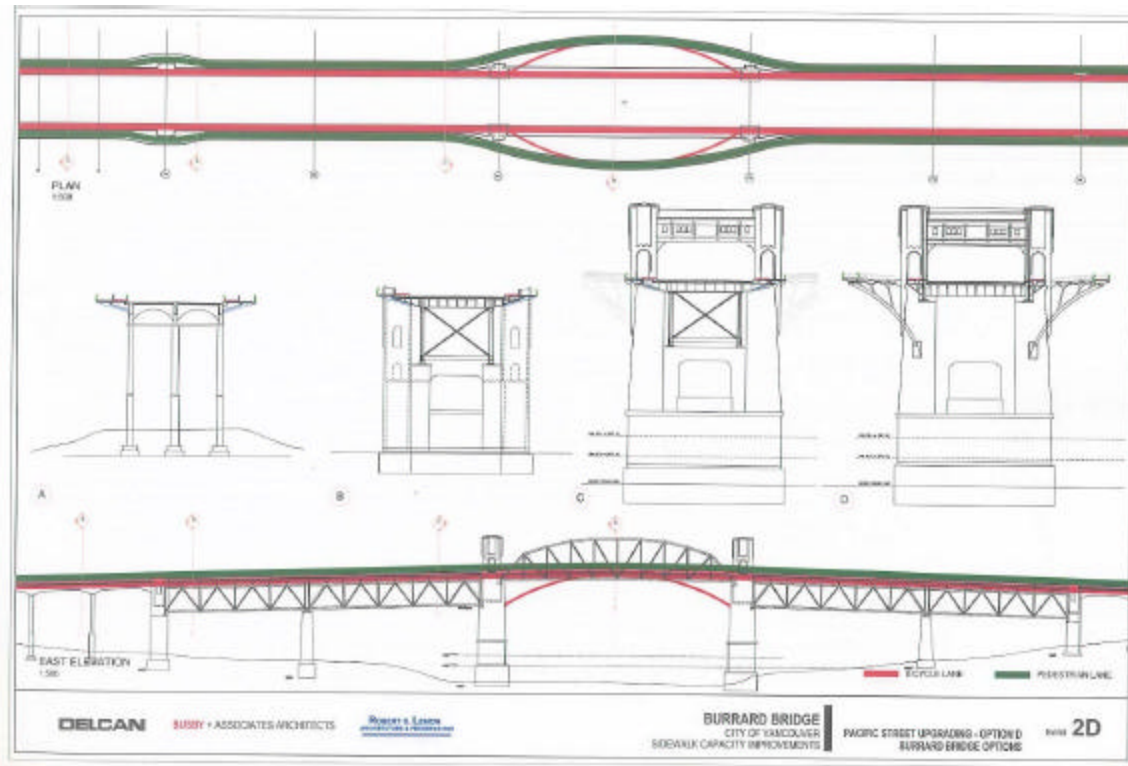
- Outward sidewalk widening
- New bike deck above existing sidewalks
- New bike path beside existing sidewalks (2 variants)
- New bike path below existing sidewalks and road deck (2 variants)
- New two-way bike path beside existing sidewalk on one side only

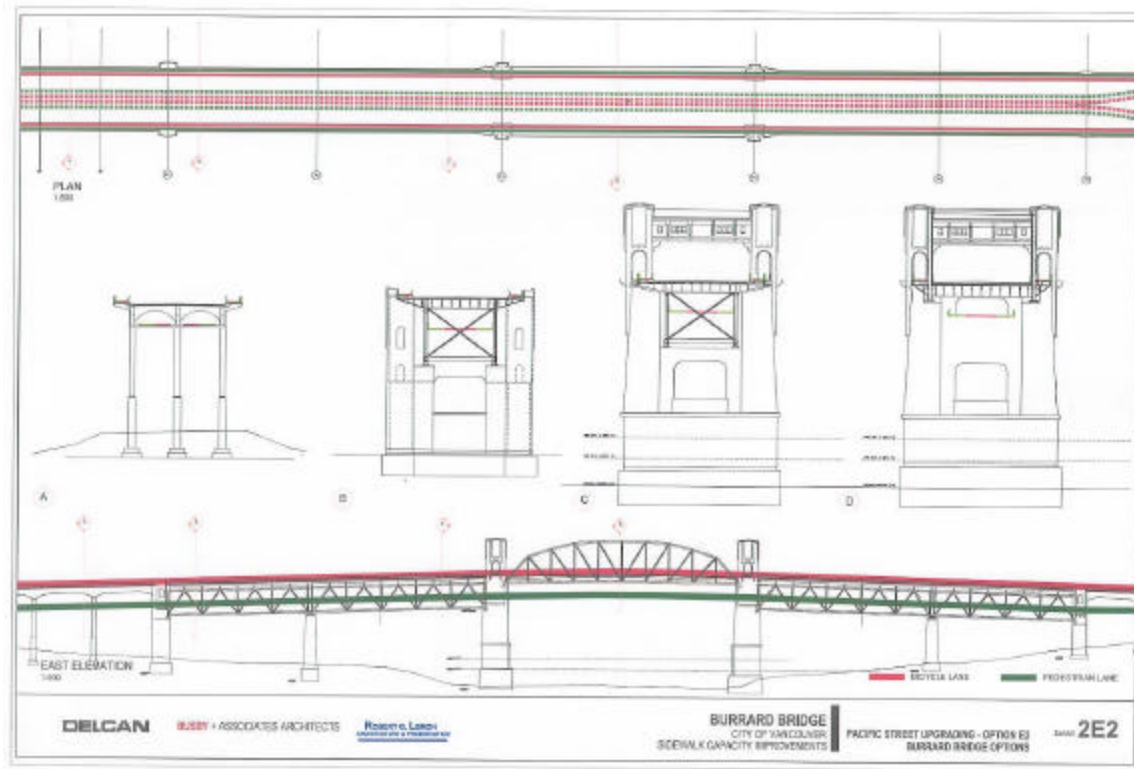
These options are shown on the following pages.

This initial list of options was evaluated against a number of criteria including function, constructability, aesthetics, heritage, navigation and cost. The resulting short list yielded three options for further development: outward sidewalk widening, and the two variations of new bike paths beside the existing sidewalks.









Through a process of technical review by City staff and the consultant team, and consultation with stakeholders, these options evolved to become the two shown in Figures E1 and E2.



Figure E1



Figure E1 shows a contemporary addition beside and below the existing sidewalks to create a new 3 m bike path. This option was eventually discarded for aesthetic, marine navigation and user desirability reasons. Objections to this option included concerns from Police and Fire & Rescue about their ability to respond to emergencies on such a facility.



Figure E2

Figure E2 shows a contemporary addition to the Art Deco bridge at the existing sidewalk level to widen the sidewalks to 6 m. This treatment addressed all the functional requirements, but questions were raised regarding the aesthetics of the contemporary / Art Deco mix of styles. To some, this was an appropriate response to the desire to differentiate the original bridge from later modifications. To others, it disrupted the look of the bridge. Another critique of this approach was the visual impact on the main towers. These continuous vertical elements would be interrupted at the road deck level.

In response to these concerns, two more options were developed with an architectural treatment more consistent with the Art Deco vernacular of the existing bridge. The first is functionally identical to the contemporary sidewalk widening, creating a 6 m sidewalk for the full length of the bridge, but with railing treatments similar to the original railings. This option would require the removal of the existing tower balconies and their replacement with larger ones (see Figure E3).



Figure E3 - Full-length outward sidewalk widening

The second option addressed the impact on the towers by eliminating the sidewalk widening at the towers (see Figure E4). The 6 m sidewalks would narrow to pass through the existing 2.3 m portals.



Figure E4 - Outward sidewalk widening, except at the towers (piers 3 & 4)

Except at the towers, these two options are the same. They have 6m wide sidewalks, providing ample space for high volumes of pedestrians and cyclists as well as inline skaters, and meet all of the transportation criteria. They maintain the existing six traffic lanes. This maintains transit operations at today's level of service and leaves open options for bus/HOV lanes or other transit improvements.

Figure E5 below shows a possible treatment of 6 m wide sidewalks, with a 1 m buffer from the curb, a 2.5 m wide bike lane and a 2.5 m wide pedestrian path.



Figure E5

Both sidewalk widening options compromise the heritage elements of the bridge. The Burrard Bridge Heritage Study identified seven character-defining elements of the seagate parti. A full-length outward sidewalk widening would affect both primary elements, the concrete piers and concrete handrails, and would significantly alter the appearance of the “seagate” (see Figure E3).

However, the scheme which avoided widening at the towers (piers 3 & 4) would affect only the concrete handrails. The handrails would be relocated outward and would have much less affect on the appearance of the “seagate” than a full-length sidewalk widening (see Figure E4).

The Burrard Bridge Heritage Study also identified twelve character-defining elements of the roadgate parti. Two of these twelve elements, the concrete handrails and the perceived width of the roadway, would be affected by outward sidewalk widening (see Figures E6 and E7).

A full-length sidewalk widening would also have the effect of transforming the road “gate” into an “arch”.



Figure E6 - Existing roadgate



Figure E7 - Roadgate with sidewalk widening, except at towers

The full-length outward sidewalk widening has been estimated to cost \$14 million. The reduced widening which would leave the towers intact would cost \$13 million.

## LANE RE-ASSIGNMENT

In 2003, Council requested that staff revisit the possibility of reassigning existing vehicle lanes on the bridge as cycling space. A number of options were investigated which would reduce the number of vehicle lanes on the bridge from the existing six to either five or four, without widening the sidewalks to the outside. The configurations investigated included:

- 5 vehicle lanes (2 northbound, 3 southbound), sidewalks widened to 4m
- 5 vehicle lanes (3 northbound, 2 southbound), sidewalks widened to 4m
- 5 vehicle lanes (2 northbound, 2 southbound, 1 reversing), sidewalks widened to 4m
- 5 vehicle lanes (2 northbound, 2 southbound, 1 transit), sidewalks widened to 4m
- 5 vehicle lanes (2 northbound, 2 southbound, 1 reversing transit), sidewalks widened to 4m
- 5 vehicle lanes (1 northbound, 1 southbound, 1 reversing, 2 transit lanes), sidewalks widened to 4m
- 5 vehicle lanes (all above configurations), bike lanes at road level, existing sidewalk
- 4 vehicle lanes (2 northbound, 2 southbound), sidewalks widened inward to 5-6m
- 4 vehicle lanes (1 northbound, 1 southbound, 2 transit), sidewalks widened inward to 5-6m
- 4 vehicle lanes (all above configurations), bike lanes at road level, existing sidewalk

In addition to the above options, which assume no outward sidewalk widening, two additional options which assume limited outward widening at the north end of the bridge were assessed. These two hybrid options, described below, were an effort to mitigate the impacts on traffic of lane re-allocation.

- 4 vehicle lanes (2 northbound, 2 southbound) and sidewalks widened inward to 5-6m south of Pier 4 (north tower), 6 vehicle lanes and outward sidewalk widening north of Pier 4
- 4 vehicle lanes (2 northbound, 2 southbound) sidewalks widened inward to 5-6m south of Pier 6 (north shore of false Creek), 6 vehicle lanes and outward sidewalk widening north of Pier 6

Figure F1 below shows how a transition from 4 lanes to 6 lanes might happen at the north tower (Pier 4) in a hybrid option.



Figure F1 - Transition between 4-lane inward sidewalk widening and 6-lane outward sidewalk widening.

Computer simulations of traffic behaviour were done to determine the likely effect of such bridge modifications. Traffic signal operations in these computer models were based on optimizing signal timing for each lane configuration, not on current signal operations.

All the various five lane options fail to meet minimum Canadian guidelines for cycling lane width or fail to provide sufficient sidewalk width to meet long-term walking and cycling needs. All these options would interfere with transit operations, slowing bus operations in at least one direction along this busy transit corridor, as well as adding to traffic congestion in Kitsilano and/or West End neighbourhoods. Even the option which provides transit lanes on the bridge would be expected to increase congestion beyond the bridgeheads to the extent that transit operations in the downtown would be adversely affected.

The four lane options would allow for the construction of pedestrian and cycling facilities which would meet long-term walking and cycling demand and would conform to Canadian guidelines for cycling and mixed-use facilities. Like the five lane options, these options would interfere with transit operations, slowing bus operations in both northbound and southbound directions, as well as adding to traffic congestion in Kitsilano and West End neighbourhoods.

Transit trip times, which are currently about 10 minutes in the peak direction and 5 minutes in the off-peak direction, would increase to nearly 20 minutes in both directions. Annual transit operating cost would increase by \$1-2 million. The economic cost of lost time to transit riders alone would be over \$1 million annually.

The 4-lane/6-lane hybrid options mitigate the effect of reduced number of vehicle lanes, but not significantly, and not to the point where transit travel times across the bridge would not be unacceptably increased.

These conclusions based on computer modelling are consistent with a simpler rationale that goes as follows: A car trip from Kitsilano to Downtown takes roughly 5 minutes longer via the Granville Bridge than via the Burrard Bridge. The Burrard Bridge is at capacity (the number of daily vehicle trips across the bridge has not increased in 25 years). Reducing the number of lanes available to vehicles will increase travel time across the Burrard Bridge. If this increase in travel time is greater than 5 minutes, some drivers will divert to Granville Bridge or other routes. Drivers will continue to seek out alternate routes until travel times on these routes become roughly equal. A new equilibrium will be reached with travel times at least 5 minutes above the status quo. This conclusion is also consistent with transit delays experienced during a 1996 bike lane trial.

Two alternative treatments for the pedestrian and bicycle facilities were developed for a 4 vehicle lane option. The first was to widen the existing sidewalks into the existing curb lanes, with pedestrians and cyclists continuing to share the sidewalks. The second was to convert the curb lanes to road-level bike lanes with a physical barrier between cyclists and vehicular traffic. This second option (see Figure F2) was overwhelmingly preferred by cyclists and pedestrians who provided feedback.



Figure F2 - Road-level bike lanes

This lane reduction option would cost under \$1 million. This excludes the cost of repairing the existing railings, a cost that is included in the sidewalk widening cost estimates.

## **PUBLIC CONSULTATION**

The stakeholders consulted have included:

### Downtown Neighbourhood and Business Associations:

- West End Residents Association (WERA)
- West End Neighbours in Action (WENA)
- Downtown Vancouver Business Improvement Association (DVBIA)
- Downtown Vancouver Association (DVA)
- Vancouver Board of Trade (BoT)

### Alternative Transportation Advocacy Groups:

- Vancouver Area Cycling Coalition (VACC)
- Better Environmentally Sound Transportation (BEST)
- Bicycle People
- Putting Pedestrians First (PPF)
- Society Promoting Environmental Conservation (SPEC)

### Heritage Advocacy Groups

- Heritage Vancouver
- Vancouver Heritage Foundation

### Council-appointed Advisory Committees

- Bicycle Advisory Committee
- Vancouver Heritage Commission
- Urban Design Panel
- Advisory Committee on Disability Issues
- Advisory Committee on Seniors Issues
- Vancouver City Planning Commission

### Emergency Services

- Police
- Fire & Rescue

### Local Residents

- Residents of 1000 Beach
- Residents of 1005 Beach
- YMCA Daycare (1475 Burrard)

The opinions of the various stakeholder groups are summarized below.



## CYCLISTS

All three options would provide good cycling facilities on the bridge, and cyclists have said as much. They also want to see changes made soon.

There is strong support among cyclists for outward sidewalk widening, although many have expressed concern about the constriction which would remain if sidewalk widening did not extend around the bridge towers.

Some cycling advocates would also like to see a reduction in vehicle capacity and so support the re-allocation of two lanes to cyclists. The separation from both vehicle and pedestrian traffic that a road-level bike lane would provide is attractive to many cyclists.

The Bicycle Advisory Committee's preferences, in order, are:

1. Lane re-allocation (2 bike lanes, 4 vehicle lanes)
2. Full-length sidewalk widening

## PEDESTRIANS

Pedestrians' concerns about the bridge are focussed on space on the sidewalks and conflicts with cyclists. The lane re-allocation and under-slung bike path options both remove cyclists from the sidewalks, while sidewalk widening provides more space on the sidewalks for both. Some pedestrians have expressed a preference for the former two options.

Some pedestrian advocates would also like to see a reduction in vehicle capacity and so support the re-allocation of two lanes to cyclists.

## TRANSIT

TransLink has opposed the lane re-allocation options as they are expected to degrade transit service.

## SENIORS & DISABLED

The Advisory Committee on Seniors Issues and the Advisory Committee on Disability Issues have a joint Transportation Sub-Committee. This sub-committee has expressed a preference for options which create a physical separation of pedestrians and cyclists and options which do not impede transit and other traffic. They have strongly opposed lane re-allocation options. Their preferences, in order, are:

1. Under-slung bike path
2. Full-length sidewalk widening
3. Sidewalk widening, except at the towers

## DOWNTOWN BUSINESSES

Downtown businesses, represented by the Downtown Vancouver Business Improvement Association (DVBIA), the Downtown Vancouver Association and the Vancouver Board of Trade, have been consistently and overwhelmingly opposed to any options which would reduce transit and goods movement capacity of the Burrard Bridge, including lane re-allocation. They have been supportive of sidewalk widening and under-slung options.

## EMERGENCY SERVICES

The Vancouver Police Department has expressed concerns about any facility which is not visible by other bridge users or which is difficult to access in case of emergency. The under-slung bike route presents both these issues.

Vancouver Fire and Rescue Services staff have expressed concerns about the effect of congestion on their ability to respond to emergencies and therefore are opposed the lane re-allocation option. Their preferences, in order, are:

1. Sidewalk widening
2. Under-slung bike path

## NEIGHBOURS

Opinions of residents near the bridgeheads are varied. Some support lane re-allocation with the expectation that it would result in less traffic in their neighbourhood. Others oppose lane re-allocation because they believe it would result in more traffic in their neighbourhood.

Residents of the apartment complexes immediately east and west of the bridge on the north shore of False Creek (1000 and 1005 Beach) have expressed concerns about sidewalk widening options, the under-slung bike path option and lane re-allocation. Concerns about the sidewalk widening are based on the proximity of pedestrians to their homes, on the increased threat of debris thrown from the bridge and on increased shadowing. Concerns regarding the under-slung bike path come from residents whose homes are at the elevation of the proposed bike path and who would have cyclists riding past their windows if this option were built. Objections to lane re-allocation are based on concerns about increased traffic congestion and localized pollution from idling vehicles.

Representatives of YMCA Daycare at Burrard and Beach have expressed concerns regarding noise, dust and falling materials during construction. They are also concerned about the safety of children in play areas, mainly in regard to thrown objects.

## HERITAGE

Most in the heritage conservation community are opposed to any changes to the existing structure of the bridge, and would like to see some of its original features restored. The Vancouver Heritage Commission has passed motions opposing sidewalk widening options and

opposing the addition of an inside railing. It has supported the under-slung bike path concept as well as the idea of a new bridge.

#### GENERAL PUBLIC

At a public open house held in March 2005, nearly 100 attendees completed surveys asking their opinions of several options.

- 2% preferred the status quo
- 73% said that the status quo was not acceptable
  
- 73% said outward sidewalk widening was acceptable
- 24% said this was their preferred solution
- of those who expressed a preference, 78% preferred full-length widening to narrowing the sidewalk at the towers
  
- 83% said lane re-allocation was acceptable
- 63% said this was their preferred solution
  
- 59% said an under-slung bike path was acceptable
- 16% said this was their preferred solution
  
- 5% said that a curb-side railing alone was their preferred solution
- 73% said that a curb-side railing alone was not acceptable

Recent public consultation has been focused on bridge stakeholders and interest groups. In 1995, the Angus Reid Group conducted a random phone survey of Vancouver residents to determine the public's attitudes and preferences regarding changes to the bridge.

- 81% were supportive of pedestrian and cyclist upgrades to the bridge
- 37 % were "strongly" supportive
  
- 69% supported outward sidewalk widening, while maintaining 6 vehicle lanes
- when cost was identified, support dropped to 62%
  
- 27% supported inward sidewalk widening, while reducing the number of lanes to 5
- when travel time and congestion effects were identified, support dropped to 19%

Neither the 4-lane re-allocation nor the under-slung options were addressed by this poll.