

5 *Implementation Ideas*

The ideas in this section are an outcome of the consultation process that occurred during the development of the Plan. When developing the downtown transportation plan it was important to assess the feasibility of the various proposals to ensure that there is a practical way to implement each of the plan components. Developing conceptual designs was a way to test the practicality of the plan.

This section illustrates how many of the major plan components could be implemented. Section 5.1 addresses site-specific issues, called “spot improvements”. Spot improvements were identified by input from the public, the safety study, and staff. Sometimes spot improvements were identified in response to a policy recommendation outlined elsewhere in the plan. Section 5.2 describes the conceptual downtown bus routes in more detail.

The accompanying approaches and illustrations are intended to provide suggestions when undertaking further detailed analysis and design development. In all cases, the usual public and stakeholder consultation process would be followed prior to implementing the various plan components. In addition, a comprehensive approach that includes the integration of public realm issues could be undertaken.

The suggestions that follow illustrate the feasibility of some of the recommendations in the Plan. However, in the end, the actual designs and solutions that are built may be quite different from the ideas in this section.

5.1 Spot Improvements

Figure 5-A shows the locations of all the implementation ideas. Figure 5-B summarizes issues and the transportation modes impacted.

The spot improvements listed in Figure 5-B have additional descriptions that can be found chronologically after the table. All will require follow-up analysis and consultation before pursuing any particular design.

Figure 5-A
Locations of Spot Improvements

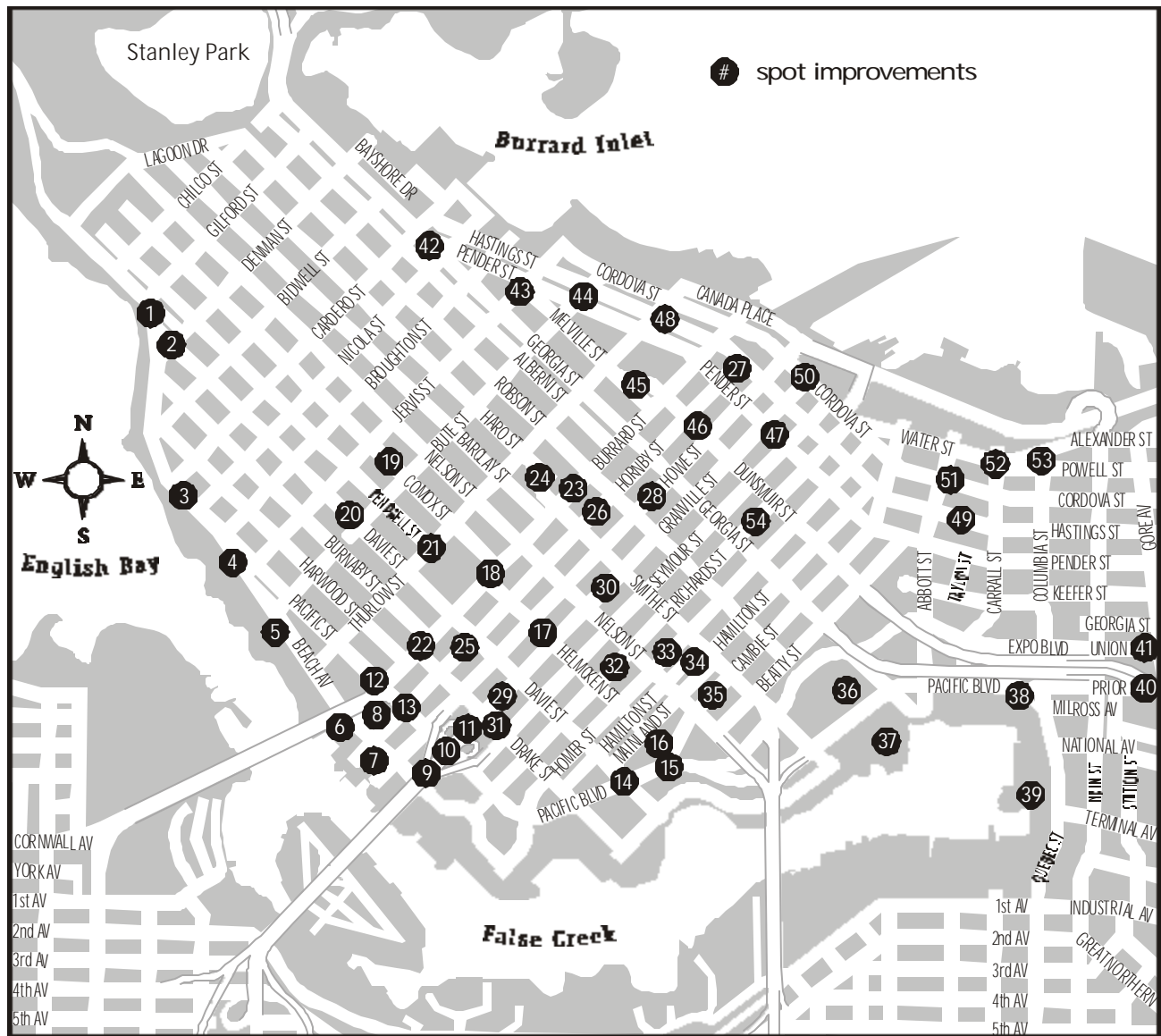


Figure 5-B

List of Spot Improvements

Item	Location	Pedestrian	Cycling	Transit	Road Network
1	Normalize the intersection of Morton Avenue at Beach Avenue	X			
2	Explore options for Morton Avenue to enhance landscaping	X			X
3	Improve pedestrian and cyclist crossing of Beach Avenue at Bidwell Avenue	X		X	
4	Improve crosswalk on Pacific Street at Beach Avenue	X			X
5	Extend the Beach Avenue Off-Street Bike Route from Bidwell St to Hornby St	X	X		
6	Improve the Seaside Route for cyclists under the Burrard Bridge	X	X		
7	Improve the Seaside Route for cyclists at Hornby and Howe Streets		X		
8	Improve Seaside Route connection to Burrard Bridge for cyclists	X	X		
9	Improve the crosswalks on the Granville Bridge at the Seymour and Howe ramps	X	X		X
10	Improve the crosswalks on Pacific Street under the Granville Bridge	X	X		X
11	Redesign the Granville Bridge Loops	X	X		X
12	Redesign the intersection of Pacific St and Burrard St	X	X		X
13	Widen Pacific Street between Burrard and Hornby St		X		X
14	Redesign the intersection of Pacific Blvd at Davie St	X	X	X	X
15	Redesign the intersection of Pacific Blvd at Cambie St	X	X		X
16	Improve pedestrian and cyclist access through Helmcken Park between Mainland and Pacific	X	X		
17	Redesign Helmcken Street as a pedestrian and cyclist friendly greenway	X	X	X	X
18	Create a cyclist connection between Helmcken and Comox across Burrard St	X	X		
19	Enhance the crosswalk on Comox St across Thurlow St		X		
20	Widen sidewalks on Davie Street using building setbacks	X			
21	Improve the streetscape and pedestrian environment on Thurlow Street	X			
22	Create a southbound bike lane on Burrard Street		X		X
23	Remove parking on Burrard between Nelson and Robson in the PM peak hour		X	X	X
24	Enhance the crosswalk on Smithe Street at Haro Street	X	X		
25	Remove parking westbound on Davie Street between Burrard and Hornby		X	X	

Item	Location	Pedestrian	Cycling	Transit	Road Network
26	Create a bike lane on Hornby Street from Pacific to Hastings Street				X
27	Adjust the intersection of Hornby Street at Hastings Street to accommodate a cyclist left turn		X		
28	Change the parking access ramps on Howe Street between Georgia Street and Smithe Street	X			X
29	Widen sidewalks on Granville Street between the Bridge and Nelson Street	X			X
30	Prohibit general traffic northbound on Granville Street between Nelson Street and Smithe Streets	X		X	X
31	Route the Pacific Boulevard Streetcar line along Drake Street to Granville Street			X	X
32	Create a southbound bike lane on Richards Street		X		X
33	Convert Homer Street to a two-way street	X			
34	Create a direct pedestrian connection between Hamilton Street end and the intersection of Hamilton between Nelson and Smithe	X			
35	Create a northbound bus lane on Cambie Street from Nelson Street to Smithe Street			X	X
36	Integrate the Northeast False Creek development into the downtown by extending the street grid into the site	X			
37	Improve pedestrian and cyclist continuity through the Plaza of Nations	X	X		
38	Modify the intersection of Pacific and Quebec to better accommodate the streetcar and cyclists		X	X	X
39	Facilitate cyclist connection through the Science World area		X	X	
40	Improve cyclist access through the intersection of Prior Street and Gore Avenue		X		
41	Improve crossing conditions for cyclists crossing Gore Avenue at Union Street	X	X		
42	Normalize the intersection of Georgia and Pender Streets	X	X		X
43	Prohibit southbound access onto Jervis Street from Pender Street	X	X		X
44	Enhance the streetscape on Bute Street between Robson Street and Cordova Street	X			
45	Enhance the crosswalk on Dunsmuir at Melville (mid-block crossing)	X	X		
46	Create a westbound bike lane and improve the traffic lanes on Dunsmuir Street		X		X
47	Create an eastbound bike lane on Pender Street and provide loading zones		X	X	X
48	Redesign Hastings Street between Burrard To Bute to eliminate the narrow traffic lanes				X

Item	Location	Pedestrian	Cycling	Transit	Road Network
49	Improve conditions for pedestrians on Hastings Street between Main Street and Cambie Streets	X			X
50	Redesign Cordova Street in front of Waterfront Station to enhance the transit hub	X	X	X	X
51	Create a streetcar route on Cordova Street between Bute Street and Columbia Street	X		X	
52	Redesign the intersection of Water/Carrall /Powell /Alexander	X	X	X	X
53	Increase the space for pedestrians and landscaping on Columbia Street between Powell Street and Alexander Street	X	X		X

Descriptions of Conceptual Designs and Spot Improvements

1. Normalize the intersection of Morton Avenue at Beach Avenue

The angled geometry of this intersection creates a long and awkward crosswalk for pedestrians. Pedestrian bulges can be used to “normalize” this intersection and improve conditions for all users.

2. Explore options for Morton Avenue to enhance landscaping

Pedestrian bulges at this intersection would improve this crosswalk and could be used to further beautify the area. Morton Avenue could be made into a one way street. This would allow for some sidewalk widening that could be used for outdoor restaurant seating or for additional landscaping.

3. Improve pedestrian and cyclist crossing of Beach Avenue at Bidwell Street

This intersection is angled such that it affects visibility. Pedestrian bulges and a cyclist push button would improve conditions for cyclists and pedestrians.

4. Improve crosswalk on Pacific Street at Beach Avenue

The Issue

The pedestrian crossing at Beach and Pacific is uncomfortable due to cars continuing on Beach Avenue where it splits into Beach Avenue and Pacific Street. An eastbound bike route through this intersection would provide a needed connection to the Burrard Bridge.

The Approach

A closure of the one leg of Beach Avenue as shown below would both increase the open space as well as improve pedestrian crossing and bike routing options. Lost curbside parking could be replaced on Pacific as shown.

5. Extend the Beach Avenue Off-Street Bike Route from Bidwell St to Hornby St

The Issue

Beach Avenue is 36' wide between Granville and Jervis with parking on both sides. Bike route connections are needed coming off of Burrard Bridge and linking up with the West End. In addition, better bike access between the Vancouver Aquatic Centre and the English Bay Bikeway would be beneficial.

The Approach

An extension of the off-street Seaside Bikeway is proposed for the south of Beach Avenue in a 2-way bike configuration terminating at Hornby Street. This would provide the opportunity to link to both the Vancouver Aquatic Centre and the Burrard Bridge as shown below.

6. Improve the Seaside Route for cyclists under the Burrard Bridge

The Issue

A tight and limited vision corner exists at the Southwest corner of the 1000 Beach property. This busy corner has a downhill slope coming from under the Burrard Bridge. Pedestrian and wheeled-user conflicts are common.

The Approach

An alternative bike and in-line skating route could be designed through the breeze way and up into the Burrard Bridge area, by-passing the tight corner on the waterfront walkway.

7. Improve the Seaside Route for cyclists at Hornby and Howe Streets

Cycling and in-line skating through these intersections can be awkward due to the curb and bollard design and location. Changes that would improve conditions for cyclists and in-line skaters are recommended and could include diversion or separation of the bike route from other users.

8. Improve Seaside Route connection to Burrard Bridge for cyclists

A direct and comfortable bike route is needed to connect the Burrard Bridge bike facility with the seaside Bikeway. This will be examined as part of the design development of an improved bike facility on the Burrard Bridge.

9. Improve the crosswalks on the Granville Bridge at the Seymour and Howe ramps

Pedestrians and cyclists that travel between the Granville Bridge and Granville Street downtown must cross the path of fast moving cars using the Seymour and Howe ramps. Changes that improve the pedestrian crosswalk will be considered as part of the False Creek Pedestrian/Cyclist Crossing Study. A bike facility on the Granville Bridge will also be evaluated as part of that work.

10. Improve the crosswalks on Pacific Street under the Granville Bridge

Crossing Pacific Street under the Granville Bridge is a challenge due to the grade changes and the vision obstruction caused by the bridge columns. This issue should be addressed as part of the re-design of the bridge "loops" (the cloverleaf interchange with Pacific Street). One possible solution is described in item 11 below.

11. Redesign the Granville Bridge Loops**The Issue**

False Creek Bridges are a critical link to the downtown peninsula. However, where the bridges connect to land, the ramps can often be problematic for development of the land and for making pedestrian and bike connections. Development adjacent to ramps can often be compromised as well. In regard to the Granville Bridge, access south on Granville Street down to False Creek is difficult for pedestrians, cyclists and even vehicles.

The Approach

A redesign of the Granville Bridge Loops is proposed. In addition, the development potential of the land parcels would be enhance and could offset the costs of reconstructing the roads. The city's street grid could be extended into the site, providing good access both to and through the parcels in the loops area, for vehicles, pedestrians and cyclists. In addition, the area could be developed into a southern gateway or anchor for Granville Street, acting as a catalyst for further development of the southern end of the street

12. Redesign the intersection of Pacific Street and Burrard Street

Pedestrian, bike and vehicular conflicts exist at the Burrard and Pacific intersection. These conflicts will be addressed as part of the Burrard Bridge Study and as part of the implementation of bike lanes on Burrard, Pacific, and Hornby Streets. Also required as part of the intersection redesign is the provision of a direct connection to the north end of the Burrard Bridge from the Seaside Bike Route.

13. Widen Pacific Street between Burrard and Hornby Streets

Bike lanes need to be routed off the Burrard Bridge and onto Pacific and Hornby Street. The current width of Pacific in this section is insufficient but a potential redesign of this section will be undertaken as part of the Burrard Bridge study.

14. Redesign the intersection of Pacific Boulevard at Davie Street

This intersection was part of the Pacific Boulevard redesign study and Council has approved a design concept.

15. Redesign the intersection of Pacific Boulevard at Cambie Street

This intersection was part of the Pacific Boulevard redesign study and Council has approved a design concept.

16. Improve pedestrian and cyclist access through Helmcken Park between Mainland and Pacific

Between Mainland and Pacific the Helmcken Greenway passes through a surface parking lot, crosses a lane and passes through Helmcken Park. Along the property lines that separate the lane from the park and parking lot are a series of bollards and chains that define the lane but make it awkward for pedestrians and cyclists to negotiate. Repositioning the bollards and chains in cooperation with the owner of the parking lot could improve conditions for all users.

17. Redesign Helmcken Street as a pedestrian and cyclist friendly greenway

Redesign Helmcken as a highly pedestrianized “woonerf street” along the lines of streets seen on Granville Island. This would include multiple curb bulges, open spaces, traffic calming, landscaping and other pedestrian features. Additional landscaping could be provided if some of the street parking is removed.

18. Create a cyclist connection between Helmcken and Comox across Burrard

This offset intersection poses additional complexities for routing cyclists across Burrard along the proposed bikeway/greenway. A combination of bike lanes and off-street bike facility on Burrard Street in front of the St. Paul’s hospital could provide a way to facilitate this movement.

19. Enhance the crosswalk on Comox Street across Thurlow Street

Crossing Thurlow Street at Comox can be difficult for some at this un-signalized intersection. The pedestrian crossing could be enhanced with a traffic signal or a raised crosswalk.

20. Widen sidewalks on Davie Street using building setbacks

Davie Street is a neighbourhood centre for the West End and Downtown South, attracting significant vehicular, transit, and pedestrian volumes. The sidewalks must accommodate pedestrians and sidewalk activities that make the street interesting like flower displays and outdoor seating for restaurants. Pedestrian volumes are projected to increase significantly as the population in Downtown South increases.

To accommodate the demand for sidewalk space new buildings on Davie Street between Burrard and Jervis could be setback 7 feet similar to Robson Street or Davie Street in Downtown South.

21. Improve the streetscape and pedestrian environment on Thurlow Street

The Issue

Thurlow Street is primarily a residential street, but lacks street trees and boulevards that are typical elsewhere in the West End. Pedestrian access across Thurlow could also benefit from some streetscape improvements. Access to St. Paul's Hospital needs to be considered with any redevelopment proposals.

The Approach

A process that involves both the hospital and the surrounding residents could be undertaken to redesign the streetscape in order to determine a preferred solution on Thurlow Street. At the very least, an opportunity exists with the current one-way configuration to create curb bulges that would improve pedestrian crossings of Thurlow Street. In addition approximately 2' of boulevard space can be added in each curb lane providing the opportunity for street tree planting along the majority of the street.

22. Create a southbound bike lane on Burrard Street

The Issue

With significant bus traffic on Burrard Street, TransLink has requested some additional bus priority measures to avoid general congestion. In addition, cyclists need a route from Downtown to the Burrard Bridge.

The Approach

A southbound bike lane could be provided on Burrard Street by narrowing the six existing lanes to standard widths without losing any vehicular capacity. In the northern section, a bus lane and/or loading zone with some parking could be designed in the curb lane with a bike lane between it and the travel lane.

In the south, by removing part-time parking on the west side of the street, a bike lane could be designated adjacent to the curb. This would also provide three southbound general traffic lanes at all times of the day.

23. Remove parking on Burrard between Nelson and Robson in the PM peak hour

The northbound curb lane is currently a parking lane with restricted hours. No stopping is enforced in the morning and afternoon peak traffic periods. However the two blocks between Nelson and Robson permit parking during the 3 to 6 PM rush hours. This creates some congestion during this period.

TransLink has requested some additional bus priority measures to avoid general congestion on Burrard Street. The DTP would remove parking on these blocks during the afternoon rush hours to create a bus lane, HOV lane, or general traffic lane to reduce delays for transit passengers and motorists.

24. Enhance the crosswalk on Smithe Street at Haro Street

At the location where Smithe Street becomes Haro Street (mid block between Burrard St and Thurlow St), the north sidewalk can be confusing and awkward for people walking along the street.

This could be corrected by normalizing the intersection. This would improve conditions for all users.

25. Remove parking westbound on Davie Street between Burrard and Hornby

This would improve vehicular circulation and transit travel times.

26. Create a bike lane on Hornby Street from Pacific to Hastings Street**The Issue**

Hornby Street provides an opportunity for a one-way bike lane feeding off of Burrard Bridge into downtown. This would combine with a Burrard bike lane to provide both north and south access to and from Burrard Bridge.

The Approach

A northbound bike lane would be provided on Hornby adjacent to the eastern curb lane. This would be accomplished by narrowing the existing lanes to standard lane widths on Hornby resulting in no loss of vehicular capacity. Parking in the existing east curb lane would become full time.

27. Adjust the intersection of Hornby Street at Hastings to accommodate a cyclist left turn

Northbound cyclists on Hornby Street must make a left turn on Hastings Street to continue north on Burrard Street. Special provisions may be required at the Hornby/Hastings intersection as the demand for cyclist left turns increase.

28. Change the parking access ramps on Howe Street between Georgia and Smithe

A series of underground parking access ramps compromise the pedestrian situation along this stretch of Howe Street. A redesign of the pedestrian environment should be undertaken with particular emphasis on pedestrian /vehicular ramp conflicts. Preferred designs of underground ramps exist on Hornby Street between Nelson and Robson and could be used as prototypes for a Howe Street redesign.

29. Widen sidewalks on Granville Street between the Bridge and Nelson Street**The Issue**

The south end of Granville Street has a six-lane cross-section with narrow lane widths. Consequently, vehicular movements are compromised, especially if a bus or truck is using the street. Sidewalks are also narrow for this area, which has seen increased night-time pedestrian activity and will see more pedestrians as the population of Downtown South increases. The streetscape in general is in need of refurbishing.

The Approach

Changing the six-lane cross-section to a five-lane cross-section would provide standard lane widths as well as left turn bays and a median down the centre of the street. This would provide opportunities for greening of the street with additional street trees. With five traffic lanes, there is some space available for wider sidewalks. This would help strengthen the link between the Granville Mall and the proposed Granville Loops redevelopment. Also a redesigned Granville Street should consider curb extension and textured crosswalks, especially at Davie Street, to improve pedestrian safety (Safety Study for the Downtown Transportation Plan, Hamilton and Associates, 2001).

30. Prohibit general traffic northbound on Granville Street between Nelson and Smithe

Currently all northbound traffic on Granville Street (except transit and authorized vehicles) are required to turn left across a busy crosswalk at Smithe Street where the Mall begins. This results in long queue of vehicles, delays, and unusually high collision rates for buses, cars and pedestrians.

The plan recommends restricting northbound traffic on this block to transit and authorized vehicles only. This would require all other northbound general traffic to turn right at Nelson. This would improve safety for all users and provide a northbound stopping lane on Granville for loading, taxis, and police vehicles (in front of the community police office).

31. Route the Pacific Boulevard Streetcar line along Drake Street to Granville**The Issue**

A streetcar extension is proposed from the Roundhouse along Pacific Boulevard and up Drake Street terminating at Granville Street. This would provide good connections to Granville transit and an opportunity to terminate the line on a low volume street.

The Approach

The streetcar could run in the regular traffic lanes, or alternatively, the streetcar could run along the south curb lane of Drake Street. A terminus for the streetcar could be located just east of Granville Street. This would require changing Drake Street to one-way westbound between Seymour and Granville Street. Good traffic circulation could be maintained a redesign of Granville Loops (see item 11).

32. Create a southbound bike lane on Richards Street**The Issue**

Richards Street is proposed to remain one-way, however, it is a residential area for a significant length of the street and a southbound bike lane is proposed to help provide access to the Granville Bridge.

The Approach

Part-time parking can be converted to full-time parking on the west side of Richards, while still providing adequate flow in the remaining lanes. A bike lane could be provided next to the parking on the west side of the street. With full-time parking corner bulges could also be added at most corners. On some blocks the extra road width could be converted to pedestrian space while still maintaining the bike lane and standard width vehicle lanes.

In the north, Richards between Pender and Cordova Street could be designed to provide two-way access for buses and bikes

33. Convert Homer Street to a two-way street**The Issue**

Downtown Vancouver is currently served with a number of one-way couplets. However a number of one-way streets are not bridge access streets and are not required to be one-way for vehicular flows. Homer Street is one of these streets. Two-way access would reduce circulation required to access properties. Homer Street is identified as a pedestrian arterial.

The Approach

Homer Street could be made two-way with permanent parking on both sides of the streets in most locations. This, in combination with pedestrian bulges at some corners, would help to calm traffic.

34. Create a direct pedestrian connection between Hamilton Street end and the intersection of Hamilton between Nelson and Smithe

Hamilton Street is discontinuous at Smithe Street. To improve pedestrian circulation and enhance personal safety in this area a pedestrian connection should be incorporated in the future development to provide a pedestrian connection between the Hamilton dead end and the intersection of Hamilton Street and Smithe Street.

35. Create a northbound bus lane on Cambie Street from Nelson to Smithe

Vehicle access through the intersection of Nelson and Cambie Streets is difficult for motorists travelling northbound on Cambie Street. Cambie Street is proposed to be two-way with bus service on it. The section between Smithe and Nelson is limited by a parking ramp on the west side of Cambie Street.

In the short term, a one-way bus only access could be provided northbound on Cambie Street. In the long term, a redesign could incorporate vehicular access northbound when redevelopment of the adjoining property provides an opportunity to remove the ramp.

36. Integrate the Northeast False Creek development into the downtown by extending the street grid into the site

Extending the street grid pattern around BC Place stadium into Northeast False Creek will help to integrate the site into the rest of the downtown. This includes creating a pedestrian connection from the intersection of Beatty and Georgia down to False Creek, extending Smithe Street east to False Creek, and extending Griffiths Way to False Creek and aligning it with Georgia Street.

37. Improve pedestrian and cyclist continuity through the Plaza of Nations

A waterfront building at the Plaza of Nations disrupts the continuity of the Seaside recreational route. Better continuity is recommended when opportunities arise.

38. Modify the intersection of Pacific and Quebec to better accommodate the streetcar and cyclists**The Issue**

The Pacific and Quebec corner will become a junction between 2 streetcar lines. It also needs to provide bike lanes through the intersection. The aesthetics of the area need improving through a detailed design study.

The Approach

A streetcar station junction could be designed on the island as shown, with links both to Gastown and Pacific Boulevard to the north and False Creek Flats and Southeast False Creek to the south. Bike lanes could also be incorporated to link up existing and proposed bike routes. Further design work in the area and under the viaducts could be part of future redevelopment proposals. In addition, northbound cyclists require a more visible signal indication of when to cross Pacific Boulevard.

39. Facilitate cyclist connection through the Science World area

A number of major bike routes converge near Science World (Ontario, Adanac, Seaside, Pacific Blvd, BC Parkway). The existing on-road connection is along Quebec Street and is considered to be a difficult cycling environment. Most cyclists using alternatives such as the Science World parking lot and the plaza in front of Science World, resulting in conflicts between cyclists, pedestrians and parking activities.

Changes in this area could help to define the bike routes and reduce conflicts between cyclists, pedestrians, and motorists.

40. Improve cyclist access through the intersection of Prior Street and Gore Avenue

Cyclists using the proposed bike lane on the Georgia Viaduct will need to negotiate this intersection to continue east. This demand should be addressed as part of the design of the intersection when Gore is extended south of Prior Street.

41. Improve crossing conditions for cyclists crossing Gore Avenue at Union Street**42. Normalize the intersection of Georgia and Pender Streets****The Issue**

The intersection at Georgia and Pender has one of the longest pedestrian crossings in the City. Cyclists require a safe connection between the bike lanes on Georgia Street and the bike lanes on Pender Street.

The Approach

An opportunity exists to create a significant public parkette that both increases green space and improves pedestrian connections. Bike lanes will be incorporated into a redesigned intersection.

43. Prohibit southbound access onto Jervis Street from Pender Street**The Issue**

The intersection at Jervis and Melville is confusing for drivers and difficult for pedestrians to negotiate. The Triangle West area is also a densely populated residential area and has limited park and open space.

The Approach

An opportunity exists to expand a parkette at the intersection as well as providing for better pedestrian connections and vehicular movements. A bike lane can also be designed through the intersection to connect the westbound bike lane on Melville to the westbound bike lane on Pender Street.

44. Enhance the streetscape on Bute Street between Robson and Cordova Street

Bute Street in this section leads down to a major new Waterfront Park but a variety of sidewalk and street tree conditions compromise the quality. A redesign should be undertaken with the surrounding community in order to improve the pedestrian environment along this gateway street leading to the Waterfront Park. Boulevard strips and street trees exist in some blocks and the street should be redesigned to have boulevard and street trees from Robson all the way to the park if possible.

45. Enhance the crosswalk on Dunsmuir at Melville (mid-block crossing)

With a major bus transit service and the Bentall Centre on one side of the street and a SkyTrain station on the other side, the pedestrian crossing demand is high mid-block on Dunsmuir between Thurlow and Burrard Streets. The existing mid-block crossing on Melville Street is not particularly well marked. This crossing should be better marked and made more visible.

46. Create a westbound bike lane and improve the traffic lanes on Dunsmuir**The Issue**

Currently Dunsmuir is a street that has a variety of curb-to-curb widths as well as lane widths. This increases confusion for both automobile and truck drivers. It also has a variety of sidewalk widths. A westbound bike lane could work with an eastbound Pender bike lane to provide better bike access in the area.

The Approach

A more standardized treatment of Dunsmuir Street would benefit the street as shown below. Lane widths have been made as constant as possible with the extra space used to widen the sidewalks and create a westbound bike lane on the north side of the street

47. Create an eastbound bike lane on Pender Street and provide loading zones**The Issue**

The current design of Pender Street between Cambie and Hornby is confusing for both vehicle drivers and bike riders. In addition, Hotels on the north side of Pender could use on-street loading zones. Pender is also an important bus route and Translink would like to improve bus operations.

The Approach

A public process needs to be undertaken to look at both the preferred one-way and two-way options for Pender Street.

48. Redesign Hastings Street between Burrard To Bute to eliminate the narrow traffic lanes

This section of Hastings Street has narrow lane widths. A redesign of the street should be undertaken with the community. Loading and parking functions on the north side of the street could be investigated for possible relocation to Cordova Street when the new section is constructed.

49. Improve conditions for pedestrians on Hastings Street between Main and Cambie Streets

This section of Hastings Street is the section of street with the highest pedestrian accidents in the downtown. A pedestrianization scheme that could include curb bulges, raised pedestrian intersections, and other pedestrian improvements should be investigated with the community. Consider additional lighting, curb extensions, and textured crosswalks at the Carrall and Colombia intersections to improve pedestrian visibility (Safety Study for the Downtown Transportation Plan, Hamilton and Associates, 2001).

50. Redesign Cordova Street in front of Waterfront Station to enhance the transit hub

With West Coast Express, SkyTrain, SeaBus, helicopters, and seaplanes, Waterfront station is the pre-eminent multi-modal transfer station. Currently the curb space available and the one-way street system limit bus access to the station.

A northbound bus lane on Richards Street should be created to improve bus access to the station. In addition a “bus station”, built as an island median in the middle of Cordova Street, could provide additional curb space for bus stops. The additional bus zones could allow for the West End bus route and the Oak and Cambie bus routes to terminate at the enhanced Waterfront station. The sidewalks on Cordova east of Granville Street are narrow. Changes to Cordova Street should seek to improve the conditions for pedestrians.

51. Create a streetcar route on Cordova Street between Bute and Columbia**The Issue**

The Downtown Streetcar will follow Cordova Street. Gastown business interests have raised the possibility of a two-way Cordova Street, which would necessitate running the streetcar in traffic. However, a two-way Cordova Street would require removal of parking at intersections as well as additional parking limitations during rush periods. Running a streetcar in traffic negates the effectiveness of a streetcar if it's in a congested area for a significant distance. Left turn bays would also be limited by a streetcar operation to prevent vehicular conflicts at intersections.

The Approach

Cordova Street should remain one-way with a single segregated streetcar line in the north curb lane. This would provide full time parking on the south side of the street and an opportunity for a streetcar station with direct access to Blood Alley.

52. Redesign the intersection of Water/Carrall /Powell /Alexander**The Issue**

This is a complex intersection with some uncomfortable pedestrian crossings. In addition, a bike facility is required on Carrall across Water Street. The Gastown paving starts near Carrall Street but the historic area extends almost to Main Street. The street-ends north of Water Street vary in design quality, with the Carrall Street end being the best design. Businesses and residents complain about the speed of traffic on Water Street.

The Approach

Extending the pavement treatment further east, as well as providing a raised pedestrian table east of Carrall Street, would help set the tone for the rest of Water Street in terms of traffic speed. A redesign of the Water/Carrall intersection can improve pedestrian comfort and accommodate a bike route through the intersection. In addition, a raised intersection could be considered at Cambie and Water as part of the Cambie Street pedestrian arterial route.

53. Increase the space for pedestrians and landscaping on Columbia Street between Powell and Alexander**The Issue**

Currently Columbia Street is a four-lane street that terminates at Alexander. It is a very low volume street with two lanes turning right and two lanes turning left. Public open space is in short supply in the east part of Gastown.

The Approach

Columbia Street between Powell and Alexander would be narrowed to one travel lane and two parking lanes, with the additional space developed as public open space or widened sidewalks.

5.2 Conceptual Bus Routes

The following bus routes conceptual only. The routes were developed to satisfy many of the issues raised in the Transit Plan (section 4.2). Any changes to existing routes and the introduction of any new bus routes will be developed through further consultation as part of TransLink’s Transit Area Service Plan.

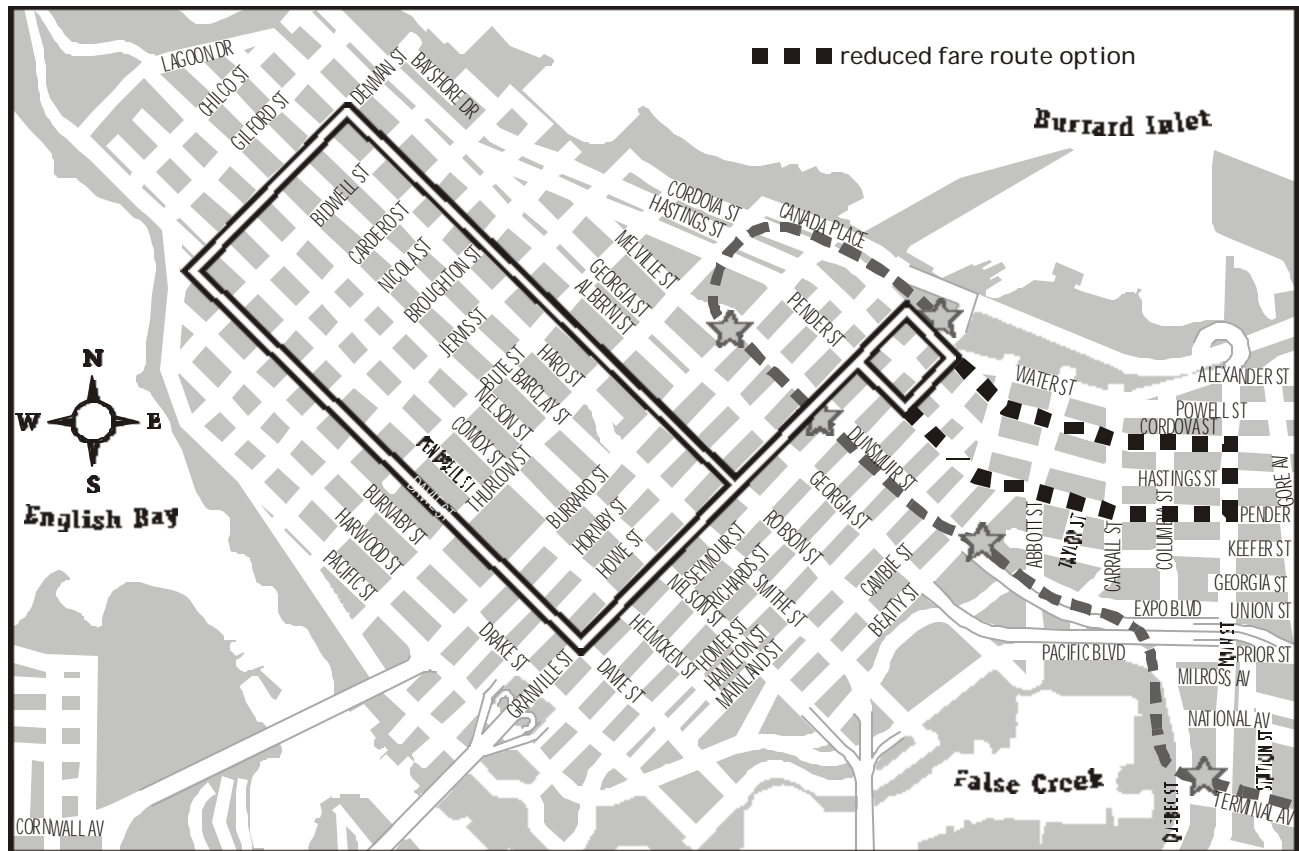
5.2.1 Adjust the West End Bus Loop

The West End loop is the main transit service in the West End. This service is popular and operating well. Therefore the route shown in *Figure 5-C* maintains the existing 5 Robson/6 Davie route largely as is given its success in meeting travel demands and being legible by transit users. The route changes at the eastern end improve connectivity to Waterfront Station by rerouting to Cordova Street and deleting the unproductive extension to Library Square. Service from the West End to the Library Square is provided by the Central Broadway Loop described later in this section.

Options

- With proposed changes to Richards and Cordova streets, the Waterfront station loop for these services could be reversed to become Granville, Pender, Richards, Cordova, Granville. This would improve connectivity and help relieve pressure on the blocks of Hastings between Richards and Granville.
- Use the proposed “transit hub” at Waterfront station as the terminus and change Davie & Denman from a layover point to a timing point to increase connectivity within the West End while maintaining service reliability.

Figure 5-C
West End Loop



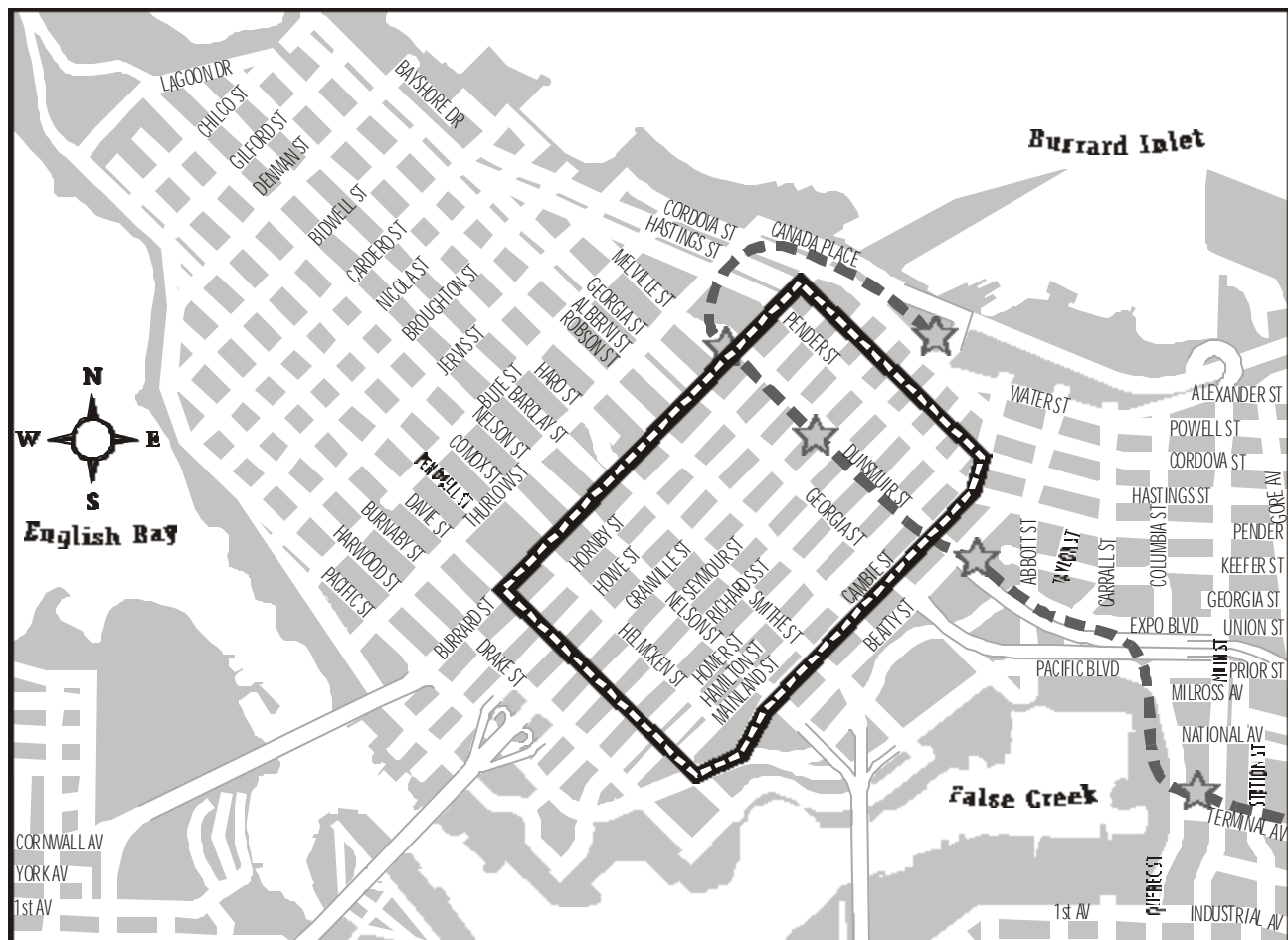
5.2.2 Create a new Downtown Bus Loop

This bus route, shown in *Figure 5-D*, replaces much of the existing #1 and #2 services in Downtown South with a more legible and consistent routing. Downtown South is within easy walking distance to many downtown destinations, so this service is designed to better serve longer trips that are less attractive as walk trips. This is why the loop traverses Burrard Street rather than Granville Street. This route also improves local bus service on Burrard and serves major connections at Burrard Station, Davie & Granville, Cambie & Dunsmuir (one block from Stadium Station) and Hastings & Seymour (one block from Waterfront Station).

Options

- Providing only the clockwise loop (#1) could be considered since this would not unduly compromise travel times between the key points of the loop (Pacific & Davie and Burrard Station), since they are on opposite corners, and would help avoid the need to modify Cambie Street. However, service on the major streets (especially Burrard, Davie and Cambie) would be unbalanced.
- The Richmond rapid transit line could follow either Davie/Burrard or Cambie. Due to the potential for duplication of service on either Burrard or Cambie, this service would need to be reviewed once a decision is made on the alignment for the rapid transit line.

Figure 5-D
Downtown Bus Loop



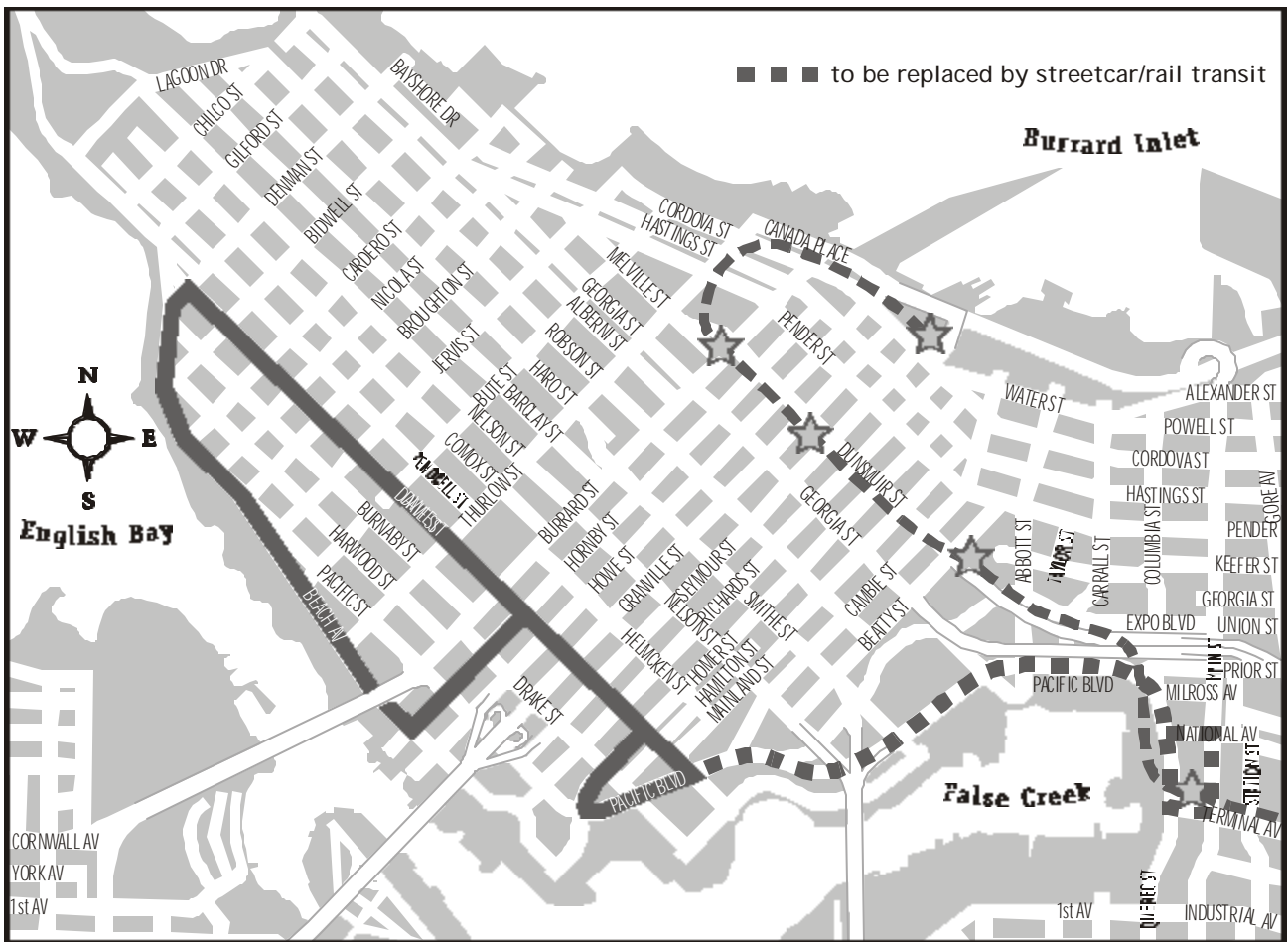
5.2.3 Modify the Beach/Yaletown Community Bus route

The suggested route for a Beach Avenue /Yaletown community bus is shown in *Figure 5-E*. This route replaces the existing #1 Beach with a route that reduces duplication on major corridors while reallocating service to route segments that are uniquely served by this route. The route maximizes transfer connections to downtown along Davie to offset the loss of a one-seat ride to downtown. Given that the demand on this route is not sufficient to justify electric trolleybuses, small, low-noise community buses should be used to reduce impacts on residential areas.

Options

- Operate the route in only one direction during evenings. Select the direction that provides the most direct service from transfer points to residential areas.
- Extend the route along Pacific and Expo boulevards to either International Village/Stadium Station, or to the Main Street SkyTrain station area and to False Creek Flats. The latter extension could help build ridership for the streetcar line proposed for this corridor and provide a West End/Yaletown - SkyTrain connection that bypasses the downtown core.
- Delete route east of Granville to reduce overlap with the Downtown East Loop and allow better service on Beach.

Figure 5-E
Beach/Yaletown Community Bus



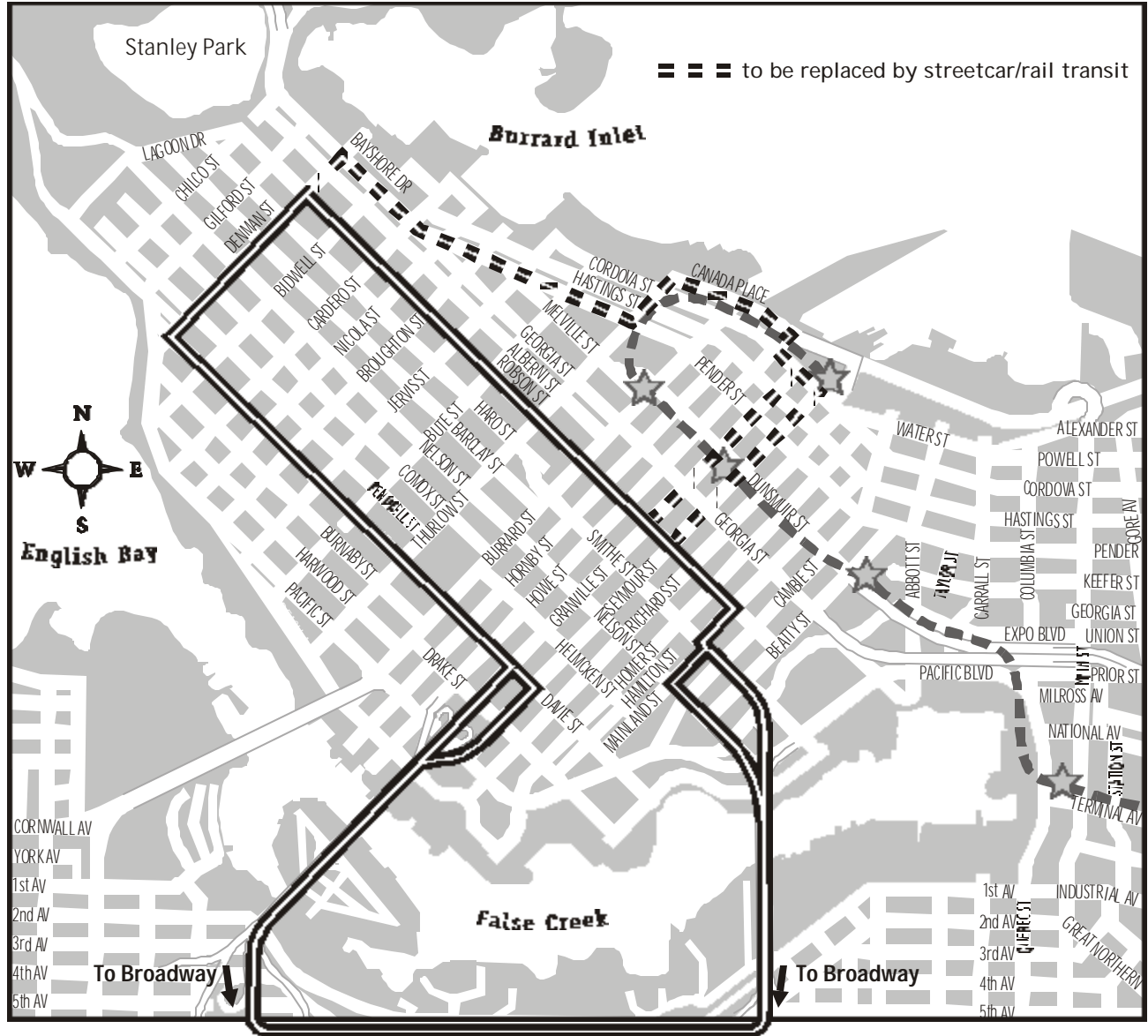
5.2.4 Create a West End to Central Broadway Bus Connection

The West End - Central Broadway travel market is large but currently not well served by transit, with one or two transfers required for a relatively short trip. Residents of Downtown South who live south of Helmcken Street face much the same options. The proposed Central Broadway Loop, shown in *Figure 5-F*, serves this demand and provides better access to Library Square and the Cultural Precinct. In the past the *Fairview Belt Line*, part of which would be replicated by the proposed service, was BC Electric's busiest streetcar route. The transportation model also projects that this would be the second busiest downtown bus route after the West End Loop.

Options

- Locating a layover point on the route is problematic - it may be simpler to design a point-to-point service by deleting the Coal Harbour part of the route and terminating the route at Waterfront Station and Denman/Georgia.
- The route could be modified to stay on Robson between Cambie and Denman in both directions in order to better serve the West End - Central Broadway market while still covering some of the CBD. The existing Cambie-Oak (15/17) service could be reconfigured to provide direct access to Waterfront Station.
- The Richmond/Airport rapid transit line could provide a good connection between Central Broadway (Fairview) and Waterfront Station. In addition, the proposed streetcar would provide service along Cordova/Hastings/Georgia. When these rail services are built the bus service could be relocated to run on Robson between Cambie and Denman rather than along Cordova/Hastings/Georgia. This would provide improved service between the West End and the Library precinct and on to Central Broadway.

Figure 5-F
West End to Central Broadway



6 Evaluation of the Plan

Assessment Tools

A number of tools were used to help develop and assess the Downtown Transportation Plan. Greater Vancouver's regional transportation model (EMME/2) was used to assess various transportation scenarios in Section 6.1. Other tools relating to environment, traffic safety and streetscape were also developed and used. Application of a noise impact study is described in Section 6.2. The development and application of an assessment model with respect to streetscape and transportation and land use suitability is described in Section 6.3. Downtown air quality is discussed in Section 6.4, and the results of a traffic safety study are discussed in Section 6.5.

6.1 The EMME/2 Transportation Model

The EMME/2 model refers to a computer program that is used to help plan transportation infrastructure. This particular computer model is used in 58 countries by over 580 organisations, such as cities, metropolitan areas, transit agencies, consulting firms, and universities.

The main function of the EMME/2 model is to assign trips to a multi-modal transportation network (vehicle, transit, walk, etc.) based on the fastest (least expensive) mode and route for an individual trip. EMME/2 emulates actual behaviour whereby people, through trial and error, are able to select the quickest route to work or school. This method of trip assignment onto a transportation network generally works well for vehicle and transit trips. The model is less accurate at predicting walk and bike trips. For walk and bike trips it is more helpful to look at trends and demographics.

The model is most accurate as a 'comparative' tool and should be used primarily in that role. This means the model can look at different transportation network options and different land uses and compare statistics such as the average vehicle speeds and transit ridership. These statistics contribute to the broader evaluation of the various network options.

6.1.1 The Downtown Sub Area Model

The EMME/2 model created for the Downtown Transportation Plan is called a "sub area model". This is because it is based on the regional transportation computer model used by the Province, TransLink and the GVRD, and it has greater detail in the downtown sub area. For example, the downtown sub area model divides the downtown peninsula into 190 areas (traffic zones) that generate and attract trips. These are approximately the size of a city block. This compares with 34 downtown traffic zones in the regional model. Practically all of the downtown streets and transit services are coded into the model. Due to the differences in on-street parking and bus schedules there is a different transportation network for both the AM and PM rush hours.

The model was calibrated for the year 1996 using information from various sources, including population and employment data from the Canada Census, traffic volumes, transit ridership, etc. The model was calibrated for both the AM and PM rush hours to replicate the vehicle volumes and transit ridership that occurred in 1996.

New scenarios were then created for the year 2021. These scenarios require projected land-use (population and employment) and the future transportation network for 2021. Transport 2021 - The Long-Range Transportation Plan for Greater Vancouver was used as the basis for the future transportation network. In the downtown it includes a future rapid transit line to Richmond and a number of transportation demand measures such as tolls on the Lions Gate and Second Narrows Bridges.

6.1.2 Evaluation using the EMME/2 Model

The process of evaluation using the EMME/2 model requires the creation of, not one, but many different scenarios. Future scenarios are examined to help test the sensitivity of things such as transport demand management measures or specific changes in the transportation network. The model generates performance results, such as vehicle volumes, average vehicle speed, and transit ridership for a specific scenario. Indicators such as total trip hours and distance for all users provides a measure of relative system performance. The results are summarised below.

a) 1996 vs. 2021 DTP

Comparing the 1996 transportation network with the Downtown Transportation Plan (DTP) fully implemented in 2021, the model results show that the recommended Plan would help reduce overall traffic congestion due to reduced vehicle volumes and would encourage more transit ridership. The model shows that there are similar benefits in both the AM and PM rush hours. Some results comparing the AM rush hour for 1996 and 2021 are summarised below:

- Vehicle trips to downtown decrease by 2 to 3 percent;
- transit ridership increases by 57 percent;
- average vehicle speeds increase by 3 percent; and
- average transit speeds increase by 14 percent.

There are significantly fewer vehicles on Georgia, Burrard, Pender, Denman, Davie, Beach and Hastings Streets. The effects of the increased population in Downtown South are reflected in more southbound traffic in the AM peak across the Granville and Cambie Bridges. During the AM peak hour, over 5,000 additional passengers will be using the Expo SkyTrain line (total of 12,500), 8,000 to 9,000 will be using the Richmond-Airport rapid transit line down the Cambie corridor, and 5,000 will be using the Millennium line in Central Broadway. Over 700 additional passengers per hour on the SeaBus offset fewer vehicle trips on the Lions Gate Bridge.

b) 2021 vs. 2021 no TDM

The model incorporates the transport demand management (TDM) measures that are recommended in the Transport 2021 Long-Range Transportation Plan. These measures include:

- tolls on major bridges,
- increased parking fees,
- increased gas taxes,
- some telecommuting, and
- employer programs that reduce trip auto trips.

If the recommended transport demand management (TDM) measures are not implemented, the results change significantly. When the 2021 results with and without TDM are compared we find that without TDM there would be;

- 15 percent more vehicle trips to downtown;
- 8 percent fewer transit tips; and
- Average vehicle speeds would be 11 percent slower.

This shows that TDM will play a significant role in minimizing downtown congestion and therefore should be pursued.

c) 2021 vs. 2021 no Richmond RT

Another scenario that was examined was “what if the Richmond rapid transit line is not built by 2021?” The 2021 results without a Richmond rapid transit line are as follows:

- there would be 2.2 percent more vehicles during rush hour,
- vehicles would travel nine percent slower,
- resulting in 18 percent more vehicle hours (number of vehicles multiplied by the travel time), and
- the average transit speeds would be 10 percent slower than if a rapid transit line is built.

This shows that a rapid transit line to Richmond would result in less traffic congestion and faster transit travel times than a scenario without rapid transit to Richmond.

d) 2021 vs. 2021 no DTP

It is also useful to compare the 2021 “no DTP” scenario with the 2021 DTP scenario. When these two scenarios are compared we find that the DTP has only a minor affect on most of the statistics produced by the model. However, most notably the DTP increases the number of transit trips originating in downtown by three percent primarily as a result of the new downtown bus and streetcar routes that are proposed. In particular, the model shows that a West End to Central Broadway bus service could attract significant ridership. Overall the DTP generates fewer vehicle trips and more transit trips. The recommended DTP will provide greater transportation choices without increasing traffic congestion.

6.1.3 Conclusion

The best over-all network performance is achieved with the implementation of;

- the downtown transportation plan along with;
- the Transport 2021 recommended transport demand management measures; and
- the Transport 2021 recommended transportation network, including a rapid transit line to Richmond and an extension of the Millennium line to Central Broadway.

6.2 Noise Impact

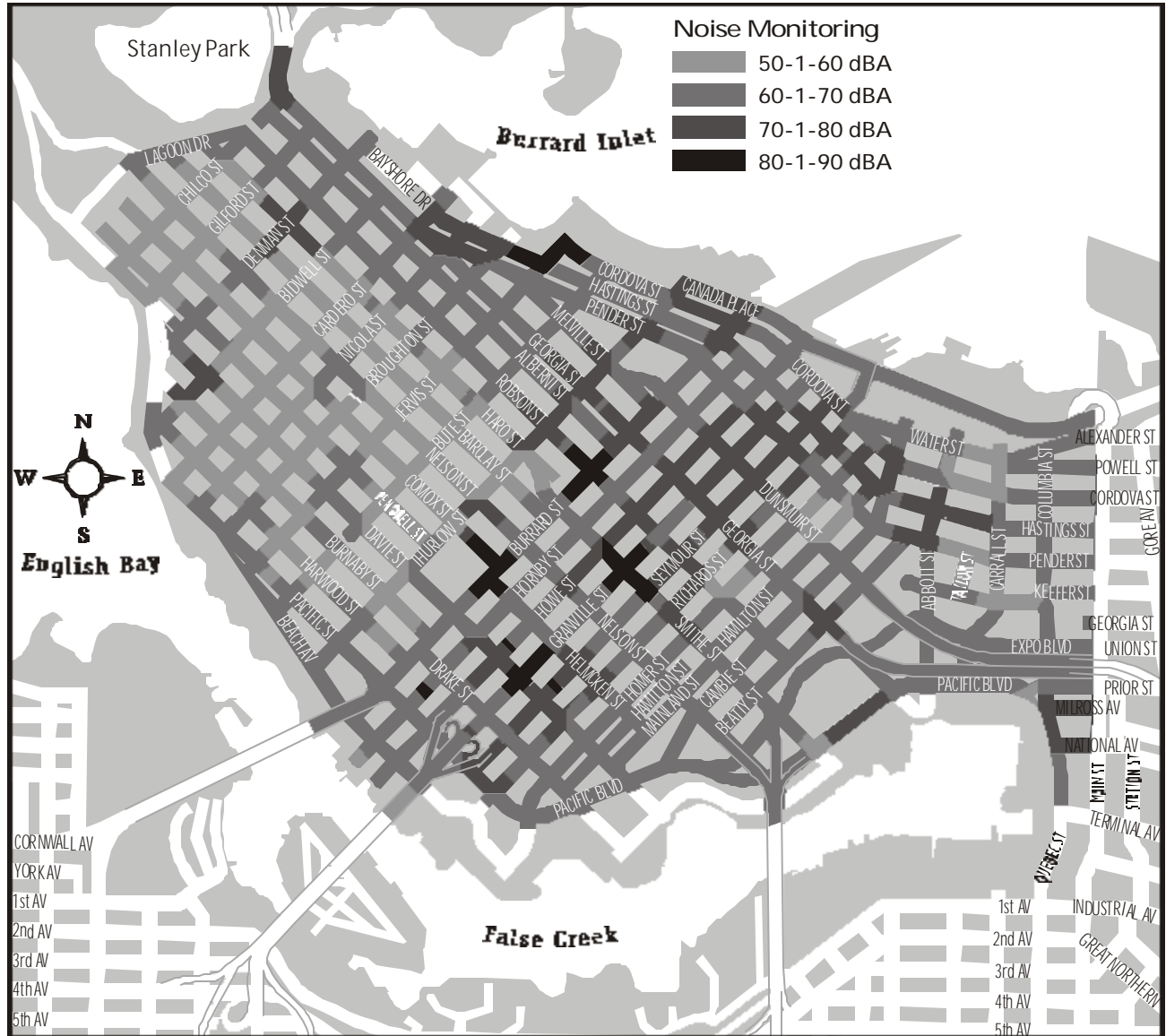
Measurements of street noise levels were undertaken by the Vancouver-Richmond Regional Health Board at selected locations throughout the downtown peninsula. Points were chosen to coincide with GIS co-ordinates used in the 1971 Greater Vancouver Noise Survey (Barron and Strachan, Consulting Acoustical Engineers, 1971: A Community Noise Survey of the Greater Vancouver Regional District). Both background noise levels and noise emanating from immediate (usually transportation vehicles) sources are measured.

Noise monitoring was accomplished using a Larson Davis model 820 Precision Integrating Sound Level Meter. The meter was calibrated twice daily while the monitoring study was in the field. A windscreen was used at all locations, and the instrument was held at least one meter above ground at the abutting property line. That environmental conditions (wind, speed, temperature, rainfall) and atypical noise sources, including construction and maintenance activities, allows more sensitive reading of the resulting noise map. Three one-minute noise level measurements were taken using an A-weighted rating scale at each sampling location. Leq (average noise level over one minute), L10 (10th percentile during time interval), L50 (median noise level during time interval) and L90 (90th percentile) were recorded after each measurement.

A noise map was developed by taking the mean Leq measured at each location and assigning that noise level to the area within the grid immediately surrounding the measurement location. Noise levels in four ranges (under 55 dBA, 55-64 dBA, 65-74 dBA and 75 and over dBA) are shown in Figure 6-A. The noise map should be interpreted with caution as it was developed with limited data collected. The local noise conditions at the time of measurement may have also affected the results. Further analysis is required before making any conclusions.

Figure 6-A
Noise Incidence Reference Map 2001

source: Vancouver/Richmond Health Board



The map shows that the quietest areas of the downtown peninsula occur in the primarily residential areas of the West End. Lord Roberts elementary school (both the main site on Bidwell and the annex on Nelson Street) are within this quiet area, as are a few small parks and green spaces and the street ends near False Creek in the area between the Burrard and Granville

Bridges. Other residential areas, such as those in the False Creek North area may be similarly quiet, but were not included in the area of detailed study. Parts of Gastown were similarly quiet. The Coal Harbour residential area was not nearly so tranquil, but construction activity was likely the cause of the higher measurements.

Noisier areas indicated by the noise map include St. Paul’s Hospital on Burrard Street. The mean Leq measured in front of the hospital on Burrard Street was 85.3 dBA. Measurements taken on the Thurlow Street frontage were 59.2 and 66.4 dBA.

Other noisy areas are those residential sites on the major arterial road corridors of the downtown peninsula. The average Leq for residential sites on Burrard, Granville, Denman, Georgia, Hastings and Pacific Boulevard is 69.4 decibels. This is above the acceptable World Health Organization standard of 55 dBA for outdoor living spaces, and would result in high noise levels in residential spaces in which windows were opened. Noise levels on Davie Street between Hornby and Richards, on most of Seymour Street south of Nelson and on Howe Street near Davie were over 75 dBA.

The general noise level in some commercial areas of downtown also appears to be relatively high. The mean Leq for all commercial sites was 67.0 decibels. Thirty of 110 commercial monitoring sites exceeded the 70 dBA noise level recommended for outdoor commercial areas by the WHO. The noisiest areas downtown, all with noise measurements of over 85 dBA, included Burrard Street at Robson and Helmcken and the intersection of Granville and Smithe Streets.

6.3 Streetscape and Land Use / Transportation Suitability

While the environmental focus of most transportation plans is on air and noise assessment, the Downtown Transportation Plan strives to include factors directly related to liveability and to streetscape. The firm Baker, McGarva, Hart Architecture (BMH) was retained to examine most of the commercial streets on the downtown peninsula, as well as the major streets in the West End. The study’s main goal was to produce an assessment model that could be used to evaluate potential transportation impacts on a street’s pedestrian environments and land uses. The assessment included such elements as land use along the street, the characteristics of the pedestrian realm, the level of privacy afforded properties along a street and the overall vibrancy of the street. These qualities became the basis for scoring a street’s robustness and resulting sensitivity to changes in street characteristics. While the study is subjective in method, its strength lies in its transparent and systematic disaggregation of the features that comprise robustness of streets and the sensitivity of uses along streets.

Figure 6-B

Street Adaptability Formula

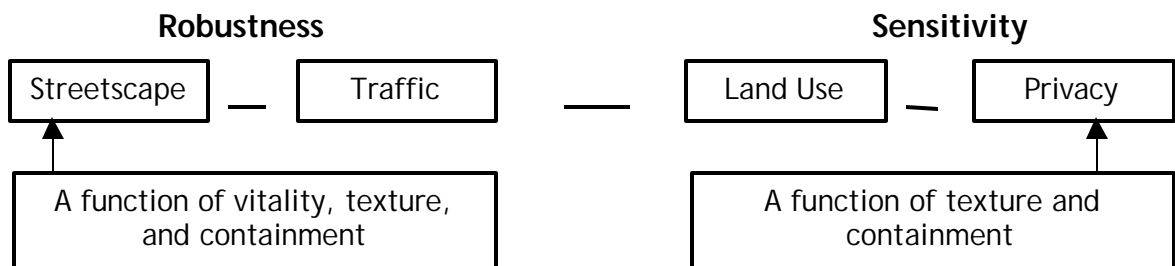


Figure 6-B depicts the streetscape elements and their relationship to one another. The idea of the ‘streetscape’ includes an increasing and expanding series of realms based on what a pedestrian experiences while travelling down a street. First, the area immediately surrounding the pedestrian, typically including the sidewalk property, is assessed for level of vitality. This

first level of experience is influenced by such factors as the condition of the sidewalk material, detailing of the sidewalk, the level of activity spilling out from adjacent land uses and the general desirability to be on that sidewalk. At the next level is the area that includes the buffer zone between the sidewalk and the traffic flow to one side and the area between the sidewalk and the property line on the building side. This area, also referred to as texture, is affected by such factors as the level of landscape planting, the frequency and nature of street parking, the location of the sidewalk within the right-of-way and the quality of the area between the buildings and the sidewalk. The final level affecting the pedestrian experience is the overall containment of the street, including the scale of building fronts. These three elements - vitality, texture and containment, mediated by traffic volumes, comprise the robustness of the street.

The second aspect of the study, identified as sensitivity, measures the sensitivity of land uses on a street to changes in the characteristics of a street. Sensitivity is a function of land use and privacy, mediated by texture and containment.

Armed with the scoring method, BMH staff filmed all the streets in the study area and then reviewed the videotape of the streets and scored each block of each street. Figures 6-C and 6-D show streetscape robustness and land use sensitivity respectively by street and block.

Figure 6-C
Robustness

source: Baker, McGarva, Hart Architecture

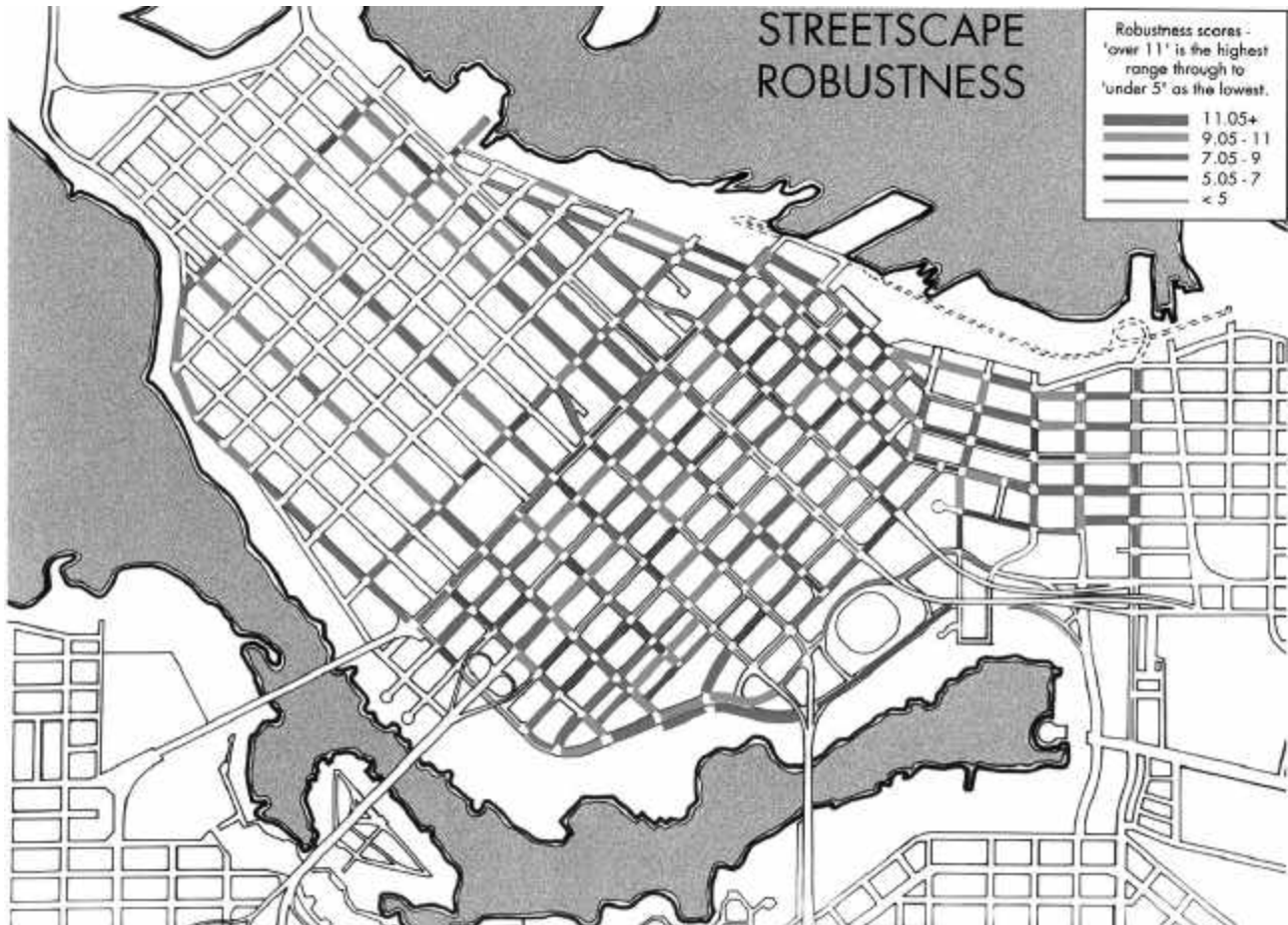
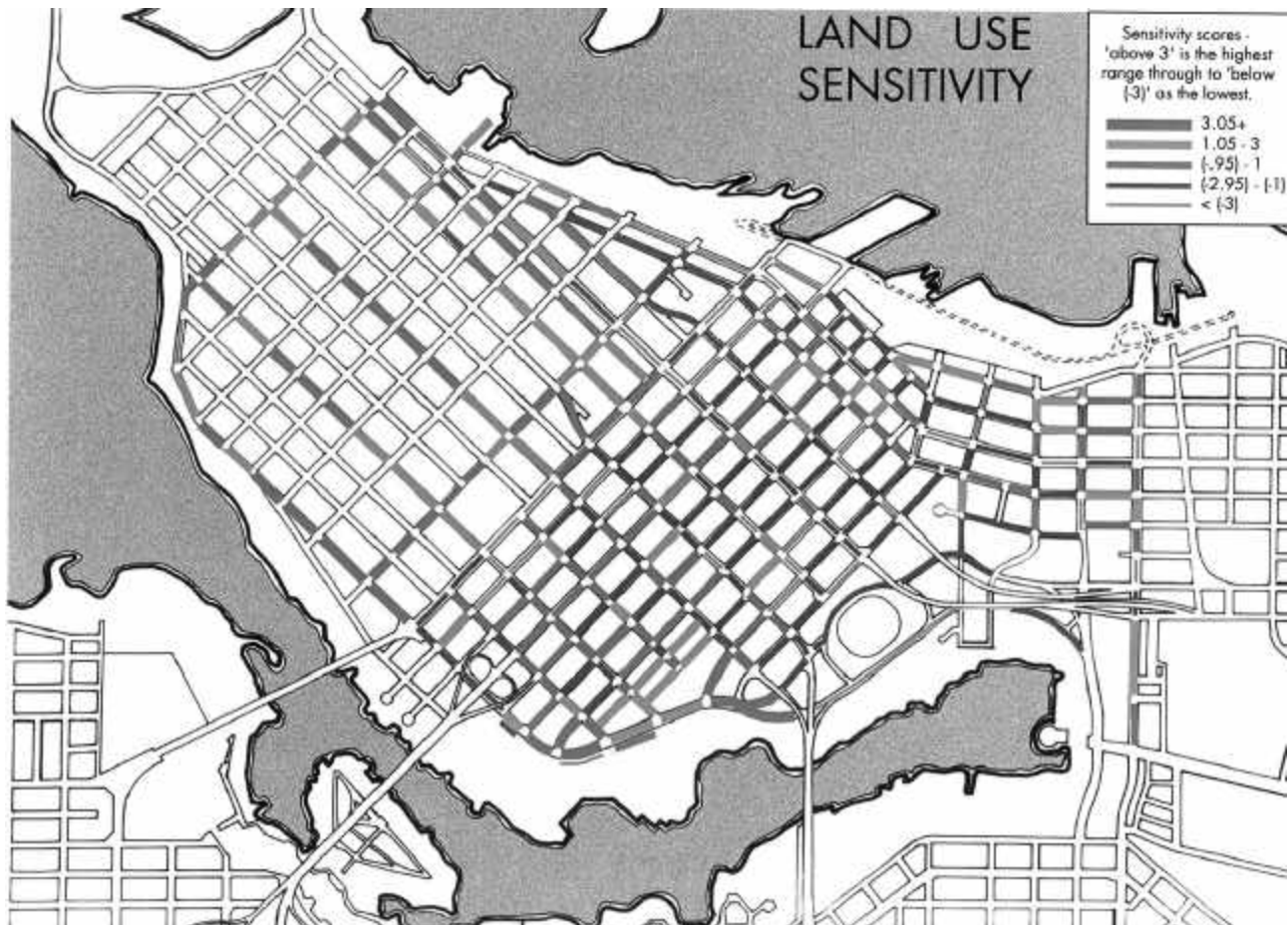


Figure 6-D

Sensitivity

source: Baker, McGarva, Hart Architecture



Not surprisingly, the major streets in the West End, such as Robson, Alberni, Davie and Denman are the most robust on the downtown peninsula. The streets of Gastown and Chinatown, especially Water and Pender Streets, but also parts of Cordova and Keefer Streets, stand out as fairly robust ones as well. Hastings Street, formerly downtown Vancouver's main retail street, lacks robustness east of Victory Square. Within the downtown core, Granville, Hornby, Homer and Pender Streets are fairly robust streets. Those streets serving primarily as access routes to the bridges and viaducts connecting downtown Vancouver to the rest of the city - Dunsmuir and Georgia, Nelson and Smith and Howe, Richards and Seymour Streets also stand out as lacking robustness. The one-way couplet of Beatty and Cambie Streets seem also to lack robustness.

The BMH study represents a significant contribution to the city's resources with respect to judging the worthiness of proposed changes in streets. The study report includes detailed instructions for applying the model in determining the likely results of proposed street changes. It is a tool that can be applied to streets where significant changes are proposed and where streetscape and liveability are at issue. Application of the tool on a consistent basis will also assist the city in monitoring the overall liveability of its streets. The model is applied to a number of downtown streets below. It is anticipated that it could be applied to a number of others in the near future, either in the context of follow-up studies to this report or related public processes likely to be initiated in the near future. Figure 6-E summarizes the potential contexts for application of the assessment model to various downtown streets.

Figure 6-E

Streetscape Assessment of Downtown Vancouver Streets

Street	Status of Assessment
Denman	No significant change
Pacific Street	Included herein
Pacific Boulevard	Pacific Boulevard Study
Expo Boulevard	Northeast False Creek ODP
Davie	No significant change
Nelson	No significant change
Smithe	No significant change
Thurlow	Community follow-up process
Burrard	Undecided scenario
Howe	No significant change
Seymour	No significant change
Richards	Included herein
Hornby	Included herein
Cambie	Included herein
Homer	Included herein
Hamilton	No significant change
Mainland	No significant change
Beatty	Included herein
Drake	Streetcar implementation
Helmcken	Greenway design
Robson	No significant change
Georgia	Undecided scenario
Dunsmuir	Community follow-up process
Melville	No significant change
Pender	Community follow-up process
Hastings	Community follow-up process
Alberni	No significant change
Cardero	No significant change
Cordova	Streetcar implementation
Powell/Water	Community follow-up process
Abbott	Community follow-up process
Carrall	Greenway design
Columbia	Streetcar implementation
Keefer	No significant change
Main	Community follow-up process
Granville	Granville study

A significant instance of the model leading to the seeking of plan alternatives is with respect to Pacific Street from Burrard west to Jervis Street. This is a narrow roadway not much more than 10.5 metres curb-to-curb width with two moving lanes of traffic and two parking lanes for much of the day. Rush hour regulations are currently applied to peak hour parking on alternate sides for the AM and PM peak periods. The street is not very robust, currently ranking about in the middle of downtown streets - Figure 6-C. There is a desire to have a bicycling corridor in both directions, connecting the West End and Stanley Park to the Cambie bridgehead and Beatty Street. One proposal is to strip parking on both sides and add boulevards to both sides and bike lanes in each direction. Such an action, though, would see a reduction in robustness, mostly as a result of decreases in containment as a result of removal of on-street parking. On the other hand, a proposal to place only an eastbound bike lane in place of parking on the south side of the street and to accommodate westbound bike traffic on a new bike lane on Beach Avenue through this section while still adding boulevards to both sides, reflects a solution that is estimated to increase the robustness of the street.

Proposals for two other streets - Homer Street from Pacific to Cordova and the same blocks of Richards Street - also illustrate the benefits of applying the model. The Downtown Transportation Plan proposal for Homer Street, which is identified for pedestrian priority (Section 4.3), is to change it from a one-way to a two-way street and to add two feet of boulevard to each side. It is estimated that such actions would change its score from an average street - with some very robust blocks - to one whose robustness was well above the current average for most of its length. The Downtown Transportation Plan proposal for Richards Street is to place full-time parking on the west side and to stripe a southbound bike lane on the west side as well. Such an action would move the street's overall score from one that was less than average to one that would be at least the current average.

A number of other streets for which changes are recommended in the Downtown Transportation Plan have also been assessed. Cambie Street is proposed to be converted from a one-way to two-way street. The result of implementing this change would likely increase robustness by one point. By making Beatty Street two-way, adding bike lanes in both directions and adding street trees to a street needing them, the overall level of robustness of the street increases by four points. The proposal to add full-time parking to the west side of Hornby Street, stripe a bike lane adjacent to the parking lane on the east side of the street and then add curb bulges most of its length would increase its robustness score by 2 - 2.5 points. This would improve the street from one that is above average in robustness for most of its length to one that would currently rank in the top 20th percentile in robustness. Abbott Street's texture and containment already make it an above average street. The adding of curb bulges where possible for most of its length would result in increased robustness that would also might see the street demonstrate a level of robustness in the upper 20th percentile for current scores. The overall increase in robustness of the streets for which significant changes are proposed in the Downtown Transportation Plan underscores the usefulness of the model as a planning tool.

6.4 Air Quality

Greater Vancouver's four health boards co-operated in undertaking a comprehensive and comparative assessment of air quality in the report, *Evaluation of ambient air pollution in the Lower Mainland of British Columbia: Public health impacts, spatial variability and temporal patterns*, released in March 2001. The report was completed by Dr. M. Brauer of the School of Occupational and Environmental Hygiene at UBC. Dr. Brauer compared the levels of air pollutants in the Lower Mainland with cities of similar or larger size in western North America (Seattle, Portland, Denver, San Antonio, Minneapolis-St. Paul, Phoenix and Los Angeles, San Diego and San Francisco in California). The results of the comparative analysis is outlined below.

Ozone - Ozone concentrations in the Lower Mainland were lower than in any of the comparison cities for which information was available. Vancouver concentrations were similar to, but less than, those in Denver, Portland and Seattle, and about half those prevailing in Los Angeles.

Carbon Monoxide - The 2nd highest 8 hour averages in the Lower Mainland were lower than all but two of the comparison cities (San Francisco-Oakland and San Antonio) for which data were available. Levels were about one-third those of Los Angeles, the city with the highest concentrations. They were about half those of Denver and about 40% less than in the neighbouring cities of Portland and Seattle.

PM₁₀ - The 2nd, 3rd and 4th highest 24 hour averages were measured. PM₁₀ concentrations in the Lower Mainland were generally lower than any of the comparison cities. Levels in Phoenix, which experienced the highest concentrations for all three periods, were more than twice as high as in Vancouver. Occasional higher readings occur at some monitoring stations in the Lower Mainland that would be in the mid-range of the comparison cities. However, Vancouver's low ranking disappears when the station with the highest readings is compared with San Francisco-Oakland, Portland and San Antonio.

Nitrogen dioxide - Concentrations of NO₂ in the Lower Mainland were in the midrange of the cities reviewed. Lower Mainland NO₂ concentrations were well below those found in Denver, Phoenix, Los Angeles or San Jose and somewhat higher than Seattle, Portland, San Francisco, Sacramento or San Antonio.

Sulfur Dioxide - As one might expect for western North America, sulfur dioxide levels (annual average ppm) were relatively low in all cities; SO₂ concentrations in the Lower Mainland were significantly lower than those in Seattle and Denver, but slightly higher than for Minneapolis, Los Angeles or San Francisco.

Downtown Air Quality

Air quality on the downtown peninsula is currently assessed on the basis of continuous measurement at a station located on the 2nd level of Robson Square, one of about 30 continuously operating air quality stations throughout the Lower Mainland. The next closest measuring station and the only other station located in the City of Vancouver is in Kitsilano (near Arbutus and West 10th Streets at the former site of GVRD headquarters). Substances measured at the downtown location include CO (Carbon Monoxide), SO₂ (Sulphur Dioxide), O₃ (Ozone) and COH (Coefficient of Haze). PM₁₀ (Particulate Matter < 10) is measured at the Kitsilano station, but not at the Robson Square site. While the CCME (Canadian Council of Ministers of the Environment) adopted a protocol for PM_{2.5} (Particulate Matter < 2.5) in 1998 and a volumetric standard in 2000, no continuous stations in the GVRD have yet been equipped with the new permanent measurement equipment for the smaller particulate matter. The GVRD has nevertheless adopted the Canada-wide standards for PM_{2.5} and plan to implement them in the future.

Despite the density of population and employment and motor vehicles on the downtown peninsula, downtown air quality is generally excellent. For the year 1999, the last year for which complete annual data have been reported by the GVRD Air Quality Branch, the Robson Square station registered only 2 hours in which the air quality did not meet the 'desirable' objective. A reading of less than desirable, but nonetheless acceptable ('fair' quality) was obtained for COH for 2 hours during the year.

However, the excellent air quality registered for downtown does not consider O₃, NO_x or PM₁₀, which are not measured at the downtown monitoring site. The nearby Kitsilano measuring station recorded 18 hours in which O₃ was in the 'fair' quality range and a further 315 hours in which PM₁₀ levels were in the 'fair' range (acceptable, but less than desirable). The Kitsilano station ranked

5th worst among the 13 stations in the GVRD measuring PM₁₀ levels. PM₁₀ was responsible for over 82 percent of 'fair' air quality in 1999 at the GVRD's 31 monitoring stations.

Conclusion

As indicated, downtown air quality is generally good. The measurement of additional variables would add to our knowledge of downtown air quality.

Air quality monitoring and mitigation measures in Greater Vancouver are within the jurisdiction of the GVRD's Air Quality Branch. As indicated, and despite the concentration of both residential and employment populations downtown, the air quality monitoring station at Robson Square does not measure some critical pollutants, including ozone and nitrous oxides. It should be augmented by the ability to measure these parameters, as well as newer ones (PM₁₀ and PM_{2.5}) whose measurement is just being implemented across the GVRD.

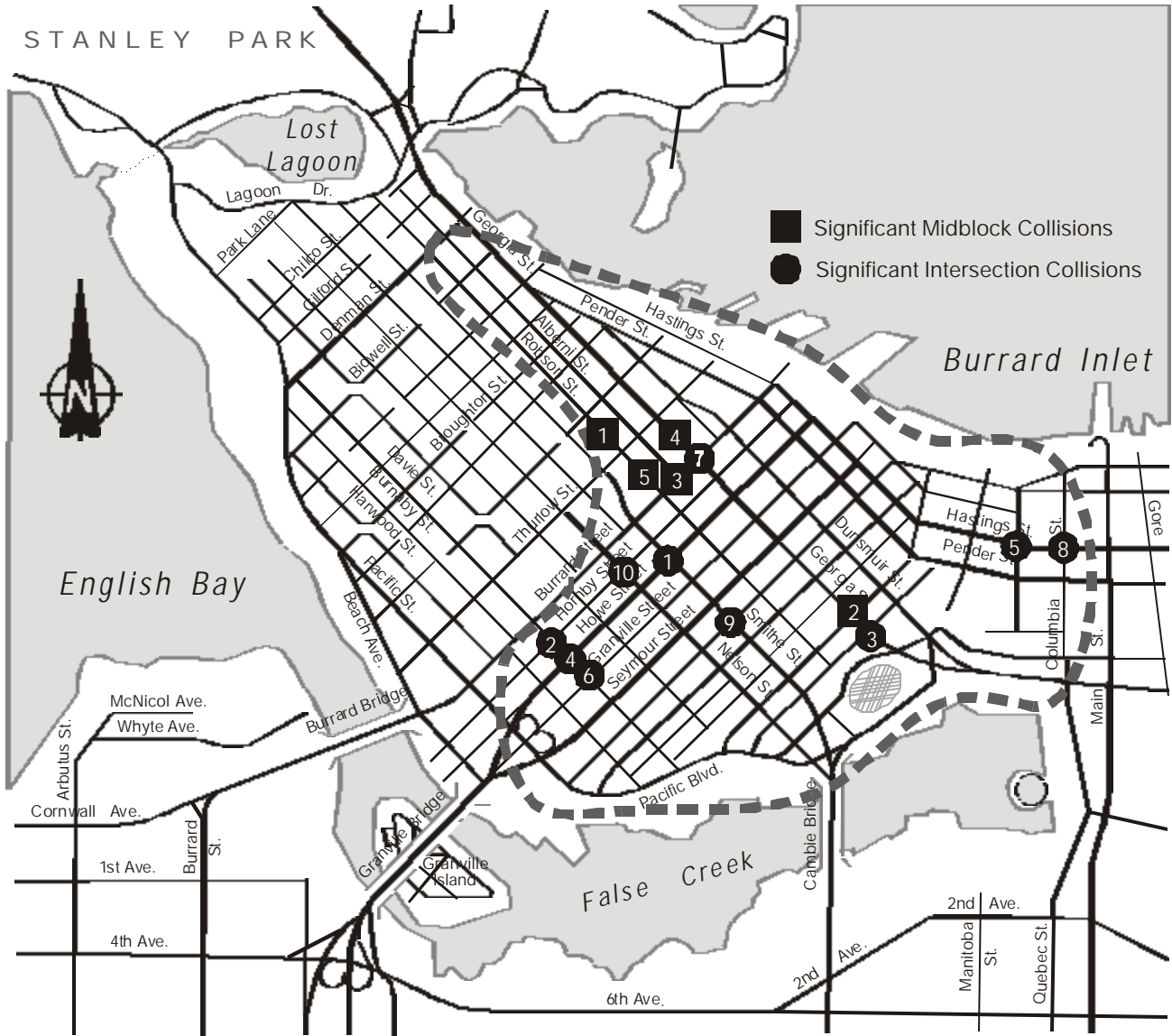
6.5 Traffic Safety

To address traffic safety issues within the downtown core, a Safety Review for the Downtown Transportation Plan was completed by Hamilton Associates with funding assistance from ICBC. The study identified traffic safety issues and potential improvement options that could be considered in the development of the Downtown Transportation Plan. Collision records for the period between 1992 and 1996 were reviewed and analysed to determine the collision frequency, collision rate, and collision severity at mid-block and intersection locations. The top ten intersection locations and the top 5 mid-block locations in terms of highest collision risk and insurance claims were identified and potential countermeasures were suggested. These are shown in *Figure 6-F*.

Figure 6-F

Locations with High Frequency of Collisions (Collision frequency adjusted for traffic volume)

source: Hamilton Associates



An analysis of individual intersection and mid-block collision data was also completed to establish collision characteristics by time, severity, type, weather, road surface, lighting and vehicle type. Compared to average downtown collision characteristics, locations with an over-representation of a particular collision characteristic were identified. For example, locations with higher than average pedestrian related collisions or head-on collisions were identified.

The results of the study helped to focus attention to some areas of concern and, where appropriate, recommendations were made in the plan to address them. In many cases, potential solutions to problem locations were related to traffic management items that were specific to that location. These were referred to the Traffic Management Branch of Engineering Services for consideration.

The safety review also provided useful information by completing a literature search on general safety impacts of potential network changes. The changes include:

- converting from two-way to one-way street operation and vice-versa;
- introducing exclusive bus, trolley-bus or streetcar lanes;
- introducing exclusive bicycle lanes;
- introducing traffic management or calming measures; and
- introducing left turn bays.

The information provided was considered in the development of the Downtown Transportation Plan.

Evaluation Recommendations

Recommendation EN1: *Apply street robustness and land use sensitivity analysis where future significant public consultation is involved in street changes and where significant change may affect streetscape and liveability issues.*

Recommendation EN2: *Request the GVRD Air Quality Branch to increase the parameters monitored by its downtown monitoring station to include the full range of substances and parameters monitored by the GVRD and that a baseline be established in the near future for ozone and particulate matter.*

7 Implementation and Funding

The recommendations in the Downtown Transportation Plan are summarized below. The majority of the recommendations can be started within three years, subject to available resources and funding. Recommendations such as providing wider crosswalks at locations with high pedestrian volumes could be completed within three years. The development of a network of bike lanes could begin immediately but would not be completed until some time afterwards. The pursuit of a rapid transit line may take 10 or more years to complete. In the very short-term, it is recommended that an implementation strategy be developed for the Downtown Transportation Plan. This strategy, to be completed by January 2003, would establish the required resources and the potential funding sources and estimate timelines.

In following-up on all the recommendations of the Downtown Transportation Plan, the intent should be to complete the recommendations at the earliest possible time. This would provide benefits to all users sooner. To this end, it is recommended that progress in achieving the Downtown Transportation Plan recommendations be monitored and reported back regularly, in coordination with the Vancouver Transportation Plan's monitoring program.

It should be noted that the pursuit of some of the recommendations requires the co-operation of other agencies, most notably, TransLink. Agreement from TransLink is required or desired on all transit-related recommendations. Fortunately, TransLink will be undertaking a Transit Service Area Plan for Vancouver later this year. The transit recommendations of this plan can be fully considered at that time. And as noted below (Section 7.1), the development of the major rapid transit lines, as well as the transport demand management (TDM) assumptions of the 2021 transportation system, are also significant for the overall performance of the transportation system. While failure to achieve either transport demand management assumptions underlying the regional transportation model or to undertake contemplated transit improvements will have little effect on modal shares for downtown trips, they have significant implications for transportation network performance characteristics.

7.1 Summary of Recommendations

Population and Employment Study Recommendations

Recommendation PE 1 Undertake follow-up studies of the demand for and supply of residential and commercial space in the Downtown Peninsula.

Road Network Plan Recommendations

Recommendation RN1: Confirm the existing designated MRN streets (Hastings, Georgia, Smithe, Nelson, Howe, Seymour and Main (south of Prior)).

Recommendation RN2: Pursue Burrard Street and Granville Street for potential inclusion as part of the Major Road Network.

Recommendation RN3: Conduct a future review of other potential MRN streets (such as Main and Dunsmuir) after considering potential land use and streetscape development.

Recommendation RN4: Distinguish and recognize the role of important circulation streets and local streets in future street modifications.

Recommendation RN5: Convert Carrall, Abbott, Beatty, Cambie and Homer to two-way streets.

Recommendation RN6: Maintain Granville Street's role as a transit, pedestrian and service vehicle corridor, entertainment district and future greenway. Transit efficiency along Granville Street should not be diminished.

Recommendation RN7: Reconfigure Granville Street south of Smithe Street to improve traffic circulation, widen sidewalks and reduce conflicts.

Recommendation RN8: Maintain Water and Cordova Streets as one-way streets.

Recommendation RN9: Further Evaluate Pender Street between Cambie and Howe for potential conversion from a two-way to one-way eastbound street.

Recommendation RN10: Widen roadways at specified locations to facilitate vehicular circulation, bus movements and bike lanes.

Transit Recommendations

Recommendation TR1: Use easy-to-read colour-coded maps at bus stops to clearly describe the downtown circulator bus routes.

Recommendation TR2: Operate downtown circulator bus routes in both directions on the same street and use electric trolley buses wherever possible.

Recommendation TR3: Encourage TransLink to investigate using advertising space on event tickets or envelopes to display bus routes and schedules leading to major event facilities, and coordinate with event organizers to charge an additional service fee to provide transit passes to event patrons.

Recommendation TR4: Reaffirm the City's commitment to develop a detailed transportation plan for the False Creek Flats in co-ordination with a rail study.

Recommendation TR5: Support the development of a rapid transit line from downtown Vancouver to Richmond (and possibly the airport) to achieve City and regional objectives, with stations in Downtown South, the central business district (centred at Burrard and Dunsmuir) and the transportation hub at Waterfront Station, using tunnel rail technology.

Recommendation TR6: Consider converting the existing bus lanes on Seymour and Howe Streets for use by other sustainable modes or for additional parking or landscaping as part of the implementation of the Richmond/Airport rapid transit line.

Recommendation TR7: Extend the proposed Pacific Boulevard streetcar line along Drake Street to Granville Street.

Recommendation TR8: Adjust the location of streetcar stations as detailed in Figure 4.2-1.

Recommendation TR9: Extend new streetcar routes for the False Creek Flats, Vanier Park, and along the Arbutus corridor.

Recommendation TR10: Consider alternative streetcar alignments on Water Street, Abbott Street or Keefer Street if needed for additional capacity.

Recommendation TR11: Investigate the potential for introducing transit/HOV lanes on Burrard Street from Pacific to Pender, in the peak periods/peak directions only, as part of the Vancouver Area Transit Plan.

Recommendation TR12: Extend the westbound 3:00 to 7:00 PM HOV lane on Georgia Street east from Burrard to Richards Street.

Recommendation TR13: Investigate the potential for a transit signal priority system on Hastings Street, following an operational review of the new 98 B-Line Granville Street transit signal pre-emption system.

Recommendation TR14: Investigate the potential for introducing bus only queue jumper lanes in the peak periods on Main Street between National Avenue and 2nd Avenue, as part of the Vancouver Area Transit Planning process.

Recommendation TR15: Enhance streetscape design of Granville Street from the bridgehead to Cordova street to improve pedestrian/transit stops.

Recommendation TR16: Investigate the potential to improve bus travel times on Granville Street by providing bus-passing opportunities and optimized signal control.

Recommendation TR17: Pursue changes to Cordova Street in front of Waterfront station to create additional bus stops, a bus-only lane on Cordova, and accommodate a streetcar station.

Recommendation TR18: Work with TransLink on a public process that will help to guide the development of a new transit area service plan for the City of Vancouver.

Recommendation TR19: Review the routing and station locations of the 98 B-Line.

Recommendation TR20: Encourage Translink to review the potential for a reduced fare for short trips.

Pedestrian Plan Recommendations

Recommendation PD 1 Implement the Pedestrian Route network as illustrated in Figure 4.3-B and adopt the Great Street network as illustrated in Figure 4.3-C

Recommendation PD 2 Provide curb ramps that align with the crosswalks at each intersection.

Recommendation PD 3 Remove restricted pedestrian crossings where safety can be maintained and where traffic impacts can be managed.

Recommendation PD 4 Provide mid-block crossings near significant pedestrian generators where safe and where direct connections are desired.

Recommendation PD 5 Create improved sidewalk crossings at rear lanes to improve safety.

Recommendation PD 6 Design and implement a universal downtown way-finding system of pedestrian signage.

Recommendation PD 7 Implement pedestrian or corner bulges in locations where pedestrian crossings are long and traffic capacity would not be greatly impacted.

Recommendation PD 8 Minimize the number of curb cuts for driveways and parking access across all sidewalks, particularly identified pedestrian routes.

Recommendation PD 9 Restrict above and below grade pedestrian crossings to increase street level activity.

Recommendation PD 10 Provide pedestrian weather protection on retail/commercial (high) streets.

Recommendation PD 11 Provide barrier-free access to new and existing developments to accommodate the largest number of pedestrians.

Recommendation PD 12 Provide pedestrian connections to the Central Waterfront via Carrall and Richards Street alignments.

Recommendation PD 13 Provide improved pedestrian access to the Coal Harbour Waterfront by providing pedestrian activated signals, shorter crossing distances, signage and landscaping where possible.

Recommendation PD 14 Provide wider crosswalks at intersections with high pedestrian volumes.

Recommendation PD 15 Remove pedestrian holds to give pedestrians greater priority where vehicle volumes will not result in significant turning queues.

Recommendation PD 16 Increase the convenience for pedestrians at intersections by installing automatic pedestrian detectors to provide pedestrians with the walk signal and provide sensory devices for sight and hearing impaired pedestrians.

Recommendation PD 17 Introduce public pathways between buildings to create more opportunities for pedestrian short-cuts where opportunities exist.

Recommendation PD 18 Redesign the intersection of Carrall/Powell/Water/Alexander

Recommendation PD 19 *Widen sidewalks on Davie Street between Burrard and Jervis using building setbacks.*

Bicycling Plan Recommendations

Recommendation BK1 *Implement the downtown bicycle network shown in Figure 4.4-B.*

Recommendation BK2 *Evaluate alternatives to the proposed bike facility along Pender and Dunsmuir.*

Recommendation BK3 *Upgrade False Creek Bridges to better accommodate bicycles.*

Recommendation BK4 *Provide related bike facilities to encourage and make bicycling safer and more convenient (e.g. bike parking facilities, way-finding/destination signage, education).*

Recommendation BK5 *Create bicycle friendly streets along all local streets within the downtown.*

Recommendation BK6 *Monitor and assess the development and impact of the bicycle network on a regular basis and expand the network as warranted.*

Recommendation BK7 *Design all new streets and multi-use paths to adequately accommodate cycling.*

Goods Movement Recommendations

Recommendation GM1 *Modify the downtown truck route network as shown in Figure 4.5-B.*

Recommendation GM2 *Remove Downtown South from the Truck Area.*

Recommendation GM3 *Review the truck loading requirements in the Parking By-law to ensure they are adequate and avoid relaxations.*

Recommendation GM4 *Monitor the municipal commercial plate program to reduce unnecessary demands on the limited on-street loading facilities.*

Recommendation GM5 *Maintain the existing system of one-way entry only to many of the rear lanes within the Central Business District and remove all lane encumbrances to the extent possible.*

Recommendation GM6 *Manage the motor coach and tour bus routes on a case-by-case basis to provide flexibility in managing conflicts.*

Recommendation GM7 Manage tour buses by undertaking an education and enforcement program, and where necessary and practical, provide additional on-street tour bus parking and loading zones.

Recommendation GM8 Avoid downtown relaxations of the tour bus parking and loading provisions within the Parking By-law.

Recommendation GM9 Pursue additional off-street loading facilities as part of the convention centre expansion.

Parking Recommendations

Recommendation PK1 Regularly review downtown residential and commercial off-street parking standards to ensure that adequate, but not abundant, parking is provided to meet needs.

Recommendation PK2 Formulate communication programs in co-operation with major employers to encouraging employees to car pool or not drive to downtown jobs.

Recommendation PK3 Discourage driveways across all sidewalks in the downtown, particularly along pedestrian oriented streets and bikeways.

Recommendation PK4 Review existing policies that permit the development of free-standing parking garages.

Recommendation PK5 Consider renovating city-owned parkades to animate street frontages and encourage private owners to do the same.

Recommendation PK6 Urge TransLink and the GVRD to develop and implement an equitable regional parking policy to achieve regional livability and transportation goals in consultation with affected municipalities.

Recommendation PK7 Adjust on-street parking regulations as per Figure 4.6-F to better balance the needs of all users.

Recommendation PK8 Monitor the demand for special on-street parking provisions for motorcycles.

Intelligent Transportation Systems Recommendations

Recommendation IT1 Pursue ITS technologies to make downtown travel by pedestrians, cyclists and transit passengers more convenient and safe, and minimize overall road congestion.

Public Realm

Recommendation PR 1: Develop a strategy and work program for undertaking a downtown public realm plan.

Environmental Assessment Recommendations

Recommendation EN1: Apply street robustness and land use sensitivity analysis where future significant public consultation is involved in street changes and where significant change may affect streetscape and liveability issues.

Recommendation EN2: Request the GVRD Air Quality Branch to increase the parameters monitored by its downtown monitoring station to include the full range of substances and parameters monitored by the GVRD and that a baseline be established in the near future for ozone and particulate matter.

Implementation and Funding

Recommendation IF1: Develop an implementation strategy for the Downtown Transportation Plan.

Recommendation IF2: Monitor the progress in achieving the Goals of the Downtown Transportation Plan in co-ordination with the Vancouver Transportation Plan's monitoring program.

7.2 Funding

The cost of transportation improvements has generally been paid in one of three ways:

1. Senior government (provincial and federal) contributions;
2. The City's capital budget; and
3. Development charges (Development Cost Levies (DCLs) or Community Amenity Contributions (CACs)).

These three sources would be examined for potential funding sources for the implementation of the Downtown Transportation Plan. Since 1999, TransLink has made available capital and operating funds for links in the Major Road Network. The City's capital program has been the main financial vehicle for local transportation projects. To address the need for additional capital funds to accommodate future growth, interim city-wide charges on new developments began to be levied in 2000, expanding a tool that had only been used in a few localized areas within Vancouver. Currently, a formal city-wide financing growth strategy is being developed and should be a consistent third source of funding in the future.

As a sub-set of the city-wide financing growth strategy, public benefit strategies have been developed for parts of the Central Area. These areas include Triangle West, Downtown South and other major development areas (False Creek, Coal Harbour and Burrard Landing). The public benefit strategies in these areas helped to outline potential public benefits, their costs, potential funding sources and timelines for implementation. This concept can be expanded to include the downtown or the entire Central Area. Upon completion of the Downtown Transportation Plan and the Streetscape Design Standards (also being undertaken currently), an opportunity exists to undertake an overall Public Benefits Strategy for the Downtown as directed by Council in 1998. The proposed changes in the Downtown Transportation Plan could result in a need for substantial capital funding over a 20-year period.

Other Public Benefit Strategy work needs to be done in the downtown area on parks, social housing and daycare. A significant part of this work has already been completed in sub-area plans, and converting this into a comprehensive strategy would be the biggest challenge. This could potentially be done in tandem with the transportation requirements as part of a comprehensive approach to the comprehensive Public Benefits Strategy for the downtown.

Acknowledgements

The Downtown Transportation Plan is an initiative of Vancouver City Council. Following the Vancouver Transportation Plan, Council requested staff to undertake a comprehensive review of the downtown transportation network. The purpose of the plan is to help achieve the city's transportation goals for the downtown and to guide decisions to 2021. Council created a joint Engineering and Planning team to prepare the plan and approved a consultation process to engage and obtain input from the public. The Project Team would like to thank the public who attended the many meetings, workshops, and walk-about, and who provided feedback during the plan's development. The final Plan reflects the time and effort downtown residents, businesses and commuters dedicated to the project. The Project Steering Committee (listed below) provided valuable guidance to the team. Finally, we want to thank the many staff in Engineering and Planning who assisted us and who provided comments on the plan.

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