REGIONAL GREENWAYS – VISION TO REALITY
Developing the Central Valley Greenway

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ABSTRACT

The Central Valley Greenway (CVG) provides pedestrians and cyclists with a relatively flat, primarily traffic separated 25 km route connecting Vancouver, Burnaby and New Westminster. The CVG was developed in partnership with the federal and provincial governments, the regional governments at TransLink and Metro Vancouver, and the neighbouring municipalities of Vancouver, Burnaby and New Westminster.

The goals of the CVG are to provide facilities that encourage people to cycle and walk, to attract new cyclists and provide experienced cyclists with improved connections. In Vancouver the 7.5 kilometers long route was constructed in three phases and links East Vancouver with the downtown and False Creek. The Greenway generally follows the rail line from the rail yards near False Creek, east to Burnaby. Along the way it climbs one hill to cross the rail tracks at Clark Drive and crosses ten busy streets.

The CVG provided an opportunity to test several technical innovations including:

- sharrows or shared use lane markings are symbols placed on the pavement to demarcate areas of the street intended for bicycle travel;
- cross-bikes or multi-use path crossing markings at roadway intersections, are used to demarcate where the multi-use trail crosses the roadway at an intersection and where cyclists and pedestrians are to cross; and
- bike-streets are typical residential streets that have been retrofitted to create separated bike paths that look and feel like a street.

The CVG is a good example of many levels of government working together to develop an important regional resource.

INTRODUCTION

The Central Valley Greenway (CVG) provides pedestrians and cyclists with a relatively flat, primarily traffic separated 25 km route connecting Vancouver, Burnaby and New Westminster. It intersects with 11 SkyTrain stations, 23 bus routes and 27 cycling facilities and connects significant destinations across the region. The CVG was developed in partnership with the federal and provincial governments, the regional governments at TransLink and Metro Vancouver, and the neighbouring municipalities of Vancouver, Burnaby and New Westminster.

In Vancouver the route is 7.5 kilometers long and links East Vancouver with the downtown and False Creek, and connects transit hubs, residential and employment areas, schools, shopping and parks. The Greenway generally follows the rail line from the rail yards near False Creek, east to Burnaby. Along the way it climbs one hill to cross the rail tracks at Clark Drive and crosses ten busy streets.

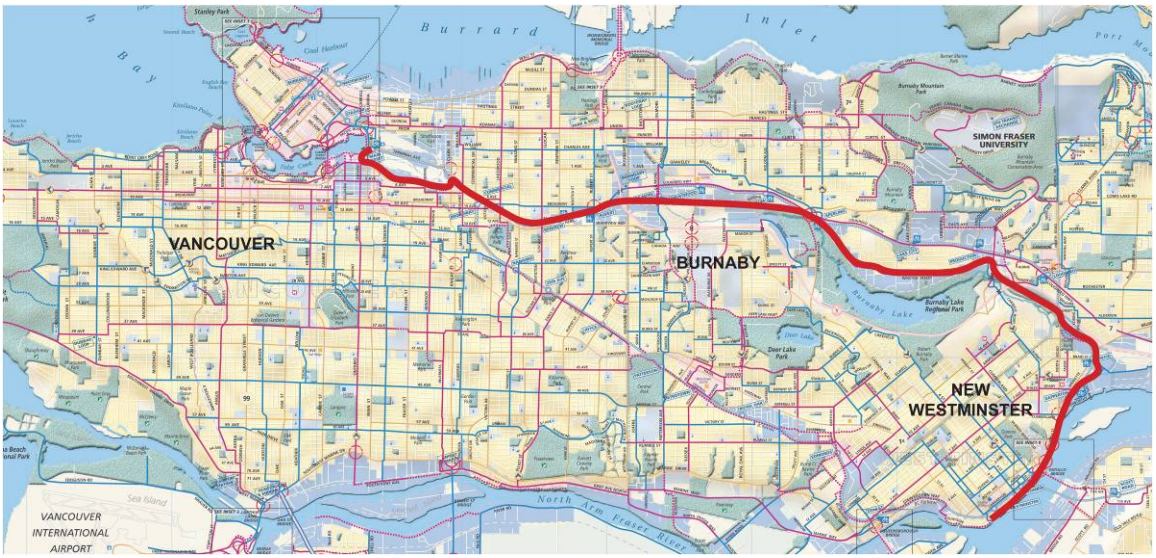

Figure I - Map of the Region and the CVG

BACKGROUND

Typically, greenways are long, thin parks called linear parks, parkways, urban trails or greenbelts. One of the earliest examples in North America is the Emerald Necklace in Boston. In 1880, North America's first landscape architect Frederick Law Olmstead developed a series of parks that linked the river, ponds and marsh areas along 11 kilometres of trails in Boston. Vancouver's own greenway legacy dates back to the 1928 Bartholomew Plan, which included a water front walkway along English Bay.

Vancouver's Greenways Plan

In 1991, then Mayor now Premier Gordon Campbell appointed the Urban Landscape Task Force to report on the existing use and future management of Vancouver's urban landscape. In their report *Greenways•Public Ways* the Task Force recommended the development of a system of interconnecting urban greenways. Following on this

recommendation, staff worked to develop a greenways plan for the City. After an intensive public participation program and detailed review by staff from various City departments including Planning, Engineering and Parks, Council approved the Vancouver Greenways Plan in 1995.

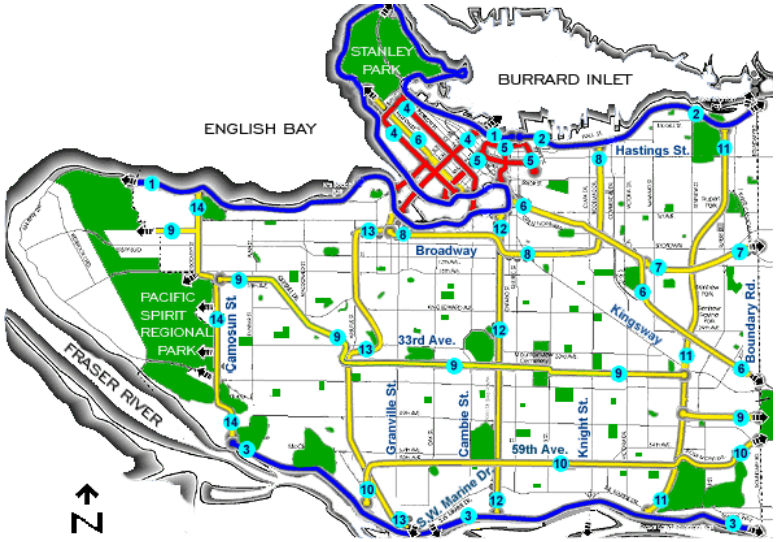

Figure II – Map of the 14 City Greenways in the 1995 Vancouver Greenways Plan

The Greenways Plan identified 14 citywide greenways. The greenways are "green urban paths" for pedestrians and cyclists, which cross the city from east to west and north to south, linking major open spaces, parks, public facilities, and neighbourhood centres. Their purpose is to provide walking and cycling connections, and expand the opportunities for urban recreation. Approximately, 50% will be developed on street right-of-ways and the remainder along Vancouver's waterfronts and rail corridors. One of the 14 greenways was the CVG another was the Seawall and Seaside Greenway originally identified in the Bartholomew Plan.

The CVG

In the Greenway Plans the CVG followed the Grandview Cut. The Cut was constructed in 1913 to provide flat grades for the railways travelling through the False Creek area. The Cut provides ideal conditions for a greenway: no hills, no intersections and lots of naturalized vegetation. In 1998, the Cut was identified by Rapid Transit 2000 as the best alignment for the Millennium SkyTrain line. An agreement between the City and the Province saw the SkyTrain constructed in the Cut and the greenway built along the top of the Cut on Grandview Highway North.

The Vancouver portion of the CVG was constructed in three phases. Phase 1 was completed in 2002, and is a 1.7 kilometre section in the middle of the route on Grandview Highway North between Slocan Street and Commercial Drive. In this section greenway development required the removal of Grandview Highway North from the City's designated truck route network and the implementation of a series of bike streets.

Figure III – Map of the Central Valley Greenway in Vancouver

The completion of Phase 1 of the CVG acted as a catalyst for the development of the entire route. In 2002 discussions began with TransLink and the three municipalities to complete the route in Vancouver, and to create a regional greenway connecting Vancouver, Burnaby and New Westminster.

Phase 2 is west of Phase 1 and connects Commercial Drive to Science World at False Creek. This 3.5 kilometre section follows Grandview Highway North, Great Northern Way and 1st Avenue. Bike lanes are used on Grandview Highway North, which is a low volume arterial street, between Commercial and Clark Drives. The greenway uses the Clark Drive Bridge to cross the Grandview Cut and then follows the north side of Great Northern Way in a traffic separated multi-use bike path, then onto 1st Avenue which uses both bike lanes and sharrows.

Phase 3 is east of Phase 1 and connects Slocan Street to Boundary Road. Phase 3 follows the SkyTrain and rail line, and provides a 2.3 kilometre traffic-separated facility with few crossings. Cyclists had long seen this alignment as ideal because of its gentle grades and separation from traffic. This area of the city was until the introduction of the greenway, limited to experienced cyclists willing to share the road along two busy arterial streets, Lougheed Highway and Grandview Highway South.

CVG Funding

The regional greenway was funded by the three municipalities, and the regional, provincial and federal governments. In 2003, the regional and municipal governments applied for and were awarded federal funding through Transport Canada's Urban Transportation Showcase Program. The program's goal is to reduce greenhouse gas emissions through innovative and replicable projects. The application bundled together six projects, including the CVG. The federal funding was used for the design and construction of Phases 2 and 3 in Vancouver, and as a catalyst for other funding opportunities.

WORKING AS A TEAM

A project as complex as the CVG involving three municipalities and at various times four levels of government required a flexible and unique management structure.

In 2002, staff from each municipal and regional government was appointed to the CVG Working Group (CVGWG). The CVGWG met regularly throughout the design and construction stages to share ideas and improvements, and to solve problems. Their first task was to develop a series of goals and standards to provide consistency along the route. These standards included materials, widths, and signage. For example, each municipality uses slightly different bicycle guide signs and street name blades. A wayfinding study was commissioned and their recommendations for standardized greenway street name blades and a directional wayfinding signage system were implemented. Together with members of the Transportation Association of Canada (TAC) Bicycle Traffic Pavement Markings and Signs Project Steering Committee, the group helped develop a new standard for multi-use path crossings at intersections, including pavement markings and signage.

In addition to working with other municipalities and levels of government in a different way, the City of Vancouver needed to utilize new methods for designing and constructing the project.

The typical City model for design and construction of greenways relies on in-house resources. On the CVG we decided to use consultants and contractors, due to the schedule and scope of the greenway and the focus of City resources on other major projects including the Olympics and Canada Line. A multi-disciplinary team of consultants was hired under the direction of a City project manager. Since one of the primary focuses of greenways is the experience of the City through walking and cycling, it was decided that the consultant team should be led by landscape architects with planners, and civil, structural, electrical and transportation engineers providing technical support and expertise.

A team of experts from various branches of Engineering Services was formed to review the designs put forward by the consultant team. The core group was made up of members from Greenways and Neighbourhood Transportation, Strategic Transportation Planning, Traffic Management, and Streets Design. Additionally, staff from Electrical Street Lighting, Land Survey, Real Estate Services, Legal Services, Sanitation, Purchasing and Parks were brought in to the assist with various aspects of the project.

PUBLIC CONSULTATION

The City of Vancouver utilizes public consultation frequently. Within the greenway project it is both a method for sharing design and construction information, and a way to build public awareness and promote the use of the greenway.

Two rounds of Open Houses were scheduled over a period of six months to provide opportunities for businesses, residents and users to comment on the design. The route was divided into Phase 2 and 3 based on location and the adjacent land uses. The first

round of Open Houses was held to introduce the goals of the greenway and a conceptual design. Questionnaires provided an opportunity for people to comment on the design. Following the Open Houses the design was refined in response to people's comments. A newsletter, which presented the comments and the design response, was delivered to every household and business inviting them to the next round of Open Houses. At the next Open Houses the final design was presented and people were asked two questions: 'Are you supportive of the plans for the CVG as proposed'; and 'Would you like to be notified of the Council report on the Greenway'.

The design and development of the CVG was well supported by the public. In 2006 Council approved the project, and following completion of the construction documentation, construction began in 2008 and was completed this year. The CVG was officially opened on June 27th, 2009.

TECHNICAL INNOVATIONS

The development of the CVG coincided with the development of the new TAC Guidelines for the Design and Application of Bikeway Pavement Markings. Members of the CVGWG and the consultant team provided input to the TAC committee. As a result we have been able to pilot new standards. In addition, the greenway provided an opportunity to test several technical innovations including sharrows, cross-bikes and bike streets.

Sharrows

Sharrows or shared use lane markings are symbols placed on the pavement to demarcate areas of the street intended for bicycle travel. As noted in the 2007 TAC Report, "The symbols raise awareness to both cyclists and motorists of the correct cyclist positioning in the lane." Sharrows are 1.0 metre wide and typically the centre of the sharrow is placed 3.4 metres from the curb to allow clearance for the door zone of parked vehicles. In cases where there is no parking, sharrows are typically placed 1.0 metre from the curb. Sharrows are used on streets where there isn't enough room for bike lanes. Naturally, this varies from city to city. In Vancouver, sharrows are used in two situations. The first is on streets which are wide enough for bicycles and vehicles to share the road side-by-side. In this case, lanes range between 4 and 4.4 metres wide. The second is when the road is less than 4 metres wide and bicycles and cars have to share the lane.

Figure IV - Typical Sharrow

Cross-Bikes

In the TAC 2007 Final Report: Guidelines for the Design and Application of Bikeway Pavement Markings, cross-bikes or multi-use path crossing markings at roadway intersections, are used "to demarcate where the multi-use trail crosses the roadway at an intersection and where cyclists and pedestrians are to cross". They can also be used when a separated bike path and sidewalk meet at a street intersection. They provide route clarity and comfort to new cyclists. Signs are used to communicate to drivers that cyclists may be crossing at the intersection, and to pedestrians and cyclists that the crossing is shared. In addition to the elephant's feet and signage, Vancouver has added pedestrian and bicycle stencils to increase driver awareness. In some cases colour has been added to make them even more visible.

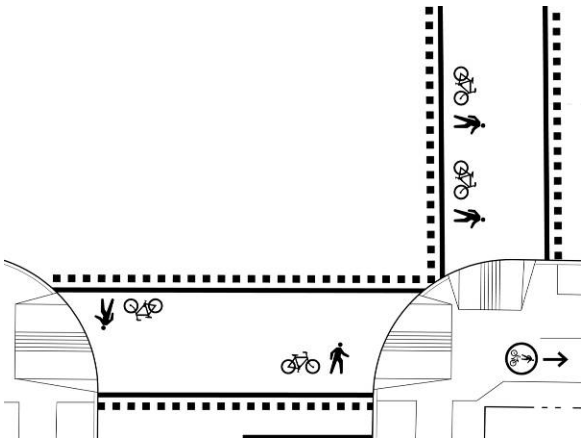

Figure V - Typical Cross-Bike on the CVG with Elephant's Feet and Stencils

Bike-Streets
In Vancouver, typical residential streets have been retrofitted to create bike-streets, separated bike paths that look and feel like a street. Typically, they are 3.5 metres wide, paved asphalt with a standard curb and gutter. One removable bollard is installed in the centre of the bike street at each end to restrict vehicle access, while still providing access for emergency vehicles. Looking like a narrow street rather than a path sends a clear message to pedestrians that the bike-street is for cyclists and emergency vehicles, and that they should use the adjacent concrete sidewalks. These cues have been very successful in minimizing conflicts between pedestrians and cyclists. In addition, bike-streets act as vehicle diverters and therefore, calm neighbourhood traffic.

Figure VI - Typical Bike-Street

DESIGN SOLUTIONS

The goals of the CVG are to provide facilities that encourage people to cycle and walk, to attract new cyclists and provide experienced cyclists with improved connections. The greenway travels through areas of the city where busy arterials were not only the most direct route but in some cases they were the only choice. As a result, the project required many innovative design solutions.

Shared Use of Industrial Streets
First Avenue east of Quebec Street is made up of primarily light industrial businesses. The traffic generated by these businesses make the street a challenge for new cyclists at certain times of the day. The street right-of-way was not wide enough for a separated bicycle facility, so bike lanes have been implemented where possible by removing parking on one side of the street. In some stretches, the combination of frequent commercial crossings and loading zones made it difficult for the businesses and bike lanes to co-exist. In these situations the use of sharrows helps to re-enforce that the street is to be shared by bicycles, cars and trucks. Sharrows also help define where cyclists should position themselves on the street, which is very beneficial for

new cyclists. A new pedestrian sidewalk which included saw cut joints, new street trees and new street and pedestrian lighting was also installed.

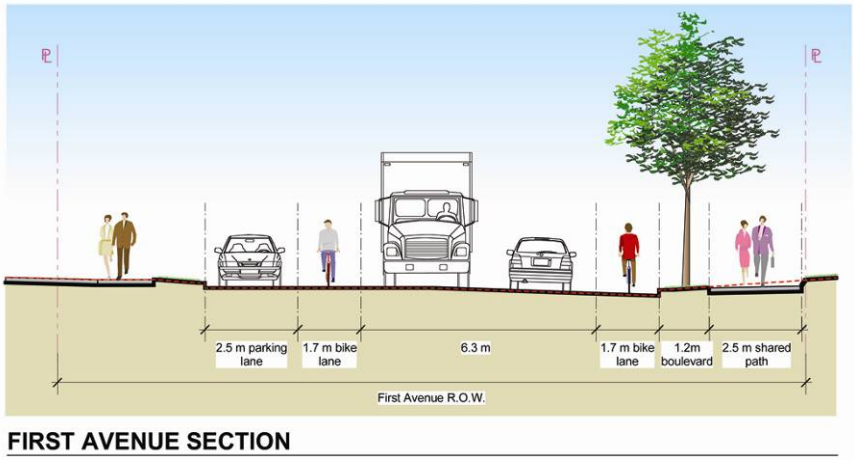

Figure VII - Typical Industrial Street with Bike Lanes

Multi-Use Paths along Arterial Streets

East of 1st Avenue the route follows Great Northern Way which is a high volume arterial street. There is 5.5 metres between the existing curb and the properties to the north. As a result we were able to install a 4.0 metre wide multi-use asphalt greenway path on one side of the street. For more experienced cyclists, bike lanes are also being proposed on the street. This will help separate users and make it more attractive for new cyclists to use the greenway.

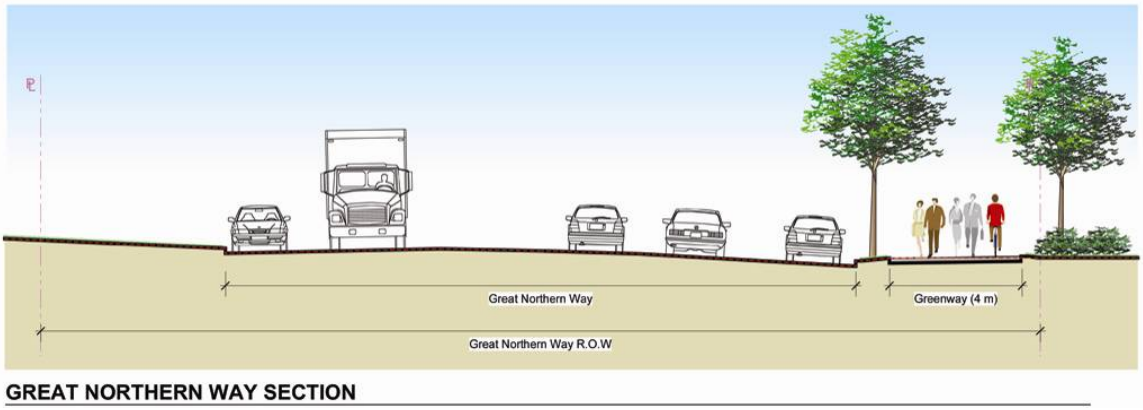

Figure VIII - Typical Multi-use Path along an Arterial Street

Introducing Cross-Bikes

Within a two block stretch Great Northern Way changes to 6th Avenue and rises 7.5 metres to meet the Clark Drive Bridge. The bridge crosses the Grandview Cut and the rail lines which enter the False Creek Flats. In order to make it easier to climb the hill, 3.5 metre paths were constructed on both sides of the street for two blocks,

between Glen and Clark Drives. As yet we have not defined the direction of travel for each side of the street, but have left it up to users to decide based on signal timing, user volumes etc. To facilitate crossing the street for both cyclists and pedestrians from the shared use paths cross-bikes were installed. Because the cross bike intersects with a shared use path, the cross-bike integrates the elephant's feet symbols as illustrated in Figure IX. Note that the cross bike also incorporates red into the crossing to increase driver awareness.

Figure IX - Integrated Cross-Bike at Clark Drive and 6th Avenue

Crossing the Cut

East of Clark Drive Bridge, the greenway travels along the north side of the Grandview Cut on Grandview Highway North. In order to make the transition from 6th to Grandview Highway North pedestrians would cross the bridge along the existing 1.5 metre sidewalk. This was too narrow to be shared with cyclists so the challenge was how to get cyclists across the Clark Drive Bridge. Clark Drive is the primary north-south truck route to the Port of Vancouver. It was decided to shift and adjust the lanes to make 1.5 metres of space available for cyclists. This was not enough room to add bike lanes on the bridge but enough to widen the existing sidewalk on the east side of the bridge to 3.0 metres.

A structural review of the bridge concluded that the addition of the sidewalk would not be possible. The review also found that the pavement thickness had been built up over the years beyond what was required. As a result, on a sunny Saturday in September two of the six lanes were closed, half the bridge was ground down and re-paved, then traffic was shifted and paving completed. Survey crews and pavement markings followed late that afternoon and into the early evening. Following this, a key was cut into the asphalt, a rebar grid was constructed and the new sidewalk poured next to the existing curb and sidewalk. While the sidewalk on the west side of Clark Drive Bridge continues to be used exclusively by pedestrians, the widened 3.0 metre sidewalk on the east side is now shared by pedestrians and cyclists.

Figure X - New Widened Sidewalk on Clark Drive Bridge

Bike-Streets and Cross-Bikes

East of Clark Drive the route follows Grandview Highway North along the north edge of the Grandview Cut. Cyclists are in bike lanes until they reach Victoria Drive where they transition to a bike street. (See Figure XI.) The transition from bike lanes to the bike-streets is handled through the use of a cross-bike. In this case the cyclists use the bike street and pedestrians use a separated path and sidewalk, so the cross-bike is also separated. (See Figure XII.)

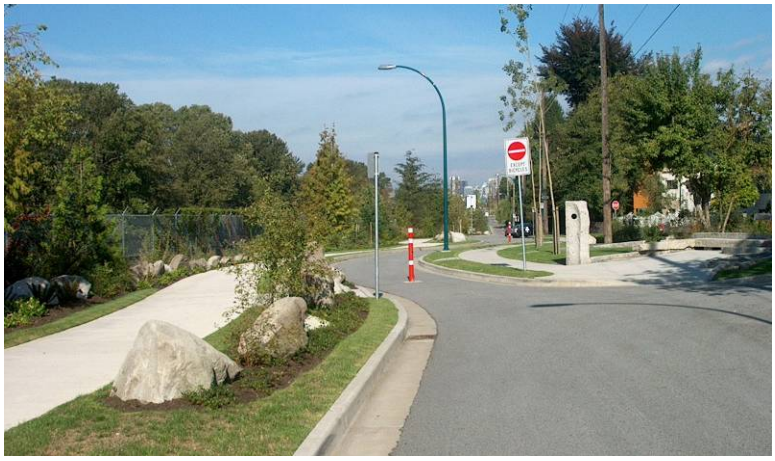

Figure XI – Bike-Street on Grandview Highway North at Garden Drive

Figure XII - Separated Cross-Bike at Grandview Highway North and Victoria Drive

Grandview Highway North between Victoria and Slocan Streets was originally part of the City's designated truck network. As part of the CVG development, trucks were removed from the street and three bike-streets were constructed which has limited traffic to local vehicle trips and bicycles. In addition this section includes several neighbourhood open spaces, public art and extensive planting of native trees and shrubs to compensate for the habitat lost during construction of the SkyTrain line.

Multi-Use Paths Next to Active Rail, SkyTrain and Industrial Lands

East of Slocan Street to Boundary Road and Burnaby, the greenway travels along a corridor designed and built for the elevated Millennium SkyTrain. The linear corridor is 7.5 metres wide with supporting columns every 30 metres that vary in width between 2 and 2.5 metres. Depending on the location of the columns within the 7.5 metre wide greenway corridor there are either two 2.5 metre wide paths or one 4.0 metre wide path. To the south is an active rail corridor and the lands directly north are zoned industrial. Due to the limited rail crossings, there are relatively few intersections between Boundary Road and Clark Drive.

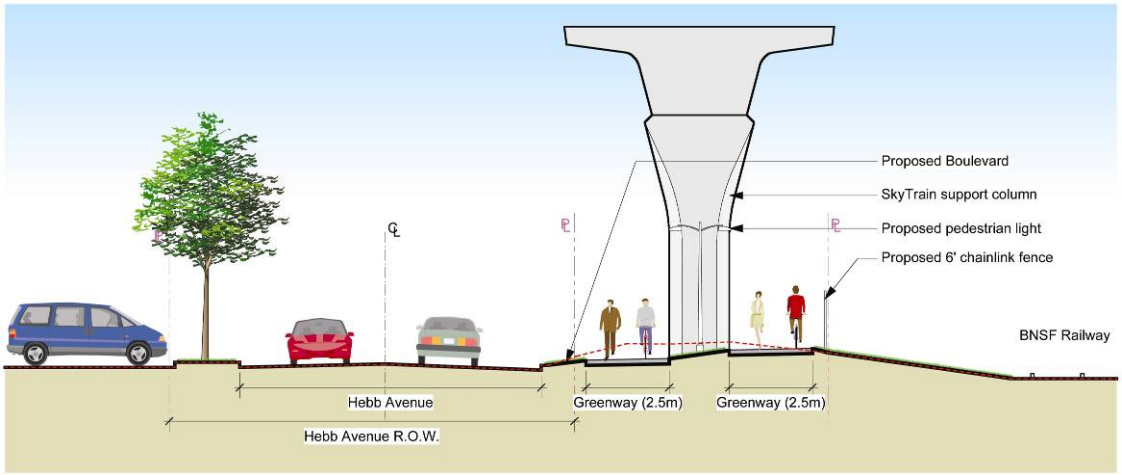

Figure XIII - Typical Separated Multi-use Paths Next to Active Rail and SkyTrain

Although the greenway seems to be shoehorned into a less than ideal location, it has been well received by the cycling community. Up until now the only direct east-west routes for cyclists was along two of the cities busiest arterial streets, Lougheed Highway and Grandview Highway South.

For years before the arrival of SkyTrain and the greenway, the industrial businesses backing onto the rail line used this piece of land for parking or for manoeuvring their trucks, particularly as both truck and trailer size expanded. With the advent of the greenway, parking had to be re-located but for some businesses this space was critical to the continued success of their operations. In one such case, the City and the owner were able to develop a design that was a workable compromise for both sides. Designs were developed and tested on site with various vehicles. (See figure XIV.) In the end the trailer size was reduced and the greenway path was curved to allow for the vehicle turning swath.

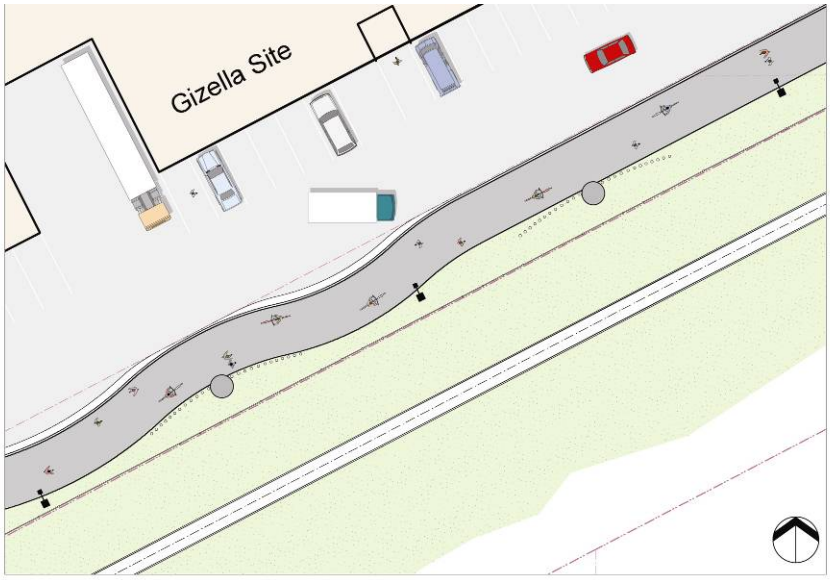

Figure XIV - Multi-use Path Design Response in the Industrial Zone

Illuminating the Greenway

Existing and proposed street and path lighting along the route was upgraded to meet current Illuminating Engineering Society (IES) requirements. Full cut-off luminaires with metal halide lighting are standard on greenways. New lighting was added in Phase 2 to meet the requirements for mixed use paths next to arterials, and bike lanes on industrial streets, and to match those proposed for South East False Creek and the Olympic Village. In Phase 3 lighting was designed to meet IES mixed use pathway standards and to provide consistency with the lighting to the east in Burnaby. The lighting upgrades provide a safe and comfortable cycling experience particularly for commuting to work in the winter months.

CONCLUSION

Since 1995, the City of Vancouver Greenways team has successfully responded to a wide variety of opportunities, which has resulted in the development of nearly 40% of the Greenway System envisioned in the Greenways Plan. The CVG is an important example of this process. Without first the IDEA and then second the PLAN, we would not have been able to respond to the funding opportunities nor would the three adjacent municipalities have been ready to work together to achieve a common regional goal. Through years of work by many diverse individuals a Greenway System is being incrementally inserted into the urban fabric of the Lower Mainland.