Designing an Ecological Experience:

Lessons & Recommendations for the Helmcken/Comox Greenway

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Designing an Ecological Experience: Lessons & Recommendations for the Helmcken/Comox Greenway

by

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We accept this project as conforming to the required standard

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EXECUTIVE SUMMARY

This project aims to operationalize a more holistic definition of the urban greenway using principles and strategies for greenway design from urban design and landscape architecture literature. The theories of placemaking, great streets, and ecoliteracy through ecological design are reviewed. A selection of best practices demonstrates lessons for greenway design and yield a set of strategies for application to distinctive conditions in Vancouver. In combination with a comprehensive urban analysis of the study area, the strategies guide a set of conceptual designs for the Helmcken/Comox section of the Central Valley Greenway in Vancouver.

The urban greenway is defined as a naturalized alternative transportation route for environmental education and connection to ecological, recreational, historical, and cultural amenities. It is argued that urban greenways have the potential for engaging citizens and visitors in a grand urban ecological connoisseurship through their function, location, and design. Ten principles for greenway design address three key urban design theories: Placemaking, Great Streets, and Ecoliteracy through Ecological Design. A series of strategies, developed from eight reference cases, aim to put the principles into practice.

The principles and strategies are tested on two sites along the Helmcken/Comox corridor in Downtown Vancouver, BC. This corridor is the proposed extension of the Central Valley Greenway, a regional route currently being designed. An urban analysis of the proposed route illustrates some of the constraints and opportunities to design. The resulting design alternatives proposed in this report demonstrate that the principles and strategies can be applied to create a great greenway that is safe, functional, and imageable. Further, the designs illustrate that there is incredible variety in application: bike boulevards, community gardens, traffic calming, and street realignment are some of the possibilities.

Recommendations to TransLink and the City of Vancouver suggest that there is an opportunity to pioneer a greenway design that challenges the status quo. It is recommended that the planning agencies develop a phasing plan that prioritizes pedestrians and cyclists in the short-term and creates a greenway that can foster knowledge, meaning, and value of the urban landscape over the long-term. The Helmcken/Comox Greenway can connect neighbourhoods, workplaces, Stanley Park, and the Central Valley Greenway in a meaningful and memorable way, while providing a means for healthy exercise and contributing to mode shift.

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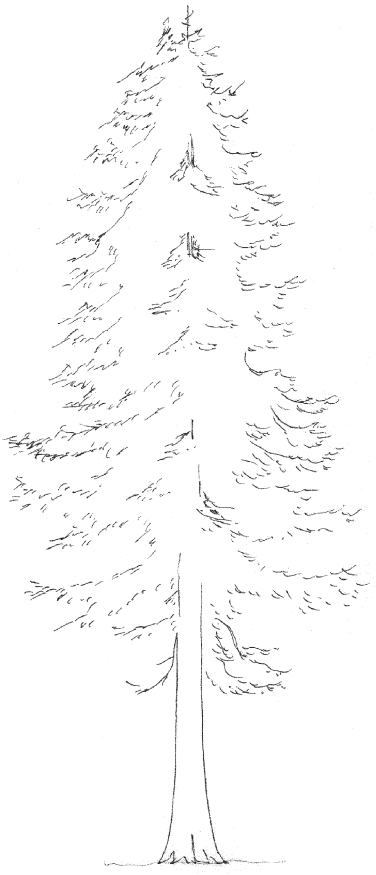
CHAPTER 1 INTRODUCTION: NATURE OUT THERE

Problem Statement

Commonly, urbanites have little connection to the natural environment: their food is acquired at the grocery store, rainwater is captured in storm drains and is quickly out of sight, and the garage door is sometimes their only connection to the outdoors. Nature is "out there" and beyond the limits of the city. In the 19th Century, it was discovered that disease was often carried by water and ever since cities have made a considerable effort to clearly separate urban life from nature (Wenk and Gregg, 1998). Hough (1986: 17) recognizes society's propensity "to bypass the environment that most people live in –the city itself." The disconnect between humans and nature leads to unhealthy ecosystems and an unsustainable quality of life –the proverbial "out of sight, out of mind." However, by fostering a personal connection with nature, we begin to understand our place within the biosphere and the consequences of our daily actions. This understanding is critical to environmental sustainability and the future of our planet.

More than fifty years ago, Aldo Leopold (1949) argued that there was a need to develop an ecological consciousness through various means: recreation, education and a perception that is enforced by a social sense of right and wrong. Today, societal investment in the protection of nature is recognized as urgent. The sustainability discourse offers a means for achieving this. Sustainability can be understood as "a shared awareness that can serve to regenerate the health of both people and ecosystems" (Van der Ryn and Cowan, 1996: 62-63). Punter and Carmona (1997) believe that landscape as a natural resource, particularly its role in the processes of hydrology, ecology, and microclimate, is a central element of urban sustainability.



Establishing places in urban environments that cultivate our relationship with nature should be a goal of planners. Such landscapes deserve to be in the urban environment as much as in the wilderness expressly for daily human interaction and the development of what Leopold called a "land ethic." In this report, the urban greenway is considered for its ability to fulfill such a role in the urban environment.

Fabos (1996) defines a greenway as a linear corridor of ecological, recreational, cultural and historical significance. Yet how this definition is manifested through greenway design is not clear. Three themes highlight issues of greenway design that present potential pitfalls to designers whose goal is for greenways to link people and nature. These themes prompt the

following questions:

- In terms of connecting a user to place, the term "greenway" can be ambiguous. What does "green" really mean? How can a greenway contribute to a user's sense of place or build an identity or image for an area? What kind of pathway is it and what does it look like to the user? How does the user know it's a greenway? What is the role and function of the greenway? Who does it serve and how? What are the characteristics of an urban greenway that a user can identify?

- Since greenways are pathways for movement, they arguably act in similar ways to a street. How are streets and greenways different? What are the lessons of "great streets" that can be applied to greenways? How do "green streets" accommodate environmental systems and cycles in the public right-of-way?

- What is ecoliteracy? What greenway design features contribute to an ecological learning environment for the public? In terms of the environmental education component of an urban greenway, how can ecological processes be daylighted in a meaningful way?

A greenway that does not contribute to place or experience or foster stewardship of the natural environment may still function as a good transportation corridor. It may even contribute to a decrease in greenhouse gas emissions by encouraging the use of alternative modes of transit, such as cycling. But without imbued knowledge, meaning, and value is the greenway an essential element of the city? How do we design greenways so that they are places people learn from, connect with, and wish to protect?

Context

In 1991, the Urban Landscape Task Force identified fifteen corridors for development as part of a city-wide greenway system for Vancouver, BC. Currently, the City lacks designs for seven of these corridors, one being the Helmcken/Comox section of the Central Valley Greenway. A thoughtful and contextual approach is needed to clearly illustrate the greenway concept along this corridor. The development of principles and strategies that will guide design is needed to showcase the Helmcken/Comox extension of the Central Valley Greenway as a linear corridor of ecological, recreational, cultural and historical significance.

Project Ideology

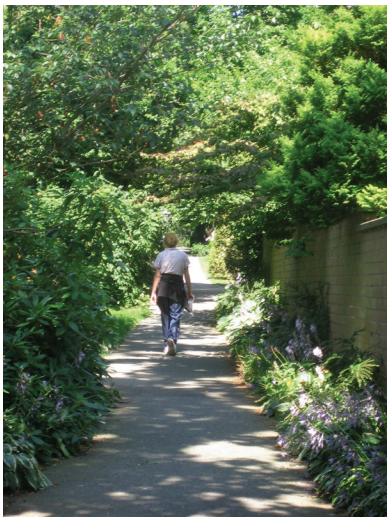
Over the past few years, I watched the evolution of the plans for the Rose Kennedy Greenway, part of the Central Artery Resurface Project –the result of the "Big Dig" in Boston, Massachusetts. The resulting designs, some of which are described later in this project, intrigued me to investigate greenway design for fulfillment of my graduate program at UBC. As a runner, I have covered many miles of greenways and experienced them step-by-step. Some have been awe-inspiring, causing me to run a bit slower and take in my surroundings. Others have been physically challenging, pushing me to work my hardest. And still others have been somewhat lacklustre, which resulted in my heading for home a little sooner. Experiences in San Francisco, where I lived for a time and where I took up running, at school, and here in Vancouver, among other places, have shaped my ideology about the environment, society, and my personal connection with nature. In this way, this project is a melding of my past –my personal connection to nature, my present –my commitment to urban design and planning, and my desire to navigate the streets and parks by placing one foot quickly in front of the other.

Project Statement

This project aims to operationalize a more holistic definition of the urban greenway using principles and strategies for greenway design from urban design and landscape architecture literature. The theories of placemaking, great streets, and ecoliteracy through ecological design are reviewed. A selection of best practices demonstrates lessons for greenway design and yield a set of strategies for application to distinctive conditions in Vancouver. In combination with a comprehensive urban analysis of the study area, the strategies guide a set of conceptual designs for the Helmcken/Comox section of the Central Valley Greenway in Vancouver.

Assumptions

Some assumptions were made to scale this literature review to the scope of the design project. The author recognizes the importance of involving the local residents in greenway planning and design. Nearby residents are the most important constituencies for greenways because they tend to use them most often (Furuseth and Altman, 1991). Gobster (1995) concurs that nearby residents can play a major role in the success of a greenway. With all of these theories, it is assumed that local resident participation is integral to the greenway design process. The intent of this project is to provide the public with a set of ideas for the design of the Helmcken/Comox greenway to launch a discussion of needs and desires. The City of Vancouver, in



coordination with TransLink and Better Environmentally Sound Transportation (BEST), is responsible for directing the public design process for this greenway. The City's public process is still in preparatory stages at this time and given that the design may not be funded until 2008, direct public involvement in this study would have been premature.

Methodology

Using an iterative process and through the theoretical filters of placemaking, great streets, and ecoliteracy, this project aims to catalyze a definition of the urban greenway. A series of eight reference cases will be drawn from a variety of public realm projects to offer design strategies for the Vancouver context. Each case study will provide a brief background on the project to highlight its aims and objectives; describe the project in terms of funding, stakeholders, participation goals, time frame, and implementation steps; evaluate the project based on the achievement of its objectives; and explore how the project aligns (or does not align) with placemaking, streets, and ecoliteracy design principles outlined in the literature review. It is expected that each case study will offer lessons, such as successes and challenges, which can be applicable to the Helmcken/Comox corridor. A synthesis of both the literature and the case studies will reinforce the principles of the literature review and identify design strategies to be applied in the demonstration design.

A brief site description of the Helmcken/Comox corridor and the Central Valley Greenway will accompany a description of the goals and objectives for the Central Valley Greenway project. The urban analysis of the Helmcken/Comox corridor will consist of narrative description and mapping of the following units of analysis: socio-economic factors, land use and ownership, ecological history and factors, access and transportation, history and culture, recreation, public-private infrastructure, impact on the community, and security. This combination narrative and mapping exercise is intended to identify:

- Potential users,
- Physical constraints and freedoms,
- Nearby amenities and activity nodes,
- Environmental features and attributes,
- Access and transportation opportunities and conflicts,
- Parking requirements,
- Historical and cultural nodes and opportunities,
- Links to other trails and facilities,
- Infrastructure constraints, and
- Security issues.

This research culminates in a demonstration design project for the Helmcken/Comox corridor. In addition to addressing the program requirements of both TransLink and the City of

Vancouver, the design seeks to activate the definition of the urban greenway using the principles and strategies developed herein. For the demonstration design, two sites that are representative of typical conditions along the twenty-block corridor will be selected for conceptual designs (1:400). Two alternatives are presented for each site. Both site plans and street sections will be used to illustrate the design ideas. It is expected that this project can help shape Helmcken/Comox Greenway objectives and principles by providing precedent research and design recommendations. The site analysis and final designs may be used by TransLink, Engineering, Central Area Planning, and BEST in the public design, commencing in the Fall of 2005, process as contextual information and an idea generator. A narrative description of the drawings accompanies this section, and finally, a list of recommendations will be made to guide the development of the greenway.

Chapter Outline

Chapter One of this report introduces the problem, the study site, the project methodology, and describes the project's program elements. Chapter Two provides a comprehensive review of the literature on greenway planning and design. In Chapter Three, the urban design theories of place and placemaking, "great" streets, and ecoliteracy and ecological design are reviewed. This results in a set of design principles –a theoretical framework for greenway design. In Chapter Four, design strategies are garnered from a review of best practices, specifically in the North American context, and are followed by a synthesis of the literature reviews and best practices. Chapter Five provides a detailed description of the study area and site analysis. Chapter Six applies the lessons from the best practices section in a demonstration design. Finally, Chapter Seven summarizes the project and learning and offers a set of final recommendations for TransLink, the City of Vancouver, and BEST.

CHAPTER 2 LITERATURE REVIEW: GREENWAYS

What is a Greenway?

Greenways are commonly understood as linear parks with multi-dimensional characteristics and functions. Ecology, recreation, connectivity, education, history, and culture are the fundamental functional components of a greenway. Beyond these fundamental functions, greenways, particularly those in the urban context, can be a key mechanism that builds the relationship between people and nature. This chapter explores the definition of a greenway and its types, history, and benefits. The literature on greenway design is reviewed for its contribution to a design rationale that promotes a user's ecological connection.

Greenways are routes, trails or natural corridors used in harmony with their ecological function. They foster the preservation of natural and cultural heritage, provide options for safe transportation, recreation and tourism, and encourage a healthier lifestyle. Greenways bring local people and businesses together with regional and state governments to work towards improvement of their communities.
(Friends of Czech Greenways, 2005)

At its most basic, a greenway is a natural (green) route (way). The word "route" implies movement and a greenway is a route of movement for people, animals, seeds and water (Searns 1995). A greenway is a path, a way to get from place to place. It is also a destination in and of itself with its own nodes, amenities, and aesthetics that classify it differently from a park or a street. Commonly, greenways are understood as multi-use paths often used by cyclists. However, a greenway is not just another bike or recreation trail set in conservation lands. There are aesthetic design elements of greenways that add to the primary bike path component, contribute to a sense of arrival and reward, and help meet human needs. Vistas, bridges, plazas, terminations, destination places, benches, picnic areas, and other rest stops are typical examples.

Greenways can be created anywhere, and have been encouraged as the bones of a "natural infrastructure" (Platt, 2000). Typically, challenges to greenway planning include jurisdictional overlap, funding, and perceptions about crime and vandalism. Therefore, security and safety are important considerations, as is universal access.

Greenways have been around since the origin of landscape architecture and Frederick Law Olmsted's design for Boston's Emerald Necklace –a string of linear parks that ring the urban core of Boston. Today, these linear parks are largely envisioned, developed, and maintained by the public sector (Cooper Marcus, 1990). Greenways are generally considered linear corridors of land that are linked to nodes within the surrounding landscape thereby connecting the landscape (Viles and Rosier, 2001). Fabos *et al* describe greenways as multi-purpose corridors that fulfill three basic functions and benefits: ecological, recreational, and historical and cultural (Fabos *et al*, 1968).

Greenway Functions

The multi-functional aspect of greenways is what makes them unique corridors. Shafer *et al* (2000) defines greenways as "multiple objective, open space corridors that perform natural functions (Baschek and Brown, 1995) while offering desirable aesthetic qualities to humans (Shannon *et al*, 1995) as they recreate or commute along trails (Gobster, 1995)." Further Shafer *et al* (2000) describe the greenway as a corridor separate from roadways or traffic, which enhances safety and promotes a "sense of escape" from the urban surroundings (Groom, 1990; Luymes and Tamminga, 1995). MacDonald (1997) further explores the multi-functional purpose of greenways including transportation, urban wildlife, flood control, utilities, education, neighbourhood planning, and other threads of the urban fabric.

Some important functions of an urban greenway can be identified and are central to the greenway concept explored in this review.

Ecological

Greenways enhance and sometimes restore ecological function. They can soften the built environment with the infusion of plants and trees that help preserve biodiversity and maintain habitat connections while potentially restoring natural hydrological systems. Searns (2003) furthers this definition by arguing that a greenway is a basic urban infrastructure that combines the benefits of conservation, stormwater management, resource stewardship, and recreation. He offers basic ecological purposes, such as the buffering of floodplains, stabilizing hillsides, or the creation of firebreaks in wildfire zones, that a greenway can fulfill. Urban greenways can also reduce stormwater flow and lessen a city's "urban heat island" effect by providing shade (Tenusak, 1995).

Recreational

Greenways are primarily recreational routes and ideally provide various amenities to users. As recreational resources, greenways are commonly comprised of at least one multi-use pathway for movement of people across an urban environment. Cyclists, pedestrians, in-line skaters, joggers, equestrians, and cross-country skiers are all potential recreational users of greenways. Greenways are often only minutes away from peoples' homes (Schwarz, Flink and Searns, 1993) and provide recreational opportunities that are more accessible than traditional parks because they are often more equitably distributed through communities and are located in close proximity to housing. Bike paths, trails, and other non-motorized routes are often incorporated into a greenway for public use.

Historical/Cultural

Greenways, in their planning, routing, design, or programming can connect users to local or regional history and culture. Dolores Hayden (1995) argues that significant public memories can be recognized and celebrated in the built environment. Former shorelines, railway lines, and roads all speak to the history of land use and are often ideal greenway routes. The historical and cultural function also speaks to native people's traditional use of the land. Contemporary culture also contributes to route significance. Cultural centres such as museums, field studies and interpretive centres, libraries, schools, and community centres are commonly linked by greenways. The greenway can also follow or host footraces, parades, charity walks, and public art displays.

Environmental Education

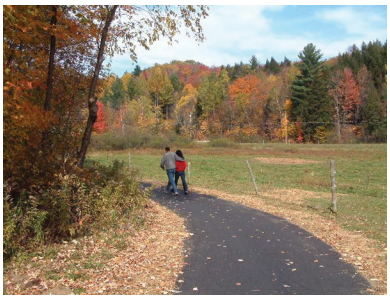
Greenways offer spaces for environmental education to occur, as informal outdoor classrooms (The Conservation Fund, 2005). Greenway programming, amenities, design, and signage encourage users to observe, interpret, and learn about their natural surroundings. Environmental education is critical to understanding human impact on ecosystems. Greenways provide an opportunity for environmental education through demonstration and pilot projects, management practices, volunteer programs, and clean-up projects.

Connectivity

Greenways can play a role in connecting people, communities and countryside by providing places for learning, gathering, and by functioning as alternative transportation routes. Trails and greenways connect diverse and incompatible land uses, and "bridge isolation of car-based planning and architectural monuments" (MacDonald, 1997). Platt (2000) defines greenways as linear parks that connect open spaces and communities with specific recreational and wildlife habitat functions. Greenways are a preferred method for moving people from their homes to larger nature and recreation resources like Stanley Park in Vancouver because they prioritize non-motorized modes of transportation (Mertes and Hall, 1995). Urban and suburban greenways are often developed for people who commute by bike.

Types of Greenways

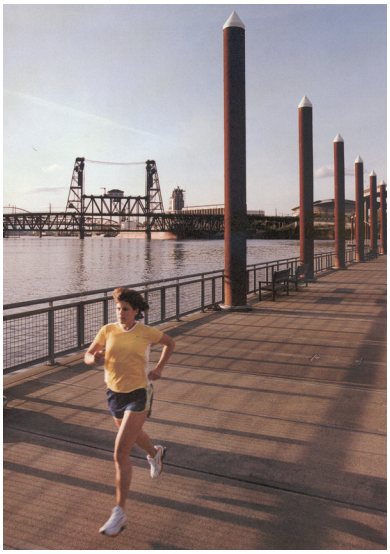
Regional



The Stowe Recreation Path in rural Stowe, Vermont is a community and tourism asset.

Regional greenways often serve purposes larger than mere recreation and can be of much larger scale than a more typical local greenway. They can be several kilometres wide and span across state or provincial boundaries (Platt, 2000). They commonly follow watercourses, ridge lines, or scenic roads. Regional greenways cross municipal, country, state or provincial, or even national boundaries. Spanning longer distances, regional greenways are planned natural corridors linking large natural areas like state parks, national forests, or wildlife refuges. Particularly along water courses, greenways provide a buffer zone for erosion control, habitat protection, native flora regeneration plans, and water quality restoration through drainage management projects. The East Coast Greenway from Calais, Maine to Key West, Florida is an example, as is the Prague-Vienna Greenway in Eastern Europe. Multi-use recreation paths are commonly integrated into a regional greenway, such as in the buffer zones of highways. Many states in the U.S. have design guidelines for such paths.

Urban



The Vera Katz Eastbank Esplanade in Portland, Oregon features a 1,200 ft. floating walkway on the Willamette River (Photo by Robbie McClaren for Runner's World).

The role of urban greenways is to provide natural corridors for public use and recreation. Like transit corridors, bike routes, and even arterial streets, the urban greenway weaves its way through the city –another thread in the urban fabric. In cities and other urban areas, greenways can encircle or be embedded within natural or man-made features and can be managed for resource conservation or recreational use. Urban greenways often follow watercourses, canals or abandoned railbeds, as regional greenways do; are multi-use trails on median planting strips such as along parkways; or serve as greenbelt growth boundaries at a city's edge. Utility corridors provide existing linear routing for greenways and can include: city water mains, aqueducts, irrigation canals, historic transportation canals, flood control projects, electric power lines, sewer lines, fibre optics lines, and gas and oil transmission pipelines (MacDonald, 1997). A less common example, though one that is heavily used in Vancouver, is the street-greenway. This type of urban greenway is a standard street that provides additional amenities for cyclists, such as bike lanes and bike boxes, and for pedestrians, such as benches and public art, thereby prioritizing these users over the automobile. The hybrid street-greenway, or "local way," allows the weaving of natural elements into the urban environment, as well.

Unlike some regional greenways and wildlife corridors, urban greenways are primarily for people. "People places," according to Clare Cooper Marcus (1990), clearly communicate to users that

they are available and intended to be used. More so than the regional greenway, the urban greenway is typified by a multi-use path though in some cases, on-street bike lanes may be a necessity resulting from physical constraints. Urban greenways are typically used for recreation and transportation (i.e. commuting) purposes and are commonly defined by the width of the tread (Schwarz, Flink and Searns, 1993). A popular type has been developed through the rails-to-trails program, which turns abandoned rail beds into multi-use paths. An example is the Minuteman Commuter Bikeway that traverses 11 miles from Bedford to Cambridge, Massachusetts where it terminates at a subway station. Located on the path of an inactive railroad, the bikeway provides a level course for bicyclists and pedestrians to travel to subway and bus lines, serving to reduce automobile traffic in the area. On multi-user routes, conflicts between users (types of users and varying levels of ability) present a challenge to planners and designers, especially with increased demand (Schwarz, Flink and Searns, 1993).

Olmsted first acknowledged that recreation corridors "should be at peoples' doorsteps for they might not have the funds or transportation to get to the facilities" (in Lusk, 2002: 48). Trail location relative to home is the strongest influence on use of a greenway: how it is used, by whom, how often, among other factors (Gobster (1996, 401). Local greenways ought to form the *basic* framework of a metropolitan system of greenways (Gobster, 1996 emphasis added). In their description of the "hybrid landscape," Quayle and van der Lieck (1997) describe the greenway as a central, organizing "broadway" through a neighbourhood that connects the community to the places of their everyday experience. Therein it acts like a linear piazza, full of the life and vibrancy of the urban village. In Vancouver, the neighbourhood greenway, a type of "local way," connects people to places within a localized area of the city and involves community members in its planning, design, and, most importantly, its maintenance. Vancouver's Green Streets program is an example of community participation in the landscaping of the public right-of-way.

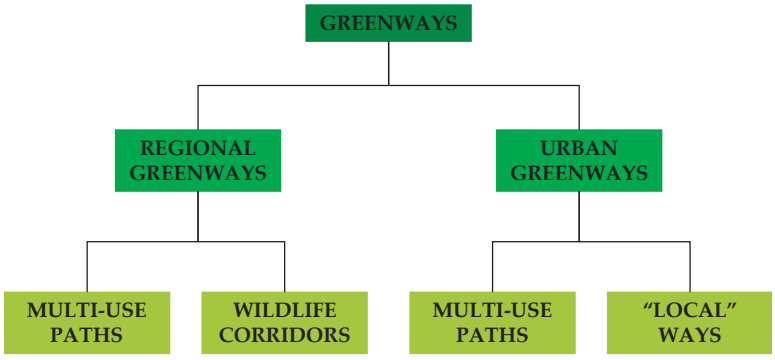


Figure 1: Types of Greenways Heuristic.

Aerial view of the Fens, part of Boston's Emerald Necklace. Photo by Phil Schermeister/Corbis.

History of the Greenway

Frederick Law Olmsted, credited with the establishment of Boston's Emerald Necklace, is considered the originator of the greenway concept in North America (Ryan, Fabos and Lindhult 2002; Little, 1990). Olmsted first coined the term "park way" in 1865 (McMahon in Schwarz, Flink and Searns, 1993). A parkway, or boulevard as designed by Olmsted in Brooklyn, NY, had two landscaped medians, one on either side of a centre through traffic roadway with two parallel local access roads on the outside of the medians (A. Jacobs, 1993). The medians were planted with a double row of trees and originally accommodated horseback riding trails though now they are used primarily by pedestrians (Bosselmann and Macdonald, 1999). Both parkways and boulevards can be considered greenways because they are linear parks and sometimes provide off-street trail opportunities (Mertes and Hall, 1995). The Emerald Necklace was conceived as a ring of green space linking Boston's Franklin Park, Arnold Arboretum, Jamaica Pond, the Fens, the Charles River, and Boston Common. Not only did these parkways connect the parks and open spaces and provide leisure-drives for Boston's elite, but they had multiple ecological purposes including the improvement of water quality in the Muddy River with the planting of native wetland plants and grasses (Smith and Hellmund, 1993). In 1899, Olmsted's pupil, Charles Eliot, further developed a comprehensive metropolitan parks system that broadened the scope of Olmsted's initial work (Ryan, Fabos and Lindhult, 2002).

During the 19th Century, a network of greenways was planned for the Minneapolis Metropolitan Region by H.W.S. Cleveland and Theodore Wirth, and in the Midwest by George E. Kessler (Fabos, 2004). McMahon (in Schwarz, Flink and Searns, 1993) suggests that the development of the Appalachian Trail in 1921 by Benton MacKaye was a significant milestone in the greenway movement. MacKaye argued that outdoor living would be supported by the creation of a framework of parks and forests that are linked by a series of trails (Schwarz, Flink and Searns, 1993). Little (1990) cites William H. Whyte as the researcher who actually coined the term greenway in 1968 (in Fabos, 2004).

The "environmental decades" of the 1960s and 1970s were another significant period in the history of the greenway. Phillip Lewis, Jr. identified "environmental corridors" that were typically aligned along waterways and topographical features, such as ridgelines, through the use of transparent map overlays (Smith and Hellmund, 1993: 7). Ian McHarg (1969) in his seminal book *Design with Nature* used a similar method: his design for the protection of the sensitive landscape of the "valley floor" yielded a greenway network. The relationship of ecological features and their recognition as sensitive landscapes was intuitively recognized by the modern greenway movement (Fabos, 2004).

Despite its early beginnings, the greenway movement did not take off until the 1980's. In 1987, the U.S. President's Commission on the American Outdoors described greenways as "corridors of private and public recreation lands and waters" that "link together the rural and urban spaces in the American landscape" (as quoted in Plumb and Lusk, 1993: 47). Charles Little's (1990) influential book, *Greenways for America*, is often cited as the eminent text on greenway development (Fabos and Ahern, 1996; Lusk, 2002). Schwarz, Flink, and Searns (1993) are also given credit for their contributions to greenway planning and design. The first international publication on greenways was contributed by Fabos and Ahern (eds. 1996) and presents a range of research on the origins of the movement, greenway planning, and perceptions and implementation of greenways. A more recent addition to the literature is Anne Lusk (2002) who developed the concept of the "Lusk Leeway" –a widening of a multi-use path at key view points (Figure 2). Lusk's doctoral dissertation "Guidelines for Greenways: Determining the distance to, features of, and human needs met by destinations on multi-use corridors" provides an experiential approach to greenway design. Many cities, towns, and regions soon developed a greenway plan, which involved the planning or creation of a greenway or network of greenways. In 1992, the Urban Landscape Task Force, a committee established by the Vancouver City Planning Commission, recommended the establishment of such a network (see Chapter 5). The development and design of greenways today is often a community-led process, though some projects are organized by governmental agencies. Rails-to-Trails, U.S. Army Corps of Engineers, Trans Canada Trails Foundation and a host of other non-profit and non-government organizations are leaders in the greenway planning movement in North America.

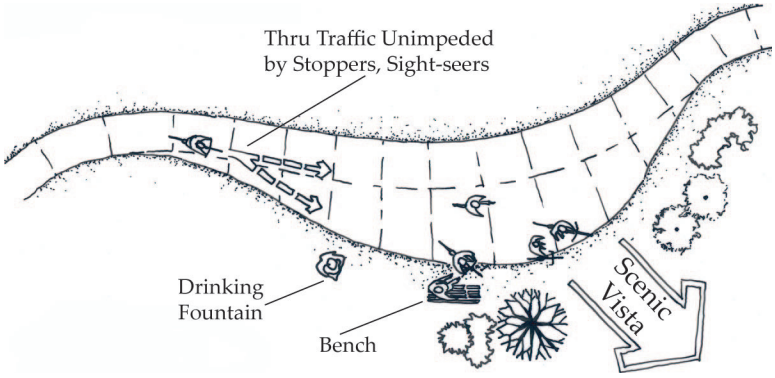


Figure 2: Lusk Leeway. A widening of a greenway trail at key locations, such as scenic vistas, to minimize user conflicts (Lusk, 2002)

Benefits of Greenways

Ecological Benefits

The ecological function of greenways can contribute to environmental health and sustainability. Environmental benefits of greenways include habitat protection and restoration, flood and drainage management through engineering, and air and water management (Hobden *et al*, 2004). Green infrastructure, such as permeable ground surfaces, bioswales, and other surface stormwater systems, is increasingly incorporated into greenway design as a method of filtering urban runoff and restoring ecosystem connectivity and health (Girling *et al*, 2000). Even narrow strips of land can "provide mobility for humans and wildlife, and potentially create buffers for sensitive ecosystems and provide other ecological services" (Hobden *et al*, 2004: 137). While urban greenways are designed for human-use, they also provide habitat for the four-legged and winged urbanites. Habitat restoration is commonly paralleled with urban greenway development through demonstration projects and learning sites. Nesting and breeding grounds, places for migratory stopovers, and vegetation for feeding can be provided in the urban greenway. Habitat for insects is also important and can provide a colourful display, such as the provision of habitat for butterflies.

Connection to the Natural World

The Conservation Fund, an advocate for greenway planning, hails the greenway as a key mechanism for connecting people with the natural world and outdoor recreational opportunities, as well as an important instrument for the protection of environmentally important lands and native plants and animals. Gobster (1995) found that, more than anything else, people like greenways for their scenic beauty. "Compatibility" with the environment is an outcome of interaction with the natural world, such as traversing a greenway (Kaplan, 1995 in Lusk, 2002: 3). The relationship between users and the surrounding natural environment must be encouraged (Relph, 1976: 78). A person's relationship to the natural world is important for the development of a harmony with nature in which a sense of place fosters ecological stewardship.

Advancing Sustainability

"Sustainability requires living within the regenerative capacity of the biosphere" (Wackernagel *et al*, 2002: 9266). Cities that consider broader environmental concerns to be priorities can focus on issues of biodiversity and energy use to address their goals of sustainability (Punter and Carmona, 1997). Integration of the urban built condition and the urban ecological condition

is can be a tool in advancing sustainability. The establishment of greenways in cities is an acknowledged method for achieving this (Greenways, Public Ways, 1992). What people learn about local ecological history and systems by cultivating a garden or traveling beneath a canopy of street trees can contribute to their overall knowledge of their personal impact on the environment. Advancing sustainability is about changing people's habits for the betterment of the environment and society.

An important consideration in the Sustainability discussion is the development and support of alternative transportation options. Greenways provide an important link to nature for city dwellers as well as vehicular "traffic-free paths for pedestrians, bicyclists, and skaters" (Tenusak, 1995). Urban and suburban greenways also act as alternative transportation routes for daily commuting (Tenusak, 1995). By providing vegetated, non-motorized commuter routes for pedestrians and cyclists, cities can potentially improve air quality and reduce non-point source pollution of streams (Schwarz, Flink and Searns, 1993). A possible outcome of widely used greenways is the reduction in GHG emissions due to a mode shift away from cars, as is the goal of the Urban Transportation Showcase Project in Greater Vancouver.

Urban greenways serve neighbourhoods by linking residents to each other and to public facilities. Lusk (2002) claims that if greenways are "designed in a sensitive and stimulating manner," they would provide components "that might foster social capital." By providing aesthetic amenity and perceptually extending backyards and front yards, greenways are development tools and create value for neighbourhoods; greenways attract a certain constituency because they are valued. The vision of the greenway is as a linear feature that transects urban neighbourhoods (Lindsey *et al*, 2001). Greenways can also provide a significant economic benefit through increased local tourism and recreation-related commerce.

Greenways not only encourage active lifestyles by providing biking and walking amenity for nearby residents, but are also proven to increase property values (Hobden *et al*, 2004). Participatory planning, management, and maintenance of greenways also promote community building, contributing to social sustainability. Cooperation, organization, compromise, and consensus can happen at all stages of the development and maintenance of a greenway. Informal social interaction can happen at nodes and resting points along the greenway, as well (Lusk, 2002).

Working Definition

In this section, greenways are defined as linear corridors of ecological, recreational, and historical and cultural significance. They are routes of connectivity and where environmental education occurs. The urban greenway provides opportunities for users to connect with nature and neighbours, commute to work, and recreate. On both a civic and personal level, greenways play a role in advancing sustainability in the fulfillment of primary functions as corridors of ecological, recreational, historical and cultural significance.

A Word About Greenway Design

Greenway design guidelines that encourage the development of a personal relationship with nature (to foster environmental sustainability) are not fully explored in the literature. Schwartz, Flink, and Searns (1993) explain five trail objectives that address design: safety, wayfinding, interpretation, universal design, and "mystery and delight." Interpretation is arguably applicable to fostering a relationship with nature, however, they argue the Olmstedian model of nature interpretation through appreciation: nature is best appreciated in silence and left unaltered. The experience of the natural world is encouraged through artful "mystery and delight," which is traditionally achieved through pastoral design and passive appreciation of views, natural landscape, curvilinear paths and diversions. While views and native plantings are important elements of greenway design, Schwartz, Flink and Searns do not explain how these elements contribute to a user's greater connection with nature. Aesthetics are also considered by Gobster and Westphal (2004), particularly as "pleasing" "dimensions" that contribute to quality of life, and though they mention public stewardship of a greenway corridor, it is primarily a result of the planning process and not the design.

Even so, many greenways are planned that do not address the local or total experience of the greenway (perhaps because the planning does not extend to the design). Lusk (2002) outlines several reasons for why the literature does not yield optimal design results. Many greenway guidelines are based on highway configurations and funding from transportation agencies (as opposed to recreation), which yields more highway-like trails. Rail alignments, such as those reconceived for Rails-to-Trails projects, were designed for efficient movement of trains and not cyclists or joggers. Optimal distances between experiential elements or visible goals are generally not standardized or even known. In addition, the reallocation of park and recreation funds to other municipal and regional accounts limits the development of greenways that may be designed with the recreationalist in mind. However, Lusk's focus is more about recreation and health issues and less about

an ecological connection. How can the greenway experience --both of travel (moving along a greenway on a bike, for example) and destination (place of interest or respite at various intervals)—foster the relationship between people and nature? What are the design considerations of this objective?

A design rationale for greenways that addresses an experiential ecological connection is the basis for the following chapter. Functionally, the definition of a greenway is complete: it is a linear corridor of ecological, recreational, historical, and cultural significance that connects people and places can be a site for environmental education. A more robust definition might suggest that a greenway should inspire meaning, value, and knowledge through its design and function. In this way, greenways may be a place in the urban landscape where Leopold's land ethic may be realized and where sustainable design can be showcased. In the following sections, I argue that greenways that are designed on the principles of "great" streets, ecological design, and placemaking are a mechanism for the development of an awareness and concern for the environment.

CHAPTER 3 LITERATURE REVIEW: URBAN DESIGN FRAMEWORK

This literature review explores how an urban greenway designed around the theories of placemaking, "great streets," and ecoliteracy through ecological design can foster a greater connection between city dwellers and the natural environment. These three urban design and landscape architecture theories offer multiple synergies, and taken together provide potential strategies for urban greenway design.

Placemaking is the cultural application of the theory of place, which is ground in the spiritual and historical connection of humans to places with meaning. The associated development of meaning contributes to a user's sense of place. It is the result of a dissatisfaction with the leftover spaces in the modern urban environment. Placemaking involves using local materials, repetition of certain characteristics, programming, and the creation of symbols, among other methods, that celebrate and reinforce the connection to a physical or spiritual locality.

Great streets are places of physical comfort and visual complexity where people can walk with leisure –some of the characteristics which combine to produce a memorable experience. "Great streets" are those city streets that leave an indelible mark on one's memory that beg to be visited again and again (A. Jacobs, 1993).

Ecoliteracy is the quality or condition of understanding the basic principles of ecology through direct experience in the natural environment (Capra, 1996). Sense of place is developed through an understanding of one's place within the ecosystem. Environmental education occurs indirectly by revealing ecological processes and directly through signage and programming.

In this chapter, these three theories are reviewed for their relevance and potential to inform greenway design. The following chapter explores some cases for design precedence and culls principles and strategies for greenway design.

PLACEMAKING

Placemaking involves designing a memorable experience that connects a person or reinforces their existing connections to a physical or spiritual place. First, this section will explain what place is and what placemaking is and how this practice developed. It then explains why placemaking is critical to greenway design and how a greater connection to place advances the human relationship with nature.

What is place?

Experience of place is composed of whole complexes of visual, auditory and olfactory sensations, present circumstances and purposes, past experiences and associations, unfolding sequence of vistas and the various cultural and aesthetic criteria by which we judge buildings and landscapes.

-Edward Relph, 1976

Edward Relph (1976) concluded that place is space with meaning. Places are often defined by geographical location (Norberg-Schulz, 1976 and Hough, 1990). It is also the visual, functional, and "how" of things (Norberg-Schulz, 1976). Place links culture, experience and intention –a means of release from the isolation of space (Relph, 1976: 12). It is a totality of physical material and characteristics or properties and is the basis for a person's sense of belonging (Norberg-Schulz, 1976). Places evolve in an organic way (Heidegger calls this 'sparing'), which is evidenced in the "care and concern for the earth and other men" (Relph, 1976: 18). Places can enrich, uplift, and inspire the human spirit. Places have meaning, which is experienced and created by users.

Quite literally, "place" is derived from "*platea*" –the Latin word meaning an open space or broadened street. Jenson (1979 in Marcus and Francis, 1990) rejects the English word "place" as too common to mean what urban designers wish it to mean. He explains that the goal of placemaking is to produce places that embody the characteristics of the Spanish *plaza* or the Italian *piazza* (*ibid*). Also, the French use of the word *place* directly means *plaza*.

Norberg-Schulz (1976) explains that "environmental character" is the essence of place. Place is always changing, multi-valent, and relativistic because it is based on individual perceptions. Multiple factors, including materials, built form, texture, and colour, but also societal, personal, climatological, and time, combine to make a place unique every time it is visited. Place is also a function of time, season, weather, and course of the day.

Piazza della Signoria in Florence, Italy is an example of a multi-valent place.

Lack of place is placelessness. Place theory and placemaking are the result of a post-modern dissatisfaction with the outcomes of modernist architecture and planning. The determinism of modernist design and manufacturing occurred through homogenization, globalization, mass production, zoning,

and engineering standards that were enacted to streamline production. Modern "spaces" are often minimalist and considered static; modern spaces are frequently considered "placeless." Placelessness is also associated with a loss of local knowledge of particular places, "and the result is the placeless sprawl visible from any highway" (Van der Ryn and Cowan, 1996:58). On placelessness Kurtz (1973) has this to say:

> "… it is all remarkably unremarkable… . You have seen it, heard it, experienced it all before, and yet… you have seen and experienced nothing…" (in Relph, 1976: 143).

In contrast, "places" are complex and continually evolving as cities and societies develop and change. Planning the space between buildings is important for building contact, increasing likelihood of optional activities, and boosting the quality of outdoor spaces (Gehl, 1987). This provides meaning for users.

As part of the place zeitgeist, the concept of "third place" was developed and explored by Oldenburg (1980). A person's first place is their home; their second place is work; their third place is where they choose to mix, mingle, and be away from home and work. A third place is neutral ground for informal relationships, gathering, and neighbourhood unity and is manifested in cafes, general stores, hair salons and barber shops, local pubs, and community centres, among others. The primary activity in a third place is conversation; a place to discuss the day's work, the world's problems, or share a story. Oldenburg believes third places are critical components to the creation and maintenance of sustainable communities for social cohesion and livability. Without third places, people lack the environments for building community, relieving stress, and participating in an informal public life.

Cafes, coffee shops, community centers, beauty salons, general stores, and pubs are all examples of third places (Oldenburg, 1980).

Placemaking

Sime (1986) defines placemaking as the degree to which a "place" can be designed independently of eventual users. Placemaking is a conscious decision (Hough, 1990). There are several principles of placemaking that are identified in the literature as fundamental components of place. They include the concepts of phenomenology, social memory, and genius loci; authenticity; and physical identity and image. These principles are briefly explained here.

Phenomenology

"Phenomenology of place" is the study of tangible physical locations and the human-conscious qualities of those places (i.e. wind, light, shade, climate, temperature, smell, materiality, etc.). The concept is part of a longer tradition dating back to the 19th Century (see Husserl). Phenomenology is defined as "knowing and being in the world through the senses rather than through the mind" (Kelbaugh, 2002: 61). Placemaking involves an awakening or activation of the senses: sight, sound, smell, touch, and taste. The philosopher Heidegger believed active involvement (experience through the senses, for example) rather than simple observation and reflection is how people understand the world and meaning is derived (Kelbaugh, 2002). A phenomenological approach to placemaking may involve designing places for users who experience the world through different ways of knowing (LeBaron, 2002).

Social Memory

People invest in places with social and cultural meaning, and urban landscape history can provide a framework for connecting those meanings into contemporary urban life.

-Dolores Hayden, 1995

Placemaking provides a direct link between history and landscape. Hayden (1995) explains that place is a social construct because memory is naturally place-oriented. Memory is stimulated visually by the urban landscape, which is an important repository for public history. Places are given personal significance, or meaning, through associated memories. "Place memory," as described by Edward S. Casey, is "a container of experiences" (in Hayden, 1995: 46). Social memory contributes to the formation of place because it is an aggregate recollection of past experience. Allowing social memory to become part of the public realm not only connects people to the past but also enables them to form their own personal connections to community and the physical place. Places enable people to put down roots (Marcus and Francis, 1990). Like the roots of a tree, personal roots bridge connections between humans and the earth, to local history and memory, and help form urban families (communities). Placemaking involves the retelling of past experience through the use of materials, symbols, patterns, and typologies to evoke social memories of a place.

Genius loci – "Spirit of Place"

Place is the manifestation of the human spiritual connection –the magic. The character or personality of a place is its *genius loci*, which is Latin for "spirit of place." It is understood by its character or the general atmosphere, which is "determined by *how* things are" (Norberg-Schulz, 1976: 119). "The spirit of place lies in its landscape" (Relph, 1976: 30). A goal of placemaking is to instill a user's sense of place, which is embodied in a place's visual appearance and features and also reflects cultural values and intentions (Relph, 1976: 31). Places have the ability to connect people across time (Hayden, 1995), and spirit of place can be enhanced and celebrated in the urban landscape (Hough, 1990).

Authenticity

An authentic attitude to place is a direct and genuine experience of the complex identity of places (Relph, 1976). The converse of authenticity is an inauthentic attitude to place –a characteristic of placelessness—which Relph contends is the lack of experiencing or a failure to create places with more than a superficial and casual involvement. Inauthenticity arises due to the postmodern desire for meaning in a largely placeless and homogenized society, and thus the creation of places of shallow and easily recognized association. An authentic place actually possesses the alleged or apparent character of that place or locality. For example, Disneyland's Magic Kingdom does not try to be an authentic European kingdom complete with an urban village and castle, but it is an authentic 1950's theme park (Larice, 2004). It is a real place. Sometimes place is more perceptual; the Velveteen Rabbit was an authentic bunny in the eye of the little boy even though he was without hind legs and his fur was worn off.

Identity & Image

Identification *with* a place refers to a person's sense of belonging. Placemaking involves the creation of an environment with which users can identify. Norberg-Schulz (1976) considers identification with the environment on par with becoming "'friends' with a particular environment" (124). Relph (1976) explains identification with a place is to be profoundly inside it (49).

…we now believe that to be a part of the landscape, to derive our identity from it is an essential precondition of our being-in-the-world, in the most solemn meaning of the phrase.

-John Brinckerhoff Jackson, 1984

Distinctiveness and sameness give a place its unique address –the "identity *of*" a place (Relph, 1976: 45). Legibility of place is the ease of public understanding of a place and the ability of that place to communicate accurately using symbolic and physical features (Lynch, 1960). Three basic components of identity are: the physical surroundings, the activities or program, and

the meaning that results. The fusion of these components is the identity. On describing the concept of a regional identity, Hough (1990) suggests that it is the "collective reaction of people to the environment over time" (180). Places with the strongest identity "are usually the remnants of a process of slow development, which occurred within sharp constraints of natural condition and cultural limitation and since then have been enriched by continuous habitation and reformation (old farming areas, historic cities)" (Lynch, 1976: 7). Identification of the environment is a key element of placemaking and directly contributes to good greenway design for a number of reasons.

- A clear path or route is important for wayfinding;
- Recognition of the greenway as a unique corridor in the city sets it apart from streets, bike routes, and parks; and
- Environmental education hinges on the practice of identification for learning.

The "painted ladies" on Alamo Square in San Francisco characterize the city's image.

The image of a place is related to, but altogether different from identity. Relph (1976) describes image as a "mental picture" which is the sum of "experiences, attitudes, memories, and immediate sensations" (56). "Seeing" a place is unique to the one experiencing it and is influenced by the phenomenological properties mentioned earlier (i.e. wind, light, shade, climate, temperature, smell, materiality, etc.). Relph uses the example of a pedestrian and a car driver traveling down the same street. They do not see the same markers and details because they have different experiences and purpose. Likewise, individuals have different images of a place and it varies depending on circumstance, perception, intention, and personality (56). This is an important concept to greenway design as it recognizes the different experiences of the cyclist, the pedestrian, the in-line skater, and the car driver. Lynch (1960) also teaches us that designers translate the users' image of a place to shape and design the city.

Why is place important to greenway design?

The creation of place is critical to the redevelopment of attachments to places. Our ability to make places authentically "is essential if we are to create environments that do not have to be ignored or endured" (Relph, 1976: 145). There is a tendency in "open space" planning to downplay the importance of place, denying city parks vitality and appeal (Hough, 1984). A strong sense of place along a greenway can establish and inspire value and meaning. This is important for building the relationship between society and nature (ecoliteracy) thereby helping to advance environmental sustainability.

Establishing a sense of place by making social memories visible, evoking the *genius loci*, and an understanding of phenomenology allows people to connect to the urban landscape, thereby

committing themselves to its restoration and protection. With a personal investment in their shared realm, the public becomes a steward of that environment, engaged in planting along the greenway, care for the trees, and planning of events that celebrate the community and the greenway.

Place is the result of experience. Events, experiences and activities define space (Tschumi, 1996). Meaning, accrued over time, is the result of the use of a place. Relph (1976) explains that place results because of experience or a range of experiences. However, meaning, cannot be established through design alone, it must be earned (Trieb, 1995). Trieb (1995) argues that designers might seek to develop pleasurable places that appeal to the senses instead of significant ones as "a more defined path towards meaning" (60). Sensory qualities of place are important to developing experiential environments (Lynch, 1976). It is inherent in humans to appreciate and experience place in all its qualities, both good and bad (Marcus and Francis, 1990).

GREAT STREETS

There are a number of similarities between streets and greenways that make this review worthwhile. From a functional perspective, both streets and greenways are conveyors of things: people, vehicles, animals, and water, for example. Quoting Rudofsky (1969), Moudon (1987: 18) reiterates that streets are "the great urban outdoors" and are a *public* commodity. Allan Jacobs (1993) contends that streets are *the* outdoor space for urbanites. Greenways, as a type of linear park, offer similar outdoor experiences for users, offering a greater connection to the natural world than a typical street.

The Street

The street is the river of life of the city, the place where we come together, the pathway to the center.

-William H. Whyte

Quite simply, a street is a path for the movement of people, vehicles, and goods. A street or road is a quintessential part of the vernacular landscape (Jackson, 1984). "The street is a product of the spread of settlement once houses have been built on all available space around its central square" (Krier, 1979: 17). It organizes districts (Relph, 1976; Lynch, 1960), reflects intentions, and directs users to or from places; it is part of a network. The word "street" is derived from the Old English *straet* from the Late Latin *strata (via)* meaning "paved (way)" (Oxford Canadian English Dictionary, 2004).

A more comprehensive definition of a street requires a broader perspective than the transportation function (A. Jacobs, 1993; Moudon ed., 1987). Jane Jacobs (1961) describes the "street ballet" as an informally coordinated dance of people, cars, animals, and goods. Streets are "celebrated in literature, music, and the movies," and "streets embody social life and its memories" (Moudon, 1987: 13). Norberg-Schultz (1971, in Relph, 1976: 20) said the street is "the basis of our experience of cities." A town or city's geographical reality is the street itself; it is the centre of everyday life (Dardel, 1952: 37; also Rudofsky, 1969 both in Relph, 1976: 17). Livable streets and sidewalks are the living rooms of our neighbourhoods: streetscaping, public art, and unique styles of lighting and signage create image of place, promote safety and enjoyment of shared space. They are the places where community is built.

Because streets are such multi-valent entities, they have various purposes. Communication is as much a function and purpose of streets as is transportation (A. Jacobs, 1993). Public space can be the medium through which ideas of citizenship and membership in society are constructed (Shaeheli and Thomson, 1997). Social interaction –the basic reason to have cities in the

first place, according to Allan Jacobs— is a primary activity on the street and streets are possibly the only public place for societal development (A. Jacobs, 1993). The street is also a political place and democratic in nature because they are inherently public. Streets are venues for demonstrations, rallies, parades, celebrations, marches, and mass expression. From an ecological perspective, a typical street is a conveyor of non-point source pollution. This can be runoff from roads, roofs, lawns, driveways, and parking lots and is considered the "number one cause of water quality impairment in the U.S." (Metro Portland, 2001: 21). The standard curb and gutter design is regarded as directly responsible for this degradation because by making the stormwater system invisible, it promotes water pollution (Metro Portland, 2001).

Historically, the street was the place "where children first learned about the world, where neighbours met, the social centres of towns and cities, the rallying points for revolts, the scenes of repression" (Appleyard, 1981: 1). Prior to the advent of the automobile, the street was shared between pedestrians, carriages and wagons, vendors, and animals. "They were planned to the scale of the human being, the horse and the carriage" (Krier, 1979: 17). In the nineteenth century, cities began to address the problems of the streets: garbage, traffic, noise, and general filth (Appleyard, 1981). Efficient movement of traffic and sewage were goals of modern planning, which were reached through the separation of uses (i.e. freeways, sidewalks, zoning). Street life was effectively shunned by modernist ideals, such as those of Le Corbusier. However, in 1961, Jane Jacobs argued that a lively urban street, where traffic moved slowly, people watched out for children, and neighbours met and organized was ideal (J. Jacobs, 1961). "The separation of pedestrians and traffic carries with it the danger of the isolation of the pedestrian zone" (Krier, 1979: 21). This launched the post-modern desire to recombine the uses of the street to achieve an intensive street life.

Despite this post-modern desire, streets today remain largely segregated: sidewalks, planting strips, curbs and gutters, parking lanes, bike lanes, transit lanes, and traffic lanes. As major public resources, city streets offer a great opportunity to rethink how and where community is formed and how natural processes can be accommodated in the public realm. In Vancouver, 36% of the land in the West End is reserved for streets versus 27% in London's City of Westminster (Moudon, 1987: 132). In the U.S., public right-of-way (mostly street) is likely to be 25-35% of a city's total developed land area (A. Jacobs, 1993). Rob Krier (1979) argues for the overlap of street functions, particularly pedestrian and vehicular circulation, but also for public recreation. "Street space is the other obvious source of open space" (Appleyard, 1981: 252). If this resource was exploited through the reintegration of uses, an active street life could promote community building and interaction with nature. Streets can be transformed by closure to traffic and become

Children play street hockey at the Commercial Drive Car-Free Festival, June 2005.

pedestrian precincts or *woonerfs* where cars and pedestrians share the road. "Walking streets" are also considered where vehicles or deliveries are banned after 9 am. Closing down the street to traffic, if only temporarily, is a common way for communities to take back their streets. In the U.S., small-town festivals, farmers' markets, craft shows, foot races, cycling events, art fairs, ethnic festivals, parades, and other street performances have been reported in abundance (Marcus and Francis, 1990). In Winter 2005 in Vancouver, a local group organized to play "hockey in the street" and effectively closed down a block in the Commercial Drive neighbourhood for this Canadian tradition.

Characteristics of a "Great" Street

Great streets are seen "as symbols of working-class urban life, images of a thriving, bustling world of intense human interaction, filled with the gossip, humor, dependence, and community solidarity that middle-class suburbanites have lost" (Appleyard, 1981: 245). Great streets facilitate community building and encourage public participation in the life of the street. They are comfortable and provide for the safety of pedestrians and others. Great streets impress long-lasting, positive memory on its visitors and artfully represent the epitome of a type, possessing a certain *je ne sais quoi* or magic (A. Jacobs, 1993).

Optimal residential street conditions include: safety from traffic and crime; minimization of stress, noise, and pollution; respect for residents' privacy and their right to control and personalize the street; facilitation of social interaction between users and neighbours; and recognition of the street as a destination, a place of activity, experience, and education (Appleyard and Lintell, 1970).

Like a street, the human dimensions of a greenway include cleanliness, naturalness, aesthetics, safety, access, and appropriateness of development (Gobster and Westphal, 2004). A similar set of environmental characteristics contribute to a "great" street experience; while all the characteristics are important, not all of them need to be present for a street to be considered "great" (Jacobs, 1993).

Comfort and Safety

The comfort and safety of users can be designed so that people feel safe from traffic hazards and be able to be on the street without fear at night (Appleyard and Lintell, 1970). Physical comfort and safety are also affected by sunlight, shade and weather protection (A. Jacobs, 1993). Deciduous street trees, for example, provide barriers to traffic, shade in the summer, and allow sunlight to filter to the ground in the winter. Walking

and resting comfort (by way of places to sit and rest) are also important. Users' fears of conflicts with other users (pedestrian/vehicle, pedestrian/cyclist, vehicle/cyclist) must be minimal; various traffic calming methods have demonstrated a reduction in vehicular conflicts. Pedestrian-oriented lighting also adds to their comfort and safety.

Image/Definition

A user's sense of enclosure on the street leads to their sense of place (A. Jacobs, 2005). Continuous street walls (buildings) and rows of street trees help to define the street, contributing to its image. The scale of the buildings and block size contribute to street image and also to accessibility. The terminus of a street might be capped with a landmark or disappear over a hill or around a bend as a way to provide a visual focus. Great streets have a set of key characteristics that contribute to their unique image and define them differently from other streets. These qualities include:

"A great street is a great time… a great experience."

-Allan Jacobs, 2005

- "a concentration of some special use of activity along their margins;
- a characteristic spatial quality;
- a special texture of floor or façade;
- a particular lighting pattern;
- a unique set of smells or sounds;
- a typical detail or mode of planting." (Lynch, 1960: 96)

Transparency

Allan Jacobs (2005) argues for transparency of the buildings and trees for aesthetic interest and safety. Being able to view the items sold in a shop or what type of business goes on behind the street wall provides interest for the passer-by. Equally important is the transparency of shop and restaurant windows so that customers and proprietors can see out, enabling the view of various street entertainment and people watching and also providing "eyes on the street" (J. Jacobs, 1961).

Harmony

A streetscape that is complementary to its surroundings is another characteristic of a great street (A. Jacobs, 1993). 24th Street in San Francisco is a neighbourhood commercial street with a wide variety of uses from a mechanic shop to small cafes and boutiques and is arguably a great neighbourhood street because the uses do not upset the character of the street (A. Jacobs, 2005; Larice, 2003). Even the mechanic's garage borders the sidewalk with similar scale and features as the bakeries and shops next door.

Sociability/Participation

Streets that encourage participation invite demonstrations, exhibition of public art, and "encounter and exchange" (A. Jacobs, 1993). Passive participation, like people-watching, is a primary activity. The encouragement of people in adjacent buildings to add something to the street, such as flowers, signs, awnings, color, tables, or benches, is important. As community builders, streets are places to be, to live, to work, and to play.

Maintenance

Responsibility for the maintenance of the street commonly falls to those who are active on it (A. Jacobs, 1993). Aesthetically, good maintenance contributes to a user's acceptance of a street as a pleasant and enjoyable experience. Likewise, a measure of the success of a greenway is how well it is both used and maintained. Community involvement in the maintenance of the greenway is key and therefore could also be considered a use (Marcus and Francis, 1990).

Visual Complexity

Multiple surfaces across which sunlight or moonlight touches, such as the leaves of trees and their shadows, "entertains the eye and keeps it moving" (A. Jacobs, 1993). Designing for visual complexity requires layering many things, surfaces, and details. Allowing sunlight and moonlight to play across the different elements, imaginatively and artfully representing the epitome of a greenway, and exploring ways to foster magic encourage visual complexity.

Serial Vision

A long straight road has little impact because the initial view is soon digested and becomes monotonous.

-Gordon Cullen, 1959

The experience of the street as a pictorial series of framed views was explored by Gordon Cullen in his seminal book *Concise Townscape* (1961). What Cullen describes as "serial vision" is a manipulation of physical elements in a streetscape, which impacts a user's emotions and that this impact is what is desired. How a person experiences the city from view to view emphasizes the context and the objects within the city. The city, or in this case a greenway, is experienced as movement, creating an identity through what a user sees over and over again. This concept also contributes to a greenway's imageability, as discussed in the Placemaking section.

Lusk (2002) identifies a major flaw of greenway design, particularly for the rails-to-trails program. She describes the story of an acquaintance who was riding his bike with his son on a rails-to-trails multi-use path. After traveling several miles

of straightaway, the man explained how his son toppled off his bike from the sheer boredom of the straight trail. The concept of serial vision is reminiscent of the picturesque landscape tradition of arranging objects in the landscape for visual interest. It is a way of reading the landscape. This concept lends itself to greenway design as a method for designing out the monotony of the straight trail.

Green Streets

A recent practice has developed to address some of the issues resulting from streets' efficient conveyance of pollutants directly into streams and other water bodies. A "green" street is a type of urban infrastructure that accommodates natural processes within the right-of-way, particularly by addressing stormwater. More specifically, a "green street":

- Is a system of stormwater treatment in the right-of-way;
- Is a ecological systems approach to improving water quality;
- Minimizes and slows the flow of stormwater;
- Maximizes stormwater interception, minimizes the "urban heat island" effect, and improves air quality by using street trees; and
- Minimizes its potential impact on sensitive areas through design and location (Metro, 2001).

Green streets provide a link between great streets and greenways as they incorporate the hydrologic cycle into the aesthetics of the public realm. By becoming part of the everyday vernacular, environmental education is a result of a green streets program. Alternative street designs like green streets may not be considered quite so alternative, if the public learns the connection between green street practices and the health of the environment.

Comparing "Great Streets" and Greenways

An existing street can be reformed as a special place –a "great" place. In the same manner, a regular street can be transformed into a great greenway. Hough (1984) proposes more than one use of traditional open spaces (i.e. parks, streets, vacant lands, industrial lands) and suggests the urban street double as a type of park. Lusk (2002) suggests that "…the empirical findings of greenways could be applied to existing and proposed bicycle paths but also to streets in cities and suburbs, perhaps by removing or restricting cars in certain instances" (19). Greenways that are developed within the public right-of-way can provide cities with the new design form and visual quality for city streets that Hough (1984) suggests for a city's paved and derelict spaces. In a city that is already developed, which is most

In a country where property rights dominate and land costs are high, the only location for creating greenways is on the street, park, back alley, or sidewalk system.

-Anne Lusk, 2002

if not all cities today, greenways on city streets can be a method to "fit the park in later," building on the collage of diversity in neighbourhoods, adding to the "street ballet" (J. Jacobs, 1961). The concept of exploring or enhancing the everyday landscape for its cultural value and meaning is well-established (Jackson, 1984; Groth and Bressi (eds.), 1997). Such streets can provide modified woodlands, climate control, and vegetative air filtration (Hough, 1984). Streets are also host to spontaneous meetings that standard parks cannot duplicate (Hough, 1990). A greenway –a linear park—because it either acts like a street or doubles as one can similarly host these impromptu meetings.

ECOLITERACY

There are two schools of thought regarding the concept of ecoliteracy. One is heralded by Fritjof Capra and David Orr as a fundamental basis for education. The other is an ecological design theory that is focused on enabling people to read and understand the landscape. In this section, both the education and ecological design paradigms are reviewed and then related to greenway design.

That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics.

-Aldo Leopold, 1949

What is Ecoliteracy?

Ecoliteracy has its roots in the environmental movement of the late 1960s and early 1970s. Henry David Thoreau, John Muir, Patrick Geddes, Aldo Leopold, and Rachel Carson are considered some of the early environmental theorists and practitioners from which ecoliteracy finds its roots. Environmental consciousness "is based on a recognition of the need to come to terms with resource scarcity, environmental pollution and the associated social issues" (Hough, 1984: 239). Ecoliteracy addresses these issues from an ethical perspective and considers "human beings as biological creatures, immersed in vital ecological relationships within the earth's biosphere; …the earth's finite capacity as an ecological system; …the need to understand the limits of the system" (Hough, 1984: 239-240). A cultural transition that gives credence to sustainable living must occur (see Capra, Orr, Hough, Rees and Wackernagel, Merkel).

Ecoliteracy through Environmental Education

Ecoliteracy is the quality or condition of understanding and learning about the basic principles of ecology through direct experience of the natural environment (Capra, 1996). Olmsted believed that experiencing the natural scenery of rural landscapes, people would learn to appreciate the natural environment (von Hoffman 1988). Ecoliteracy expands this idea from mere appreciation to fostering an ethical connectedness to the Earth. From an ecological perspective, sense of place is developed through an understanding of our place within the ecosystem and is not limited to historical and cultural connectedness. An ecological sense of place is about the everyday experience in the built environment as inseparable from the natural environment (Hayden, 1995). Ecological knowledge is the basis for sustainable living (Capra, 1996); Orr (1994) suggests that ecoliteracy begins with peoples' *daily* lives (also Hough, 1990). This ranges from the air we breathe to the water we drink to the gasoline we use in our cars.

Systems thinking is the fundamental framework of the ecoliteracy zeitgeist. Ecosystems provide fundamental life-support services without which most life on the planet would cease to exist. Lubchenco (1998) lists thirteen "ecosystem services" including the purification of air and water, partial climate stabilization, support of diverse human cultures, and "provision of aesthetic beauty and intellectual stimulation that lift the human spirit." Land use and development policy is at the crux of the ecosystems services issue (Lubchenco, 1998). Rees (1997) argues that the city is merely a piece of a geographically much more extensive human "superecosystem." Understanding the ecosystem concept is the key to evaluating the state of the biosphere and determining policies that may promote sustainability.

Ecoliteracy is a system-based understanding of the Earth, how it is organized, and by what principles that enable it "to sustain the web of life." To be ecoliterate, means "understanding the basic principles of ecology and being able to embody them in the daily life of human communities" (Capra, 1996). "The nature of the whole is always different than the mere sum of its parts." Systems theory requires observation of the world in terms of relationships, connectedness, and context.

It is also an ecological framework for education reform. Orr (1994) suggests that an ecoliteracy program be developed in the schools as the core of the curriculum, particularly at the grade school level, first by encouraging a fascination with nature and then through a transformative cultural change or revolution. Ecoliteracy encourages the classroom to be moved out-of-doors, regardless of setting –urban or rural, for hands-on exploration of the natural world. In her influential book "Silent Spring," Rachel Carson (1962) suggests that the mystery of the natural world evokes a "sense of wonder." Orr (1994) explains that this is when ecological education begins.

Ecoliteracy involves some aspect of human engagement with the natural environment. Beyond the mere visual recognition of the natural, recognition of the human place within the natural world is the main premise of ecoliteracy. It is the nurturing of a renewed relationship with nature as a result of their engagement that is at the center of ecoliteracy. The aim of ecoliteracy is to instill or inspire stewardship by building value. Commitment and responsibility to the environment, in this case a greenway, comes from regular, everyday use (Hough, 1986). In this manner, Orr (1994) claims sustainability is within the realm of possibility. The combination of "organized engagement with living systems" and one's daily life can affect societal change (Orr, 1994). Despite Olmsted's good intentions, mere quiet contemplation of the natural environment is perhaps not enough for the development of a relationship with nature to the point where people are willing to take responsibility for its maintenance and protection.

Ecoliteracy through Ecological Design

Revealing and healing natural processes through design for environmental education is the basis of ecological landscape design. It is defined as "that which considers issues attendant to the interactive processes and dynamic balance among organisms and their environments" (Brown, Harkness and Johnston, 1998: x). More simply, it is the "*adaptation to* and *integration with* nature's processes" (Van der Ryn and Cowan, 1996: 18). Ecological design has several major components: educating and illuminating ecological phenomena, processes and relationships; designing experience and interpretation of ecology; punctuating and enlivening the environment; restoring the natural function of physical environments; and developing users' awareness to what is known (Brown, Harkness and Johnston, 1998). Three main strategies of ecological design are conservation, restoration, and stewardship (Van der Ryn and Cowan, 1996; Hough, 1984). Like ecoliteracy, proponents of ecological design argue that "if one is more aware of environmental phenomena and processes [by seeing and comprehending them], one is better able to appreciate, evaluate and make wise decisions concerning them" (Brown, Harkness and Johnston, 1998: *x*).

Creative practices of ecology and landscape architecture construct –or, more precisely, enable*—alternative forms of relationship and hybridization between people, place, material, and Earth.*

-James Corner, 1997

Van der Ryn and Cowan (1996) identify five principles of ecological design:

- Solutions grow from place.
- Ecological accounting informs design.
- Design with Nature.
- Everyone is a designer.
- Make nature visible.

While all five principles have direct applicability to greenway design, the fifth principle, "Make nature visible," is discussed here for its applicability to the urban condition where nature is considered least evident. Making nature visible in the urban environment may encourage people to develop an awareness and knowledge of ecological "processes, patterns, and relationships" (Van der Ryn and Cowan, 1996: 170).

Ecological design is a form of placemaking that addresses environmental restoration and conservation and also "reveals and interprets ecological phenomena, processes and relationships" (Galatowitsch, 1998: 99). Also known as "ecorevelatory design," its focus is on the cultural and aesthetic qualities of landscapes, as well as, biophysical factors. Contemporary landscape architecture, suggests James Corner (1997), is the combination of ecology, creativity, and landscape. These didactic landscapes "dictate that forms should tell us, in fact *instruct*, us about the natural workings or history of a place" (Trieb, 1995, 53). Ecologically designed landscapes provide a physical link between ecological systems and everyday life.

In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught.

-Baba Dioum, Senegalese conservationist

Three Phases of Ecoliteracy through Ecological Design

Ecoliteracy is a process that can be initiated at any stage of one's life (although Capra and Orr would argue that to affect the greatest societal change, ecoliteracy is best taught to young children). As a process, ecoliteracy begins with learning and awareness, which, in turn, develops one's connection to place and from that connection, a desire to steward the environment, perhaps by changing their habits. Here, I introduce three phases of ecoliteracy that can be affected by ecological design: Learn it, Love it, Live it.

Learn it - Knowledge

Whether through hands-on, field-based education as proposed by Capra and Orr, or by revealing natural processes through demonstration landscape design, environmental education and awareness of ecological principles are the primary learning objectives of ecoliteracy. Carson's "sense of wonder," Orr's concept of the mysterious waiting to be discovered, and the "magic" of the natural world are cultivated in this phase. Users of places must know their environment (Hough, 1986). People can develop their knowledge of the natural environment, if they are taught. Users can be taught local ecology and the problems caused by human intervention through grand and modest gestures in the landscape. Signage, programming, partnerships with schools, events and festivals can broadcast messages about water and air pollution, deterioration of wildlife habitat, garbage dumps, and other problems which can have local and global implications. In this way, ecologically designed landscapes can teach users about the interrelationships between people and the environment (Hough, 1986). Through learned knowledge of the environment, a person's ecological conscience and curiosity can be harnessed at this early stage. This is the "Learn It" phase of ecoliteracy.

Love it – Meaning

It is through this education that a person's relationship with the natural environment can be fostered. There is an "essential bond of people to nature and to the biological sustainability of life itself" (Hough, 1990: 179). Sense of place and from that a sense of belonging are born out of the relationship with the local natural environment. Like meaning in place theory, meaning in landscapes "results less from the effects of a particular design than from the collective associations accrued over time" (Trieb, 1995: 47). A main premise behind ecoliteracy is the production of a biophilic humanity, that is, lovers of nature. Biophilia was termed by E.O. Wilson and asserts that meaning and fulfillment of human existence "is intimately dependent upon our relationship with nature" (Wilson, 1993 in Van der Ryn and

Cowan, 1996: 163). "Love It" is the mantra of the students in this phase of ecoliteracy.

Live it – Value

Knowledge of a place and its place within an ecosystem can change our attitudes and our relationship with the environment (Hough, 1986). Only when this relationship has been nurtured can the third phase of ecoliteracy manifest. The third phase, "Live It," is centered on stewardship of the Earth, sustainable development, and responsible living. While there are multiple definitions for stewardship (The President's Council on Sustainable Development, 1996; U.S. National Forest Service, 2005; Hiebert, 1996), the one that has transcended time is Aldo Leopold's 1949 Land Ethic.

> "A land ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land" (Leopold, 1966: 258).

This kind of responsibility requires knowledge, restraint, and commitment to a physical place. It also involves the application of personal and communal values of and about the environment, which were cultivated during the earlier phases. Responsible living requires a personal investigation into one's daily routine, looking for elements to scale back or explore. When people discover value in the urban environment, they may begin to seek tangible ways of changing their lifestyle to one that is more sustainable. In essence, the "Live It" phase is about taking responsibility for ourselves and the Earth.

Ecoliteracy and Greenways

Urban landscapes that provide cities with a stronger ecological dimension build knowledge, meaning, and value of the natural world (Punter and Carmona, 1997). These landscapes can and do consist of greenways among other elements (Greenways, Public Ways, 1992; Quayle and Driessen van der Lieck, 1997). Greenways can provide the important link between nature and development, where a "strand of the wild" provides an outdoor classroom (Searns, 2003). It can be argued that a greenway, as a component of the urban landscape, is invaluable to reinforcing an urbanite's connection with nature. Multi-functional landscapes, such as greenways, are ideal for combining conservation, restoration, and stewardship goals.

...enter into the life of trees: know your relationship and understand their language, unspoken, unwritten talk.

-Emily Carr, 1966

As ecological and recreational corridors, greenways provide an optimal stage for ecoliteracy through ecological design. Environmental education is a key function of urban greenways. Using ecological design in conjunction with programming,

school curriculum, and signage, can be a method of educating the public to ecology and human impact on the environment. Using the street pattern for integration of greenways may help natural processes become part of the everyday vernacular. Relegating the urban natural environment strictly to parks and the periphery of cities, assists "our minds [in shutting] out nature from the rest of life" (Van der Ryn and Cowan, 1996: 171). The everyday landscape is the building block to ecoliteracy because familiar surroundings can provide the essential links between urbanites and nature (Hough, 1984). Van der Ryn and Cowan (1996) argue that "weaving nature back into everyday life breaks down destructive dichotomies between the built world and wild nature" (163). It brings the Nature "out there" into the realm of everyday.

CONCLUSION

As an ecological, recreational, historical and cultural place and *experience,* an urban greenway can teach users about ethical treatment of natural processes. Daily interaction with the environment can provide a functional connection of people to the land, to each other, and, through placemaking, can connect people to *place*. The next chapter offers some examples of place-based design.

Streets and greenways are similar in function and sometimes in design. They are both paths for the movement of people, vehicles, and goods. Great streets and great greenways are safe, comfortable routes with a strong image and definition; they are transparent and harmonious; they are well-maintained; they allow for participation of users in their care and design; and they offer users a visual complexity that encourages them to be revisited again and again. The design practices of green streets will help to highlight the ecological function of the greenway, particularly greenways that are developed on city streets. The next chapter will research methods for daylighting ecological functions of streets.

Enhancing the ecological function of the greenway so that nature is made visible encourages environmental education and further establishes a connection to place through nature. Ecoliteracy begins with the acquisition of knowledge of ecological processes. Repetition of ecological experiences in the everyday environment develops one's connection to place because meaning is found in the landscape. The next chapter will investigate ways in which greenway design features contribute to ecological learning and how ecological processes can be incorporated into landscape design.

A greenway that does not contribute to place or experience or foster stewardship of the natural environment may still function as a good transportation corridor. It may even contribute to a decrease in greenhouse gas emissions by encouraging the use of alternative modes of transit, such as cycling. But with knowledge, meaning, and value is the greenway can be an essential element of the sustainable city. A greenway can be a recreational and ecological attraction, and by development within the everyday public realm it has the potential to change the daily experiences of the people who use it and live adjacent to it. Stewardship, and perhaps a change in habit, results because through education and meaning, people find value in the natural world.

CHAPTER 4 REFERENCE CASES

The following reference cases are drawn from a variety of sources. The first two are examples of greenway projects; one in Brooklyn, New York which is currently being developed and the other was the pilot greenway project in Vancouver. Four streetscaping projects of varying scale and scope are also reviewed for their lessons for street-based greenway design. Finally, two park designs demonstrate social and ecological representation in the landscape, while restoring ecological systems.

For each reference case, the project is described, known objectives of its planning and design are identified, and project design details are highlighted. Cases are loosely evaluated for functionality and contributions to a user's connection to nature and place based on criteria from the literature: function and movement, contributions to place, composition of great streets characteristics, and capacity for achieving ecological design strategies. Lessons are drawn to help inform future projects and build upon best practices.

COMBINATION OLMSTED/URBAN STREET GREENWAY: Brooklyn Waterfront Trail, Brooklyn, NY

Description:

Proposed route of the Brooklyn Waterfront Greenway.

The Brooklyn Waterfront Greenway is a proposed continuous 14-mile bicycle and walking path with an Olmstedian vision. Within six years, it is expected that 90 percent of the route will be off-road with separate lanes for bicycles and pedestrians and a belt of grass, trees, and plantings, with 24-hour public access, lighting, and signage. The majority of the route will run along the waterfront and cut inland in a few areas, such as the Brooklyn Navy Yard and the proposed cruise ship terminal, to allow for maritime uses. Refurbished parks and public access to some piers are planned, as well as, interpretation of local industrial heritage, restoration of wetlands and habitats, floating walkways, recreational facilities, and commercial uses.

Objectives:

The greenway is envisioned as a multi-use trail system that is expected to provide recreation and transportation opportunities to local residents, spur economic investment in the area, and reconnect neighbourhoods to the waterfront.

Project:

A rendering of the proposed greenway shows separated bike and pedestrian paths with a centre planted median (Brooklyn Greenway Initiative, 2005).

The minimum right-of-way sought for the finished greenway is 30-feet with a minimum 18-foot with at certain pinch points. A required fence at the Navy Yard will be used to engage greenway users with an interpretive display, illustrating the Navy Yard's rich industrial past and current industrial, manufacturing, and filmmaking activities. In Vinegar Hill, the greenway will widen the current sidewalks from 10-feet to 30-feet. The greenway is a joint project of the community-based Brooklyn Greenway Initiative, Inc. and Regional Plan Association. Greenway planning began in 1993; the greenway is expected to be developed in two phases: on an interim basis (implementation is currently in process) and complete right-of-way dedication (ongoing).

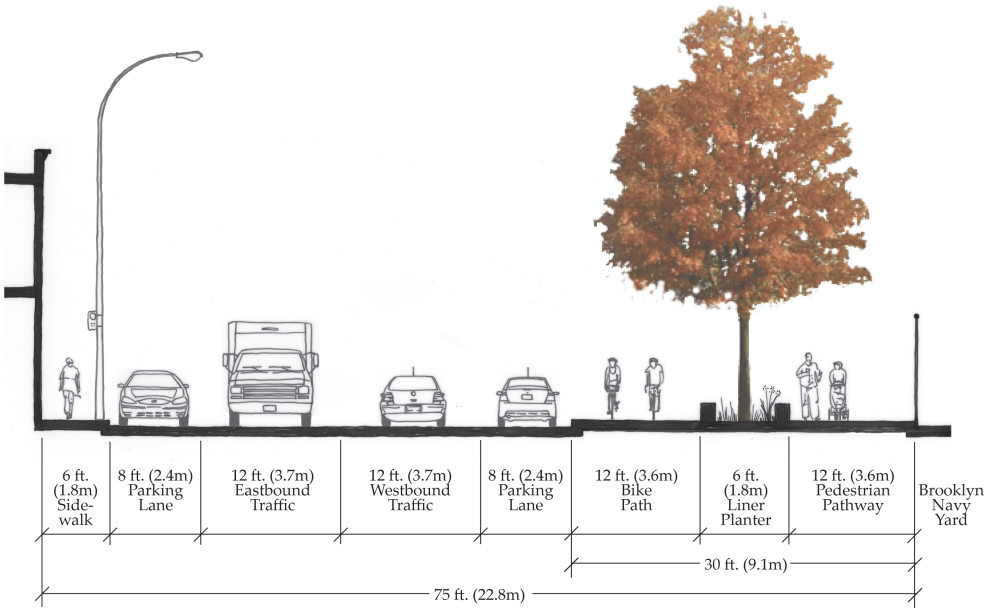
Evaluation:

The Brooklyn Greenway Initiative expects that the benefits will include improved public access to the waterfront, better quality of life, healthier lifestyles, more diverse transportation options, and increased economic development. The greenway "journey"

alternates between a tour of the local shipping industry history and auditory stimuli, like the occasional fog horn, which is indicative of present-day container shipping. Given the constraints of the inland route width, "greening" the greenway poses a challenge. Restoration of ecological functions is a primary objective of the project, as is the expected mode shift; both functions contribute to the project's sustainability quotient. Financial support for the project comes from multiple sources, including local running groups and races; Red Hook Park (with running track), an oasis of green among the industrial ruins, was one of four New York City parks that received funding from the ING Run for Something Better in 2003.

Lessons:

- Off-street paths are considered more family friendly, safe and inviting.
- Separated bike and pedestrian paths can accommodate a diversity of users while minimizing conflicts.
- Unconventional path designs require a certain level of user awareness.
- A 30-foot greenway width (paths, shoulders, and medians) can handle the volumes of users safely and enjoyably.
- Continuity of the route can engage users in a single, connected experience.
- Connecting diverse neighbourhoods to a varied experience along the waterfront encourages learning of local ecology and past histories.



Cross-Section of the Brooklyn Waterfront Greenway on Flushing Avenue at Portland Avenue next to the Brooklyn Navy Yard.

THE STREET-GREENWAY: Ridgeway, Vancouver, BC

A cyclist-activated traffic signal topped with a "garden rake" whimsically recognizes nearby Van Dusen Botanical Gardens.

Close-up of the garden rake cyclist-activated signal "finial."

Description:

The Ridgeway Greenway is the pilot greenway project of Vancouver's first greenways plan. It is a bike route and planted right-of-way on the north side of the street to take advantage of the sun and view to the Coast Mountains to the north. The greenway extends 13 km across the City of Vancouver from Pacific Spirit Park to the City of Burnaby's Central Park. The original pilot project extended from Granville Street to Knight Street along 37th Avenue, and is the focus of this reference case.

Objectives:

The objectives of the City Greenways program are to "make walking more interesting, make cycling safer and more convenient, reduce the impact of the car, make the Greenway 'greener,' and use public art to make the Greenway more interesting" (City of Vancouver, Engineering Services, 2005).

Project:

The pilot project was initiated in 1995 and completed in 1998. It connects Van Dusen Gardens, Queen Elizabeth Park, Mountain View Cemetery –significant park and green space amenities in the City. The greenway is not a linear park nor is it restricted to motorized vehicles except for a mixed-use path in Jones Park. Recreational uses are separated; pedestrians use the sidewalk and cyclists share the road with vehicles. Traffic calming measures, such as planted traffic circles, curb bulbouts, and chicanes, are in place to emphasize the pedestrian and cyclist priorities in the right-of-way. The main pathway/sidewalk is located on the north side of the street "to take advantage of the many public open spaces along the route, the sunny side of the street, and the view opportunities" (City of Vancouver, Engineering Services, 2005).

Evaluation:

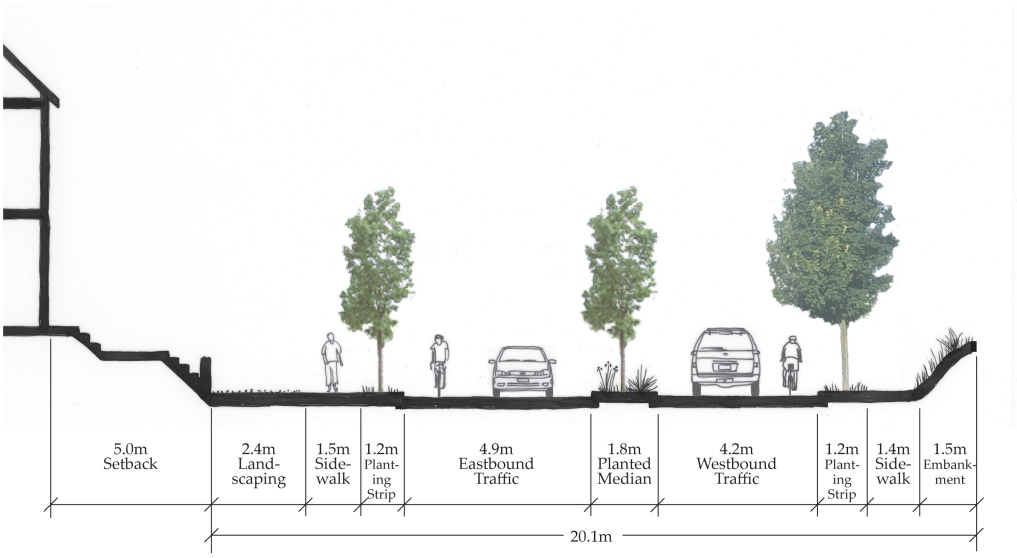
The greenway is not granted its own official right-of-way nor is a bike lane marked on the roadway. However, road signs and stencils painted on the pavement indicate shared use of the street. Traffic calming measures like curb extensions, bike boxes, half-closures, traffic circles, and chicanes are also used to prioritize non-motorized greenway users. Pedestrians are given a standard 1.8 metre sidewalk, which is not consistently shaded from the sun by street trees. Public art at parks and on bike-operated signal poles is both functional and whimsical.

Public art combines function and whimsy at this small corner plaza, offering a place to sit and refreshment (water fountain).

Lessons:

- Prioritizing pedestrians and cyclists can be achieved will little relative effort or expense.
- Public art can do much to elevate the importance of the corridor and bring attention to particular concepts.
- Traffic calming treatments effectively slow motorized traffic, reduce traffic volumes, reduce crossing distances for pedestrians, and provide aesthetically pleasing and ecologically important landscapes.

A traffic diverter discourages cars from cutting through the neighbourhood, but allows thru bike travel on 10th Avenue.



Cross-Section of Ridgeway Greenway at Oak street.

URBAN BIKE ROUTE: 13th Arrondissement (Boulevard Saint-Jacques at Rue Glaciere) Paris, France

Description:

The elevated Metro rail runs alongside Boulevard Saint-Jacques and provides covered recreation space.

Boulevard Saint-Jacques is a segregated street in Paris' Thirteenth Arrondissement. The street is a one-way vehicular street with parking on both sides. The 2-metre bike lane is separated from the parking lane by a 1.5-metre-wide median. A double-allee of trees set in decomposed granite separates the bike lane from the sidewalk; a pedestrian promenade runs in-between the rows of trees. Beneath the trees within the gravelly planting strip, bike racks, benches, trash barrels, and other street furniture have been installed. On some neighbourhood streets, operations to stop vehicular traffic on some streets occur on Sundays and public holidays for exclusive use by pedestrians, cyclists and roller-blades. Stop signs and signals on the bicycle boulevard are limited to the greatest extent possible, except where they aid bicyclists in crossing busy streets. The bicycle level of service may be further enhanced through the use of directional signage and other amenities. The development of a bicycle boulevard may include the alteration of intersection controls, the installation of signage, stencils, or other treatments that facilitate bicycling. Bicycle boulevards are most effective when several treatments are used in combination.

Objectives:

A double-allee of trees shades the bikeway along Boulevard Saint-Jacques at Rue Glaciere.

To improve the safety and convenience of bicycling on local streets. The bike boulevard is located in the Thirteenth Arrondissement, which is a mainly residential and business district.

Project:

Detailed project information was unavailable.

Evaluation:

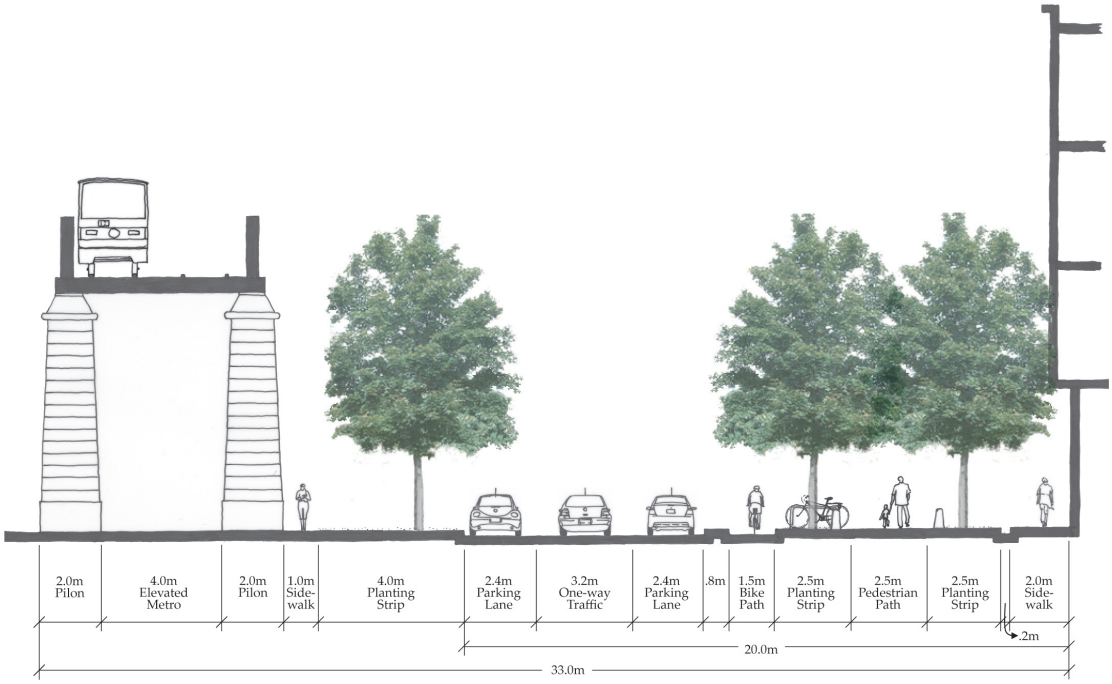
Separation of uses enables efficient movement of cars, bikes, and pedestrians. Conflicts between users are reduced thereby increasing safety for cyclists and pedestrians. A narrower vehicular lane, due to the giving-over of lane width to bicycles, potentially reduces and slows through vehicle traffic. Neighbourhood residents may object to the alteration of their street, especially intersection controls (stop sign rotation, traffic circles) and vehicle access limitations. Depending on

the location of the installation, it may divert vehicle traffic to nearby streets. If bicycle boulevard design includes closures, partial-closures or forced right-turn treatments for vehicles, it may result in more circuitous vehicle circulation routes, possibly affecting emergency vehicle response.

Lessons:

- Separation of modes prevents user conflicts.
- Narrow vehicular lanes slows vehicular speed, making the public realm safer for pedestrians and cyclists.
- High level of design detail, such as paving and planting, creates inviting movement corridors.
- Unvegetated tree pits do not limit pedestrian movement.

Pedestrian crossings are protected by bollards at the intersection of Boulevard Saint-Jacques and Rue Glaciere.



The cross-section shows the elevated Metro (eft), roadway, one-way separated bike path, and a regularly-spaced double-allee of trees.

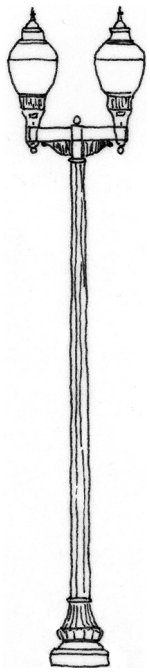
CIVIC STREETSCAPING: Rose Kennedy Greenway, Boston, MA

Description:

Approximately 1-mile in length, the Rose Kennedy Greenway (RKG) is a 30-acre corridor in Downtown Boston that extends from the Leonard P. Zakim Bridge to the South Bay interchange and is the final phase of the Central Artery/Tunnel (CA/T) Project --the "Big Dig." The $20 million surface restoration includes planting, lighting, furnishings, utilities, public art, and public parks and plazas. The urban design framework, developed through a public process, is the basis upon which the preliminary surface design and construction documentation were built. A vocabulary of streetscape elements - lighting, sidewalks, crosswalks, street trees, planters, benches, trash receptacles, bike racks, and other street furnishings – are expected to create a recognizable identity for each district through which the corridor runs.

Objectives:

The objectives of the greenway are to provide an overarching, cohesive streetscape; provide open space in an area of the City that has very little; connect the harbour and adjacent neighbourhoods to the core of the City, while promoting their individual character; continue "to build a regional system of open spaces;" and "heal and inspire" (Massachusetts Turnpike Authority, 2001: 3).



The acorn-style pedestrian light reflects Boston's historic character.

Project:

The greenway and streetscaping plan includes "several miles of new and refurbished sidewalks, 600 street lights, nearly 900 trees with irrigation, numerous plazas and 14 new parks" (Massachusetts Turnpike Authority, 2003: 15). The species of street tree is the October Glory Red Maple and the Armstrong Red Maple. Single or double acorn fixture lights with decorative poles that are "historic" in appearance are carried the length of the corridor. Brick sidewalks with granite curbs extend along the entire corridor, reinforcing the Boston image. The connection to the waterfront is reinforced by the use of landscaped water features in each of the neighbourhood parks. Copley Wolff Design Group (CDWG) prepared the surface restoration designs. State and City agencies, neighbourhood groups, abutting property owners, businesses and residents all participated in the design process. The CA/T Project is managed by the Massachusetts Turnpike Authority.

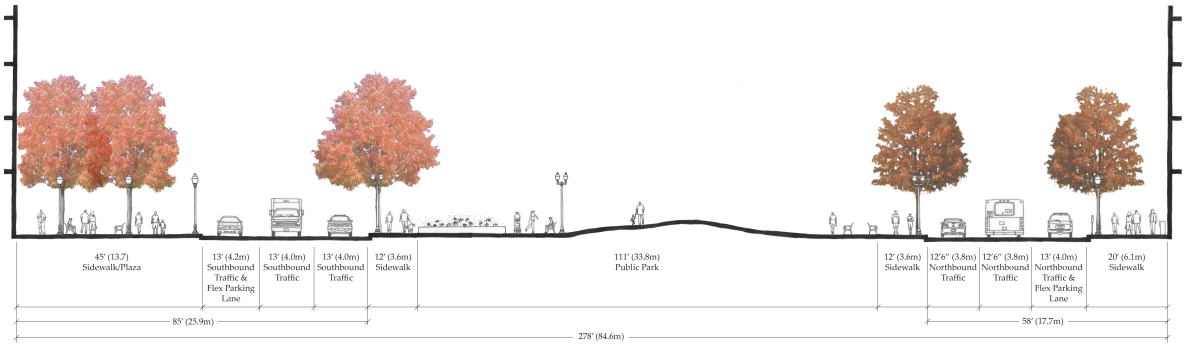
Evaluation:

As a civic streetscaping project, the surface restoration project succeeds in the creation of a "great" street: deciduous street trees provide shade when it's hot and allow sunlight to filter through when it's cool; the trees are planted at regular intervals for a continuous tree canopy; the street trees also have irrigation to promote their longevity; the brick sidewalks compliment the adjacent historic buildings and Boston's traditional palette; and the pedestrian light is a simple style that replicates those used in other historic areas. However, the typical street width (2 traffic lanes and 1 parking/peak hour lane in each direction) prevents the trees from creating a canopy that connects over the street, which is less effective from the perspective of a driver. The pedestrian experience could be enhanced with a double-allee of trees and further reinforce the significance of the corridor. Connection to the waterfront is restricted to street termini with park water features suggesting a more abstract connection. The brick sidewalks present some accessibility issues for those with limited mobility, particularly if the sidewalks are not well maintained over the long-term; budget constraints could pose a challenge to maintenance.

Photorendering of the new boulevard and Wharf District park (Copley Wolff Design Group).

Lessons:

- A continuous deciduous tree canopy provides shade in summer and filtered sunlight in winter.
- A complimentary materials palette respects and mimics local and historic context.
- Pedestrian physical comfort and safety is addressed with a simple lighting strategy that carries the whole way.
- A tree canopy that spans the width of the street can provide a natural tunnel experience for drivers.
- Maintenance is critical, if brick-like pavers are used, for universal access.



The Rose Kennedy Greenway is a significant corridor in Boston's history; the greenway contributes to the city's civic image.

SHARED STREETS:
The Dutch Woonerf, Delft, The Netherlands

Description:

A woonerf uses a variety of paving materials to designate space and use like this one in Delft.

A "woonerf" is a residential street that acts like a yard, where the right-of-way is shared between pedestrians and vehicles and rules of the road grant pedestrians priority (Appleyard, 1981). It is a Dutch term, which literally means "street for living." Traffic flows on a woonerf are typically between 100 to 300 vehicles per hour at peak times (Appleyard, 1981). Design features of the woonerf include:

- Street grading to raise the street to the level of the sidewalk for the elimination of curbs;
- Vertical features, such as trees and bollards;
- Surface changes from asphalt to bricks, pavers, cobblestones, or gravel;
- Plantings, such as flowers and shrubs; and
- Street furniture, such as benches, bike racks, trash receptacles, newspaper boxes, planters and street lighting.

Pedestrians are encouraged to utilize the full width of the roadway, which doubles as play space for children and the young-at-heart. Driving speeds are restricted to the "speed at which a rider allows his horse to walk" (15-20 kph) (Royal Dutch Touring Club, 1978 in Appleyard, 1981: 251).

Objectives:

Woonerven realign the roadway to slow traffic and provide parking and play space. This woonerf provides bike racks, too.

Create a public space for children to play and for social and possibly commercial activities. Traffic calming through the prioritization of the pedestrian is a secondary objective of woonerven.

Project:

No specific project was investigated for this case.

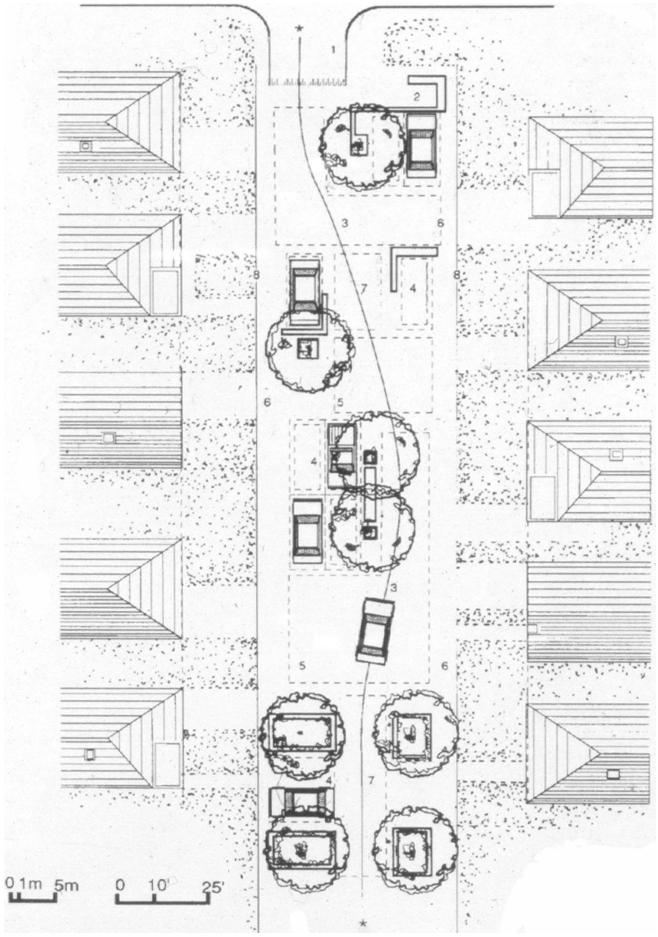
Evaluation:

A woonerf is generally not appropriate where there is a need to provide non-resident motorists with access to services or through travel. The design needs to keep vehicle speeds very low in order to make the streets safe for children playing in them. Woonerven are meant for streets with low traffic volumes.

Speeds of 15 kph (9 mph) are considered sustainable only for short distances on local access streets. Incidents of motorcycle speeding is typically not affected by woonerf conditions. The cost to retrofit a woonerf may be quite high, but there would be no extra cost if designed into the original construction. A true woonerf blends the realms for the pedestrian and the car, to put those modes of travel on equal terms. Most importantly, it attempts to interweave the social function of the street with the need for access and mobility. A study of Dutch woonerven demonstrated that post-construction the speed of vehicles dropped, accidents declined, air quality improved, and the cost of employing the traffic calming measures was about one-third to one-fourth that of constructing a bypass (Ewing, 1999).

Lessons:

- Woonerf designs are intended for streets with low (100-300 vehicles per day) traffic volumes.
- Vehicle speeds and accident rates are reduced on woonerven, thereby increasing safety.
- Woonerven can re-invigorate the social function of the street.



A typical plan of a shared street contains many of the following design details:

1. *Clearly marked entry*
2. *Sitting areas/bench*
3. *Bend in driving lane*
4. *Parking space*
5. *Varied paving materials*
6. *No continuous curb*
7. *Chockers/planting beds*
8. *Typical Right-of-Way*

STORMWATER MANAGEMENT: SEA Streets, Seattle, WA

A street without traditional curbs allows stormwater to drain into planted beds at the street edge (Seattle Public Utilities, 2003).

Description:

"Sea streets" –Street Edge Alternative— are a new street treatment that replaces the traditional curb and gutter construction. Swales or small ponds with water-absorbing soil are created between the street edge and the sidewalk to reduce run-off and aid salmon recovery (Brown, 2003). Sea streets are a natural drainage system approach that mimics nature with shallow depressions, amended soils, and plants, which, in turn, helps improve water quality and reduces non-point source pollution and runoff speed.

Objectives:

The idea behind sea streets is that this type of restorative development will daylight natural processes. Sea streets are designed to reduce impervious surfaces by narrowing the road, create more space for plants and soil to absorb rain water, control flooding, and move stormwater away from the roadway. SEA Street is located in the Pipers Creek watershed in northwest Seattle. The project is located on 2nd Avenue NW, between NW 117th and 120th Streets. The drainage goals for this project include conveyance, flood control, and minimizing the flow of stormwater off-site.

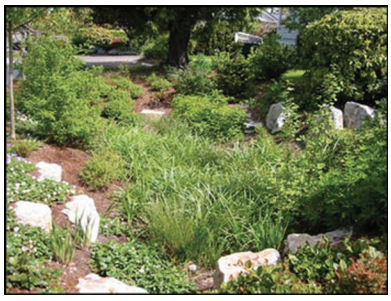
"Flat curbs" visually narrow the width of the roadway, which slows traffic (Seattle Public Utilities, 2003).

Project:

The 2nd Avenue NW sea street has a 14-foot driving lane with 2-foot "flat curbs" on either side to visually narrow the roadway, reducing vehicular speed and creating a friendlier environment for pedestrians and cyclists. Limited angled parking for residents and visitors is distributed in clusters and based on a recent parking survey. A non-invasive species planting scheme is based on the concept of "right plant, right place" (Seattle Public Utilities, 2003). A combination of soils and plants filters stormwater and allows it to seep into the ground instead of the sewer as it washes off the roadway and parking spaces. Stormwater swales connect beneath cross-streets via underground pipes for continuity. It was Seattle Public Utilities' first project to explore the alternative drainage and street design approach now known as Natural Drainage Systems. The project was completed in 2001.

Evaluation:

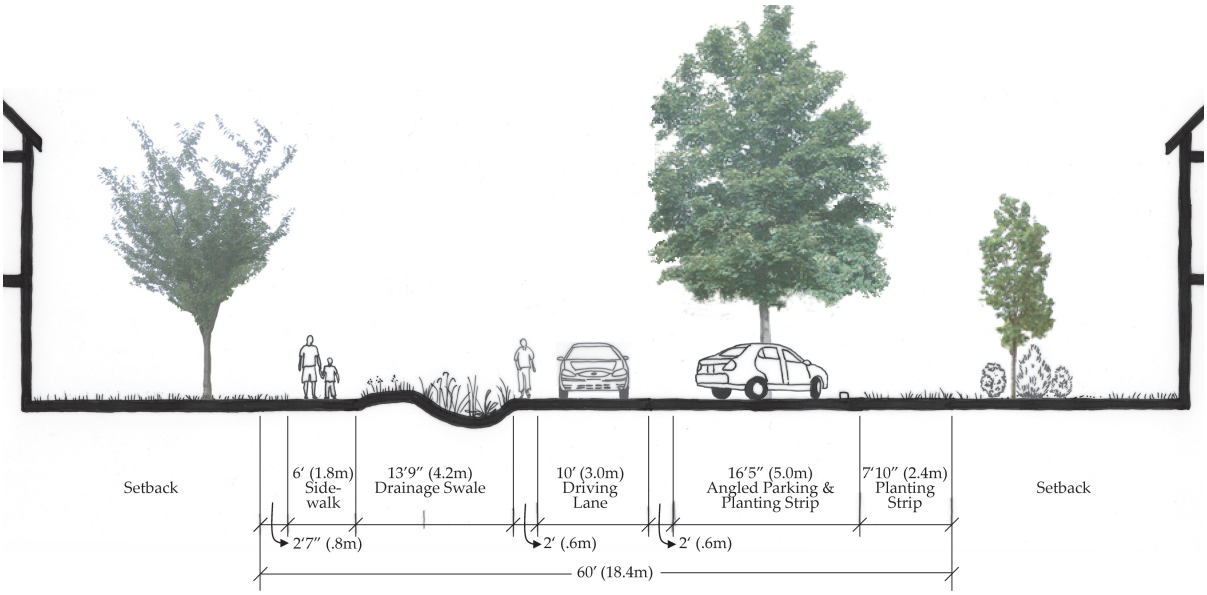
By retrofitting the street using an NDS approach, the project team supported the transportation needs of the neighborhood while simultaneously providing space for rainwater to return to the earth, rather than flowing rapidly across the paved landscape toward Pipers Creek. Seattle Public Utilities claims that the aesthetics of the new design have been integral in community stewardship of the landscaping and have spawned greater involvement in local watershed issues. Two years of monitoring show that SEA Street has reduced the total volume of stormwater leaving the street by 98% for a 2-year storm event (City of Seattle, 2003).



Grasses and sedges line the swales, naturally filtering the stormwater (Seattle Public Utilities, 2003).

Lessons:

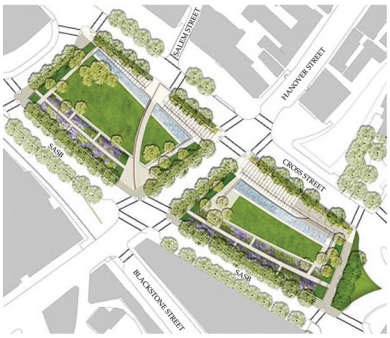
- Natural drainage systems can reduce stormwater run-off dramatically.
- Planted street edges provide an aesthetically pleasing environment for residents that they are interested in maintaining.
- Reducing lane width for restorative street edge development, creates a safer and friendly environment.
- Awareness of residents' place within the watershed can be achieved with SEA Street design, prompting stewardship and action.



Street Edge Alternatives do not require significant road widths. Angled parking is grouped to provide more concentrated natural areas.

REPRESENTING SOCIAL AND ECOLOGICAL HISTORY: North End Park, Boston, MA

Description:



Plan of North End Park (Massachusetts Turnpike Authority, 2005).

Developed as part of the Rose Kennedy Greenway (see page 48), the North End park is expected to be the "front porch" for the North End neighbourhood. The "front porch" concept was conceived to extend the gateway of the North End neighbourhood and provide a pleasant place to meet neighbours. An "oasis" for residents, the park's main feature is a pergola-covered "stoop," which is imagined to be a resident's "living room in the open air" (Caruso, 2004). There is no café or commercial enterprise in the park; "You get a coffee on Hanover [Street] and bring it out onto the porch" (Martin, 2004). This consideration was directly informed by the public's desires for community outdoor space that did not take away from local business. Interpretation of the social history also includes a bronze "lean rail," which is engraved with historical facts and quotes from the various waves of immigrant groups that lived in the neighbourhood over its several hundred year history. The quotes are based on more sensory experiences of home and what it was like to live in the North End. Interpretation of the historic land form involves the use of pavers engraved with a map of the shoreline in 1775 and 2000. A fully-native tree palette contributes to the "regional home" concept and the ecological history of the land (Martin, 2004). Other features include: a water play area with seating steps for parents; a linear water element; and the refurbished Freedom Trail.

Objectives:

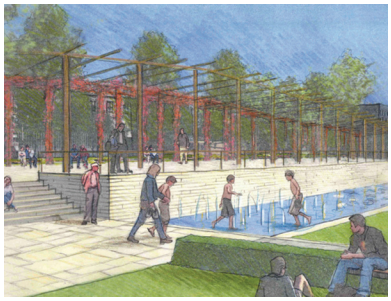
Sketch detail of Freedom Trail link (Crosby Schlessinger Smallridge in association with Gustafson Guthrie Nichol Ltd).

The North End Park is expected to reconnect the urban fabric that was severed by the construction of an elevated freeway in 1952. Situated at the threshold the North End neighbourhood, the park is considered "a significant 'hinge' point between the grand civic spaces of downtown and the intimacy of Boston's oldest neighbourhood" (Massachusetts Turnpike Authority, 2005). The area is a place of great cultural, historical and topographical significance. Interpretation of the local social and ecological history that is particular to this place was a primary objective of the park design.

Project:

The North End Park is being developed as part of the Rose Kennedy Greenway, the final stage in the Central Artery/Tunnel Project (CA/T) –a multi-billion dollar transportation project that

has removed an elevated freeway and placed it below ground. The landscape architect for the park is Crosby Schlessinger Smallridge LLC of Boston in association with Gustafson Guthrie Nichol Ltd. of Seattle. The schematic design was completed in June 2004. The official ground-breaking for the construction of the park was held on April 11, 2005.



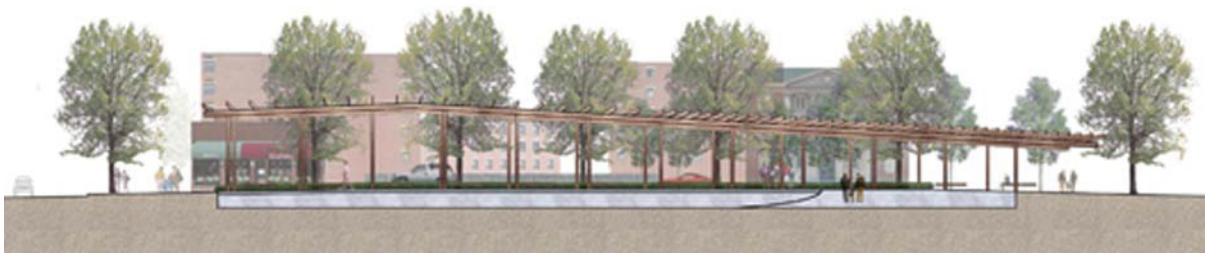
Sketch detail of water feature that represents the historic Mill Creek (Crosby Schlessinger Smallridge in association with Gustafson Guthrie Nichol Ltd).

Evaluation:

The front porch concept of the park design is abstract, but works because of the connection the park makes to Hanover Street (main commercial street in the North End), the combination with the Freedom Trail (heavy pedestrian tourist traffic), and the proximity to Haymarket and North stations (subway and rail transit). The water feature is also an abstract representation of the historic Mill Creek, further emphasizing Hanover Street as the bridge (once the "neck") or gateway to the neighbourhood. The native species palette is a strong statement of connection to the land at different moments in time. Both the lean rail and the shoreline interpretation are literal representations of history and not as innovative in concept. Though some have argued that the park does not thoroughly represent the Italian identity of the neighbourhood, the community stakeholders defend their front porch concept to other Piazza Navona-style plans (Caruso, 2004; Martin, 2004).

Lessons:

- Community culture is represented metaphorically, not literally.
- Connections to pedestrian routes, community nodes, and transit stations activate the place.
- Ecological history can be represented abstractly and literally for aesthetic and educational purposes.



Rendering of the "front porch" elevation (Crosby Schlessinger Smallridge in association with Gustafson Guthrie Nichol Ltd).

ENVIRONMENTAL RESTORATION: Crissy Field, San Francisco, CA

The wide, 25-ft. promenade accommodates many users. The path material is regenerated asphalt, which is kinder to runner's joints than concrete.

Description:

Originally a rich salt marsh, later the landing site of Spanish explorers and Russian, English and Boston traders, the site of the Panama Pacific International Exposition in 1915, and shortly after, a World War I military airfield, Crissy Field is a restored 100-acre national parkland located within the Golden Gate National Recreation Area and the Presidio of San Francisco. Now a linear park and estuary, it was the largest community-based park undertaking in the history of San Francisco (National Park Service, 2004). Features of the project include: a 1.5 mile shoreline promenade –a dedicated path for cyclists, pedestrians, and joggers; revitalized native dunes that are wheelchair accessible; a 28-acre grassy meadow at the historic airfield; expanded beach including a beach for off-leash dogs; a restored 20-acre tidal marsh; scenic overlooks; family picnic areas; a dedicated hardscape path for cyclists and in-line skaters; and a community environmental centre.

Objectives:

The 1994 Presidio General Management Plan Amendment called for a complete restoration of Crissy Field. A primary objective of the project was to recreate the estuarine wetlands that once dominated the coastal landscape prior to development. Crissy Field extends from the Marina and Fort Mason to the Golden Gate Bridge between the Presidio and the San Francisco waterfront. The project was guided by four key principles: restoration, remediation, recycling, and renewal.

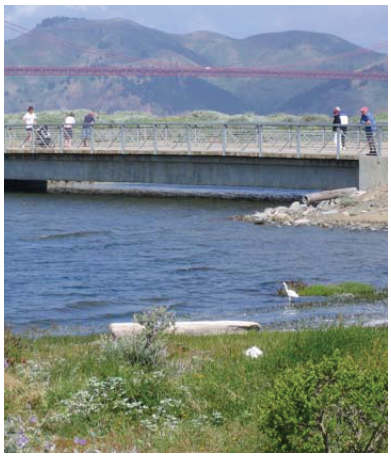
The dedicated bike and pedestrian path offers pristine views of San Francisco Bay, the new estuary, and the Golden Gate Bridge; stencil markings indicate who should use what lane.

Project:

Beginning in 1997, 70 acres of asphalt were removed for the re-creation of the tidal marsh, and the material was regenerated for the foundation of the recreation trail along the water. The National Park Service (public) partnered with the Golden Gate National Parks Conservancy (non-profit) for the project and received generous private donations, including a $14 million gift by the Evelyn and Walter Haas Jr. Fund. The landscape architect was Hargreaves Associates. Replanting of more than 100,000 native plants was conducted by numerous volunteers. Cultural interpretation of Native American (Ohlone) artifacts found during restoration is held at the Crissy Field Center, which hosts educational programs, activities, and workshops for the community. The park opened to the public in May 2001.

Evaluation:

Restoration is the significant accomplishment of this project. It was recognized by one park official that "since the tidal marsh opened, we've seen birds returning to the area that we haven't seen for years." More than 120 species of birds have been seen in the park, including great blue herons, peregrine falcons, and red-tailed hawks. Some of the birds are attracted by prey species such as bay shrimp and dungeness crab that have also returned. Also, the project demonstrates that the integration of recreational activities and *use* of an ecologically sensitive landscape is possible. Stewardship of the area was achieved through community participation and volunteerism. The route is also considered a "rave run" by Runner's World Magazine (2005).



The promenade bridge makes a sweeping gesture over the tidal inlet, recognizing the restored landscape,

Lessons:

- Ecological restoration and recreation are worthwhile partners.
- Derelict sites have incredible potential for environmental learning.
- Community participation and volunteerism promotes education and stewardship.
- Ecological landscape design cam simultaneously evoke a site's past use, restore ecological function, and accommodate recreational use.

"The built work reflects a singular landscape vision within which seemingly incompatible program uses and landscape typologies coexist in an integrated rather than segregated landscape" (American Society of Landscape Architects, 2002).

GREENWAY DESIGN PRINCIPLES & STRATEGIES - AN URBAN DESIGN FRAMEWORK

The following design principles and strategies are derived from the literature review in Chapter 3 and from the preceding reference case lessons. They are organized by the principles also developed in Chapter 3. These strategies are meant to guide the design of the Helmcken/Comox greenway in Chapter 6 of this report, assist TransLink, BEST, and the City of Vancouver in the development of design objectives, and are transferable to the whole of the Central Valley Greenway, as well as other greenway projects. The strategies are a collection of design measures from which a greenway designer can pick and choose depending on the site. That is, not all of the strategies need to be implemented together to compose a great greenway, but rather they are a toolkit of design components. Strategies should be utilized from all four categories: General Greenway Design, Placemaking, Great Streets, and Ecoliteracy. In Chapter 6, the strategies are applied to two specific sites as a way to demonstrate how they can be used.

GENERAL GREENWAY DESIGN

A well-designed urban greenway addresses safety, comfort, accessibility, minimizes conflict, invites users, and accommodates their needs.

An urban greenway is a naturalized alternative transportation route for environmental education and connectivity of ecological, recreational, historical, and cultural sites. It is often a direct and easy route to appeal to users who prefer the greenway to get to places quickly and for recreational users, including young children, seniors, and the disabled. Lighting, maintenance, and security contribute to safety and comfort levels. The pathway width is wide enough to allow users to safely pass each other. Aesthetically, the ideal urban greenway invites people to use it for transportation purposes, exercise, and for fun.

- CONNECT the greenway to other pedestrian routes, community nodes, and transit stations to activate the greenway. Signage, maps, and changes in materials can help communicate these linkages.
- NEGOTIATE a greenway width that can handle the expected volume of users to minimize user conflicts and provide an enjoyable experience. For example, if rollerbladers will regularly use the path, consider that they need more space to pass other users than a

pedestrian or cyclist does.

- SEPARATE modes to prevent user conflicts when potential for interference is high and provide for family friendly, safe, and inviting greenways. Trees, plants, or bollards might be used in combination to separate modes.
- ADJUST the path width in places where visual or sensory interest inspires users to stop, allowing others to safely pass. For example, widen the pathway at key vantage points to allow users to take in the view.
- ENCOURAGE participation in the planning, design, and maintenance of the greenway. In this way, "nobody gets everything they want, but everybody gets a lot" (A. Jacobs, 2005).
- MAINTAIN and FUND the greenway. While community stewardship may build public ownership of the greenway, institutional ownership and maintenance is critical to the greenway's longevity and aesthetic beauty.

PLACEMAKING

Sensory Fascination: A memorable experience appeals to the senses.

Activating olfactory senses attaches users to place phenomenologically, helping them connect to and identify with the natural world. Sounds (songbirds, wind, plants) and smells (flowers, food, fresh-cut grass) are as important as visual stimulation.

- ENCOURAGE sensory experience by designing tactile, auditory, and olfactory-stimulating elements that allow us to know and feel connected to the greenway. For example, plant fragrant flowers downwind of the pathway to allow the scent to drift towards users.

Genius loci: The spirit of place can be evoked on the greenway to connect users across time to the landscape and establish a sense of place.

A user's spiritual connection to the land is encouraged through a sense of place. Stewardship of the environment is possible because users care about the place. Consult the spirit of place, and render an analysis on what it tells us (Trieb, 1995).

- ANIMATE the tales, myths, and stories of the past to connect people across time and landscape. Local history markers and vestiges of the area's cultural past can be placed within the greenway for interpretation.

- EVOKE the ecological *genius loci* along the greenway to connect users to place. For example, use locally harvested or recycled materials to create seating or signage or utilize traditional methods in their construction.

Authenticity: A greenway that possesses the character of the place –and is a place itself—can provide users with a genuine experience.

A real greenway is unique, a draw, a place that begs to be visited again and again. It is not strictly a path to get to other places; it is a place in and of itself. It becomes the preferred route because it delights a user's imagination and challenges their sense of adventure.

- ALLOW the community to possess the greenway, to make it their own and give it life. Programs like Green Streets, buy-a-brick, or planting a tree to commemorate a leader in the community allow ownership.
- TRANSPOSE literal or metaphorical elements of local culture to support community adoption of the greenway. For example, if the greenway will commonly be used by cyclists, consider street furniture or cyclist-activated signals that include bike-like wheels with spokes as part of their design.

Image: Legibility of the greenway as a unique natural route within the city can be reinforced using symbolic and physical features that are particular to the bioregion.

The green or natural element of the greenway implies a visual characteristic, as well as a functional one. The pedestrian or cyclist on the greenway can recognize the ecological importance of the place through treatments that are contrasting to standard street design. Greenways can help users understand, respect and celebrate their bioregional context through the celebration of topography, rivers, hilltops, open lands, and native flora and fauna.

- USE place-based landmarks and materials that facilitate orientation to the greenway, the city, and the bioregion. For example, a greenway lined with large Western redcedar trees tells a user he is in the Pacific Northwest.

STREETS

Great Streets: The characteristics of a great street – safety, comfort, image and definition, transparency, harmony, participation, maintenance, and visual complexity— can contribute both functionally and experientially to a memorable greenway.

These designable characteristics are the most potent means by which a memorable experience can be had by a user of a greenway. "The very concentration of habitual travel along a path… will reinforce this familiar continuous image (Lynch, 1960: 96).

- INCREASE pedestrian safety by slowing traffic using woonerf-like paving treatments and roadway design when appropriate. Traffic diverters used in combination with brick, stone, or concrete pavers at intersections can slow traffic, as well.
- NARROW vehicular lanes to slow auto speed and prioritize pedestrians and cyclists. For example, valley gutters or different surface treatments at the edges of a street visually narrow the roadway for drivers with the effect of slowing vehicular speed.
- RESPECT local historic context by using a complimentary materials palette. If red brick was a dominant building material in the past, it could be used to visually separate a multi-use path or as the paving material around benches.
- RE-INVIGORATE the social function of the street-greenway by designing it for people, not just cars. For example, provide more places for people to sit, play a game of chess, or share gardening tips.
- FACILITATE community building by hosting events along the greenway like footraces, parades, street fairs, sidewalk sales, farmer's markets, and tours.
- MAINTAIN streets and the pedestrian realm for aesthetics, safety, and universal access. A citizens group or trust could conduct annual assessments, clean-up days, and fundraisers for upkeep.
- PROVIDE for user comfort by planting deciduous trees for shade in summer and filtered sunlight in winter and for a continuous tree canopy. The filtered light through the leaves or bare branches also contributes to visual complexity.

Serial Vision: Consider the linear experience of the greenway by manipulating the physical elements to gain the greatest emotional impact.

Views, optics, contrast, juxtaposition, features, and landmarks

can begin to mould the greenway into a complex narrative (Cullen, 1961). If the landscape is considered "a portion of the earth's surface that can be comprehended at a glace" (Jackson, 1984: 8), it can be designed in a series of contrasting dimensions to yield a sense of discovery and drama (Cullen, 1961). Mystery, revelation, the street where you are and the place beyond, interplay, intricacy, fresh alignments and groupings, in this way things are linked together along a path.

- ENGAGE users in a single, connected experience by providing a continuous green route. For example, the directionality of the route should alter or realign to new features, but the materials used should be uninterrupted by other developments.
- SUPPORT physical comfort and safety of the greenway's users with "a good single light that carries the whole way" (A. Jacobs, 2005). Regular placement can reinforce the linear route and has a positive aesthetic effect, too.
- CREATE a natural tunnel experience for drivers and cyclists with a tree canopy that spans the width of the street. The tunnel effect provides enclosure and intersections or other breaks in the tunnel are given new importance and meaning.
- STRING public gathering places every block or two to break the monotony of the streetscape and allow for the development of community. For example, small pocket parks with groupings of benches next to planted flower beds can invite and initiate conversation.

Green Streets: Ecological systems, like the hydrologic cycle, can be restored within the public right-of-way.

The design practices of green streets will help to highlight the ecological function of the greenway, particularly greenways that are developed on city streets. In this way, the design begins to impress a long-lasting, positive memory on visitors and users of the greenway as a special condition.

- REDUCE stormwater run-off using natural drainage systems. For example, loose stone gutters with plants and grasses instead of traditional concrete gutters can allow stormwater to percolate into the ground and filter pollutants.
- PLANT street edges to provide an aesthetically pleasing environment for residents. Local schools or residents could carve up planting strips into garden plots for learning exercises or spiritual and physical enjoyment.
- REDUCE lane width or reconsider parking lane requirements for restorative street edge development. Vehicles do not require asphalt treatments for parking

or slow neighbourhood speeds. A parking lane surfaced with regenerated asphalt or reinforced grass paving systems can restore natural drainage to the hydrologic system.

ECOLITERACY THROUGH ECOLOGICAL DESIGN

"Learn it" – Knowledge: Illuminate place-based ecological phenomena, processes and relationships to build knowledge of place and ecology and to develop a user's awareness of what is known.

Opportunities can be created to enhance our awareness of place and connection to nature in ways that are educational, instructive, and part of everyday activities and enjoyment. Choosing ecological phenomena or processes relevant to the local region can link the learning objectives of the site to larger environmental issues (Galatowitsch, 1998). Enabling users to "read" the culture of our urban environments (Wenk and Gregg, 1998) can help users recognize patterns in plant life, the built environment, and weather systems. For example, since gridded street patterns are often aligned to the cardinal directions, they may provide orienting clues to the sun's daily and seasonal paths.

- REVEAL the traces of the urban natural environment to educate users about local ecology. Traces that could be revealed include:
    - Streams and watercourses by daylighting culverted streams.
    - Wildlife habitat by providing food for birds like native berries.
    - Climate by allowing for rainwater to puddle and drain as a naturally designed water feature.
    - Native plants because they are accustomed to the microclimate and soil conditions of the local area.
    - Contours/topography by creating openings or lookouts to view the valley below.
    - Local history and culture by using elements like nets, buoys, or traps to represent a local fishing industry.
    - Recycled and reused materials to utilize what we already have.
    - Permeable materials to allow for natural stormwater drainage.
    - Low maintenance plantings because they are vigorous and easy to grow by a gardener of average means and experience.
    - Drought tolerant species because they do not require excessive watering, which is important if the gardener or caretaker must carry the water to the site.

- TELL the stories of the natural landscape to reconnect fragments of the urban ecology. For example, plant a stand of trees to recognize the site of an ancient forest; leave a single tree stump to represent the harvested trees.
- REPRESENT ecological history abstractly and figuratively for aesthetic and educational purposes. A former waterline delineated by a different coloured paver can symbolize the old water's edge; signage would more literally tell the same story.

"Love it" – Meaning: Unique markers establish a user's sense of place and build meaning by punctuating and enlivening the urban environment.

Transform environmental nuisances and liabilities, such as rainwater, into assets to be celebrated (Galatowitsch, 1998). Unearth the natural attributes of the place that underlie the built environment to build a greenway's identity. Meaning can be bestowed on place by creating enjoyable experiences.

- FIND the diamond-in-the-rough of derelict sites and EXPOSE its potential for environmental learning. For example, "gorilla gardeners" have appropriated vacant lots and derelict spaces for wildflowers and other plantings.

"Live it" – Value: A greenway that is designed as an experience and interpretative journey of ecology can build awareness of human impact on the environment.

By enhancing the visibility of ecological phenomena, their importance in the urban landscape is reinforced. An interesting journey may encourage new patterns and habits. Corner (1997) suggests that "…landscapes that engage, enable, diversify, trick, emancipate, and elude –put simply, landscapes that function as actants, as continual transformations and encounters that actively resist closure and representation" may build awareness and responsibility to the restoration and protection of natural systems (105).

- DEMONSTRATE the concept that we all live downstream. Trace the path of a pollutant or ecological element from creation to emission along the path of the pedestrian or cyclist.
- ENGAGE citizens and visitors in a grand urban ecological connoisseurship. For example, announce to the neighbourhood that garden plots are available for adoption.

- CELEBRATE the natural world through unique festivals and signage that highlights the urban environment. In the UK, an organization called Common Ground hosts an annual Tree Dressing Day that includes hanging lanterns, storytelling, shining lights, hanging ornaments, dance, and music.
- ALLOW the community to steward the greenway and be responsible for its design and maintenance. For example, a greenway trust can sponsor events that teach sustainability principles through practice.

CHAPTER 5 CONTEXT DESCRIPTION & SITE ANALYSIS

Greenways in Vancouver

Greenways Public Ways Report

In 1991, the Vancouver Urban Landscape Task Force was mandated by City Council to identify what the public valued in Vancouver's urban landscape and to make recommendations for the management, conservation, and enhancement of the urban landscape. The *Greenways – Public Ways* report presents the result of their findings and establishes the urban greenway as a primary method of connecting people to each other and to the natural world. Notably, the Task Force considers the "urban landscape as a combination of dynamic, overlapping systems" (City of Vancouver, 1992: 2). The report focuses on how the greenway is primarily a *connector*; it does not illustrate how the greenway itself can function as its own "landscape legacy" aside from the addition of street trees. The report rationalizes the creation of a Greenway Trust –a public/private body that would oversee the development of the Vancouver Urban Greenway System. This greenway system was incorporated into CityPlan and Planning and Engineering staff were instructed to pursue developing greenways in Vancouver.

Some of the "essential actions" recommended in the report that are pertinent to greenways include:

- Recognition of natural and cultural landscapes as "legacies" to be celebrated;
- Reclamation of neighbourhood streets for cyclists and pedestrians;
- Development of a comprehensive "street strategy" that includes the redevelopment of 20-30% of residential streets into woonerfs and pedestrian-only plazas;
- Inventory of major biophysical and cultural features of the urban landscape for identification of environmentally sensitive areas and "sacred and civic spaces;"
- Promotion of Vancouver's "urban forest;"
- Adoption of ecological performance standards including stormwater, drainage, and hydrological system policies, as well as, air quality, energy conservation, and waste management, among others;
- Promotion of "urban ecological literacy" through school, park, and other public and private sector programs; and
- Reinforcement of Vancouver's image as a "City of Gardens."

Vancouver Greenways Plan

In 1995, the *Vancouver Greenways Plan* was adopted by City Council. This plan asserts that the primary purpose of the greenway is "to expand the opportunities for urban recreation and to enhance the experience of nature and city life" (City of Vancouver, 1995: 1). Secondarily, it identifies the greenway as an optimal site for habitat restoration and stormwater management projects, as contributors to reducing air pollution, as places for community building, and as aesthetically pleasing landscapes. The plan describes two major components of Vancouver's greenway system, city and neighbourhood greenways, and proposes 140 km of greenways on 14 different routes, using street rights-of-way for 50% of the system; the Seawall/Seaside route makes up 25% of the total system (see Figure 5.1). The neighbourhood greenway system is organized on a more ad-hoc basis and is generally initiated by the community. These routes are considered more local in scale and focus, connecting people to amenities within the neighbourhood. A related program is Engineering's Green Streets program, which encourages residents to adopt a traffic bulge or circle as a garden.

Downtown Transportation Plan

A major influence on the *Downtown Transportation Plan* (2002) was the prioritization of pedestrians, bicyclists, transit, goods movement, and private automobiles in that order in the 1997 *Vancouver Transportation Plan*. The 2002 Plan defines greenways as "multi-use recreational routes that provide greater priority to pedestrians and cyclists through the use of traffic diversions, pedestrian activated signals, wider sidewalks with landscaped boulevards, increased numbers of trees, pedestrian oriented lighting, pedestrian oriented signage and street furniture including drinking fountains, seating, and public art" (Downtown Transportation Plan, 2002: 87). The Helmcken/Comox greenway is recommended in the 2002 Plan for integration into the city greenways system and is named "Parkway" (Downtown Transportation Plan, 2002: 87). This route was apparently chosen because Helmcken and Comox together are the only local, low-traffic, two-way streets that generally bi-sect the downtown peninsula. It was also identified as the most direct connection to Stanley Park from the Seawall and Main Street Sky Train Station where the Central Valley Greenway terminates. The *Downtown Transportation Plan* (2002) calls for a greenway design that "introduces landscaping treatments (trees, shrubs, and flowerbeds), public art, street furniture, improved visibility of pedestrians through pedestrian bulges, pedestrian oriented lighting and improved signage" (Downtown Transportation Plan, 2002: 87). Both parking and local vehicle access will also be maintained.

Urban Transportation Showcase Project

The Urban Transportation Showcase is a $35 million set of six innovative projects that aim to promote walking, cycling, transit and other alternative modes of transportation (why walking is considered "alternative" when, by our very nature it is something we are, in large part, born to do?). The goals of this project are to improve air quality and address climate change by reducing greenhouse gas emissions (GHG) –key targets outlined in the Kyoto agreement— through sustainable transportation initiatives. TransLink and the Greater Vancouver Regional District (GVRD) were awarded $8.8 million from Transport Canada under the Urban Transportation Showcase Program. Additional funding from municipal, provincial and non-government partners support this project.

The Central Valley Greenway (CVG) is one of the six projects slated for funding through the Urban Transportation Showcase Project, including the Helmcken/Comox extension (Map page 5 of Showcase doc). It is anticipated that the CVG's high-quality, traffic-separated bike path will provide a safer, more comfortable alternative to shared facilities on roads (i.e. standard sidewalks and bike lanes). A goal of the CVG is to reduce auto-dependence through careful design and construction of integrated walking and cycling routes. The Sustainable Region Showcase has been developed to reflect the need for long-lasting GHG reductions. CVG is considered by the Showcase to be a "behavioural change measure" that will contribute to GHG reductions via modal shift.

Figure 5.1 - Vancouver's City Greenways Plan. #3 shows the Helmcken/Comox Extension.

Central Valley Greenway

The main section of the Central Valley Greenway, when complete, will extend from the Main Street SkyTrain Station at Main and Terminal in Vancouver through Burnaby to the Westminster Quay in New Westminster (Figure 5.2). This dedicated traffic-free, 22.5 km long corridor generally follows the Millennium Line SkyTrain route and is expected to be completed by the end of 2007. The project is a partnership between TransLink, the Greater Vancouver Regional District (GVRD), Better Environmentally Sound Transportation (BEST), and the Cities of Vancouver, Burnaby, and New Westminster. The Federal Government has committed funds for the Greenway through Transport Canada's Urban Transportation Showcase Program, the guarantee of which is contingent on the completion of construction by 2007. These funds are matched by TransLink and the Cities of Vancouver, Burnaby and New Westminster.

Helmcken/Comox Extension

The CVG is expected to be extended from Main Street SkyTrain Station and Science World along the seawall until North False Creek and then continue along a direct route through the downtown to Stanley Park. This will serve a regional function by providing a direct connection through downtown and its many destinations including Yaletown, Downtown South, St. Paul's Hospital, and the West End and contribute to regional alternative transportation goals. Locally, the route will serve an area of the GVRD with the densest population and the highest concentration of non-vehicular trips, further encouraging local non-vehicular trips which are expected to result in a greater decrease in atmospheric emissions. Funding for the extension is expected in 2008 after the allocation of Capital Plan funds.

PAGE HOLDER

CVG MAP

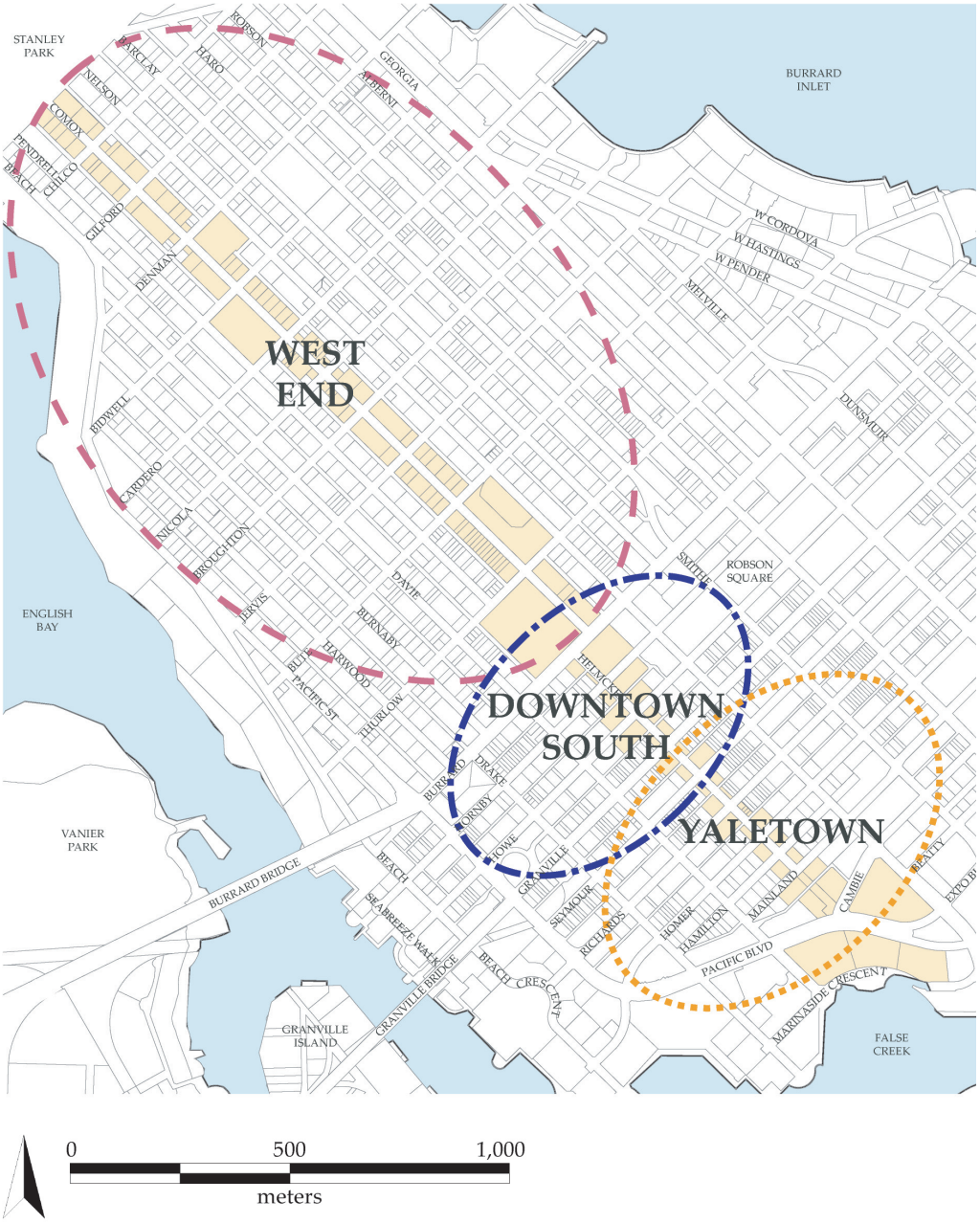
PAGE HOLDER

CVG MAP

West End

The West End is bordered by Stanley Park to the northwest, the neighbourhood of Coal Harbour to the northeast, the Central Business District to the east, the Yaletown neighbourhood to the southeast, and English Bay to the south and west. The Seawall provides a buffer and great neighbourhood amenity between the neighbourhood's south-western edge and the water.

Figure 5.3 - Neighbourhood Orientation



URBAN ANALYSIS

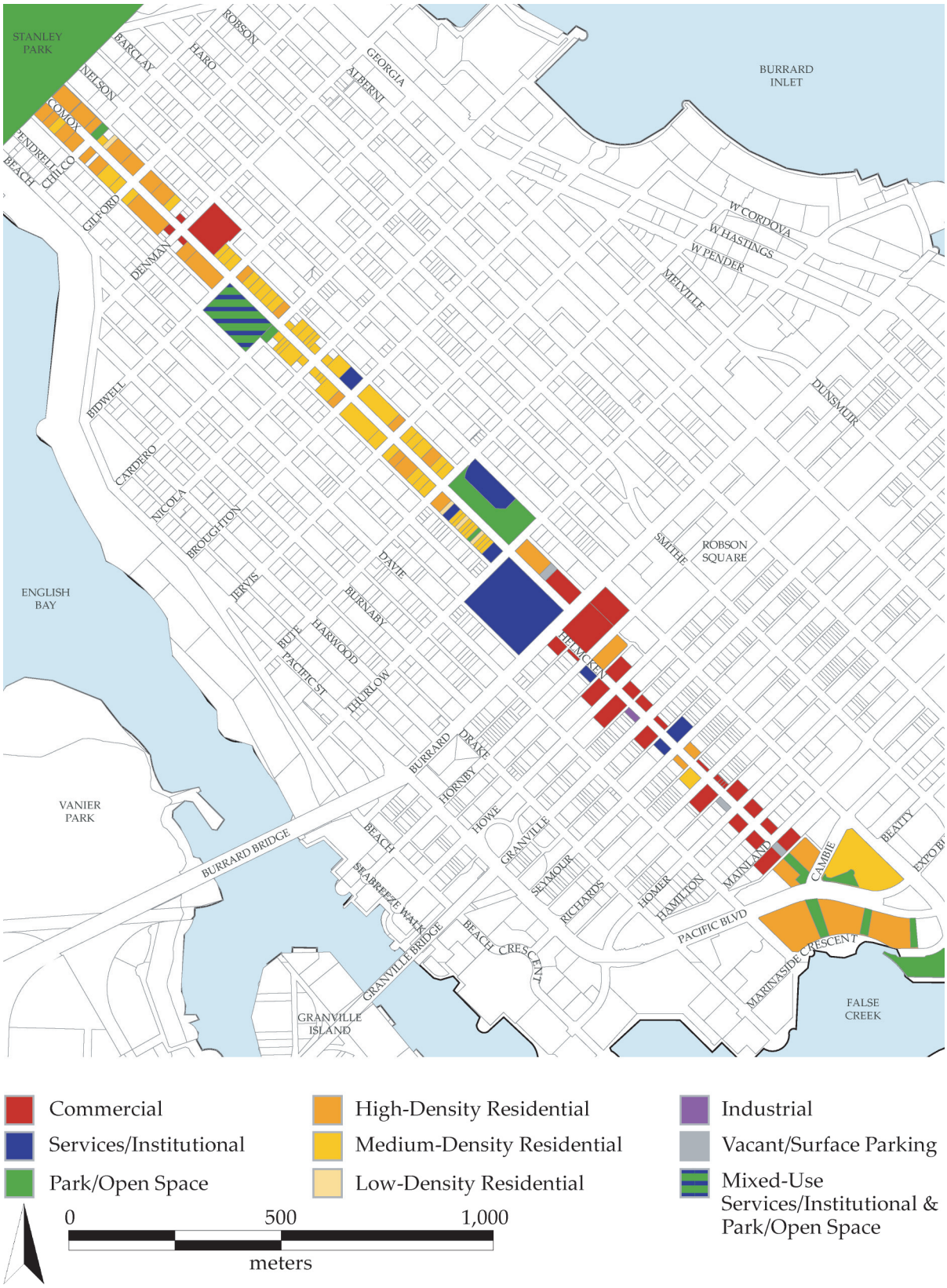
This site analysis investigates the immediate spacial implications of the Helmcken/Comox corridor and adjacent lands. The study area includes the area within a 400-metre walkshed to identify nearby amenities and elements in the urban environment to connect, make visible, restore, teach about or interpret as part of the greenway's design.

Land Use & Zoning

Figure 5.4 illustrates street-level land use on the parcels abutting the greenway route. From False Creek, the greenway passes through high-density (multi-family, greater than 5 storeys) residential developments on either side of Pacific Boulevard. Through Yaletown along Helmcken Street, most of the adjacent land uses are commercial: specialty and local-serving retail, office, and restaurants and cafes. From Richards to Howe streets, the greenway passes through a section that is undergoing a process of gentrification though businesses such as Madame Cleo's still exist. From Howe to Thurlow, downtown office buildings like the Wall Centre and major service centres such as St. Paul's Hospital dominant the area. As the greenway traverses through the West End, it passes the Mole Hill residential block and Nelson Park between Thurlow and Bute and then past a mix of medium (multi-family, less than 5 storeys) to high-density residential blocks. Denman Street is a major retail street in the West End; the greenway passes the Coast Plaza Suites hotel and the Denman Place Mall here. Between Denman and Stanley Park, the area is characterized by high-density residential towers and a few low-rise apartments and heritage homes (single and multi-family). The greenway enters Stanley Park, a 400-hectare park and recreation mecca. The tennis courts and Parks Board offices are nearby.

The North False Creek development between the Seawall and historic Yaletown is part of a comprehensive development district (BCPED). The historic Yaletown area from Mainland to Homer Street is considered a historic area district (HA-3, HA-4). From Homer to Burrard and including St. Paul's Hospital and the properties fronting on the west side of Burrard is another type of comprehensive development district (DD). Much of the greenway route in the West End is zoned as multiple dwelling district (RM-5, RM-5A, RM-5B) with a few exceptions including the properties along Denman Street, which are zoned commercial district (C-5).

Figure 5.4 - Land Use of Adjacent Parcels



Environmental Inventory & Ecological History

Geology, Geomorphology & Geodynamics

Most of the City of Vancouver including the Burrard peninsula was formed by the Fraser River delta, which drains an area of 220,000 square kilometres. Silt and sands from the river were transported and deposited over a period of 70 million years; without the delta deposits most of the area would look like the rest of the BC coastline: rocky and rugged. 15,000 years ago a glacier 1.5 kilometres thick depressed the land at least 350 metres lower than it is today. The glacier melted and receded between 15,000 and 11,000 years ago, depositing a layer of clay, sand, gravel, and boulders as it retreated (Macdonald, 1992). The area is also prone to earthquakes. South-eastern British Columbia lies on the western edge of the North America Plate. The Queen Charlotte Fault lies to the west of Vancouver Island where the Pacific, Explorer, Juan de Fuca, and South Gorda Plates shift under the North America Plate at an area called the Cascadia Subduction Zone (Geological Survey of Canada, 2002).

Topography

The corridor contains fairly pronounced changes in elevation, which affect the public realm, particularly as the greenway runs over a hill (see Figure 5.5). Sections of Comox and Helmcken provide views down slope to the north shore mountains and to English Bay and False Creek. The downtown peninsula has a general transverse slope down to Coal Harbour and the Burrard Inlet. Along its length, Comox is almost flat from Stanley Park to Cardero Street, and from there slopes steeply to Bute Street, gaining approximately 22 metres in elevation. This is the highest point of the greenway at approximately 44 metres above sea level. At Homer Street in Yaletown, the slope drops steadily to Mainland Street where the course levels out to the edge of False Creek.

Figure 5.5 - Site Topography

10-meter Contour Lines

2-meter Contour Lines

Climate/microclimate & Sunlight

In comparison to the rest of mainland Canada, the Vancouver climate is fairly unique. Generally, temperatures and wind conditions are mild due to the moderating affects of the surrounding water and buffering from Vancouver Island. Mean annual temperatures range from 9˚C to 11˚C; areas of the downtown that are more built out and with less paved space tend to have higher temperatures due to the urban heat island effect. Average rainfall for the downtown peninsula is 1400 mm, though this varies across the city as a whole (Macdonald, 1992). The rainy season extends from October through March with the drier weather occurring during the summer months when fire danger can rise dramatically. The 45° orientation of the downtown's street grid is ideal in terms of sunlight. On clear days, all downtown streets are in full sunlight for some portion of the day throughout the year, regardless of surrounding built form (City of Vancouver, 1982). Figure 5.6 illustrates the arc or bearing of the sun during the summer and winter. It also notes the altitude or angle of the sun's height above the horizon: 67° in summer; 17° in winter.

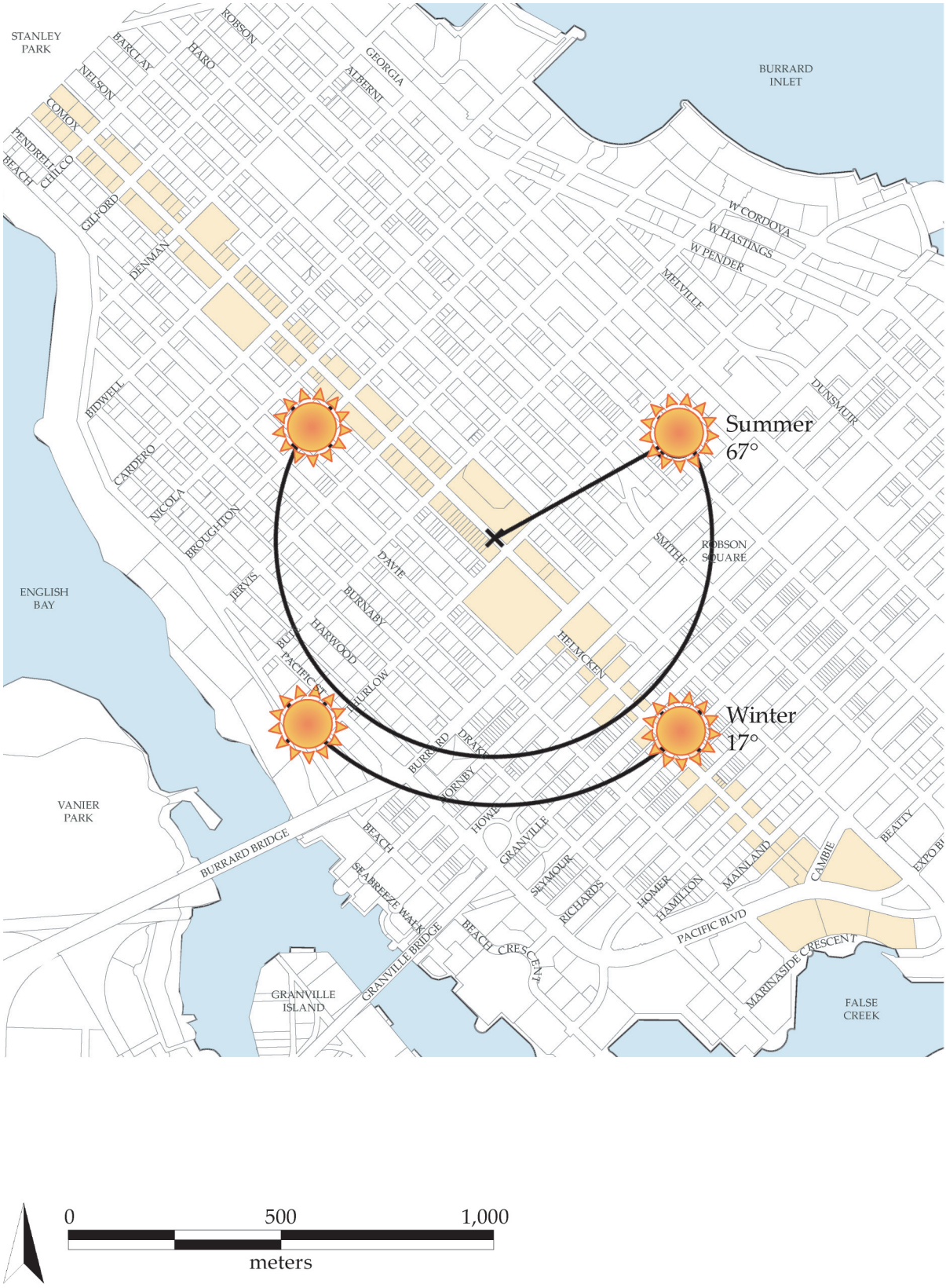
Vegetation

Prior to European settlement and harvesting of the forested peninsula, the Burrard peninsula was covered in a thick forest of Douglas fir, cedar, hemlock, and spruce trees –similar to the treed vegetation of Stanley Park today (Macdonald, 1992). Fir trees measured as much as 95 metres tall and spruce trees up to 100 metres tall (see Figure 5.7). Spruce trees with circumferences of nearly 12 metres were common before the forest was logged. Ferns, salmonberry, and vine maple also covered the landscape (Harris, 1978).

Animals

Vancouver streams and bays were once abundant with fish. Coho salmon, chum salmon, pink salmon, rainbow trout, cutthroat trout, and steelhead all inhabited the many streams in Vancouver before most streams were filled-in or culverted (Harris, 1978). Sole, perch, sturgeon, smelt, and flounder could be found in False Creek and sea-pen, sea urchin, shellfish, herring, smelt, anchovy, halibut, and octopus could be found in the waters of English Bay and Burrard Inlet (Macdonald, 1992). Orcas, grey whales, porpoises, harbour seals, and otters were regularly spotted in the waters around the peninsula. On land, muskrats, porcupines, chipmunks, flying squirrels, bats, mice and other rodents, ducks, beavers, cormorants, bears, deer, and wolves also inhabited the area (Macdonald, 1992). Some of these animals still call the area home for all or part of the year, such as the blue herons.

Figure 5.6 - Sun Bearing & Altitude



No one would ever dream that during the salmon run, English Bay would be so full of fish that one could figuratively almost cross to the south shore by stepping from fish to fish, and still harder to believe that I caught a salmon at the corner of Maple Street and Third Avenue.

-Thomas A. Dutton to J.S. Matthews, Vancouver Archivist, 1955 (Harris, 1978: 4)

Ecological History

Figure 5.7 illustrates the shoreline, existing streams, and marshland of the downtown peninsula prior to European settlement. "Acres of marsh" once fed flowing streams in Vancouver (Harris, 1978: 13); the rainforest environment of Stanley Park today leads us to believe that this was no different for the Burrard peninsula. It is difficult to imagine today that the Downtown was once completely forested with giant fir trees that seemingly touched the sky. The towering steel and glass of downtown office buildings cannot compare to the muffled silence of the forest, draped in lush mosses, liquorice vine, and ferns. The thick canopy of the hemlock, cedars, and firs would have cast a heavy shadow on the damp forest floor, especially during dark and rainy winter days. Clearings in the forest were saturated with water, where pools and swamps teemed with young salmon and trout.

First Nations

Social and cultural history of the First Nations people tells us a lot about the ecological history to the study area. For example, the Western redcedar (*Thuja plicata*) is known as the "tree of life" to the Coast Salish people because its logs were used for canoe and house construction, its bark for cordage and clothing, and its roots for basket-making among other uses. Fruit and berries gathered included black-caps, salal berries, strawberries, cranberries, huckleberries, Indian plum, and crabapple; these were often dried and stored for winter use. Edible roots included cinquefoil, clover, plantain, bracken fern, and lily. Natives also hunted birds (more than 20 species) including ducks, swans, and grouse. Large game, which required the use of bow and arrow, included bear, elk, deer, and mountain goats (Macdonald, 1992). A First Nations midden (campsite) was located approximately at Beach and Morton streets and was known as a place of "good footing" (Macdonald, 1992: 10).

Water & Hydrology

Natural hydrology in the study area has largely been replaced or supplemented by paved gutters, storm sewers, and other elements of artificial drainage. Impervious coverage of 30% of a land area is associated with severe degradation of the local watershed (Metro, 2002: 16). The impervious land area of a typical residential block in the West End is roughly 58% (O'Neill, 2005). The impervious land area in Yaletown or Downtown South is likely even higher due to the fact that there is a lesser amount of green open space, fewer street trees and planting strips, and smaller or non-existent landscaped setbacks. Degradation of the watershed, which includes False Creek,

Figure 5.7 - Ecological History

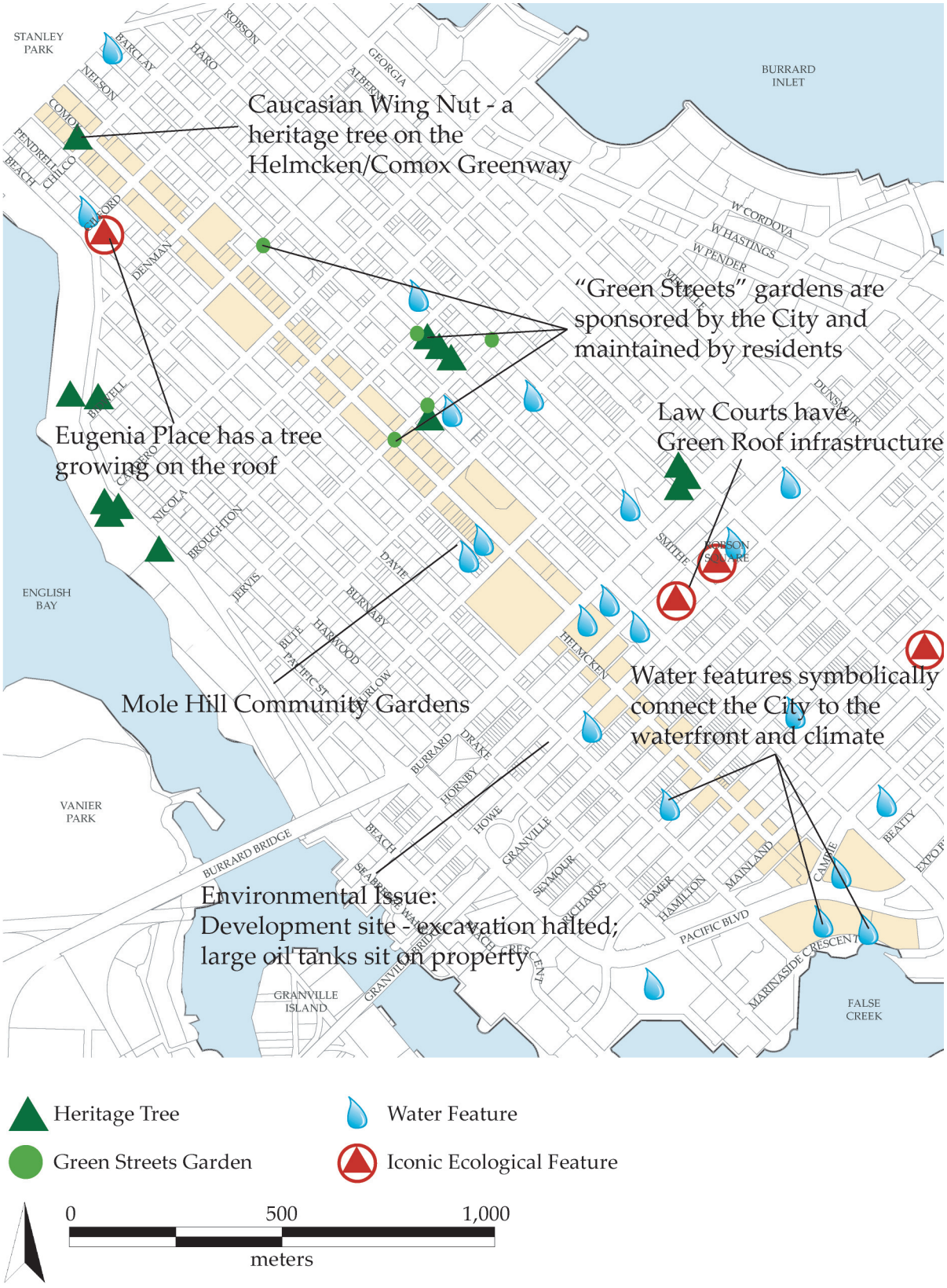
English Bay, and Burrard Inlet, is occurring because the larger volume of rainwater cannot infiltrate into the soil. Instead it is intercepted by buildings, streets, parking lots, and other paved surfaces, collecting pollutants before flowing into storm drains and eventually into the surrounding waters. During peak flows from a heavy rainstorm, this stormwater combines with the sewage system and flows directly into False Creek, English Bay, and Burrard Inlet.

Eugenia Place with its iconic tree on the balcony of the top floor. It has been said that this symbolizes the original height of the West End forest.

Ecoliteracy

Figure 5.8 locates various ecological features within a short walking distance from the greenway. Water features include a collection of fountains and reflecting pools, which recognize the relationship the City has with water from its economic ties to the ports to its geologic ties to the land's formation by the Fraser River Delta. Community gardens at Mole Hill and Green Streets garden plots demonstrate the community's relationship to the natural environment. Iconic ecological features like the green roof at Robson Square designed by Cornelia Oberlander or Eugenia Place in the West End with a tree on its roof are recognized by many people. A project sponsored by the British Columbia Society of Landscape Architects in the early 1980s unearthed the histories of over a hundred trees all over the city. These trees were not all the oldest trees or the ones with the greatest ecological importance, but also had unique stories about them such as the reason for their planting commemorated a significant event.

Figure 5.8 - Ecoliteracy Map



Access & Transportation

Access

Both Helmcken and Comox were selected for the siting of the greenway due to their generally low, neighbourhood-level traffic volumes. This characteristic make Helmcken and Comox an ideal location for a greenway and increased use by cyclists and pedestrians. Access to the corridor is very good, as the route follows a city street course set on a grid system. The Aquabus and another private ferry service along False Creek provide additional access to the downtown. As one might expect, the downtown is well-accessed by transit, particularly along Granville Street (Figure 5.9). Aquabus and other private ferry service along False Creek provide additional access to the downtown. Sidewalks are generally poured concrete, though Yaletown's heritage district has brick sidewalks. In either case, sidewalks are generally well-maintained and regular curb cuts provide access for the mobility-impaired.

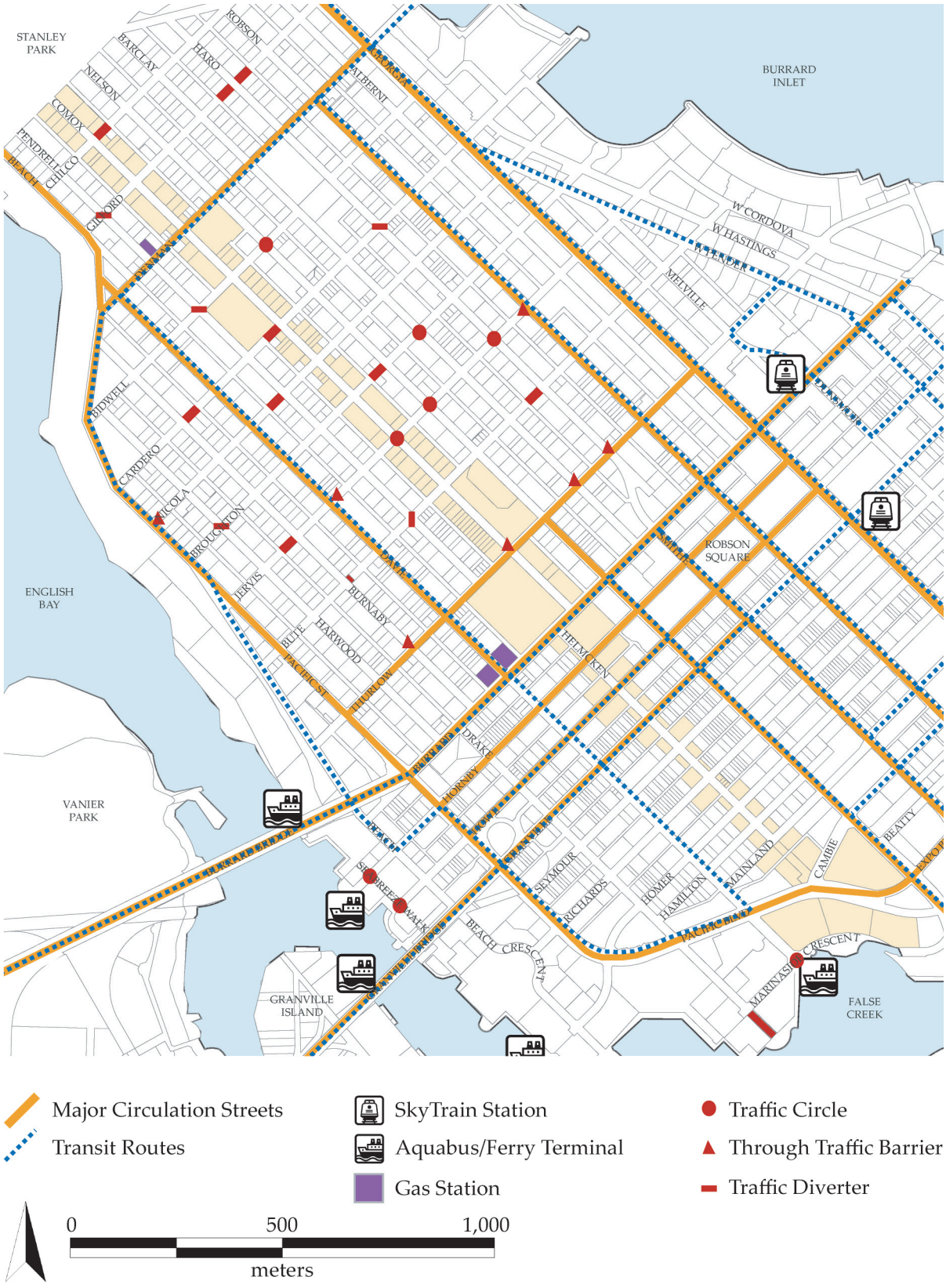
Vehicular Transportation

Figure 5.9 illustrates the circulation streets and transportation nodes of the downtown. In comparison to neighbouring streets and some cross-streets, very little vehicular activity occurs on Helmcken and Comox. Neither street is a transit street nor are they carry a heavy volume of arterial traffic. In Yaletown, most traffic circumvents the historic area along Pacific Boulevard. Davie, Nelson and Granville streets carry additional traffic around the neighbourhood. Davie, Denman, and Robson form a trio of vehicular and transit streets that carry most of the West End's through traffic. Both Burrard Street and Pacific Boulevard are major arterials that are significant barriers to greenway routing. Traffic counts conducted at peak morning and evening rush hours on Burrard at Comox Street support this statement: 2,088 vehicles/hour in the morning and 2,052 vehicles/hour in the evening (see Appendix B). Denman Street traffic volumes at peak hour can exceed 1,000 vehicles/hour at peak times, and can rise even higher on the weekends. Both Helmcken and Comox typically experience low-traffic volume with counts not exceeding 200 vehicles/hour even at peak times. Neither Helmcken nor Comox were identified as streets with significant traffic safety issues, that is, streets with a high frequency of collisions (Downtown Transportation Plan, 2002).[2]

Parking

In Yaletown and Downtown South, metered parking is generally allowed on both sides of the street. Along Burrard Street, a transit stop outside the Peter Wall Centre prohibits parking at all times and parking is restricted on the east side of the street at

Figure 5.9 - Vehicular Transportation



peak hours; parking in front of St. Paul's hospital is prohibited. With the exception of the block of Comox at Nelson Park where parking is allowed on the south side of the street only, parking in the West End from Burrard to Denman is on the north side only and is generally permit parking or metered. From Denman Street to Stanley Park, permit parking is on the south side only.

Signals, Crossings, & Traffic Calming

Both timed and pedestrian-activated signals are used along the route. Generally, most timed signals are located between Richards and Hornby streets in the Downtown South area. Pedestrian-activated signals are located at Pacific Boulevard, Burrard and Denman streets. There are no bike-activated signals along the route. All other crossings are two- or four-way stops. Two-way stops are typically on the east-west streets in Yaletown (along Helmcken, for example) and on the north-south streets in the West End (Comox has through traffic with few stop signs). Signal and crossing improvements that prioritize thru cyclists on Helmcken and Comox are recommended. Traffic calming and diversion measures in the central area of the West End discourage through vehicular traffic. Typical calming measures include street closures, half-closures, traffic circles, and diverters. A diverter on Comox Street at Thurlow prevents thru westbound traffic across Thurlow. One traffic circle at Jervis Street is maintained through the "Green Streets" program.

Pedestrian & Cyclist Transportation

Both Helmcken and Comox streets are well-travelled by pedestrians particularly within a few blocks of retail streets like Denman Street in the West End. Evenings and weekend days are typically the busiest days for pedestrians on Helmcken and Comox. The number of cyclists travelling on the route are not significant and counts were generally consistent with census data. On a typical weekday evening in good weather, 9 cyclists per hour were counted on Helmcken at Homer Street and only 3 cyclists per hour on Comox at Denman Street. In comparison, the number of cyclists on the Seawall on a typical weekday evening in good weather was 189 per hour.

Mode Split

Both walking and cycling have seen an increase in mode share over the past several years in the downtown (TransLink, 2004). Indeed, the 2002 Downtown Transportation Plan recognizes that patterns of travel in and around the downtown have shifted from single-occupant-vehicles (SOV) to walking, biking and transit. It is commonly acknowledged that every transit trip begins and ends with a walking trip. Figure 5.12 illustrates that

Figure 5.10 - Pedestrian & Cyclist Transportation

walking exceeds SOV use for residents of the West End in means of transportation to work. Compared to the City of Vancouver at 13%, walking grabs a much larger percentage of mode share in both the West End and Yaletown, at 42% and 35% respectively. This more than accounts for lower transit ridership percentages in these neighbourhoods. Unfortunately distance to work data is not available through Statistics Canada; this information may further indicate that those within a reasonable walking or cycling distance of their job are choosing that mode over using their cars.

	West End	Yaletown	City of Vancouver
Car / Motorcycle	35%	46%	58%
Carpool	3%	4%	7%
Public Transit	15%	10%	17%
Bike	3%	3%	4%
Walk	**42%**	**35%**	**13%**
All Others	1%	1%	1%
Worked at Home	8%	11%	8%

Figure 5.11 Mode Split for the West End, Yaletown, and the City of Vancouver.

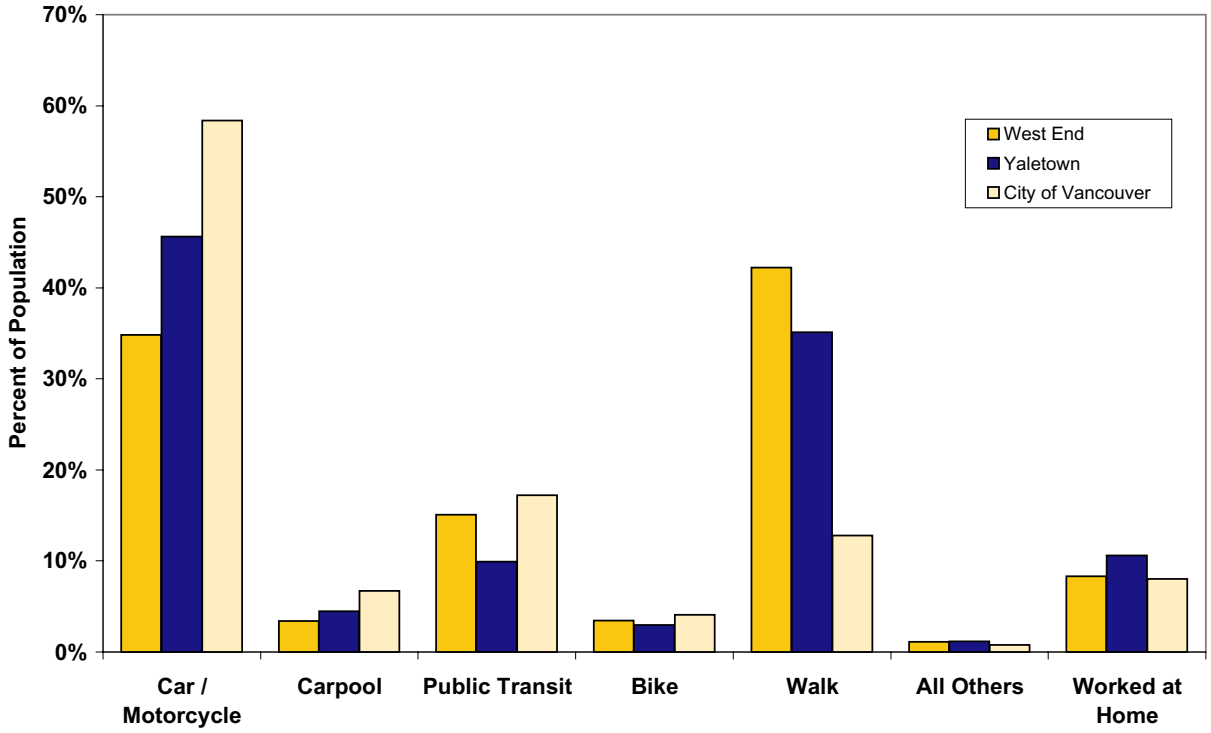


Figure 5.12 Mode Split for the West End, Yaletown, and the City of Vancouver.

Socio-economic factors

History & Culture

Yaletown was named after the town of Yale, BC from where materials were brought to fill the Yaletown warehouses. It is believed that the great fire of 1886 began in Yaletown. The narrow right-of-ways and loading docks of Hamilton and Mainland streets were typical conditions of this warehouse district and made loading of goods on and off railcars simple. The canopies that extend over the loading docks were functional and designed to keep boxes and materials dry during loading. Reminders of the district's rail-oriented past are evident today in the public art, loading docks, canopies, and the Roundhouse. The Roundhouse today houses a community centre and the first locomotive to arrive in Vancouver –Engine 374. The heritage building and turnstile was saved in part from complete demolition as a result of the activism of some Architecture students from the University of British Columbia in the 1980s. A "buy-a-brick" program funded the installation of Engine 374 and the construction and restoration of the Roundhouse as part of Expo '86.

Downtown South has traditionally been a commercial area of the downtown. More recently, new residential housing construction have dominated the land development picture in the downtown. Downtown South barely existed as a residential area when Vancouver's Central Area Plan was adopted by Council in 1991. It is anticipated to have a population of 24,000 by 2021 (City of Vancouver, 2005). Downtown South in the 1970s was an area of mostly 2 and 3 storey buildings with a mix of warehousing and distribution as well as residential and commercial uses. Zoning by-laws introduced in the mid-1970s and a 1987 City Council endorsement to change the area into a high density residential neighbourhood as part of a strategy to revitalize Granville Street. Granville Street, with many of the city's cinemas, clubs and theatres, also forms the heart of the Entertainment District.

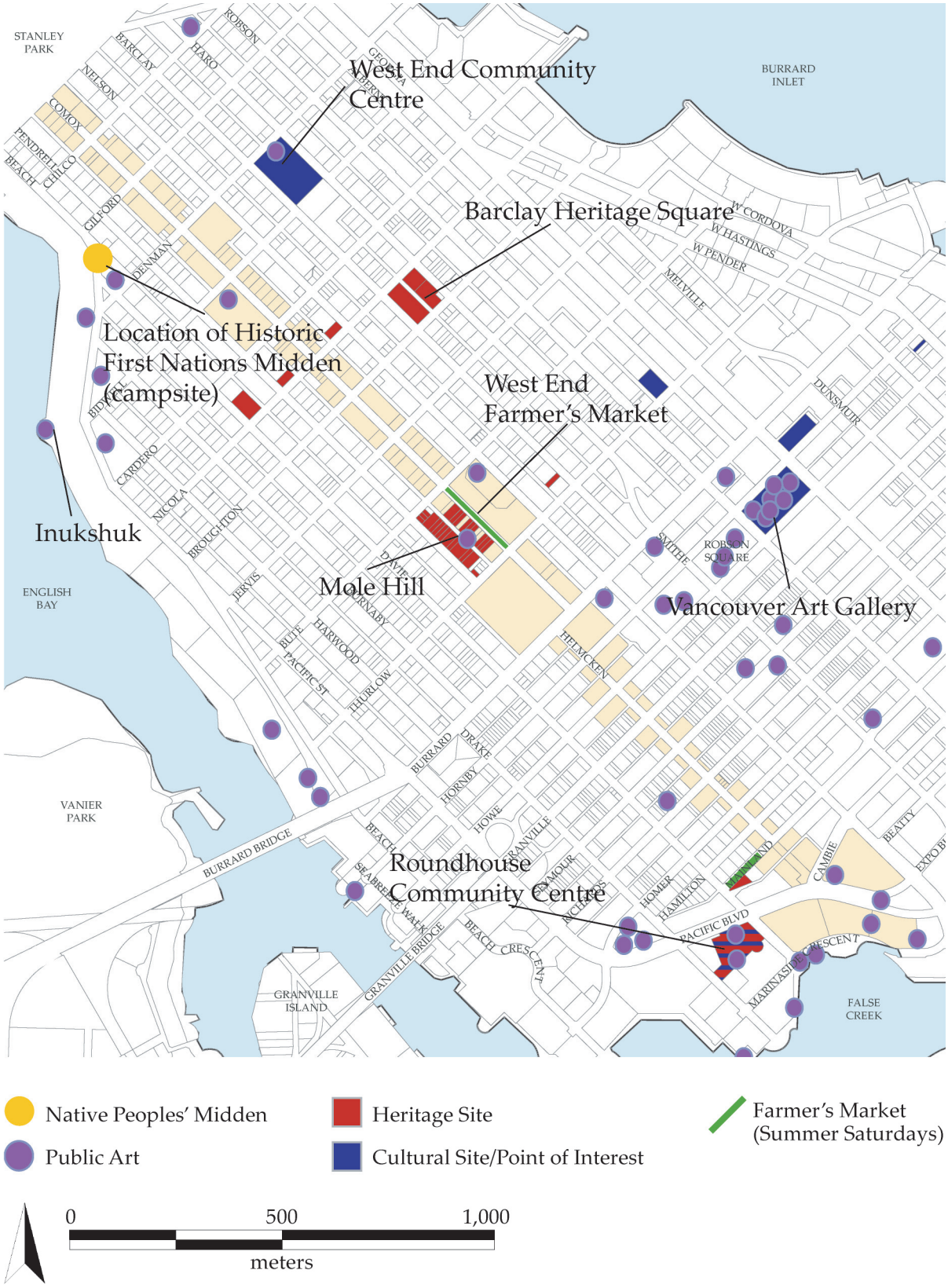
The discovery of coal in 1859 was an early event in the West End's development history. Much of the land was sold a short time later to a group of land speculators who platted the streets in an irregular American gridiron fashion. North-south streets terminated at perimeter roads along the waterfronts, leaving beaches and parkland at the periphery as public amenities. In 1884, every third lot was given to the Canadian Pacific Railroad (CPR) as an inducement to extend the railroad line to Vancouver from Port Moody. Between 1884 and 1910 the area was developed with houses for the upper classes in the Edwardian, Queen Anne, and Craftsman styles. The West End quickly became the high-end neighbourhood of choice for well-to-do families and CPR magnates. A streetcar line along Robson, Denman, and Davie streets brought businessmen to downtown offices and visitors to the beach at English Bay. A

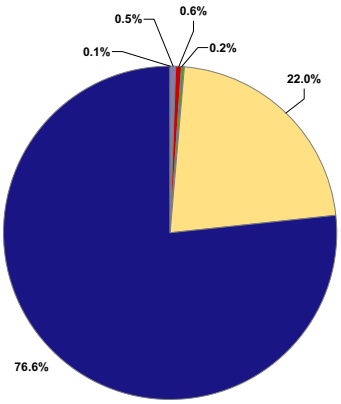
lack of zoning and the desirability of the neighbourhood led to a rise in land prices and soon the construction of elegant low-rise apartment buildings brought younger, well-educated and more transient residents. With the advent of the motor-car, an influx of ethnic residents (Chinese and Japanese), and the development of Shaughnessy, wealthy families began to move away, homes were converted to smaller apartment units, maintenance faltered, and the area began a period of decline. In 1927, the City sought to address the decline with a zoning by-law that restricted building heights to 60 feet, increased ground coverage allowances, reduced setbacks, and mixed uses. The Depression and the War Years also affected the neighbourhood economically and physically. By the 1950s, many of the original single-family homes had been destroyed in favour of apartments. With the end of World War II and the major influence of Corbusian "tower in the park" development concepts, the neighbourhood witnessed another major change. New zoning effectively removed height restrictions, permitted land assembly, required deeper set-backs, and increased developer freedoms through as-of-right zoning. Between 1956 and 1971 over 220 towers were built in the West End, more than doubling the number of housing units (Gray *et al*, 1976: 28). Most of the towers were constructed at the periphery of the neighbourhood, leaving the central area a mix of low-rise housing types. Incrementally, the West End became the home of Vancouver's gay community, whereby Davie Street became that community's cultural hub. Dwelling unit sizes continued to shrink and rents continued to increase and the demographic profile changed to one that was younger, poorer, single, fewer kids, and more seniors. Traffic calming measures were installed in the 1970s to discourage drivers from cutting through the neighbourhood, as well as to inhibit cruising for prostitutes.

Two recent developments that are significant to the celebration of the remaining heritage homes in the West End are Mole Hill and Barclay Heritage Square. Mole Hill was redeveloped as social housing with 120 units in 70 houses, woonerf alley, childcare centre, community gardens, and pocket parks. Similarly, Barclay Heritage Square features a total of nine Victorian homes, most of which serve as community spaces and social housing facilities, houses the Roedde House Museum, a fully-restored Victorian home believed to have been designed by British Columbia's most famous architect, Francis Rattenbury.

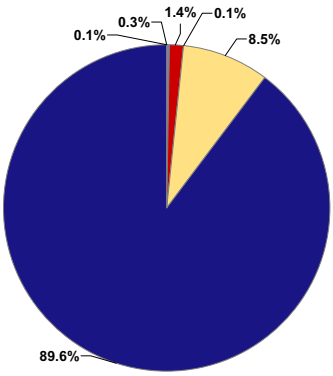
Figure 5.13 shows some of the various historical and cultural sites, as well as public art installations within a short walking distance of the study area.

Figure 5.13 - Historical & Cultural Sites

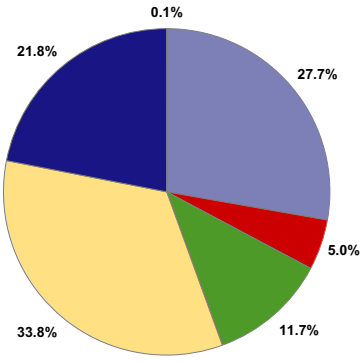




5.14a - West End



5.14b - Yaletown



5.14c - City of Vancouver

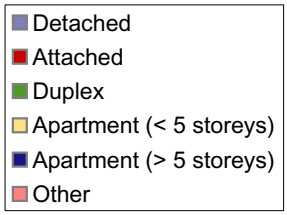


Figure 5.14a-c - Housing Types by Neighbourhood

Demographics[3]

An important difference in population between the City and the West End is the number of children present (see Figure 5.15) for 2001. A location quotient of 0.3 for 2001 illustrates that the population under the age of 19 is highly underrepresented and that the neighbourhood carries a burden with respect to age distribution. This indicates that the neighbourhood has fewer families or perhaps that the neighbourhood does not offer the types of amenities that families need, such as larger living spaces, and therefore families choose not locate there. The situation is similar in Yaletown (location quotient of 0.5) with the average number of bedrooms per dwelling (1.2) slightly higher than the West End (0.9). The average number of bedrooms for the City is 2.1. Both neighbourhoods are characterized by multiple apartment towers (Figures 5.14a-c) in which units are likely smaller in size than a detached dwelling that are in greater abundance in other parts of the city and perhaps better support family life. This is further supported by headship rate data (see Appendix B).

Most notably in the two neighbourhoods is their density, particularly in comparison to the city overall (Figure 5.16). Yaletown ranks higher than the West End in terms of density with 37 units per acres. This number is even considered somewhat low given the housing constructed since the 2001 census. The West End has 21 units per acre, most of which lies nearer the periphery of the neighbourhood. In comparison, Vancouver as a whole has a density of only 9 units per acre. Average household income of $60,964 for Yaletown exceeds the City average of $57,916, though the West End's average household income of $44,413 is far below the City average.[4] It is suspected that because census tracts were combined for Yaletown and Downtown South a low-income dissemination area outlier or group of outliers exist, likely in Downtown South where a few Single Room Occupancy hotels (SROs) still exist (mainly in the Granville Street area).

In summary, a typical resident in Yaletown lives in an apartment tower and drives or walks to work. They are married with few or no children, perhaps an empty-nester or a single young professional. In the West End, a typical resident is single and lives in a low-rise apartment building or high-rise tower. The typical West End resident pays a significant portion of their income on rent. With so many residents living adjacent to the greenway, there is an opportunity to entice residents from their hish-rise apartments out into the urban environment.

[3] Census information is from Statistics Canada, 2001. Appendix C includes a map of the census tract areas used in this study.

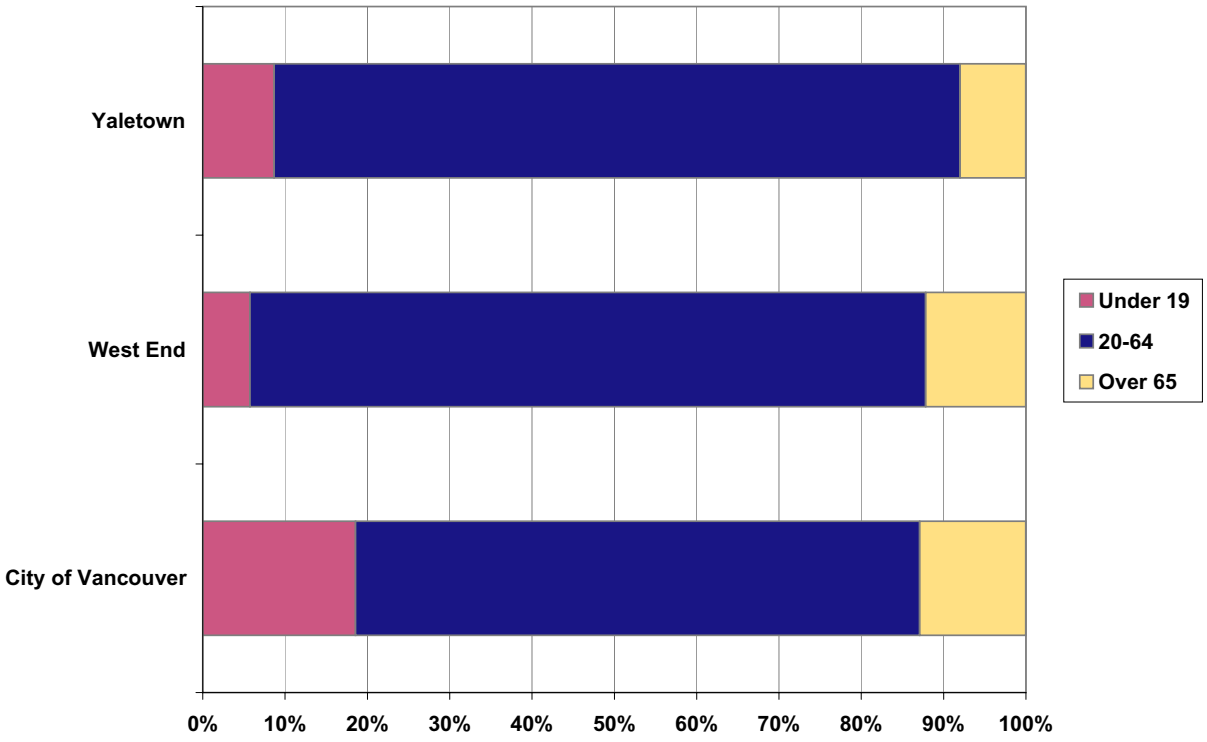


Figure 5.15 - Percentage of Study Area Population by Neighbourhood and Age Group

	West End	Yaletown	City of Vancouver
Total Private Dwellings	29,392	9,077	248,981
Land Area (acres)	1,409	247	28,343
Dwellings per acre	**21**	**37**	**9**

Figure 5.16 - Study Area Density

Community Outlook

As part of the public process on the 2002 Downtown Transportation Plan, "a majority of respondents strongly agreed with redesigning Helmcken Street as part of the Greenway network to give pedestrians and cyclist more priority" (Downtown Transportation Plan, 2002: 34). Direct involvement of adjacent residents and business owners in the discussion of routing, traffic calming measures, parking restrictions, material choices, and other design considerations is necessary for acceptance and ownership of the greenway. Partnership with local schools, gardening, running, and cycling groups is also integral to the greenway's success. Nelson Park is currently slated for a redesign; opportunities for integration of the greenway with this park are possible.

Community Events

The greenway's prime location through the middle of downtown provides a great opportunity to connect with events happening in the area. Figure 5.17 illustrates just some of the many community events that occur throughout the year within a short walking distance of the greenway. Types of events include farmer's markets, parades, rallies and marches, road races, street fairs and block parties, and other festivals. Two similar events Navigate the Streets and the Incredible Race, both "Amazing Race"-style scavenger hunt/road races where participants solve clues and races to various locations or checkpoints to raise money for Doctors Without Borders, occur in late August.

Public-Private Infrastructure

In Vancouver, as in most North American cities, the streets are commonly used as utility corridors for sewers, water, electrical, cable, fibre optic, telephone, and gas lines. Along the Helmcken/Comox corridor, conduits, service panels, and junction boxes for street lighting can be found in the right-of-way. On Helmcken in Yaletown and most of Downtown South, sewer mains cut across the corridor on the north-south streets or alleys. In the West End, sewer mains generally track a course beneath the alleys, which run east-west. Water mains, however, run along the streets and not the alleys. The location of these lines in the greenway corridor is important to recognize as places where certain plantings, such as trees, should be prohibited and where access to service locations should be maintained.

Safety, Maintenance & Crime

Lighting

Typical lighting along the Helmcken/Comox route currently is cobra-style light standards. This type of lighting is designed to light the roadway for vehicles and not directed towards the pedestrian realm. Ambient light from shops and residences provides additional light for the sidewalk. Pedestrian lighting exists in Helmcken Park and along Aquarius Mews between Pacific Boulevard and Marinaside Crescent. Additionally, two large street trees on the north side of Comox west of Denman have up lights mounted on their trunks for a dramatic effect.

Maintenance

The public realm along the corridor is generally in good condition. Streets are not in need of major repairs and sidewalks are generally even. As the 2002 Downtown Transportation gets implemented, additional bikes lanes will be added to newly resurfaced downtown streets, as what recently occurred on

Figure 5.17 - Community Events

Burrard Street. Privately maintained gardens, balconies, and roof gardens, particularly in the West End, indicate general resident interest in gardening and natural improvements in the public realm. Figure 5.8 shows the locations of City-sponsored Green Streets gardens, where residents "adopt" a section of the public realm, like a traffic circle, for planting and gardening; these are also well-maintained.

Security

Safety and security are worthy concerns in any metropolitan area and Vancouver is no different. Theft is a common problem in the downtown and Vancouver in general. For example, while conducting mid-morning Saturday traffic counts at Burrard and Comox, the researcher's assistant had his bike stolen from a bike rack outside St. Paul's hospital. Also, several attacks on women have occurred in the West End in and near Stanley Park in the last year. In addition, perceptions of safety, such as in the area between Granville and Richards streets where homeless, prostitutes, and other vagrants linger, threaten the greenway's success as a route for all members of the community.

Recreation

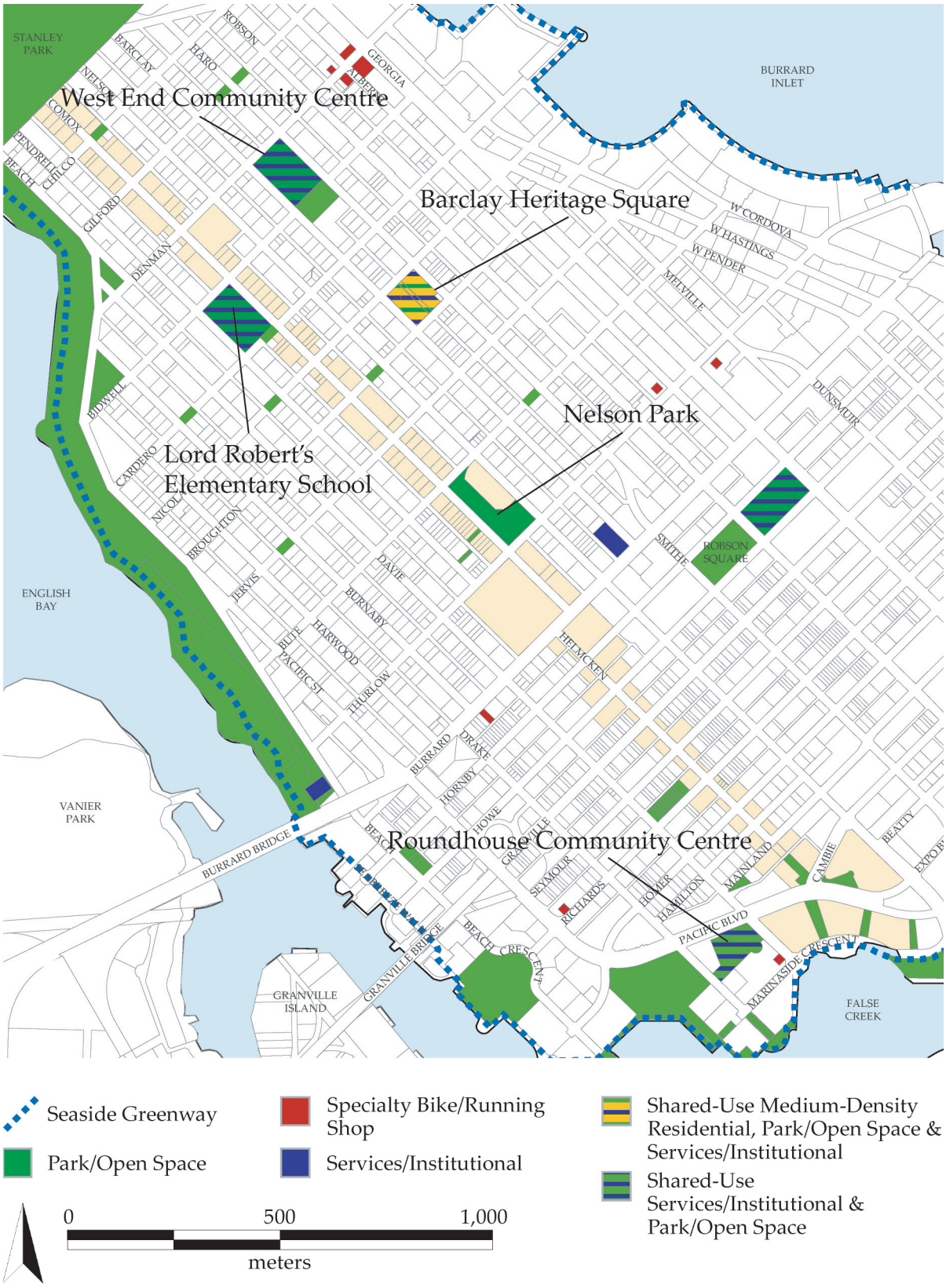
Facilities

Figure 5.18 locates several recreational facilities such as the YMCA on Burrard Street, the Roundhouse Community Centre in Yaletown, and a few of the specialty sport shops where greenway users may find necessary gear. Parks and other civic areas are also shown as they are places where travelers along the greenway may disembark to attend an event, visit a museum, or explore more informally.

Links to Other Trails

Figure 5.8 illustrates routes commonly taken by local running clubs, other recreational trails like the Seawall, bike lanes, and major pedestrian streets. The circle-cross symbols denote areas of significant pedestrian activity often centred around major cultural nodes such as Robson Square or shopping and eatery locations like at Denman and Davie streets.

Figure 5.18 - Recreational Activities



STUDY AREA

Helmcken/Comox Corridor Orientation

The core route of the Central Valley Greenway terminates at Main Street SkyTrain Station where the greenway connects to the multi-use Seaside greenway at Science World. The Helmcken/ Comox greenway extension traverses the Burrard peninsula leaves the meandering seawall at North False Creek and follows a more direct route northwest to Stanley Park (Figure 5.19).

Section 1: Aquarius Mews.

Section 1 - False Creek Seawall to Pacific Boulevard

Pedestrian-only access is available through the Concord Pacific development via Aquarius Mews to Pacific Boulevard. An alternative route for bikes from the seawall using Cambie and Pacific Boulevard is expected unless an easement through the development can be acquired for bike access.

Section 2: Helmcken Park (above) and a parking lot at the end of Helmcken Street (below).

Section 2 - Pacific Boulevard to Mainland Street

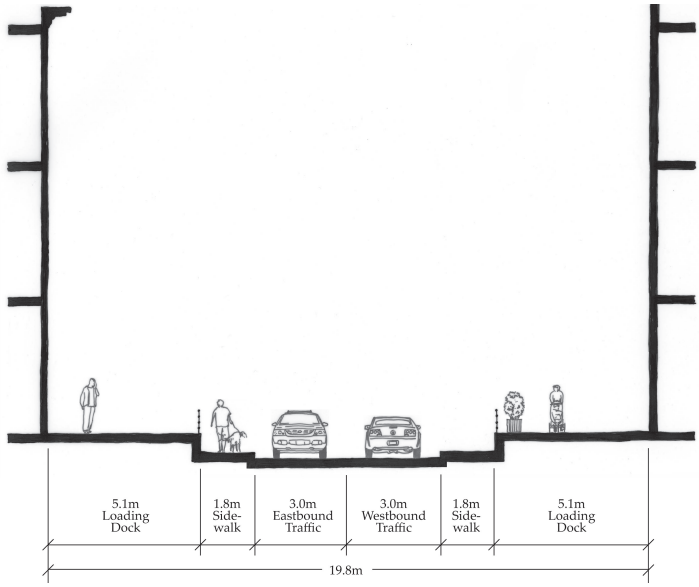
In this section, the route traverses Helmcken Park and a street-end parking lot at the terminus of Helmcken Street. Easement and through-way negotiations with the Parks Board and property owners are anticipated for bike access and vehicular conflict mitigation.

Figure 5.19 - Helmcken/Comox Extension Route Orientation

Section 3: Yaletown's loading docks restrict street width.

Section 3 - Mainland Street to Homer Street

This section goes through the heritage area of Yaletown. Helmcken Street width is varied in this location by the presence of heritage protected loading docks. Design details will need to take into account these structures as well as vehicular movements in a tight area. Parking is also at a premium in the Yaletown area.

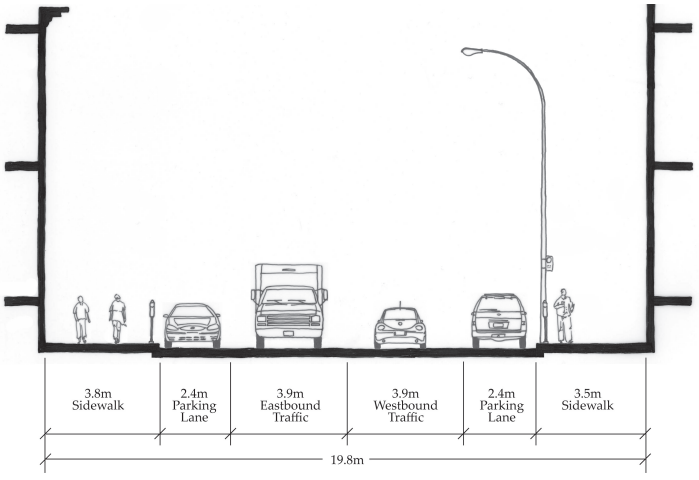


Cross-section showing the heritage loading docks in Yaletown. The working right-of-way is only 9.7 metres.

Section 4: Downtown South area has street parking on the north side.

Section 4 - Homer Street to Burrard Street

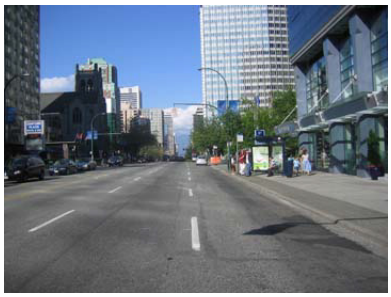
This section is a more regular right of way with more flexibility for design. Building access and resident input will be significant in this section.



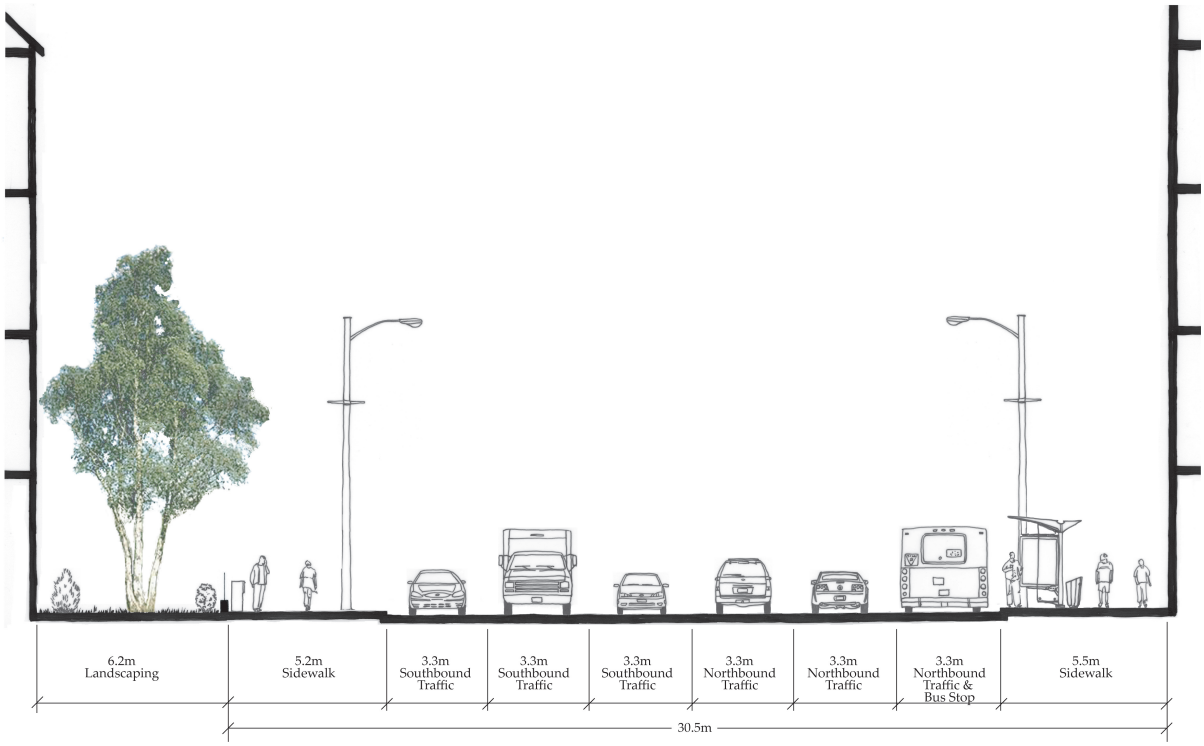
Cross-section showing the typical right-of-way in the Downtown South area.

Section 5 - Burrard Street to Thurlow Street

This section includes a complicated crossing of Burrard and jog over to Comox Street. St. Paul's Hospital requirements will need to be designed into any concept with the hospital's input. St. Paul's, a heritage site, requires a significant and False Creek Flats sometime in the next few years as the current location. In addition, hotels in this area attract a heavy traffic volume both from taxis and tourists (drivers) unfamiliar with the area.



Section 5: 18 jaywalkers per hour were counted for this study.



Burrard Street is 30.5m (100 ft.) wide and without a straight cross intersection, people commonly dash across the six lanes of traffic.

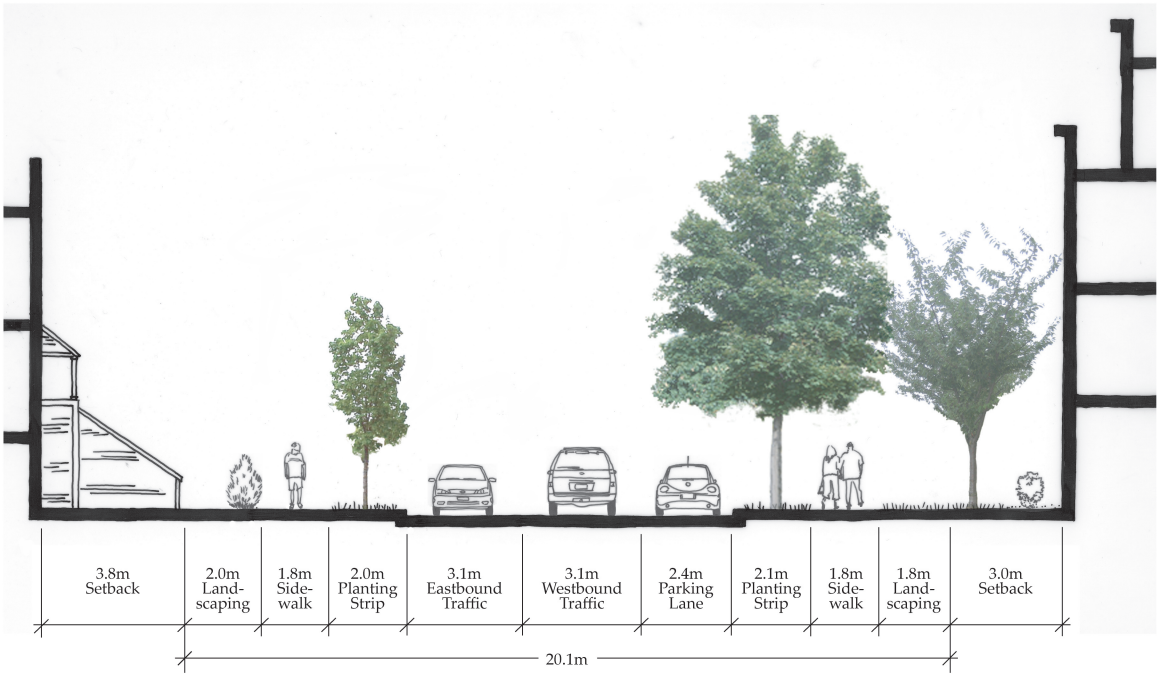
Section 6 - Thurlow Street to Bute Street

This section has an opportunity for a street calming design adjacent to Nelson Park. The potential for an effective park expansion exists. A weekly farmer's market occurs on this block on Saturdays from late June through October, during which times the street is closed to vehicular traffic, parking is prohibited, and through bike traffic is impeded.

Section 7: A traffic circle at the intersection of Jervis and Comox Street is part of the Green Streets program and is maintained by local residents.

Section 7 - Bute Street to Stanley Park

This section benefits from the West End traffic calming plan and further design improvements are possible to make this a prominent greenway through the West End.

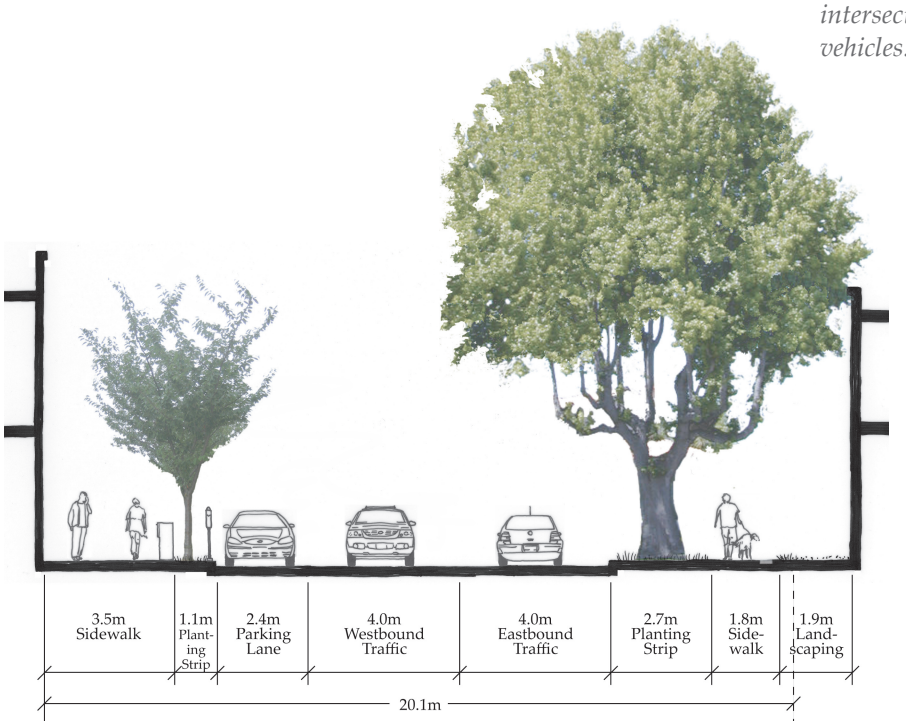


Comox Street typically has parking on the north side of the street. A variety of tree species, spaced at varying intervals make an unbalanced streetscape.

Section 7 - Bute Street to Stanley Park continued

Significant taxi and occasional tour bus traffic occurs at the intersection of Comox and Denman Streets due to the location of the Coast Plaza hotel on Comox; while this vehicular traffic is generally slow, prioritization of greenway users and aesthetic treatments will be key to the route's success here.

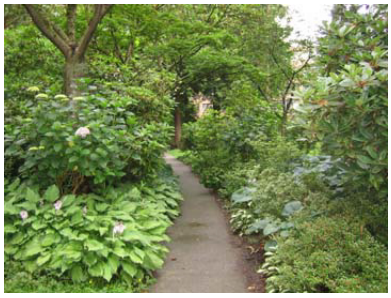
Section 7: Denman Street is a busy intersection for pedestrians and vehicles.



Comox Street at Denman Street looking east away from Stanley Park has wide traffic lanes and metered parking.

Stanley Park Entrance

Comox ends in a cul-de-sac at the edge of Stanley Park with two pedestrian paths leading into the Park. The entrance to Stanley Park can be accomplished at the western end of Comox with some redesign (i.e. widening) of pathways into the park. This area of the Park is also the seasonal home of a community of blue herons. The route would traverse their nesting grounds; route design will need to be sensitive to this habitat. Alternatively, though less ideally, a jog over to Nelson Street can connect up with a current major entry point. Design work will need to include Park Board staff and Park Board approval.



Stanley Park Entrance: The pedestrian entrances to Stanley Park are narrow.

SUMMARY

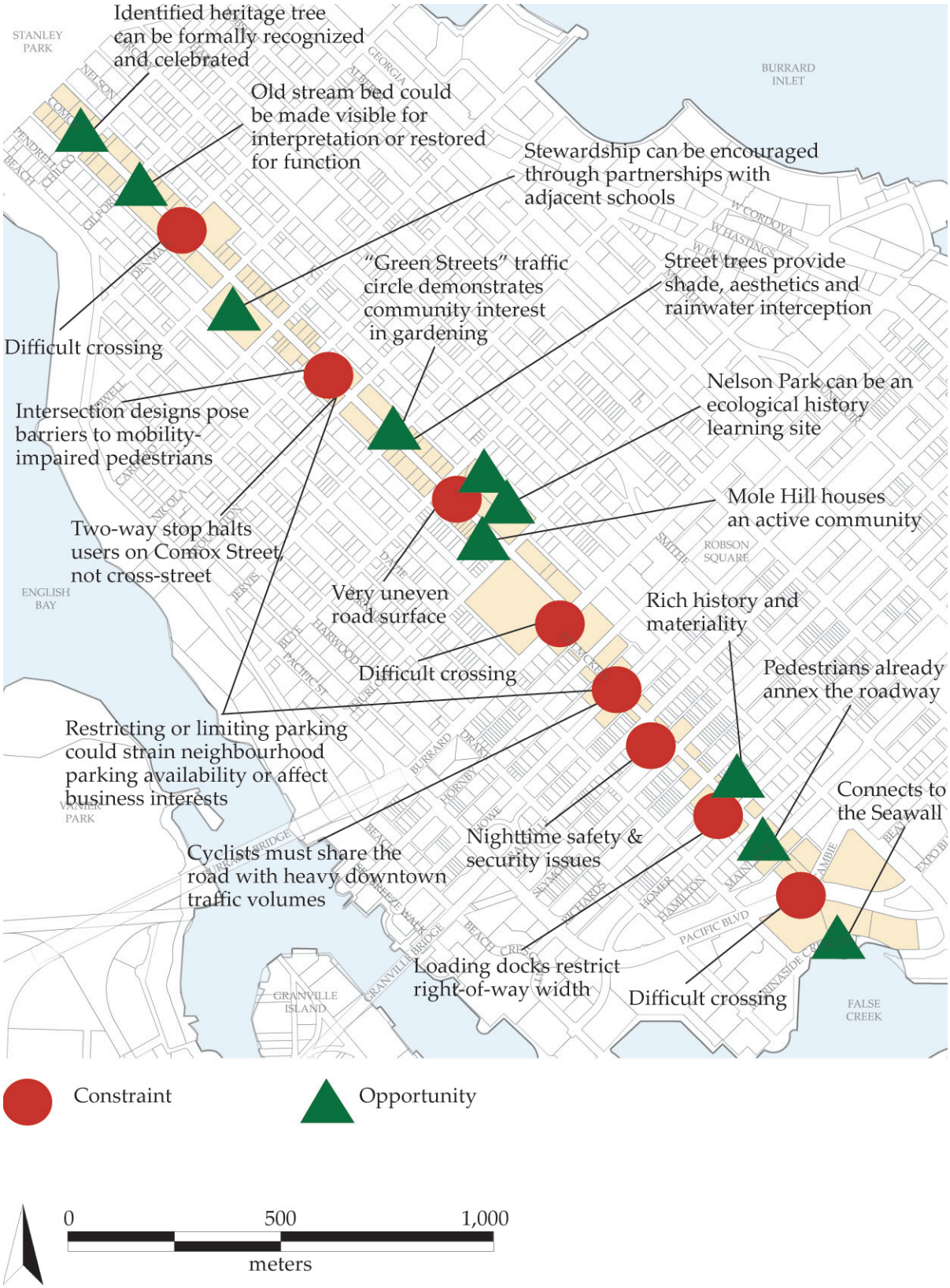
Constraints

In general, the right-of-way width is 20.1 metres (66 feet); fire and rescue vehicles require an unobstructed through-way of a minimum of 6.1 metres (20 feet). This yields only 14 metres (46 feet) for sidewalks, bike lanes and amenities, and parking. While this may seem like a reasonable distance, providing space for users and increasing space for ecological systems can be difficult. In Yaletown, heritage-protected loading docks further constrain design, as they barely allow space for two sidewalks (one on each side) and the required 6.1 metre roadway. Yaletown and Downtown South are typically commercial areas with strong bargaining power to maintain existing parking along Helmcken. Restricting vehicular directionality to one-way could be considered. However, it is recognized that one-way streets require an opposite direction couplet and the Downtown Transportation Plan, which approved *removal* of some one-way streets, was only recently adopted. Due to the high, and growing, residential density in the neighbourhoods the greenway transects, restricting on-street parking could be a difficult argument. Other more site-specific constraints include crossing difficulties at Pacific and Burrard, negotiating bikes on Helmcken Park's narrow walks, and accommodating existing trees.

Opportunities

The route's traffic volume is typically low and on par with what the Downtown Transportation Plan considers "neighbourhood" level; this is a benefit to cyclists who could share the road more equitably than on more arterial streets. Yaletown's rich history as a former train yard and warehouse district provides a palette of materials (i.e. brick, iron, and wood) that can be borrowed. The West End supports a much greener streetscape complete with various street trees and landscaped setbacks than Yaletown's more urban condition. From an ecological and recreational perspective, Nelson Park could realize its potential as a great greenway node for nature enthusiasts and recreationalists alike. It also offers a unique space for ecological education, as it was once the site of a fir tree forest. Partnerships with neighbourhood schools in the West End, two of which are located on the Comox route, provide an excellent opportunity for environmental learning and stewardship. In addition, existing events like the West End farmer's market or the creation of new events like a 5-kilometre road race offer ways to promote the visibility of the greenway as a unique route through the city.

Figure 5.20 - Summary of Constraints & Opportunities



CHAPTER 6 DESIGN IDEAS & RECOMMENDATIONS

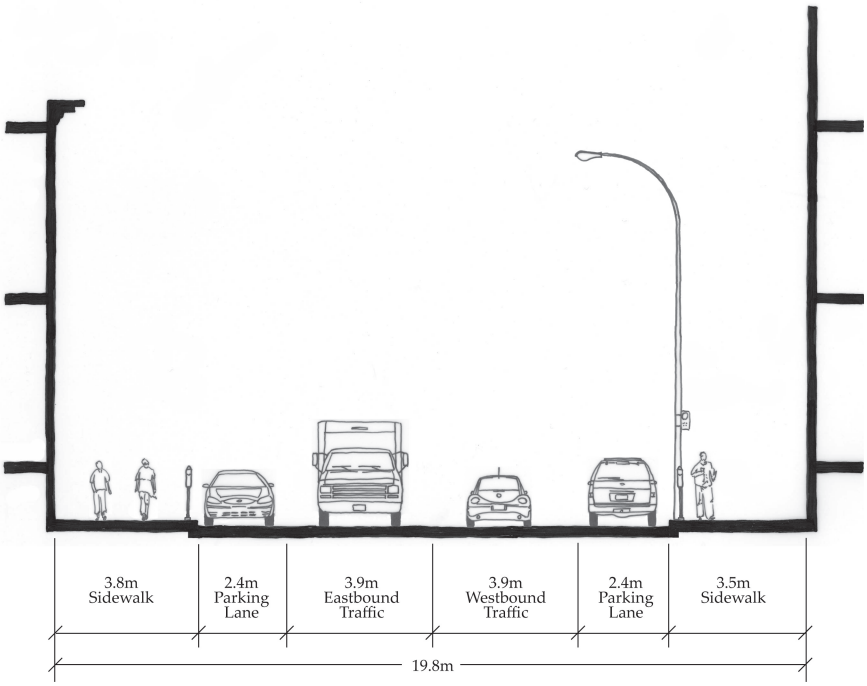
Two sites along the Helmcken/Comox corridor were selected to demonstrate how the design principles and strategies can be operationalized. The Helmcken site is located in Yaletown between Homer Street (to the north) and Hamilton Street (to the south). It is the short end of the block between Davie Street and Nelson Street. The Comox site is slightly larger and extends from Nicola Street (to the north) to Broughton Street (to the south) in the West End. This site is situated between Pendrell Street and Nelson Street and is adjacent to an old, but operational, fire hall (at Nicola and Nelson).

HELMCKEN - EXISTING CONDITIONS

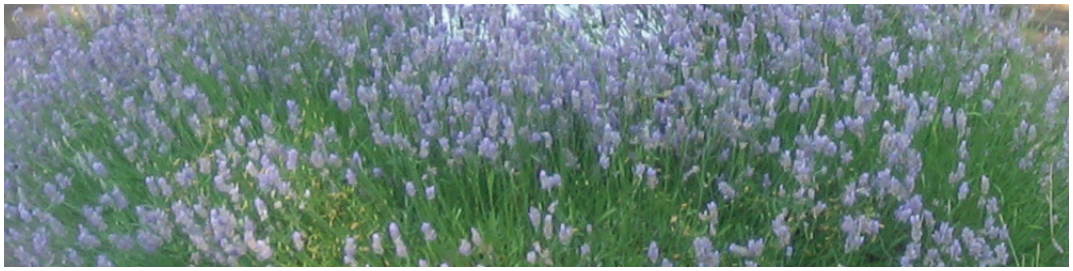
Existing Conditions

From the end of Helmcken Street at Helmcken Park in Yaletown, the right-of-way is restricted by the existing heritage-protected loading docks. While the purpose of the loading docks was for easy loading and unloading of goods onto and off the railcars that ran along Mainland and Hamilton streets, the raised docks also extend around the corners onto Helmcken. There is only enough room for a 1.8-metre sidewalk on either side of a 6.1-metre roadway. Heading west toward Granville and Burrard streets, Helmcken assumes the Vancouver standard right-of-way width of 20.1-metres (66 feet). Parking on both sides of the street and a minimum lane width of more than 3-metres is typical. Here there is more design flexibility.

On this block of Helmcken between Homer and Hamilton, there is metered parking for eight cars. There are no street trees on this block, though they exist to the north. The sidewalks in this block are brick as are the loading docks. The sidewalks that skirt around the loading docks are concrete. Black iron bollards protect the loading docks from vehicles; a black iron railing protects pedestrians on the elevated loading docks.



Typical existing conditions on Helmcken Street



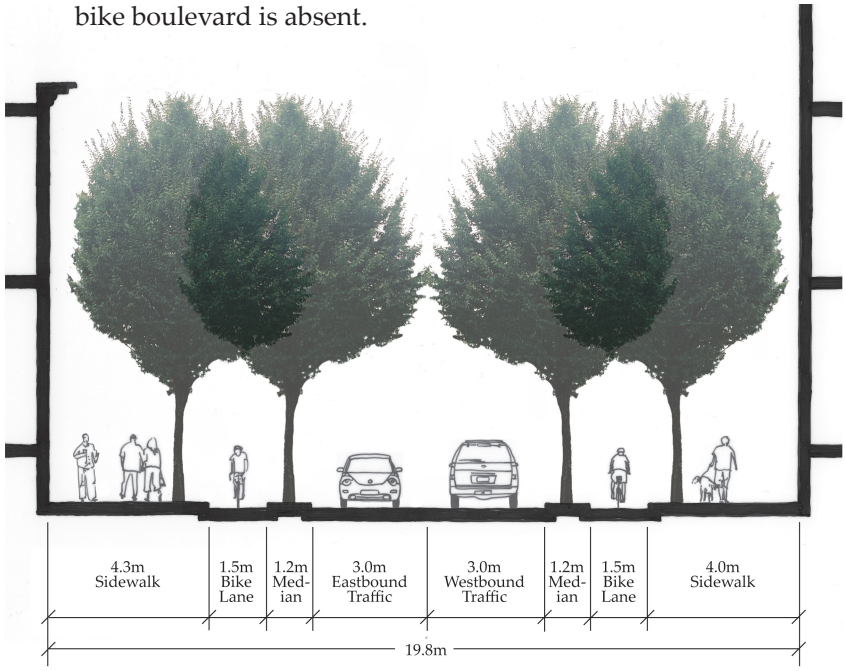
HELMCKEN - ALTERNATIVE B: BIKE BOULEVARD

Physical Description

A dramatic double-allee of trees characterizes Alternative B for Helmcken Street. This bike boulevard would be a truly unique condition in Vancouver, and perhaps in North America. The design is inspired by the Parisian bike boulevard. A green tunnel cutting through the Downtown, this option considers the experience of the pedestrian, cyclist, and driver by creating a unique streetscape. Helmcken Street could become one of the most imageable streets in Vancouver.

Technical Details

The trees are planted every 6 metres in an alternating double-allee to allow for canopy spread at maturity. A little-leafed linden tree is recommended for its seasonal fragrance. Regularly-spaced pedestrian lighting is placed in between the street trees on the sidewalk. Street parking is eliminated with this option. A 3-inch rolled curb replaces the existing curb at the intersection of Helmcken and Hamilton south to Mainland Street. Bollards relocated from the edge of the loading docks to the curb edge creates a condition similar to that of Granville Island. Bike stencils illustrate shared use of the road where the bike boulevard is absent.



Typical conditions of the bike boulevard where a double-allee of trees creates a dramatic streetscape.

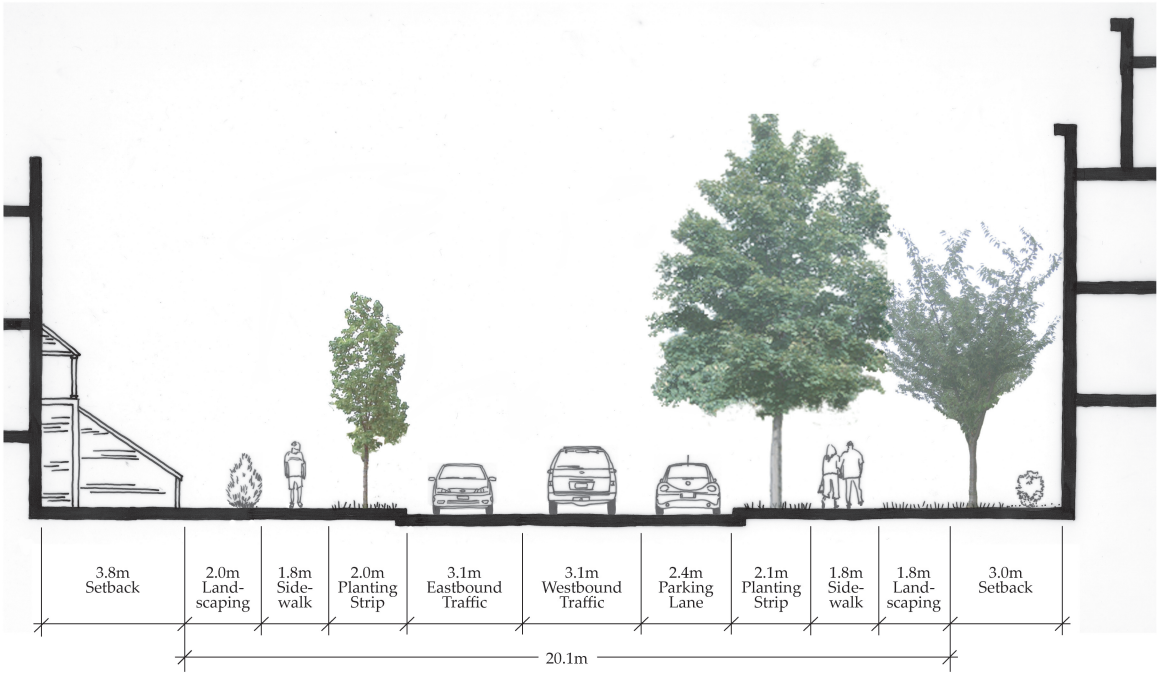

bike


Science
World
Central Valley
BC Parkway

COMOX - EXISTING CONDITIONS

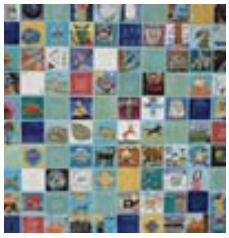
Existing Conditions

Comox is generally a quiet residential street through the West End. It is one of the few streets in all of the West End that does not have a traffic diverter for traffic heading east. The right-of-way is typically tight enough that two cars passing in opposite directions would need to slow down. In places, the pavement is rough and uneven, making it not so pleasant to cycle. The sidewalk is a standard 1.8-metres (6-ft.) concrete walkway on both sides of the street. Street trees provide aesthetic value, particularly in the spring when the cherry and flowering plum trees bloom. The trees also provide shade in the summer months, though tree spacing is somewhat irregular. Grass and lawn is the typical planting strip treatment except in some cases where residents have adopted the extra space as part of their landscaped setback. In short, Comox is a pleasant neighbourhood street to walk or ride your bike.



Typical street section of Comox Street in the West End.


CENTRAL VALLEY
Comox St.



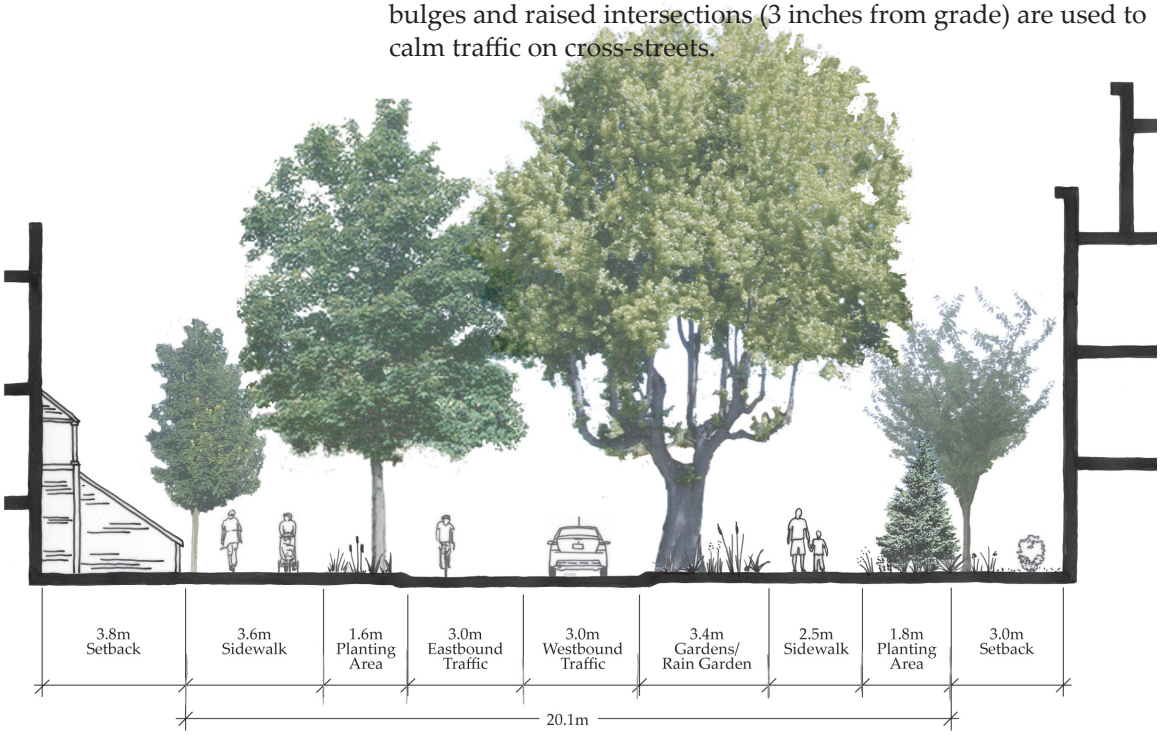
COMOX - ALTERNATIVE B: WOONERF MEETS GREEN STREET

Physical Description

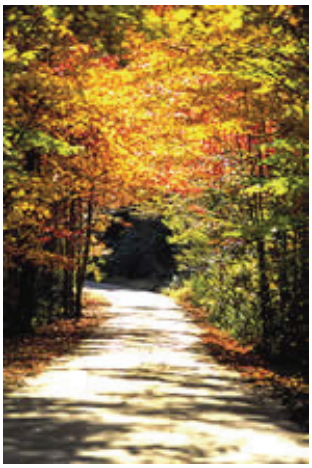
This woonerf-style option makes a grand gesture in the landscape, preserving existing heritage trees and sculpting the roadway into a new alignment. Design influences for this alternative come from the Crissy Field case, the Dutch woonerf, and Seattle's SEA streets. The plan envisions a street strategy that reinvents the street as two parts parkland and one part vehicular movement.

Technical Details

The meandering road is determined by the location of existing trees; a variety of tree species fill-in the landscape for more forest-like groves. Some areas are left more open to allow for sunnier clearings and drainage swales. Five parking spaces are retained on decomposed granite to allow for stormwater infiltration. Bikes share the 6.1-metre roadway with vehicles; shared use is marked by bike stencils and vertical signage. A 3-inch rolled curb is used to bound the parking spots and edge the roadway where the sidewalk abuts vehicular traffic. Corner bulges and raised intersections (3 inches from grade) are used to calm traffic on cross-streets.



Typical street section of the Comox woonerf illustrates mature trees in a park-like setting within the right-of-way.



CHAPTER 7 FINDINGS, FINAL RECOMMENDATIONS & CONCLUSION

Key Findings

In this report, the urban greenway is defined as a naturalized alternative transportation route for environmental education and connection to ecological, recreational, historical, and cultural amenities. The urban greenway can be easily identified as a unique, green corridor that traverses the urban landscape. Its role a pathway for movement of people, water, and animals and its function as a recreational and ecological resource can serve local and regional community and ecology. From cyclists, runners, and rollerbladers to seniors, the disabled, and schoolchildren, a great greenway design considers many different kinds of users. In addition, a greenway can offer relief from urban stress by enhancing the health and well-being of users.

The application of theory of place and placemaking can contribute to the creation of a successful greenway. Placemaking, as part of greenway design, involves using local materials, repetition of certain characteristics, programming, and the creation of symbols, among other methods, that celebrate and reinforce the connection to the physical or spiritual location of the greenway. Inherently, they can express a visual sense of place: greenways are *green*. These design components can help build the greenway's identity and image that contribute to the creation of a memorable experience for the user. A greenway that is designed with placemaking principles in mind can help develop a user's relationship with nature through a greater connection to place.

A greenway is, in effect, a linear park with a primary transportation component. The linearity of the greenway primes the user for exploration and discovery by its nature. In this way, a greenway possesses characteristics that are similar to streets. "Great streets" are imageable places where community is formed, where people can walk with leisure, and where the eye is entertained by layers of details. Visual interest, distinctness, and image combine to create a memorable experience on the street or the greenway. Constructing greenways along city streets can enhance the everyday landscape, building on the street collage and providing space for ecological systems.

Ecoliteracy is an environmental education philosophy that seeks to develop a person's understanding of ecology through direct experience in the natural environment. Its goal is to foster comprehension of one's place within the larger ecosystem. Ecological design provides a method for achieving

this understanding. Revealing and healing natural processes through design for environmental education is the basis for ecological landscape design. Urban greenways are an ideal location for the application of ecological design principles because they are often equitably located near housing and schools. Using local streets for the integration of greenways may help natural processes become part of the everyday vernacular. By bringing the Nature "out there" into the realm of the everyday, we can begin to foster our personal relationship with the natural environment.

The most magnificent of city complexes recognized the need to integrate infrastructure, or civil engineering, with landscape, or architecture. Beautiful and brilliant schemes are created when they both recognize space for human needs, both produce works of art in the truest sense.

-John Brinckerhoff Jackson

Urban greenways have the potential for engaging citizens and visitors in a grand urban ecological connoisseurship through its function, location and design. This report offers a compendium of design principles and strategies that can guide greenway design and help shape the urban greenway experience. These principles and strategies were tested on two sites along the Helmcken/Comox route. The resulting design alternatives demonstrate that these principles and strategies can be used to create a great greenway that is safe, functional, and imageable. There is also incredible variety in their application: bike boulevards, community gardens, traffic calming, and street realignment prioritizes alternative modes, helps build community, and restores natural systems. The Helmcken/Comox Greenway can connect neighbourhoods, workplaces, Stanley Park, and the Central Valley Greenway in a meaningful and memorable way, while providing a means for healthy exercise and contributing to mode shift. It can help develop our relationship with the natural environment through the increased presence of natural elements like trees, flowers, and wildlife. By allowing the community to take part in the greenway's design and to adopt places along it, the greenway can inspire knowledge, meaning, and value of the urban landscape. In this way, the greenway can be a place people learn from, connect with, and wish to protect.

Final Recommendations

Considering the prime downtown location of the Helmcken/Comox Greenway and as part of the Urban Transportation Showcase Project, the City of Vancouver, TransLink, and BEST have an opportunity to pioneer a greenway design that challenges the status quo. This report argues that a greenway has a role in the urban environment not only as a transportation route, but also as a place for the cultivation of our relationship with nature. As the demonstration designs illustrate, a variety of options are possible from the pragmatic to the dramatic. It is recommended that the planning agencies develop a phasing plan that prioritizes pedestrians and cyclists in the short-term and creates a greenway that can foster knowledge, meaning, and value of the urban landscape over the long-term.

The design alternatives offered in this report are meant to initiate a larger discussion of the opportunities for the creation of a great greenway. Each alternative is not limited in application to the demonstration site: they can be mixed and matched to create a number of different possibilities. Considering that designs for the signage and street furniture will be universal along the entire Central Valley Greenway, they can provide some continuity for the route, despite varying conditions.

Conclusion

In conclusion, a greenway may function as a good alternative transportation corridor even if it neglects the lessons of placemaking, memorable experience, and ecoliteracy. It may further contribute to mode shift and a decrease in greenhouse gas emissions by functionally providing space for cyclists and pedestrians. However, a greenway can become an essential component of sustainable city's urban landscape if it considers the design principles of placemaking, great streets, and ecological design. A greenway can be an imageable recreational and ecological amenity, which, if located in the everyday environment, has the potential to change the daily habits of the people who use it and live adjacent to it.

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APPENDIX A - SITE ANALYSIS METHODS

1. Context description – Brief description of Vancouver greenways planning, the Downtown Transportation Plan, the Urban Showcase project, the CVG, the program requirements for the Helmcken/Comox extension, and general corridor orientation with map.

2. Land use – Description and map of land uses of parcels immediately adjacent to greenway route.

3. Ecological – Inventory and description of ecological features and attributes of the route including soil, geology, vegetation, water/hydrology, climate/microclimate, temperature, shadow/sun exposure, animals, and topography. Map of open space and ecological resources/centres within 5-minute walk of the route.

4. Access & Transportation – Description and maps of major pedestrian, cyclist, transit, and vehicular routes that parallel or intersect the route within a 5-minute walk of the greenway. Map of existing/potential user-conflict areas. Traffic and pedestrians counts on the corridor at two locations: West End (mid-neighbourhood) and Yaletown (mid-neighbourhood) to gage current usage of corridor. Comparison counts on Seaside greenway in West End (ped and cyclist) and Davie St. (major neighbourhood retail and collector street). Parking regulations along the route will also be described and mapped.

5. History & Culture – Description of neighbourhood histories (West End and Yaletown) and map of historical and cultural resources/places, public art, and First Nations resources/places within a 5-minute walk of the greenway.

6. Demographic – Description and profile of West End and Yaletown communities. Details age and family distribution, household income, density, and mode split.

7. Socio-Economic – Description and map of local running clubs, bike advocates, gardening groups, and community events – farmer's markets, street fairs, road races, parades, rallies, etc.

8. Recreation – Description and map of area recreational facilities/links to other trails.

9. Public/Private Infrastructure – Description of sewer, water, electrical, cable, fiber optic, telephone, oil and gas, and storm sewer utilities along the corridor.

10. Other – Description and map of other site considerations such as views, odor and noise, security, and dimensions.

11. Site analysis concludes with a summary of opportunities and constraints.

APPENDIX B - TRAFFIC COUNTS

Traffic Counts - Morning

	Denman/Comox				Broughton/Comox				Burrard/Comox				Helmcken/Homer				Seawall	
	Denman		Comox		Broughton		Comox		Burrard		Comox		Helmcken		Homer		Seawall	
	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour
Vehicles																		
Northbound	216	648	0	0	19	57	0	0	469	1407	0	0	0	0	114	342	0	0
Southbound	243	729	0	0	5	15	0	0	168	504	0	0	0	0	8	24	0	0
Eastbound	0	0	21	63	0	0	15	45	0	0	17	51	10	30	0	0	1	3
Westbound	0	0	10	30	0	0	7	21	0	0	43	129	3	9	0	0	0	0
Buses	12	36	0	0	1	3	0	0	30	90	0	0	0	0	0	0	0	0
Taxis	6	18	18	54	5	15	0	0	29	87	0	0	0	0	3	9	0	0
Motorcycles	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0
TOTAL	**480**	**1440**	**49**	**147**	**30**	**90**	**22**	**66**	**696**	**2088**	**60**	**180**	**14**	**42**	**125**	**375**	**1**	**3**
Cyclists																		
Northbound	5	15	0	0	4	12	0	0	15	45	0	0	0	0	2	6	0	0
Southbound	4	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastbound	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	12	36
Westbound	0	0	1	3	0	0	0	0	0	0	2	6	2	6	0	0	8	24
TOTAL	**9**	**27**	**2**	**6**	**4**	**12**	**0**	**0**	**15**	**45**	**2**	**6**	**2**	**6**	**2**	**6**	**20**	**60**
Pedestrians	60	180	44	132	26	78	18	54	166	498	47	141	28	84	29	87	28	84
Dogwalkers	0	0	0	0	4	12	0	0	1	3	0	0	1	3	1	3	0	0
Joggers	2	6	0	0	0	0	0	0	0	0	0	0	0	0	1	3	15	45
Children	1	3	0	0	1	3	0	0	1	3	0	0	0	0	0	0	0	0
Other	0	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**63**	**189**	**46**	**138**	**31**	**93**	**18**	**54**	**168**	**504**	**47**	**141**	**29**	**87**	**31**	**93**	**43**	**129**
Rollerbladers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walking Space (m)	**3.04**		**5.32**		**3.64**		**3.64**		**6.28**		**3.64**		**5.93**		**3.14**		**9.32**	
People/m/min[1]		**1**		**0**		**0**		**0**		**1**		**1**		**0**		**0**		**0**
Parking																		
Spots	0	N/A	6	N/A	11	N/A	18	N/A	0	N/A	18	N/A	8	N/A	29	N/A	N/A	N/A
Parkers[2]	0	0	0	0	0	0	0	0	0	0	2	6	2	6	2	6	0	0
Violations																		
U-Turns	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parking	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jaywalkers	0	0	4	12	0	0	0	0	3	9	37	111	2	6	1	3	0	0
Moving	0	0	0	0	0	0	0	0	4	12	0	0	0	0	0	0	0	0

[1] People/m/min calculation on the Seawall only includes all recreationalists (including rollerbladers and cyclists).

[2] "Parkers" on the seawall are people sitting/relaxing on the ground, benches, or other furniture.

Traffic Counts - Evening

	Denman/Comox				Broughton/Comox				Burrard/Comox				Helmcken/Homer				Seawall	
	Denman		Comox		Broughton		Comox		Burrard		Comox		Helmcken		Homer		Seawall	
	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour
Vehicles																		
Northbound	186	558	0	0	48	144	0	0	252	756	0	0	0	0	140	420	0	0
Southbound	136	408	0	0	10	30	0	0	362	1086	0	0	0	0	27	81	0	0
Eastbound	0	0	12	36	0	0	24	72	0	0	22	66	13	39	0	0	0	0
Westbound	0	0	16	48	0	0	15	45	0	0	30	90	35	105	0	0	0	0
Buses	9	27	0	0	1	3	0	0	26	78	0	0	0	0	1	3	0	0
Taxis	22	66	0	0	6	18	0	0	43	129	0	0	2	6	4	12	0	0
Motorcycles	6	18	0	0	1	3	0	0	1	3	0	0	2	6	2	6	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**359**	**1077**	**28**	**84**	**66**	**198**	**39**	**117**	**684**	**2052**	**52**	**156**	**52**	**156**	**174**	**522**	**0**	**0**
Cyclists																		
Northbound	6	18	0	0	0	0	0	0	4	12	0	0	0	0	0	0	0	0
Southbound	8	24	0	0	1	3	0	0	15	45	0	0	0	0	0	0	0	0
Eastbound	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	24	72
Westbound	0	0	1	3	0	0	3	9	0	0	5	15	3	9	0	0	39	117
TOTAL	**14**	**42**	**1**	**3**	**1**	**3**	**3**	**9**	**19**	**57**	**7**	**21**	**3**	**9**	**0**	**0**	**63**	**189**
Pedestrians	348	1044	77	231	43	129	45	135	232	696	42	126	93	279	101	303	115	345
Dogwalkers	7	21	0	0	1	3	0	0	1	3	0	0	7	21	4	12	12	36
Joggers	0	0	0	0	0	0	0	0	2	6	0	0	2	6	0	0	45	135
Children	10	30	0	0	5	15	0	0	2	6	0	0	6	18	0	0	14	42
Other	1	3	0	0	1	3	0	0	0	0	0	0	0	0	0	0	6	18
TOTAL	**366**	**1098**	**77**	**231**	**50**	**150**	**45**	**135**	**237**	**711**	**42**	**126**	**108**	**324**	**105**	**315**	**192**	**576**
Rollerbladers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	96
Walking Space (m)	**3.0**		**5.3**		**3.6**		**3.6**		**6.3**		**3.6**		**5.9**		**3.1**		**9.3**	
People/m/min[1]		**6**		**1**		**1**		**1**		**2**		**1**		**1**		**2**		**1**
Parking																		
Spots	0	N/A	6	N/A	11	N/A	18	N/A	0	N/A	18	N/A	8	N/A	27	N/A	N/A	N/A
Parkers[2]	2	6	1	3	1	3	2	6	0	0	3	9	1	3	2	6	13	39
Violations																		
U-Turns	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0
Parking	0	0	1	3	0	0	0	0	0	0	3	9	1	3	0	0	0	0
Jaywalkers	1	3	5	15	4	12	1	3	0	0	5	15	9	27	10	30	0	0
Moving	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0	0	0

[1] People/m/min calculation on the Seawall only includes all recreationalists (including rollerbladers and cyclists).

[2] "Parkers" on the seawall are people sitting/relaxing on the ground, benches, or other furniture.

Traffic Counts - Saturday

	Denman/Comox				Broughton/Comox				Burrard/Comox				Helmcken/Homer				Seawall	
	Denman		Comox		Broughton		Comox		Burrard		Comox		Helmcken		Homer		Seawall	
	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour	Actual	Per Hour
Vehicles																		
Northbound	243	729	0	0	N/A	N/A	N/A	N/A	250	750	0	0	0	0	75	225	0	0
Southbound	253	759	0	0	N/A	N/A	N/A	N/A	172	516	0	0	0	0	16	48	0	0
Eastbound	0	0	20	60	N/A	N/A	N/A	N/A	0	0	15	45	10	30	0	0	0	0
Westbound	0	0	14	42	N/A	N/A	N/A	N/A	0	0	16	48	11	33	0	0	0	0
Buses	8	24	0	0	N/A	N/A	N/A	N/A	15	45	0	0	0	0	0	0	0	0
Taxis	17	51	0	0	N/A	N/A	N/A	N/A	29	87	0	0	2	6	0	0	0	0
Motorcycles	6	18	0	0	N/A	N/A	N/A	N/A	7	21	0	0	1	3	1	3	0	0
Other	1	3	0	0	N/A	N/A	N/A	N/A	9	27	0	0	0	0	0	0	0	0
TOTAL	**528**	**1584**	**34**	**102**	**N/A**	**N/A**	**N/A**	**N/A**	**482**	**1446**	**31**	**93**	**24**	**72**	**92**	**276**	**0**	**0**
Cyclists																		
Northbound	3	9	0	0	N/A	N/A	N/A	N/A	4	12	0	0	0	0	1	3	0	0
Southbound	6	18	0	0	N/A	N/A	N/A	N/A	2	6	0	0	0	0	0	0	0	0
Eastbound	0	0	1	3	N/A	N/A	N/A	N/A	0	0	0	0	1	3	0	0	37	111
Westbound	0	0	0	0	N/A	N/A	N/A	N/A	0	0	0	0	1	3	0	0	47	141
TOTAL	**9**	**27**	**1**	**3**	**N/A**	**N/A**	**N/A**	**N/A**	**6**	**18**	**0**	**0**	**2**	**6**	**1**	**3**	**84**	**252**
Pedestrians	386	1158	94	282	N/A	N/A	N/A	N/A	93	279	41	123	70		42	126	86	258
Dogwalkers	6	18	0	0	N/A	N/A	N/A	N/A	0	0	0	0	2	6	2	6	3	9
Joggers	5	15	0	0	N/A	N/A	N/A	N/A	1	3	0	0	2	6	0	0	20	60
Children	15	45	0	0	N/A	N/A	N/A	N/A	9	27	0	0	3	9	2	6	12	36
Other	1	3	0	0	N/A	N/A	N/A	N/A	1	3	0	0	0	0	0	0	11	33
TOTAL	**413**	**1239**	**94**	**282**	**N/A**	**N/A**	**N/A**	**N/A**	**104**	**312**	**41**	**123**	**77**	**21**	**46**	**138**	**132**	**396**
Rollerbladers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	69
Walking Space (m)	**3.04**		**5.32**		**3.64**		**3.64**		**6.28**		**3.64**		**5.93**		**3.14**		**9.32**	
People/m/min[1]		**7**		**1**		**N/A**		**N/A**		**1**		**1**		**0**		**1**		**1**
Parking																		
Spots	0	N/A	6	N/A	11	N/A	18	N/A		N/A	11	N/A	8	N/A	27	N/A	N/A	N/A
Parkers[2]	1	3	2	6	N/A	N/A	N/A	N/A	0	0	1	3	1	3	6	18	6	18
Violations																		
U-Turns	0	0	0	0	N/A	N/A	N/A	N/A	0	0	1	3	0	0	1	3	0	0
Parking	0	0	0	0	N/A	N/A	N/A	N/A	0	0	2	6	0	0	1	3	0	0
Jaywalkers	7	21	9	27	N/A	N/A	N/A	N/A	6	18	16	48	3	9	1	3	0	0
Moving	0	0	0	0	N/A	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0	0

[1] People/m/min calculation on the Seawall only includes all recreationalists (including rollerbladers and cyclists).

[2] "Parkers" on the seawall are people sitting/relaxing on the ground, benches, or other furniture.

APPENDIX C - RAW DEMOGRAPHIC DATA

Category	WEST END 2001 raw numbers	details	% of total	WEST END '01 location quotient	YALETOWN 2001 raw numbers	details	% of total	YALETOWN '01 location quotient	VANCOUVER (CITY) 2001 raw numbers	details	% of total	VANCOUVER (CITY) '01 location quotient
POPULATION												
Total Population	41,340		100.0%		13,328		100.0%		545,671		100.0%	
Male	21,575		52.2%	1.1	7,390		55.4%	1.1	267,700		49.1%	0.5
Female	19,770		47.8%	0.9	5,940		44.6%	0.9	277,970		50.9%	0.5
Under 19	2,365		5.7%	0.3	1,155		8.7%	0.5	101,255		18.6%	0.2
20-64	33,925		82.1%	1.2	11,090		83.2%	1.2	374,080		68.6%	0.7
Over 65	5,035		12.2%	0.9	1,065		8.0%	0.6	70,320		12.9%	0.1
ETHNICITY (Single response)												
British, French & European	11,655		28.3%		3,110		23.6%		97,455		18.1%	
North American	2,595		6.3%		980		7.4%		27,385		5.1%	
Aboriginal	220		0.5%		65		0.5%		5,175		1.0%	
Carribean	60		0.1%		40		0.3%		695		0.1%	
Latin/Central/South American	110		0.3%		40		0.3%		925		0.2%	
African	80		0.2%		0		0.0%		775		0.1%	
Arab	120		0.3%		45		0.3%		735		0.1%	
Asian	7,150		17.4%		3,440		26.1%		220,660		40.9%	
Oceania	N/A		N/A		N/A		N/A		N/A		N/A	
Other	N/A		N/A		N/A		N/A		N/A		N/A	
Multiple Origins	17,895		43.5%		4,980		37.8%		170,285		31.6%	
ORIGINS & MOBILITY												
Place of Birth (total)	41,135				13,190				539,630			
In Province	9,985		24.3%		3,725		28.2%		176,800		32.8%	
In Canada / Territory (add up)	14,430		35.1%		3,625		27.5%		102,705		19.0%	
Foreign Born	13,395		32.6%		5,400		40.9%		247,640		45.9%	
Non-immigrants	24,415		59.4%	1.1	7,345		55.7%	1.1	279,510		51.8%	0.5
Immigrants	13,395		32.6%	0.7	5,400		40.9%	0.9	247,640		45.9%	0.5
Non-permanent Residents	3,300		8.0%	3.5	440		3.3%	1.4	12,480		2.3%	0.0
Residence in 1996 (total in same house)	12,995		32.2%	0.7	2,250		17.6%	0.4	249,135		48.3%	0.5
Moved Here in Last 5 Years	27,360		67.8%	1.3	10,520		82.4%	1.6	266,615		51.7%	0.5
INCOME (in 2000 $)												
Median Household Income	N/A		N/A		N/A		N/A		$42,026		N/A	
Average Household Income	$44,413		N/A		$60,964		N/A		$57,916		N/A	0.2
Median Family Income	N/A		N/A		N/A		N/A		$51,268		N/A	
Average Family Income	$65,064		N/A		$88,755		N/A		$69,190		N/A	0.5
Poverty Status (calc %)	11,345		41.4%	1.2	2,990		37.6%	1.1	84,330		35.7%	0.4
Low Income Unattached Individuals (15 yrs+)	8,790		38.9%		2,255		41.3%		57,305		43.1%	
Low Income Economic Families	1,465		18.0%		510		16.2%		27,815		21.4%	
TRANSPORTATION												
Means of Transportation to Work (total)	23,350				7,400				253,330			
Car / Motorcycle	8,135		34.8%		3,375		45.6%		147,905		58.4%	
Carpool	790		3.4%		330		4.5%		17,065		6.7%	
Public Transit	3,520		15.1%		735		9.9%		43,625		17.2%	
Bike	805		3.4%		220		3.0%		10,340		4.1%	
Walk	9,860		42.2%		2,600		35.1%		32,465		12.8%	
All Others	265		1.1%		85		1.1%		1,915		0.8%	
Worked at Home	2,135		8.3%		890		10.6%		22,370		8.0%	

Category	WEST END 2001 raw numbers	details	% of total	WEST END '01 location quotient	YALETOWN 2001 raw numbers	details	% of total	YALETOWN '01 location quotient	VANCOUVER (CITY) 2001 raw numbers	details	% of total	VANCOUVER (CITY) '01 location quotient
HOUSEHOLDS												
No. of Households	27,415				7,965				236,095			
No. of Families	7,880				3,040				134,380			
Average HH Size		1.5				1.6				2.3		
Average Family Size		2.2				2.4				2.9		
Headship Rate		0.7				0.6				0.4		
% Family Households	7,880		28.7%	0.5	3,040		38.2%	0.7	134,380		56.9%	0.6
% Non-Family Households	19,555		71.3%	1.5	4,960		62.3%	1.3	109,840		46.5%	0.5
% One Person Households	16,480		60.1%	1.6	4,310		54.1%	1.4	91,515		38.8%	0.4
HOUSING												
Total Housing Units	29,392		N/A		9,077		N/A		248,981		N/A	
% Occupied	27,415		93.3%		7,960		N/A		236,095		94.8%	
% Vacant	1,977		6.7%				N/A		12,886		5.2%	
% Owner Occupied Housing Units	4,835		17.6%	0.4	2,985		37.5%	0.9	103,340		43.8%	0.4
% Renter Occupied Housing Units	22,575		82.3%	1.5	4,980		62.6%	1.1	132,755		56.2%	0.6
Land Area (in km^2)	5.7				1.0				115			
Land Area (acres)	1,409				247				28,343			
Dwellings per km^2		5,156				9,077				2,171		
Dwellings per acre		21				37				9		
RENT / MORTGAGE (in 2000 $)												
Average Gross Rent	$807		N/A		$889		N/A		$796	Med. Income	22.7%	
HH Spending 30% or more of HH Income on Gross Rent	9,995	of total HH	24.4%		2,065	of total HH	15.7%		57,630	of total HH	10.7%	
Average Monthly Owner Costs (w/ mortgage)	N/A		N/A		N/A		N/A		$1,010			
HH Spending 30% or more of HH Income on Owner Costs	1,295	of total HH	3.2%		1,165	of total HH	8.9%		25,915	of total HH	4.8%	
Average Housing Value	N/A		N/A		N/A		N/A		$358,374			
HOUSING STOCK												
Average No. Bedrooms per dwelling		0.9				1.2				2.1		
Detached	140		0.5%	0.0	20		0.3%	0.0	65,390		27.7%	0.3
Attached	170		0.6%	0.1	110		1.4%	0.3	11,700		5.0%	0.0
Duplex	55		0.2%	0.0	5		0.1%	0.0	27,650		11.7%	0.1
Apartment (< 5 storeys)	6,040		22.0%	0.7	680		8.5%	0.3	79,755		33.8%	0.3
Apartment (> 5 storeys)	21,005		76.6%	3.5	7,135		89.6%	4.1	51,375		21.8%	0.2
Other	20		0.1%	0.8	10		0.1%	1.3	225		0.1%	0.0