symbiotic streetscapes

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symbiotic urbanism masterplan : hastings corridor individual design

sustainable urbanism : the hastings corridor

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Introduction

The Hastings Corridor

Hastings street is the only arterial road in the northern part of Burnaby and as such must accommodate the movement of a large volume of goods and people. The major conflict along the corridor arises from these 40,000 plus trips per day and the desire, some would argue need, to support a vibrant commercial corridor and pedestrian friendly street environment as the heart of a walkable, transit-oriented neighbourhood.

We are currently approaching the end of the era of cheap, non-renewable energy that has traditionally fueled the kind of limitless personal mobility we have taken for granted since the 1950s. As oil becomes more scarce and the impacts of its combustion become more difficult to ignore we must begin to reconceptualize the way we look at mobility. The street network is the basic armature around which our cities develop and is perhaps the component that is hardest to change once its basic form is in place. For this reason, the decisions we make today in regard to transportation systems need to be far-sighted to avoid shackling future generations to a fundamentally unsustainable urban form.

The following design focuses on the Hastings corridor while also placing the corridor in a larger context of green streets and alleys that support it's role as the backbone of a more holistically conceived, complete community. Design interventions respond to the existing conditions of the Hastings corridor. These existing conditions can be divided into three categories:

1. Streetcar Neighbourhood
2. Constrained Auto-Oriented
3. Unconstrained Auto-Oriented

1. Streetcar Neighbourhood
The portion of Hastings between Boundary and Willingdon was once served by a streetcar and its development typifies the streetcar suburb main street found in other cities built prior to WWII. These main streets are characterized by one to four story commercial or mixed-use buildings fronting the street with no building setbacks. Traditionally these main streets are supported by residential densities of 10 dwelling units per acre or more, however, in the Hastings case these residential densities do not yet exist.

Opportunities: The buildup of commercial buildings existing along Hastings provides the opportunity for a vibrant corridor that enhances the pedestrian realm and supports high levels of transit service while providing goods and services within a 5 minute walk of a large portion of the residents living in the area.

Constraints: Due to the lack of setbacks the building front to building front dimension of the street is generally 26 meters. This constrains the physical dimensions of the street, limiting the room available for parking, dedicated transit lanes and expansion of the sidewalk which is relatively narrow and suffers from proximity to the high traffic arterial, specifically the HOV lane.

2. Constrained Auto-Oriented Typology
East of Willingdon the landscape transforms into the typical auto-oriented landscape of the majority of post WWII development in North America. The commercial corridor vanishes and land uses with no real relationship to the street and the pedestrian realm dominate. Buildings are generally set back from the street and parking lots, long blocks, hedges/fences and narrow sidewalks all conspire to make walking uncomfortable and inconvenient.

Opportunities: Inefficient land uses along the corridor provide opportunities for infill development that would support higher density, mixed use communities.

Constraints: Although the building setbacks could potentially allow widening of the sidewalk and addition of a boulevard to buffer the pedestrian realm, the steep topography of this portion of Hastings Street significantly constrains this widening.

3. Unconstrained Auto-Oriented Typology
East of Fell Avenue the auto-oriented development continues but the steepness of the topography lessens and adjacent land uses are predominantly parks, industrial land, golf courses and parking lots.

Opportunities: Because the landscape is no longer constrained by steep topography and only very few buildings exists immediately adjacent to the street there is a great opportunity for significantly widening Hastings.

Constraints: Very low density land uses, large blocks and low residental density makes it difficult to create a vibrant corridor condition.

Research

An Examination of the Issues

TRANSIT

Future plans for Hastings street include the expansion of Translink's B-line bus service along the corridor. While this might make sense as a cost effective option in the short term a study recently released by the Design Centre for Sustainability indicates that articulated diesel buses (of the type used in the B-line service) are significantly less cost effective than modern streetcars when the full lifecycle costs are taken into consideration. Streetcars have also been shown to stimulate economic development along their routes (unlike both buses and long distance Light Rail Transit) are more capable of accommodating increased ridership in comfort and don't contribute any point source, ground level air pollution in urban areas.

LANE WIDTHS

Current design standards for minimum lane widths in Burnaby are 3.7m (12 feet). However, several studies have shown no operational difficulties to buses or trucks with lanes narrowed to 10 feet or less. In Victoria, 12 and 11 ft lanes were reduced to 9 foot lanes with only negligible operational problems with buses and trucks using the narrowed lanes (Delabure 2003). Some studies have shown speed reductions of as much as 3 mph for every foot of lane narrowing.

STREETCAR SPECIFICATIONS

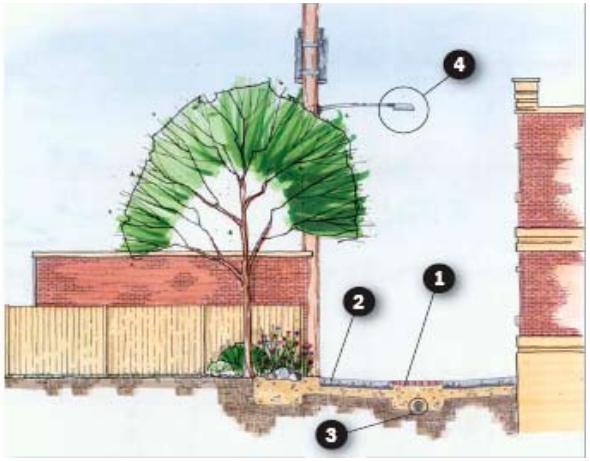
Modern streetcars are capable of operating in the street with no grade separation. Right of way width ranges from 19-24 ft for a double track and 11-13 feet for a single track (Reconnecting America). Low-floor modern streetcar, now operating in Portland, Oregon and Boston, eliminate the need for steps or high platforms and provide better accessibility for wheelchairs and other users such as the elderly or people with strollers (Kittelson 1999).

Siemens' Combino Plus
Track gauge: 1,435 mm
Vehicle width: 2,400 mm
Vehicle height: 3,639 mm
Vehicle length: 9,000 mm modules (length range from 18m – 72m)

PERMEABLE PAVEMENT
The City of Burnaby currently operates with a combined sewer system which means that during large rain events stormwater floods the system and combined sewer and stormwater overflow is released untreated into receiving waters. Infiltrating stormwater onside can reduce the stress on the combined sewer system. Permeable concrete or asphalt has pores or openings that allow water to pass through the surface and percolate through the existing subsoil. In areas where soils do not drain freely, permeable pavement can be used in combination with subsurface drainage systems, like pipe underdrains or stormwater infi ltration trenches. Benefits include reducing the rate and quantity of stormwater runoff, reducing stress on sewer system, recharging ground water, filtering silt, pollutants and debris (DCS Site Design Manual).

BOULEVARD PRECEDENT
Diagonal, Barcelona:

This precedent was chosen because like Hastings Street it is a major arterial lined with mixed-use commercial and office. It has fast moving traffic, narrow sidewalks but unlike Hastings street it also has wide tree-lined medians. Pedestrian-scale light fixtures occur at every third space between the trees and occational benches are set between the trees, facing into the median. Transit stops occur along the edge near the corners. Sidewalks are 10.5 feet with no trees.



GREEN ALLEY PRECEDENT
Chicago Green Alley Program

Where soil conditions are appropriate, water is allowed to infiltrate into the soils through permeable pavement or infiltration basins, instead of being directed into the sewer system or onto adjacent property.
1. Permeable pavement (asphalt or concrete)
2. High albedo concrete paving
3. Optional pipe underdrain
4. Energy efficient dark sky compliant light

goals & objectives

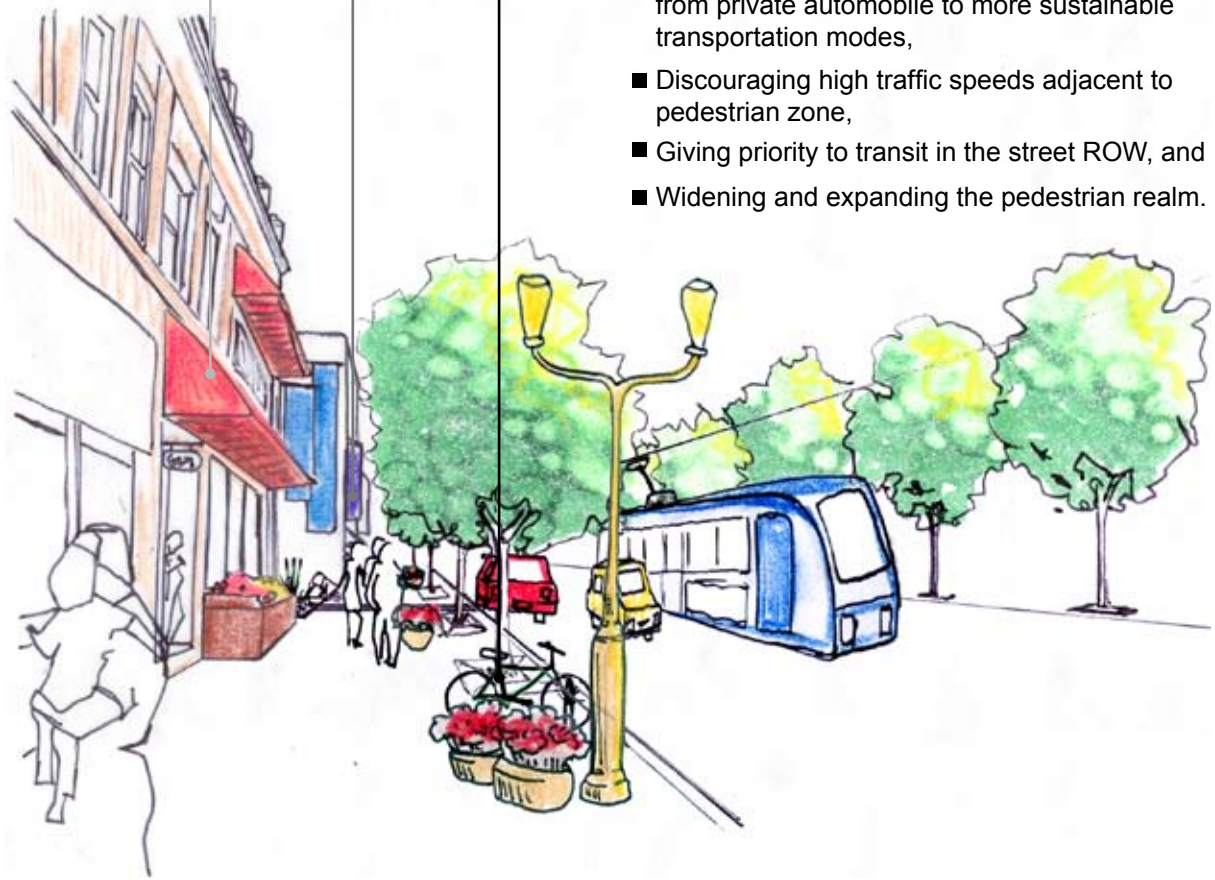
Goal: Design a streetscape that revitalizes the Hastings corridor as a pedestrian destination and increases the efficiency with which people move within and through the area without compromising the sustainability goals set out in Greater Vancouver's Livable Region Strategic Plan.

Intensify functionality and experience by layering social, economic and ecological uses.

Allow the design to respond to and enhance the neighbourhood character.

Encourage sustainable modes of transportation by:

- Allowing congestion: this encourages a shift from private automobile to more sustainable transportation modes,
- Discouraging high traffic speeds adjacent to pedestrian zone,
- Giving priority to transit in the street ROW, and
- Widening and expanding the pedestrian realm.



Design Principles

- Challenge the stigma of single-use single-family
- Amplify the inherent intensity of intersections and maximize interaction with the street
- Design participatory and didactic green infrastructure
- Context-informed corridor
- Equitable use of the street
- Importance of the journey

Design Principles

Formal Implications

The following three design principles help to intensify functionality and experience by layering social, economic and ecological uses.

Challenge the stigma of single-use single-family

Encourage multi-use, multi-family typologies, provide building types that cater to present and future demographics and increase density to fuel stronger commercial districts.

Amplify inherent intensity of intersections & maximize interaction with the street

Provide places for collective gathering and happenstance and create visual interest and pedestrian-scale design.

Design participatory and didactic green infrastructure

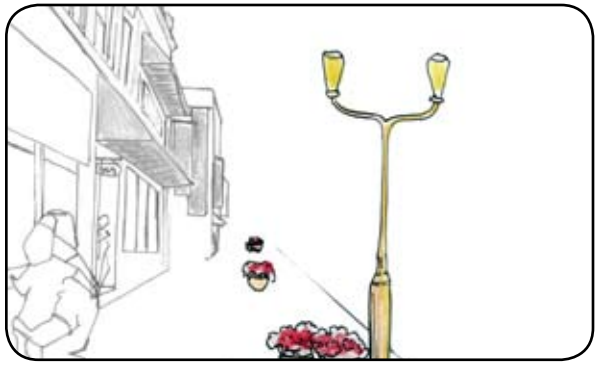
Increase porosity and interception with paving and vegetative surfaces and make natural processes more visible.

Design Principles

Formal Implications

The following design principles allow the design ro respond to and enhance the neighbourhood character and also encourage sustainabe modes of transportations.

Context-informed corridor



Provide equitable opportunity for all types of movement.

Equitable use of the street

Intensify district-defining elements along the corridor and use the site opportunities & constraints fo inform the design response.

Importance of the journey

Recognize that the journey is equally important to the destination and provide stimulating and comfortable pedestrian environments that link people with services, transit and recreation.

Building Setbacks

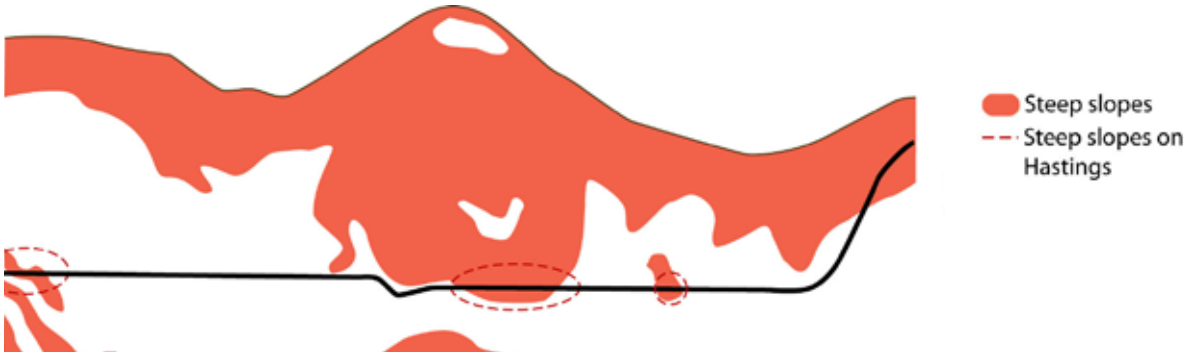
The influence of built form

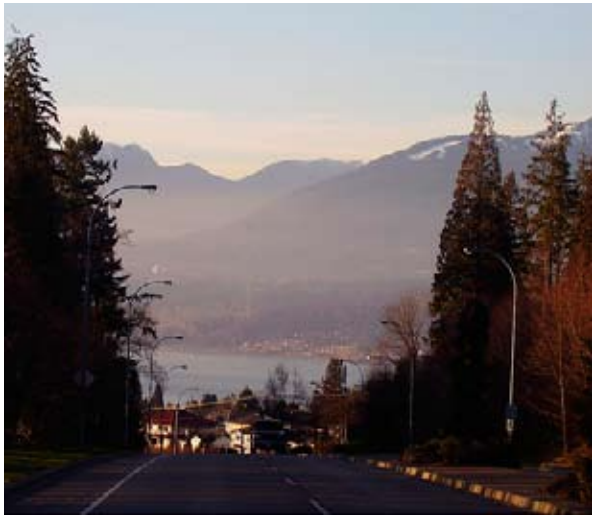
West of Fell Avenue existing buildings are not setback from the street. This creates a condition where widening the street ROW would require the aquisition and re-development of many lots fronting the street. For this reason, and also to preserve the unique character of The Heights, the streetscape design of this portion of Hastings is constrained by the existing street row.

Steep Slopes

The impact of natural topography

Much of Burnaby is characterized by extreme topography and Hastings is no exception. Between Delta and Fell Avenue, Capitol Hill creates steeply rising topography to the north and steeply falling topography to the south. This complicates development along Hastings in this region and limits the potential for widening the street right of way.





Design response

Two kinds of street treatment

Due to the different site conditions along the Hastings corridor it is appropriate to propose two distinct designs to respond to these changing conditions. The first is the Urban Arterial, characterized by a narrow ROW, and the second is the Boulevard which takes advantage of the opportunity to expand the street ROW to incorporate on-street parking, dedicated transit lanes and planted medians.

Blue/Green Network

Regional systems

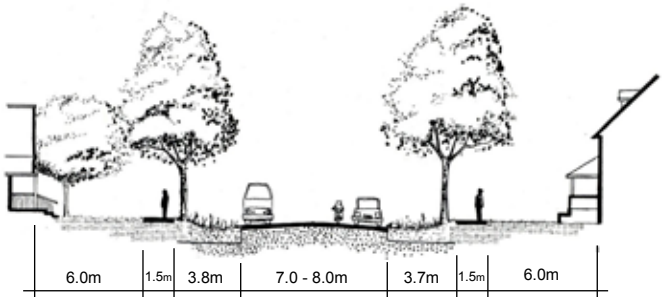
The subterranean street section can provide infiltration and conveyance of rainwater which acts to clean, cool and slow down water before it is discharged into receiving waters. Green streets and eco-lanes increase the connectivity of the green network for people and other organisms.

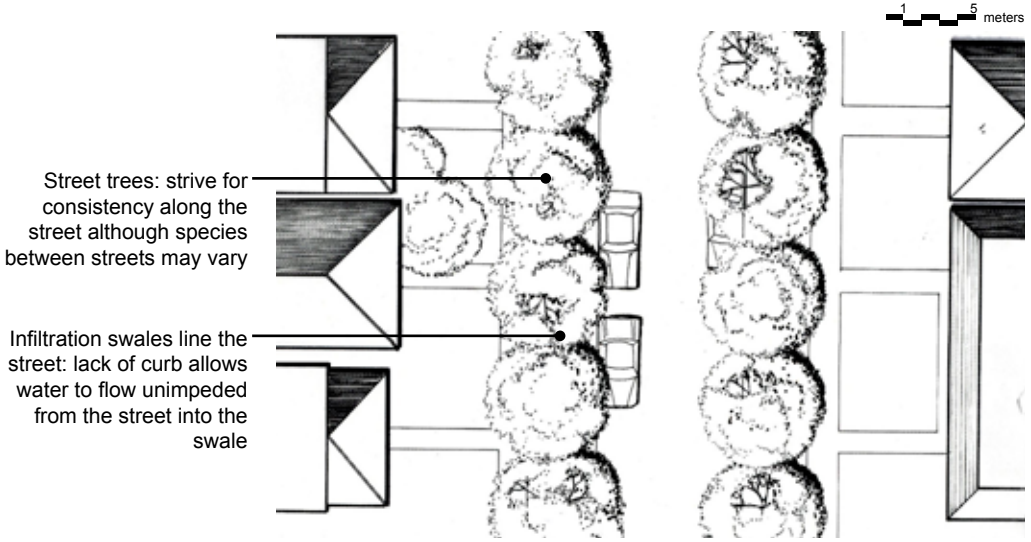
Green Street

A Deep Green Queuing street

The network of green streets laid out in our masterplan is highlighted below. To the right is a potential configuration of one of these green streets designed within the framework of our design principles. This design works within the existing street dimension of a typical queuing street in the neighbourhood (in this case Union Street) but adapts these dimensions to accommodate two lanes of on-street parking, one through lane and one bike lane. In addition the street is paved with pervious pavement and is bounded by infiltration swales. Building setbacks are 6.0 meters or less to ensure that even two story residential buildings provide sufficient street definition.

Tree Canopy	Softscape	Hardscape	Setback
60%	44%	56%	<6.0m

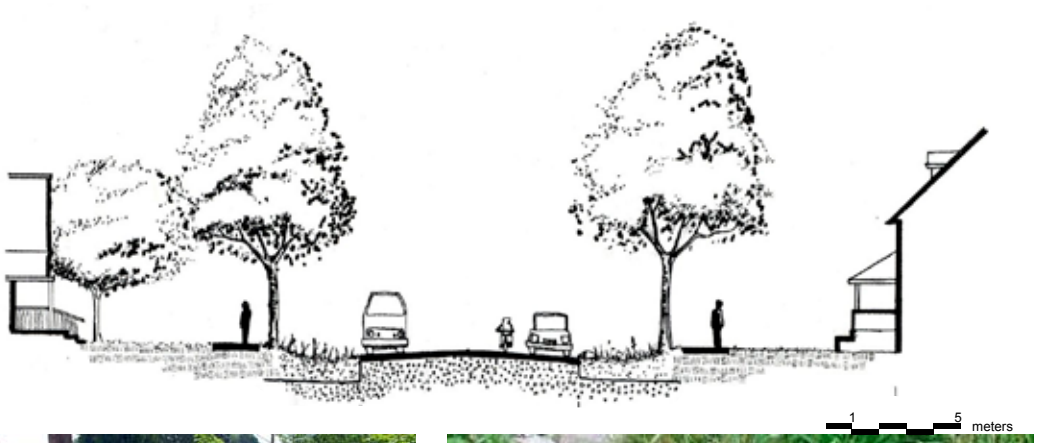




Green Street

A Deep Green Queuing Street

The character of the deep green queuing street is informed by the residential context of Burnaby. Burnaby is a city that values its beautiful natural setting therefore the green streets embody a more natural aesthetic. Because the topography is often steep infiltration swales will often need to make use of weirs to slow the movement of water during rain events.



Green Street

A Palette of Green Streets

Because of the size of the study area and the different characters and site constraints of different streets it is important to point out that the design shown previously is just one of many different configurations capable of meeting the design principles outlined above. To provide a glimpse of the range of potential solutions several alternative precedents are shown below. The design of each individual street should take these examples as insipration but allow the site context to inform the specific design response.

Eco-lane

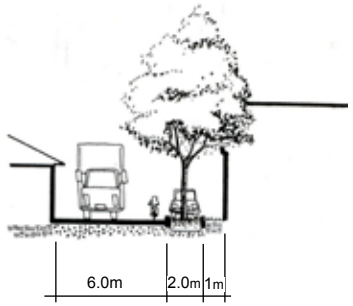
Layering Uses in Back Alleys

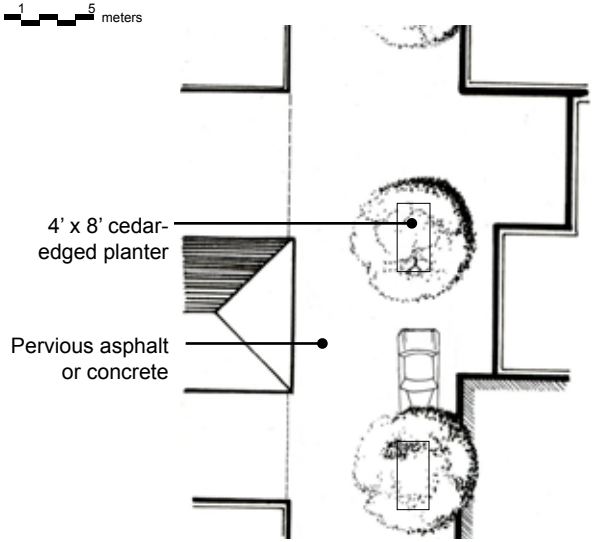
Although laneways was not the focus of this design it is important to acknowledge their potential role in a larger network of rainwater infiltration, mobility and social and economic activity. The design provided here is again just one example of a potential configuration (based on the existing alley dimensions off of Hastings Street) that would satisfy the design principles laid out previously. Uses are layered both spatially and temporally in these spaces.

Layer rich plantings...

...with pervious paving

Tree Canopy	Softscape	Hardscape	Setback
27%	7%	93%	>1.0m





Eco-Lane

A Palette of Eco-Lanes

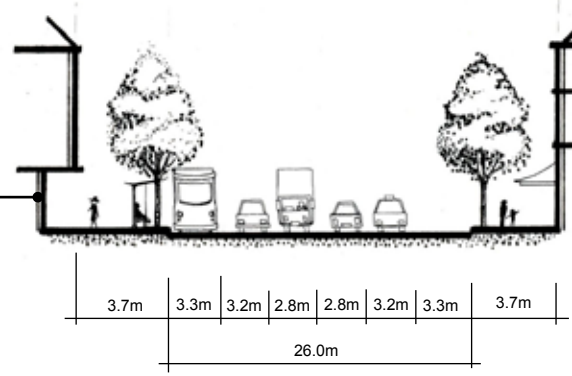
Once again this design does not attempt to create a one-size fits all solution to the alley. Approaches will vary depending on the urbanity of the adjacent land uses and the character of the neighbourhood and the utility requirements acommodated in the alley. Residential alleys will be treated much different than the alleys directly off of Hastings street and here we provide some interesting precedents that are in line with our design principles.

Urban Arterial

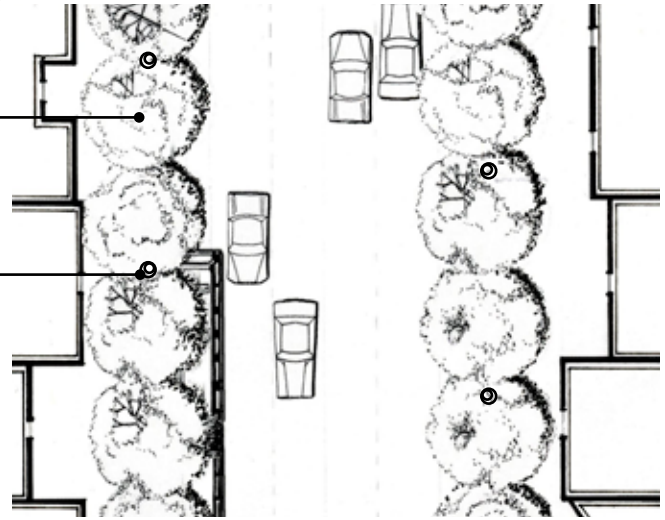
Balancing Livability & Mobility

The urban arterial design is applied to Hastings street between Boundary and Fell Ave. This incorporates The Heights, a major commercial corridor developed during the streetcar era, and the auto-oriented development east of Willingdon that is constrained by steep topography. Because the physical constraints of the site restrict the expansion of the pedestrian realm, lanes are narrowed, not only to provide more space for the sidewalk but also to slow traffic down. This has the dual benefit of reducing the negative experiential impact of vehicles on the pedestrian realm and making the personal automobile trip slower and therefore less desireable.

Tree Canopy	Softscape	Hardscape	Setback
42%	4%	96%	None



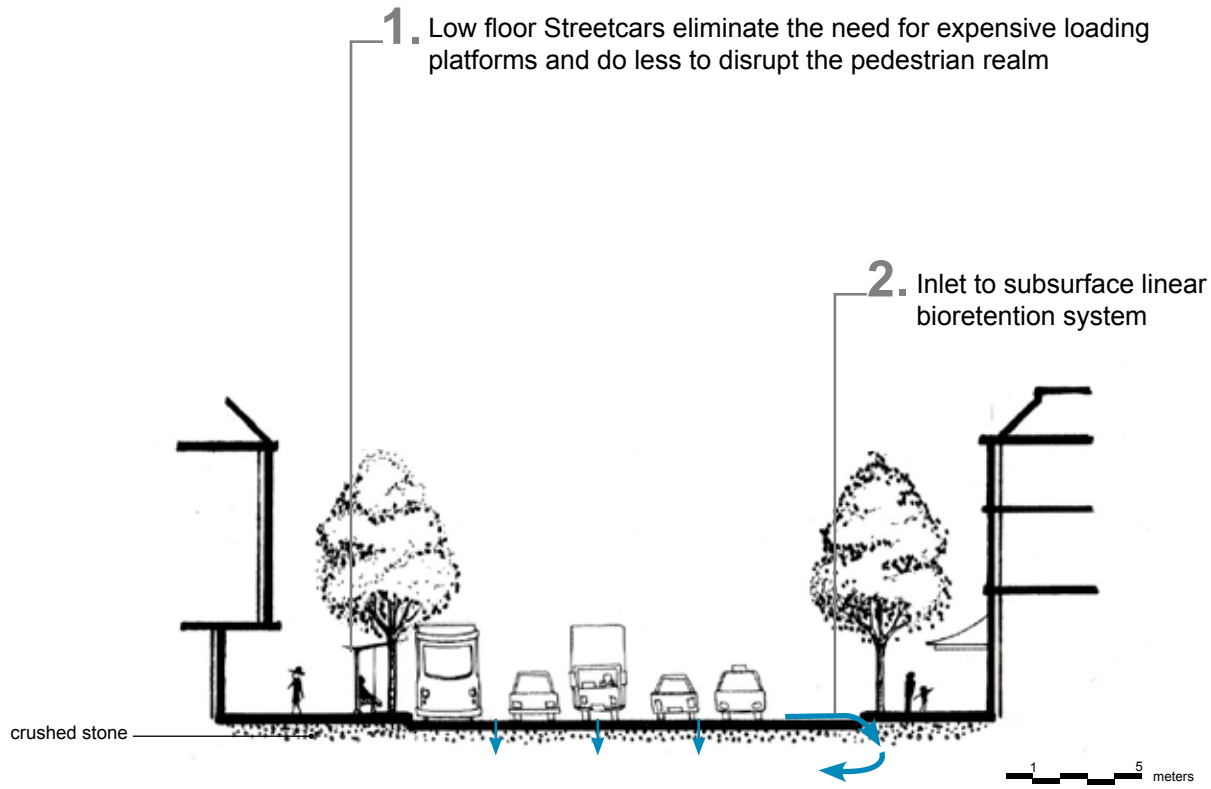
Acer rubrum (Red Maple)



Urban Arterial

Transportation + Infiltration

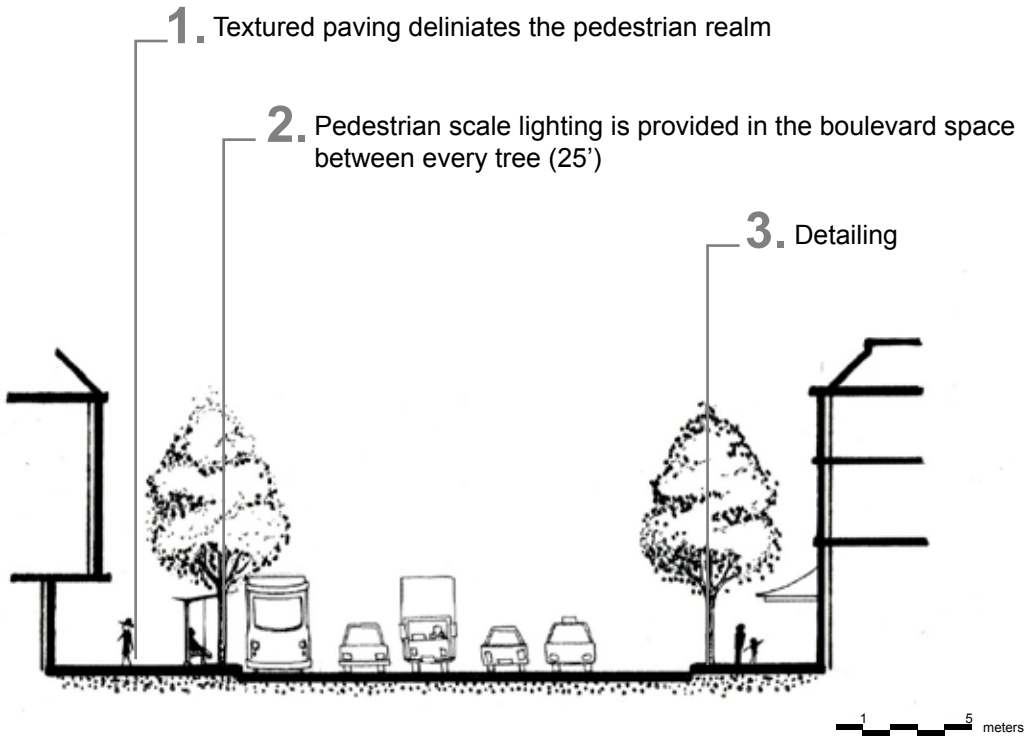
Dedicated transit lanes operating down the middle of the street require loading platforms of a minimum of 2m wide. Due to the physical constraints on the street this 2m platform could not be accommodated without further reducing the already narrow sidewalks or eliminating at least one travel lane. For this reason, dedicated transit lanes are placed alongside the sidewalk. This has the added benefit of separating the pedestrian realm from high traffic, higher speed through lanes (particularly the two trucking lanes) located in the middle of the street. Infiltration is provided with pervious paving (either pervious asphalt or concrete) and excess rainwater is directed towards curb inlets that lead to a subsurface linear bioretention system that allows water to infiltrate more rapidly. Overflow from this system is directed into the void spaces left in the 12 to 18 inches of crushed stone that provides structural support to the street.

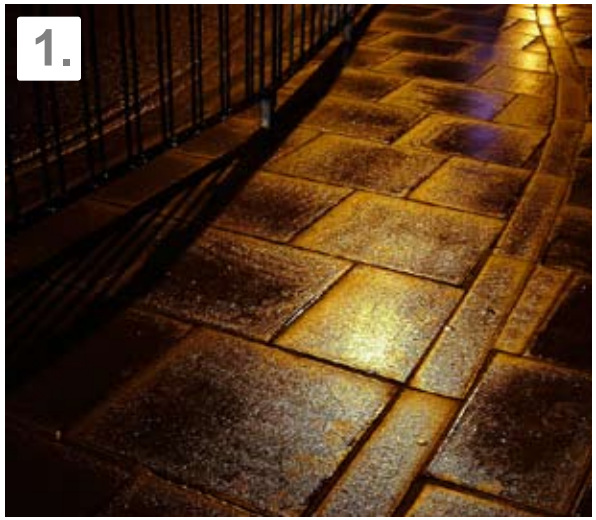


Urban Arterial

Character

The character of the Urban Arterial is derived from the existing character of the traditional Heights district. Emphasis is placed on intimacy of scale, richly detailed street furniture, textured paving and subtle pedestrian lighting that enlivens the night-time experience and adds a feeling of comfort and safety to the pedestrian realm.



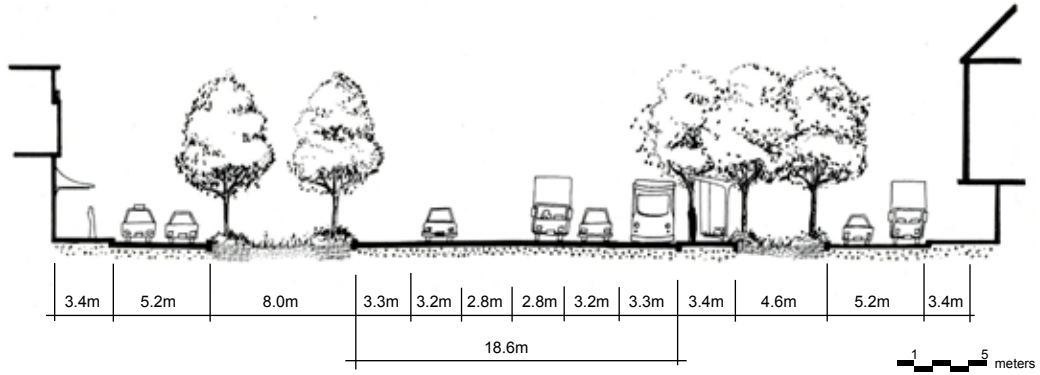


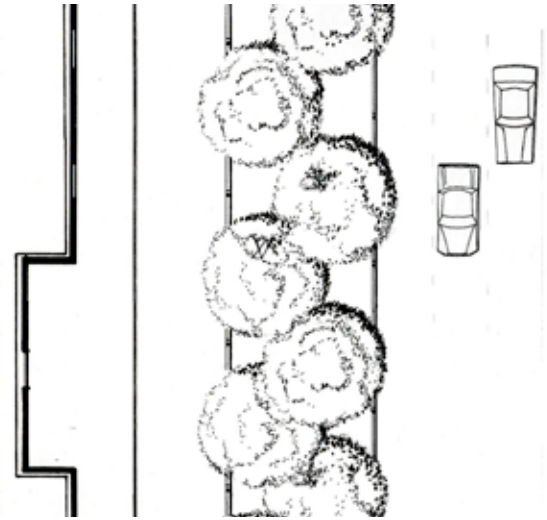
Boulevard

Re-Imagining the Arterial

The boulevard design takes advantage of the under-utilized space adjacent to Hastings street east of Fell Avenue by widening the street right of way to accommodate planted medians, two additional lanes for local traffic and two lanes for on-street parking. The character of this street section is eco-modern to reflect contemporary design and environmental responsibility.

Tree Canopy	Softscape	Hardscape	Setback
30%	31%	69%	None



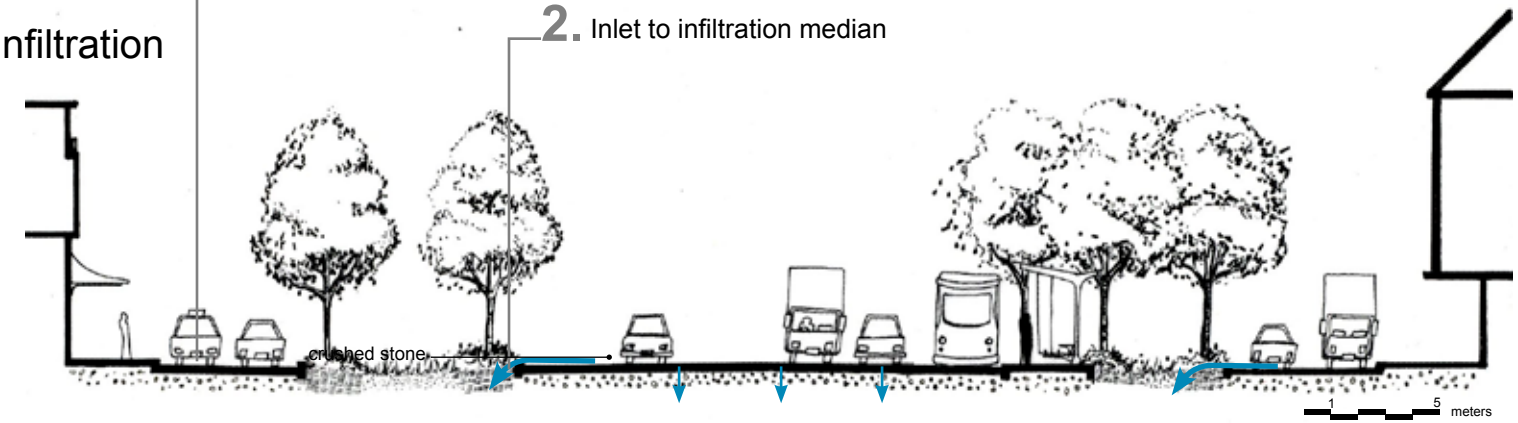


Boulevard

Transportation + Infiltration

1. Local traffic lanes are “shared space” where pedestrians and cars intermingle and traffic speeds are significantly reduced.

2. Inlet to infiltration median

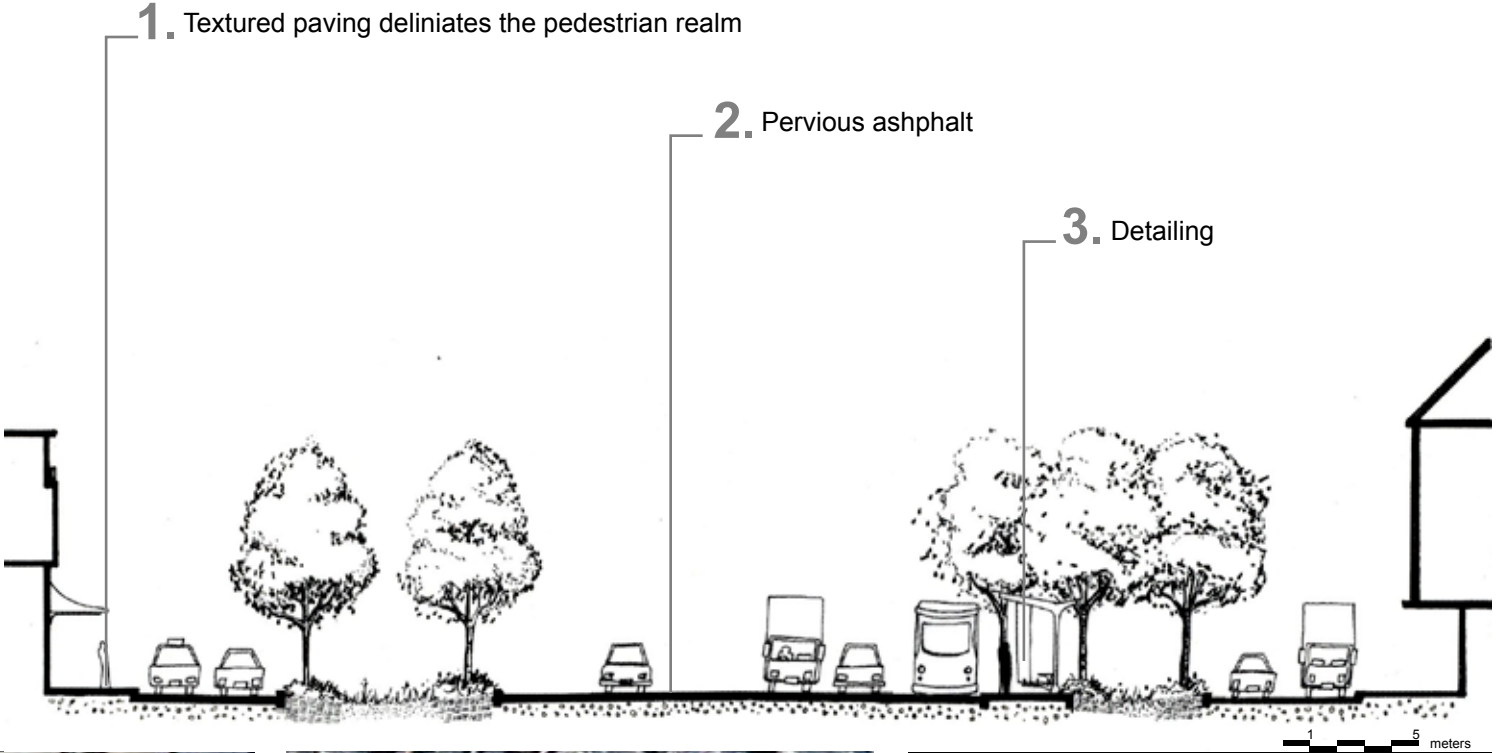


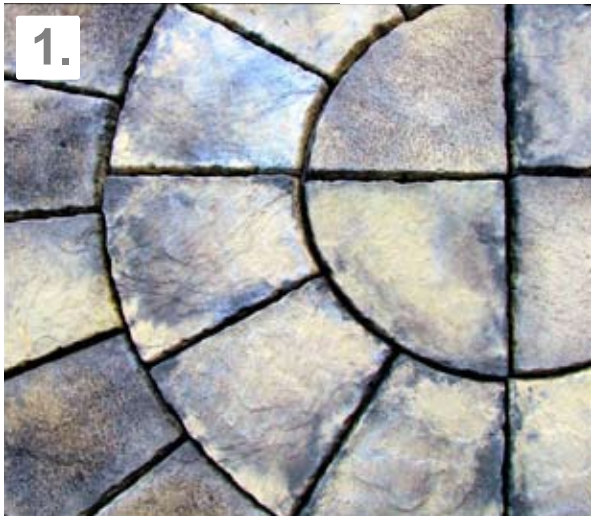
Two large planted medians separate local traffic and through traffic. The streetcar is included in the through traffic as part of a larger regional network that supports both local and regional transportation. Two of the local traffic lanes are dedicated for on-street parking and the other are very narrow to avoid excessive speed. The intent is to have the pedestrian realm bleed into these local lanes where the street becomes shared space for pedestrians and cars. The large planted medians are planted with quaking aspen, nootka rose and sedges that will help to clean and filter rainwater runoff directed from the streets through curb cuts along their length. These infiltration medians tie into the larger system of infiltration outlined above.

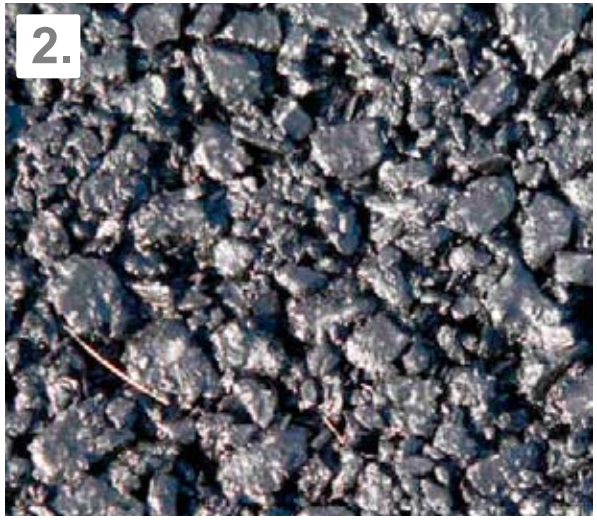
Boulevard

Character

The character of the Boulevard is informed by a sensitivity and respect for natural systems and an appreciation for the cooler colours of the west coast palette.



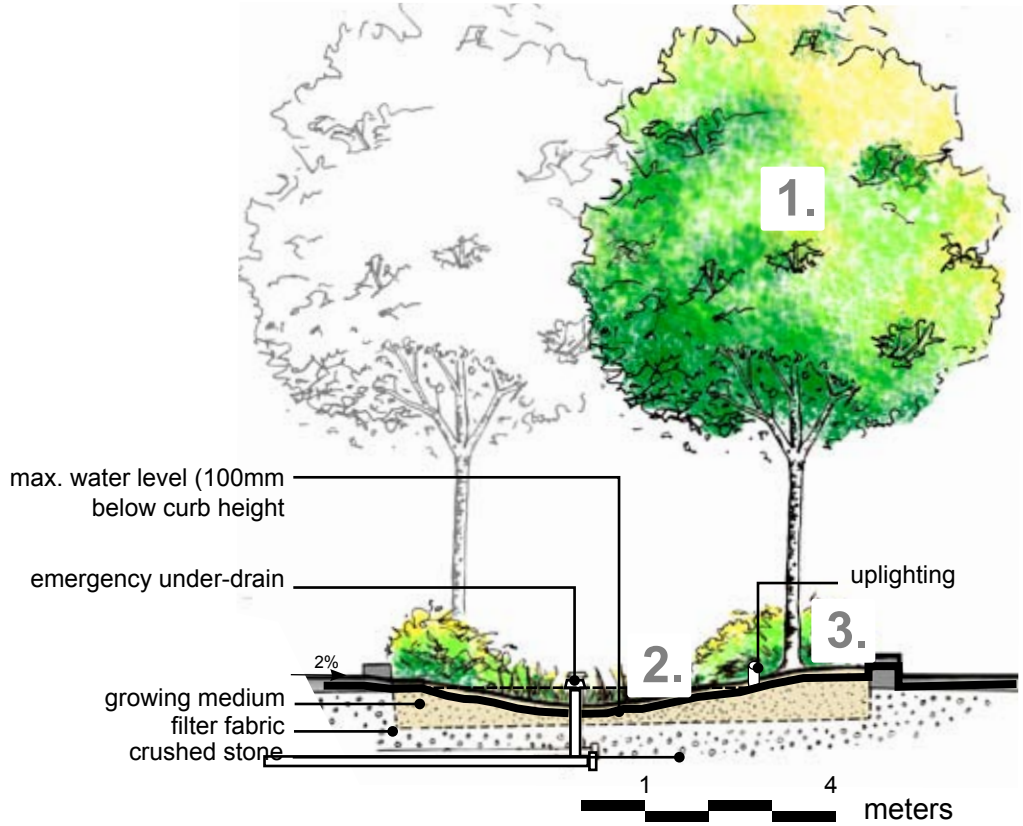




Boulevard

Detail of the Planted Medians

The planted medians collect, treat and infiltrate rainwater that is not infiltrated through the pervious street. They are planted with two rows of quaking aspen that will provide a rich and unique street experience along the boulevard. Shrubs and sedges planted within the medians were chosen for their ability to clean and filter water and for their aesthetic characteristics.



Conclusion

Symbiotic Streetscapes

Symbiotic streetscapes recognize that as population increases and global resources become more scarse, the way in which we build, live and move throughout our cities must become more effiecient. This means layering uses and shifting priorities away from inefficient and unsustainable practices. The design of the Hastings corridor has focused on providing a pedestrian realm that supports local transit and encourages walk trips while supporting local businesses and minimizing the negative impact on natural hydrology. By restoring the health of the corridor, the communities through which it passes have a fighting chance of adapting to an ever more complex and challenging future.