

## Urban Bicycle Planning

### Overview

Increasing non-recreational bicycle use beyond the current low levels found in most Canadian cities is likely to require a sustained, coordinated effort involving a number of stakeholders both within and outside the municipal government. A municipal bicycle plan can be a useful if not essential tool for defining a municipality's goals vis-à-vis bicycle use, setting an agenda for attaining these goals, and coordinating the activities of the various stakeholders involved.

This issue paper examines the key barriers to bicycle use and how municipal bicycle plans can address them. The basic elements of bicycle plans are described, including bicycle circulation infrastructure; bicycle parking infrastructure and other end-of-trip facilities; and education and promotional measures. Key bicycle planning considerations, including the choice of appropriate infrastructure and promotional programs; land use and urban; and integration of cycling and public transit are considered.

Two exemplary public bicycle plans adopted within the last decade – one by the City of Vancouver and the other by the City of Toronto – are presented as case studies at the end of the paper.

### Resources

BIXI ([www.bixi.ca](http://www.bixi.ca))

Cycling in Toronto ([www.toronto.ca/cycling](http://www.toronto.ca/cycling))

Cycling in Vancouver  
([vancouver.ca/engsvcs/transport/cycling/](http://vancouver.ca/engsvcs/transport/cycling/))

Public Bike System ([www.bixisystem.ca](http://www.bixisystem.ca))

Voyagez Futé Accèsvélo  
([www.voyagezfute.ca/veloLibre.asp](http://www.voyagezfute.ca/veloLibre.asp))

Vélib ([www.velib.paris.fr](http://www.velib.paris.fr))

See end of document for a full list of resources.

### Introduction

While cycling is a fairly popular form of recreation in Canada, its use for non-recreational purposes in most cities – i.e. as a mode of urban transportation – can at best be described as marginal. In terms of mode share, the bicycle occupies a distant fourth place after the automobile, public transit, and walking.

One type of non-recreational bicycle use for which statistics are readily available is commuting to work. According to the 2006 Canadian Census, only 1.4% of people living within one of the country's Census Metropolitan Areas (CMAs) cycle to work on a regular basis. The share of bicycle commuters has been growing, albeit slowly: it was 1.2% in 1996 and 1.3% in 2001. Victoria, BC, had the highest share of bicycle commuters in 2006, at 5.6%; Kingston, ON, and Saskatoon, SK, share a distant second place, each with a bicycle mode share of 2.4%. The CMAs with the lowest levels of bicycle use were St. John's, NL, and Saint John, NB, each having only 0.3% commuters who used bicycles, followed closely by Oshawa, ON, with 0.4%. Among the CMAs with populations over one million, Ottawa-Gatineau had the highest bicycle commuter mode share, at 2.1%; followed by the Vancouver and Montreal CMAs with 1.7% and 1.6% respectively; and trailed by the Toronto CMA with 1.0% (see Table 1).

An increase in levels of bicycle use in Canadian cities would entail a number of benefits. These include:

- Environmental benefits, through reduced emissions of toxic pollutant and greenhouse gases;
- Health benefits related to higher levels of physical activity, including improved cardiovascular health and lower risk of obesity;
- Health benefits related to the reduction of airborne pollutants, including lower incidence of respiratory diseases;
- Economic benefits, such as reduced household expenditures on transportation, reduced work hours lost in traffic jams, and reduced healthcare costs thanks to the effects of regular exercise and reduced pollution.

**Table 1 – Percentage of workers cycling to get to work in Census Metropolitan Areas (CMAs)** (source: Statistics Canada, censuses of population, 1996 to 2006)

	cycling to work (%)		
	1996	2001	2006
Total CMA population	1.2	1.3	1.4
<b>Newfoundland and Labrador</b>			
St. John's	0.3	0.1	0.3
<b>Nova Scotia</b>			
Halifax	1.0	0.9	1.0
<b>New Brunswick</b>			
Moncton	0.7	0.6	1.0
Saint John	0.2	0.4	0.3
<b>Quebec</b>			
Gatineau	1.4	1.6	1.7
Montréal	1.0	1.3	1.6
Québec	0.9	1.3	1.4
Saguenay	0.6	0.8	0.8
Sherbrooke	0.7	0.9	0.9
Trois-Rivières	1.2	1.5	1.4
<b>Ontario</b>			
Barrie	0.7	0.5	0.6
Brantford	0.7	1.0	1.1
Greater Sudbury	0.5	0.4	0.7
Guelph	2.1	1.8	2.3
Hamilton	0.7	0.9	0.9
Kingston	2.1	2.2	2.4
Kitchener	1.1	1.1	1.6
London	1.5	1.4	1.6
Oshawa	0.4	0.5	0.4
Ottawa	2.3	2.0	2.2
Peterborough	1.7	1.8	2.3
St. Catharines - Niagara	0.9	0.9	1.5
Thunder Bay	1.0	1.0	1.6
Toronto	0.8	0.8	1.0
Windsor	1.1	1.1	1.3
<b>Manitoba</b>			
Winnipeg	1.4	1.4	1.6
<b>Saskatchewan</b>			
Regina	1.1	1.4	1.4
Saskatoon	2	2.5	2.4
<b>Alberta</b>			
Calgary (Alberta)	1.1	1.5	1.3
Edmonton (Alberta)	1.1	1.2	1.1
<b>British Columbia</b>			
Abbotsford	0.9	0.9	0.7
Kelowna	2.0	2.1	2.1
Vancouver	1.7	1.9	1.7
Victoria	4.9	4.8	5.6

Moreover, the increased use of bicycles could partly offset increases in public transit and road capacity required to combat congestion. The infrastructure requirements of bicycles are very modest compared to those of motorized modes of transportation.

Increasing non-recreational bicycle use beyond the current low levels is likely to require a sustained, coordinated effort involving a number of stakeholders both within and outside the municipal government. A municipal bicycle plan can be a useful if not essential tool for defining a municipality's goals vis-à-vis bicycle use, setting an agenda for attaining these goals, and coordinating the activities of the various stakeholders involved.

#### *Barriers to Bicycle Use*

Bicycle plans are usually devised with the goal of increasing bicycle use, especially non-recreational use. In defining the means to achieve these goals, bicycle plans should address at least some of the main factors that dissuade people from using bicycles.

Beck and Immers (2004) surveyed commuters in the Amsterdam region, probing their reasons for choosing or not choosing the bicycle as their mode of transportation to go to work. Bicycle commuters cited speed, independence from public transit, and health benefits as their top reasons for choosing to cycle. Non-bicycle commuters cited distance, discomfort and feeling unsafe, the inability to travel with others or to carry passengers, and the limited ability to carry cargo as the main factors deterring them from using bicycles.

Badgett et al. (1994) surveyed employees at six different employment clusters in the Seattle area about factors influencing their decision to cycle or not work. The main factors discouraging cycling were found to be: distance; unsafe roads; inadequate trip-end facilities, such as parking and showers; the low cost, greater speed, and general convenience of driving; the need to make multiple trips during the day; and a perception that cycling is not "cool".

More recently, background research for Montreal's 2008 Transportation Plan, a survey of residents' habits and attitudes with respect to transportation (Baromètre, 2005). The survey contained a series of questions probing attitudes towards bicycle use, including the key reasons for not cycling. The results are reported in Table 2 below. The top two reasons for not cycling were essentially the same as those found in both Amsterdam and Seattle: feeling that cycling was unsafe and that the distance to be travelled was too long.

The same two factors are likely to be key inhibitors of bicycle use in many Canadian municipalities. Municipalities should in principle be able to act on both of these inhibiting factors. The safety factor can be overcome through a combination of providing dedicated infrastructure and traffic calming as well as motorist and

cyclist education. Overcoming the distance factor is somewhat less obvious. Appropriate measures would include improving the cycling network to provide more direct trajectories to principal destinations and providing more opportunities for transit-bicycle intermodality. Increasing population densities and mix of land uses is another way to reduce trip distances.

**Table 2 – Top 10 reasons for not cycling reported on the 2005 Montreal Transportation Survey** (source: Ville de Montréal, 2005)

Reason	% respondents (N=908)
Too dangerous	14%
Distance	12%
Too old	12%
Climate	10%
Not fast enough	5%
Not interested	5%
Not in shape/illness/handicap	4%
Need car at work	4%
Do not know how to bike	4%
Lack of bikeways	3%

## Infrastructure – Circulation

The extent and the quality of bicycle circulation facilities, such as dedicated bicycle tracks and lanes, are believed to have a positive impact on whether or not cycling is perceived as a safe activity (FHWA 1995; Landis 1998). Providing more and better quality bicycle infrastructure therefore seems like a valid strategy to encourage people to use bicycles.

Indeed, research from the US shows that there is a positive relationship between the provision of bicycle routes and non-recreational bicycle use. In a study comparing bicycle commuting in 18 cities in the US, Nelson and Allen (1997) found that the number of miles of bicycle pathways per capita has a significant positive correlation with the number of bicycle commuters, controlling for mean temperature, the number of rainy days, the general topography (whether hilly or flat), and the percentage of the population who are students. Dill and Carr (2003) performed a similar analysis but used a larger sample of 43 cities and several additional control variables, including geographic factors such as population density and demographic factors such as mean number of vehicles per household and median household income. They also distinguished between on- and off-street bicycle routes. Their general findings confirmed those of Nelson and Allen. An additional finding was that the length of off-street bicycle paths per unit of area had a stronger correlation with the number of bicycle commuters than the length of on-street bicycle lanes. It is important to note that this research merely observes that there is a correlation between the length of bicycle routes and the level of bicycle commuting; it does not conclusively demonstrate

that the addition of new bicycle routes would induce more bicycle commuting.

Barnes and Thompson (2005) studied the change in bicycle mode share in parts of Minneapolis-St. Paul in which bicycle routes were added. They made two critical findings: (1) that bicycle routes were built in areas where cycling mode share was already higher than the metropolitan average; and (2) the construction of each of the studied bicycle routes induced a significant increase in levels of bicycle commuting. Unlike the abovementioned studies, this one does conclusively demonstrate that bicycle network expansions induce additional bicycle commuting.

Designated urban bicycle route networks are composed of four basic building blocks. In order from the least to most segregated from vehicular traffic, these include: (1) shared routes; (2) bicycle lanes; (3) bicycle tracks; and (4) off-street paths. Aside from designated routes, extensive traffic calming of local streets is another means of creating a bicycle-friendly environment and mitigating the perception of cycling as unsafe.

### *Shared Routes*

Shared routes consist of streets on which bicycles are required to share the carriageway with motorized vehicles; there is no portion of the street surface reserved only for bicycles. Generally, shared routes are designated on local, residential streets with a low volume of vehicular traffic, or streets that are simply too narrow to fit dedicated bicycle lanes or a bicycle track. Shared routes are sometimes also designated on arterial roads that have wide curb lanes or a wide paved shoulder.

The creation of a shared route can entail merely adding signage and street markings to an existing sufficiently calm residential street or a sufficiently wide arterial road at minimal cost. However, where traffic is not deemed sufficiently calm, the creation of a shared route may require a variety of traffic calming interventions designed to limit the volume and speed of vehicular traffic. In this case, the cost can be considerable.

### *Bicycle Lanes*

Bicycle lanes are narrow lanes (1.2 m to 1.5 m wide) on the carriageway reserved exclusively for bicycles. They provide only partial segregation from vehicular traffic – there is nothing physically preventing vehicles from entering a bicycle lane. They are usually adjacent to the curb on streets with no parking, or between the parking lanes and the outer (right-hand) traffic lanes on streets with parking. They are most often demarcated with continuous lines, separating them from the parking and traffic lanes. Sometimes, the width of the bicycle lane is paved with a different material or painted to have a different colour than the vehicular lanes.

The key advantage of bicycle lanes is that they are inexpensive to implement. At minimum, they require only that a line or two parallel lines be painted along an existing roadway. In some cases, existing lanes may need to be moved slightly or removed to make room for the bicycle lane. Even then, the costs associated with removing old lane markings and repainting new ones are likely to be modest.

The main disadvantage of bicycle lanes is that, in the absence of a physical barrier between them and the vehicular lanes, they are prone to being encroached upon by automobiles. Where there is on-street parking, automobiles will cross the bicycle lane when entering and exiting the parking lane, creating a potential hazard for cyclists. Whether or not there is on-street parking, motorists might park or double-park their vehicle in the bicycle lane, forcing cyclists onto the traffic lanes.

These potential problems notwithstanding, there is empirical evidence showing that bicycle lanes reduce conflict between bicycles and motorized vehicles and improve both cyclists' perceived and real levels of safety (FHWA, 1995; Landis, 1998; Van Houten and Seiderman, 2005). Among other findings, it has been observed that bicycle lanes make motorists more aware of cyclists. It has also been noted that when bicycle lanes are added to streets with on-street parking, cyclists tend to ride further from the parked cars, reducing the risk of collision with an open car door (Van Houten and Seiderman, 2005).



**Figure 1 - Contra-flow bicycle lane on Milton Street**  
(photo: Christopher DeWolf)

#### *Bicycle Tracks*

Bicycle tracks, unlike bicycle lanes, fully segregate cyclists from motorists through the use of a strong physical barrier. Bicycle tracks are usually either grade separated or separated from the traffic lanes by means such as a concrete median or a row of bollards (Figure 1). Unlike bicycle lanes, which are usually subject to the same traffic signals as automobiles, bicycle tracks are sometimes

equipped with dedicated signals at intersections that provide a priority cycle or an exclusive cycle for bicycles.

Generally speaking, bicycle tracks offer cyclists a higher level of perceived safety and can potentially induce more bicycle use than shared routes and bicycle lanes (Dill and Carr, 2003). Some commentators have argued however that they do not necessarily offer higher levels of real safety, given that most bicycle-automobile collisions occur at intersections, which users of bicycle tracks must still share with motorists.



**Figure 2 - The Claire-Morissette bicycle track crossing downtown Montreal along Boulevard de Maisonneuve**  
(source: Pierre Obendrauf / The Gazette)

The main disadvantage of bicycle tracks is that they can be expensive to build. Perhaps unsurprisingly, on-street bicycle tracks are generally rare in Canada, most municipalities preferring to create networks of shared routes and bicycle lanes. Montreal is the only municipality to have used this type of bicycle infrastructure extensively. Construction of the new 3.5 km Claire-Morissette bicycle track (Figure 2) through downtown Montreal, completed in late 2007, cost \$3.5 million. As the track replaced approximately 250 parking spaces, the city has also lost

\$1.7 million worth of annual parking revenues (Dobbin, 2007).

However, apart from the Claire-Morissette track, most of the recently added bicycle routes consist of bicycle lanes rather than tracks (such as the Milton Street path seen in Figure 1). The exception was made for de Maisonneuve blvd. because it was feared that bicycle lanes would be too prone to encroachment by cars, given frequent occurrences of double parking in downtown Montreal (Jolicoeur, personal communication).

#### *Off-street Routes*

A municipality's network of on-street bicycle routes can be complemented if not completed by a system of off-street routes. In most cases, these are routes that run through parks, along waterfronts, and through greenways (green corridors). They can also include routes running along operational rail corridors.

Off-street routes come in two basic varieties: shared-use paths and bicycle-only paths. Shared-use paths can be subject to conflict between pedestrians and cyclists; if used by a large number of bicycle commuters, shared-use paths can become hazardous for pedestrians (FHWA, 2006).

## **Infrastructure – Parking**

#### *On-street Parking*

On-street bicycle racks are needed to provide secure and convenient bicycle parking opportunities. At the same time, bicycle racks can help ensure that bicycles do not interfere with pedestrians and do not block building entrances. They can also help prevent damage to fences, street signs, and trees, which cyclists are likely to use where bicycle parking is insufficient.

Many municipalities outsource the provision of bicycle racks on commercial streets to advertising companies, or simply leave the provision of bicycle parking up to businesses or property owners along the street. An increasing number of municipalities provide on-street bicycle racks themselves. Toronto, for example, has a program whereby residents or businesses can request the installation of one or more simple “post-and-ring” racks in front of or near their home or business (Figure 3).

Montreal's public parking authority, Stationnement de Montréal, has recently added rings intended for locking bicycles to parking meter posts (Figure 4). The same agency also converts a number of automobile parking spots to bicycle parking during the City's official cycling season (early April to mid-November).



**Figure 3 - Characteristic *post-and-ring* bicycle stands provided by the City of Toronto** (source: [rubiking.wordpress.com](http://rubiking.wordpress.com))



**Figure 4 - Bicycle locking rings on parking meters in Montreal** (photo: Misha Warbanski)



**Figure 5 - Bicycle parking replaces on-street car parking spots in Montreal** (photo: Christopher DeWolf)

### *Off-street Parking*

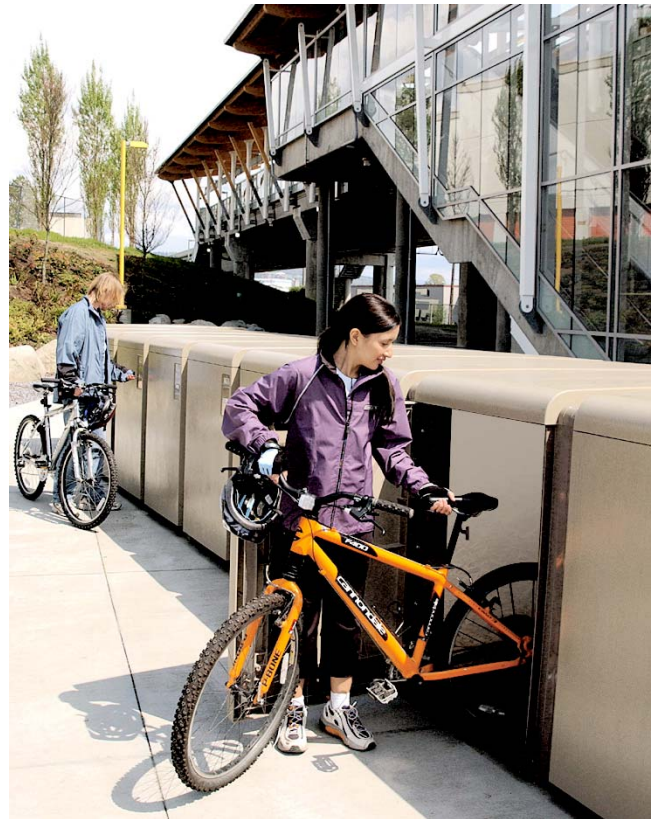
Any bicycle stand or storage facility located either indoors or outdoors on private property are considered off-street bicycle parking. New multi-family residential, commercial, and institutional developments are increasingly being required to provide indoor and outdoor off-street bicycle parking. In some cities, such as Vancouver and Calgary, bicycle-parking requirements are specified in the same municipal by-laws that govern automobile parking requirements. Like automobile parking requirements, they are tied to number of units, in the case of a multi-family residential development or to floor area in the case of commercial or institutional buildings. Vancouver's Parking By-law for example requires 1.25 bicycle parking spaces per multi-family dwelling unit; one space for every 750 m<sup>2</sup> of floor area for office and retail uses; and one space for every 25 employees for institutional and manufacturing uses (City of Vancouver, 2008).

Some municipalities provide off-street public bicycle parking facilities at transit hubs. In most cases, rows of outdoor bicycle stands are provided; in more rare cases covered bicycle sheds are provided. Some municipalities (e.g. Metro Vancouver, Toronto) also provide bicycle lockers at transit hubs (Figure 6). These are provided to intermodal bicycle-transit commuters for a modest monthly fee, to allow safe, worry-free bicycle storage during the workday. In Vancouver, for example, the current fee is \$30 for three months.

### *End-of-trip facilities*

The prospect of spending the day wearing sweat-drenched clothes after a bicycle to work can potentially dissuade many people from cycling to work. End-of-trip facilities are intended specifically for bicycle commuters, allowing them to conveniently wash, change, and store their bicycle gear at work. Typically, they include amenities such as

showers, change rooms, and storage lockers. In most cases, separate facilities are provided for men and women. An increasing number of municipalities are requiring that these types of amenities be provided at employment land uses (i.e. commercial and institutional uses). Vancouver, for example, ties the required number of end-of-trip facilities to the number of indoor bicycle parking spaces required by its Parking By-law (see [Bicycle Planning Considerations](#)).



**Figure 6 - Bicycle lockers at a SkyTrain station in Vancouver** (source: www.cyclesafe.com)

## Promotional Tools

### *Festivals*

A few Canadian cities sponsor bicycle festivals as a means of promoting bicycle use – recreational and utilitarian. Examples of such festivals include Montreal's *Féria du vélo* and Vancouver's *Bike Week*, both of which are held annually during the first week of June. Both festivals include a utilitarian cycling component. The *Féria du vélo*, for example, includes [Opération vélo-boulot](#) (Operation Bike-to-Work), which offers workshops on bicycle commuting to local businesses.

### *Education Programs*

Some municipalities sponsor bicycle education for residents and employers. The City of Toronto and the City

of Ottawa, for example, both offer nationally standardized CAN-BIKE courses, developed by the Canadian Cycling Association. Courses offered under the CAN-BIKE banner include: Kids CAN-BIKE, a course for children under 14 years old; CAN-BIKE I and CAN-BIKE II for people 14 years old and up; CAN-BIKE Cycling Freedom for Women, a course specifically for women, similar to the regular CAN-BIKE I course but with the additional instruction on security, riding at night, and riding with children; CAN-BIKE Cycling Skills for Seniors, a course specifically for seniors; and a CAN-BIKE safety instructor's certification program. Both Ottawa and Toronto provide information on CAN-BIKE courses in the cycling information sections of their websites. In both cities, the registration fees for the aforementioned courses range between \$70 and \$100. Toronto in particular actively encourages employers to provide bicycle safety training to their employees either by hiring a CAN-BIKE instructor or by having one of their own employees receive instructor certification.

Other municipalities leave bicycle education up to non-governmental organizations. The City of Calgary, for example, refers residents to the Elbow Valley Cycling Club for CAN-BIKE classes and to the Calgary Safety Council for bicycle safety education for kids; the City of Montreal leaves bicycle education up to Vélo Québec; and Vancouver leaves it up to the Vancouver Area Cycling Coalition (see [UTSP Case Study 59](#)).

#### *Awards Programs*

Awards programs can target both individual citizens or entire institutions, offering recognition for undertaking initiatives that encourage bicycle use, or simply for making greater use of bicycles.

*Wheel 2 Work Whitehorse* is an example of a marketing campaign that uses incentive prizes to encourage individual residents to commute by bicycle during the summer season. The program is intended to complement the city's numerous recent bicycle network investments and improvements with the objective of helping ensure that these investments are optimized and that the new infrastructure is well used by residents (see [UTSP Case Study 47](#)).

Since 2001, the City of Toronto has sponsored an annual *Bicycle Friendly Business Awards* program to recognize businesses and organizations that are making an effort to encourage their clients and employees to cycle. Awards have been given to organizations that have proven their commitment to cycling through initiatives such as providing secure bike parking, shower and change facilities, and offering economic incentives for employees who cycle to work. The 2008 winners included: Ryerson University for Best Bike Parking; Quadrangle Architects for Bicycle Commute; Bike Pirates for Best Skills Development; Cervelo for Best Small Business; Ryerson University for

Best Large Business; ZM Cycle and Fitness for Bicycle-Friendliest Suburban Business; and Bikechain for Best Overall. A full list of past winners and their contact information is available on the [City of Toronto Cycling website](#).

#### *Corporate Bike Sharing Programs*

Corporate bicycle sharing programs make a small fleet of bicycles available for free or at little cost to the employees or clients of a large private enterprise or a public institution, such as a college or university. Generally, such programs are intended for individuals who commute by means other than bicycle. The shared bicycles can be used for short daytime errands, for travelling between different locations belonging to the same institution, or simply for recreation.

An example of such a program is Montreal's [Voyages Futé Accèsvélo](#) program. Under the program, bicycles are leased to large, centrally located employers. The lease package includes bicycle maintenance and a promotional programs, such as prizes for employees who use the bicycles or who encourage their colleagues to use them. In the 2008 season, 13 large employers primarily based in downtown Montreal participated in the program, including federal and provincial agencies, a few large private corporations (such as Bell Canada, whose headquarters is in Montreal), and the municipal corporation itself. A total of 115 bicycles, including 12 electric bicycles, were available at 23 different lending locations. Between April 21<sup>st</sup> and November 17<sup>th</sup>, they were used for a total of about 2,000 trips, 18% of which were business-related.

#### *Public Bicycle Systems*

Public bicycle systems are large fleets of bicycles available to the general public for short-term use at little or no cost. The bicycles are usually attached to special electronically controlled racks or "stations" that are distributed across the core areas of a city. Using an electronic key card or their credit card, users can take bicycles out from one station and returned them to any other station in the system.

Recent European experiences suggest that public bicycle systems can act as a catalyst for increased bicycle use. The experience of Paris, Lyon, and Barcelona, all of which had low levels of bicycle use, on par with Canadian cities, is that the use of private bicycles increases after the introduction of the public bicycle system. The combined use of public and private bicycles translates to a significant increase in total bicycle use. The City of Paris, for example, expects that its *Vélib* (Figure 7) public bicycle system will lead to a three- or fourfold increase in bicycle use (Nadal, 2007).

Public bicycles can also serve as an extension to the public transit system. In particular, transit commuters could use

bicycles to travel from their arrival station to their final destination, be it work or school. Many European public bicycle systems are closely integrated with public transit: public bicycles, large numbers of which are placed around transit stations, can be taken out using a transit pass.

Montreal is set to become the first Canadian city to have an electronically controlled self-service public bicycle system. The system, dubbed *BIXI* (contraction of *BI*cycle and *taXI*), is to be fully deployed in the spring of 2009. It will cover three central boroughs, including downtown Montreal, and will have a fleet of 2,400 bicycles distributed across 300 stations. Montreal's municipal parking authority, Stationnement de Montréal, which owns and operates the system, has set up a non-profit subsidiary called Public Bike System to market its bike sharing technology to other cities.



**Figure 7 - A Vélib public bicycle station in Paris** (photo: [austinevan](#))

## Bicycle Planning Considerations

### *Distribution of Bicycle Infrastructure*

To encourage cycling for utilitarian purposes, the network of bicycle routes must be interconnected and have a layout that affords direct trajectories, as the practical range of utilitarian cycling trips is limited to about 5 km. A layout that forces cyclists to take circuitous routes to feel safe is likely to discourage bicycle commuting and other types of utilitarian bicycle use. Adaptations to the street network that provide cyclists with short cuts and more direct routes are likely to have a positive impact on bicycle use.

Both Toronto and Vancouver's bicycle plans call for creating a citywide grid of bicycle routes. Vancouver calls for a grid in which parallel routes would be no more than 1 km apart; Toronto's grid is to have parallel bicycle corridors no more than 2 km apart (or to have a bicycle route no more than a 5 minute bike ride from any location in the City).

### *Developing Safety and Promotion Programs*

There are a wide variety of practices that municipalities can undertake to encourage bicycle use. The selection of programs should reflect the current share of the modal split and the prevailing local attitude towards bicycles. In small cities and suburban municipalities, in which bicycle use is almost nil, the focus should be on convincing the population that the bicycle is a viable form of urban transportation and not merely a form of recreation. In dense, core urban areas of cities such as Montreal, Toronto, and Vancouver, where bicycles are already highly visible, bicycle plans can focus more on improving safety and convenience of cycling.

### *Urban Form and Land Use*

Bicycles have a practical range of 5 km for most non-recreational intents and purposes. People will only use bicycles if meaningful destinations exist within a 5 km range of the point of origin of their trip. The more intensive patterns of land use that exist in the older, denser, core parts of Canadian metropolitan areas are generally speaking supportive of bicycle use because they offer a wide range of meaningful destinations within a relatively small area. In contrast, the extensive patterns of land use found on the periphery of most Canadian cities offer very few meaningful destinations within a range practical for cycling. Even with the addition of dedicated bicycle infrastructure, such areas are not likely to support significantly higher levels of bicycle use without interventions on land use. Increasing density and the diversity of land uses in these peripheral areas would be expected to have a positive impact on bicycle use.

The City of Vancouver's Neighbourhood Centres program is an example of an initiative for changing land use patterns in automobile-oriented areas that can have a positive impact on bicycle use. The program intends to consolidate commercial and residential development around several existing commercial nodes and corridors to make existing neighbourhoods more walking, cycling, and transit oriented. Though the Neighbourhood Centres initiative was proposed in Vancouver's 1995 City Plan, only two neighbourhood centres are currently being implemented. Their actual effect on bicycle use remains to be seen.

### *Integration of Cycling and Public Transit*

Aside from facilitating the use of bicycles as a primary mode of transportation, municipalities can also do more to create conditions favouring the use of bicycles in combination with public transit. This entails facilitating bicycle access to transit corridors or stations. In planning bicycle route networks, municipalities should be mindful of providing links to transit facilities. The provision of secure, high-quality bicycle parking, such as bicycle lockers or supervised bicycle garages, could also encourage the use



of bicycles for transit access. Access to bicycle lockers or garages could be discounted for transit pass holders.

Given that most Canadian cities have a large share of downtown employment, and given that downtown employees tend to make up the lion's share of transit commuters, public bicycle systems are a potential means for encouraging transit-bicycle intermodality. Montreal will become the first Canadian to test this potential in 2009.

## Barriers to Implementation

In several Canadian cities, after an explosion of interest in the construction of bicycle paths in the 1980s and early 1990s, the development of bicycle route networks and of complementary promotional programs has languished. The main reason for the lack of progress appears to be a lack of political will on the part of politicians at all levels of government and, as a consequence, insufficient funding of bicycle initiatives. In part, the problem may be related to the ongoing failure of both politicians and a large portion of the urban population to perceive the bicycle as a viable mode of urban transportation and not merely a form of recreation.

The surge in oil prices (prior to the economic slowdown in the second half of 2008) and growing concern about climate change appears to have compelled at least some municipalities to resume their efforts to build bicycle networks and to undertake new initiatives to increase bicycle use. Toronto and Vancouver (see case studies below), for example, have injected considerable funds towards the completion of their bicycle plans.

## Case Study 1 – Vancouver, BC

### *Background*

Bicycle use for commuting in the Vancouver CMA is only slightly above the average for CMA's – 1.7% versus the average 1.4% in 2006. However, the mode share in the City of Vancouver itself is considerably higher – estimated to be around 3.3% (City of Vancouver, 2005).

A primarily recreational bicycle network began developing in Vancouver in the late 1980s with the adoption of the Vancouver Comprehensive Bicycle Plan (1988) and construction of the BC Parkway and Seaside recreational routes. In 1992, the City approved the Bicycle Network Study, which recommended the creation of on-street bicycle routes on quiet, residential streets running parallel to major arterials. The 1988 Comprehensive Bicycle Plan and the Bicycle Network Study were superseded by a new Bicycle Plan, approved in 1999, which still remains in force at the time of writing.

### *Contents of the Plan*

The 1999 Bicycle Plan aims to increase cycling in Vancouver through “four fundamental Es” – engineering, education, enforcement, and encouragement. The first ‘E’, engineering, receives considerably more attention than the remaining three.

Under the rubric of Engineering, the Bicycle Plan calls for completing the routes envisioned in the 1992 Bicycle Network Study (which were around 60% complete in 1999) and ultimately creating a grid of bicycle routes across the territory, in which parallel routes would be no more than 1 km apart. The plan also calls for developing citywide network of greenways.

In terms of other infrastructure, the Bicycle Plan commits the City to requiring off-street bicycle parking facilities in new developments. The City's Parking By-law (City of Vancouver, 2008 a) has been updated to require most multi-family residential uses to provide a certain amount of off-street bicycle parking space. There are also bicycle parking requirements for most retail, service, office, cultural and recreational uses as well as for certain institutional uses, namely for schools and health care facilities. The City's Building By-law stipulates that buildings with four or more off-street bicycle parking spaces, as required by the Parking By-law, must provide one pair of end-of-trip facilities (one for each gender); an additional pair of facilities is required for roughly every 30 additional required bicycle parking spaces (City of Vancouver, 1995 b).

Whereas Engineering has its own extensive section, the rubrics of ‘Education’, ‘Enforcement’, and ‘Encouragement’ are dealt with jointly in a single brief section. Under education, the plan calls for aggressively distributing bicycle route maps across the city to “educate residents about the cycling opportunities that exist within the City of Vancouver”. Under enforcement, the plan calls for: setting up telephone and e-mail hotlines for reporting bicycle hazards; bicycle courier licenses; and enforcement of a helmet by-law and the bicycle parking components of the Parking By-law. In terms of encouragement, the Bicycle Plan commits the City to supporting the annual *Bike Week* at the beginning of June, organized in collaboration with a local non-governmental sustainable transportation agency, Better Environmentally Sound Transportation (BEST).

### *Implementation*

Since 1999, the bicycle route network has grown at a slower pace than over the previous decade, expanding from 133 km in 1999 to 178 km in 2007. Nevertheless, in 2007, eleven new route segments were approved by council and expected to increase the total network length to 241 km (City of Vancouver, 2007). With the construction of these bicycle routes, all points within the

City's territory, except areas in the south-east corner, will be within 1 km of a bicycle route.

The City has systematically been using road and utility maintenance projects as opportunities for inserting new, on-street bicycle facilities or making roads more bicycle-friendly, even though there is no policy requirement to do so (City of Vancouver, 2007).

The Metro Vancouver regional government has simultaneously been sponsoring the creation of a inter-municipal greenway network, which includes the 22 km Central Valley Greenway from False Creek in Vancouver's downtown core to the eastern suburb of New Westminister (see the [Sustainable Region Showcase](#)).

## Case Study 2 – Toronto, ON

### *Background*

According to its 1999 Cycling Survey, the City of Toronto has high bicycle ownership and a high level of bicycle use. Approximately 62% of households in Toronto own a bicycle, and there are over 939,000 adult cyclists within the City. However, non-recreational bicycle use remains relatively low. The City has committed itself to increasing the level of bicycle use, especially for non-recreational purposes, with the adoption of the 2001 City of Toronto Bike Plan.

### *Contents of the Plan*

The 2001 City of Toronto Bike Plan has two primary goals: (1) to double the number of bicycle trips made in the city by 2011; and (2) to significantly reduce the number of bicycle collisions and injuries.

The bicycle plan is structured around six key themes, linked through a common implementation strategy. The themes include:

- bikeway network
- bicycle friendly streets
- bicycle parking
- cycling and transit
- promotion
- safety and education

The plan stresses that the six themes must be pursued in tandem in order to achieve the two main goals. For each theme, the plan describes its overall importance to whole plan and lays out a set of objectives to be met, and recommendations on how to meet these objectives.

In terms of the bikeway network, the plan proposed to expand the City's network from the 166 km it had at the time to a total of 1000 km. This would translate into a bikeway network that is a grid of north-south and east-

west routes spaced approximately two kilometres apart. At the time, the cost of the bikeway network was estimated at \$68.8 million. Implementation was to begin immediately and continue beyond the bike plan's 2011 time horizon; no specific target date for completion is mentioned.

In terms of creating bicycle-friendly streets, the plan includes a number of fairly detailed measures, such as: improving traffic signals to detect cyclists to trigger a bicycle compatible cycle; exempt cyclists from certain turn restrictions; explore the potential for contra-flow bicycle paths on one-way streets (see Figure 1); provide wide curb lanes on arterial roads; provide bicycle-friendly features on bridges and underpasses; and to instill road maintenance and repair practices that better accommodate cyclists.

In terms of bicycle parking, the plan calls for installing at 1000 new post-and-ring (Figure 3) bicycle stands per year at requested location; installing bicycle parking at all municipal facilities and civic buildings; investigating the feasibility of more advanced bicycle parking systems, such as lockers and sheds; and to update zoning by-laws and development guidelines to require high-quality bicycle parking and end-of-trip facilities at new developments.

In terms of cycling and transit, the plan commits the City to regularly monitor bike and ride activity at transit stations; to evaluate the effectiveness of bicycle racks on buses; to review bicycle access to transit stations and implement required improvements; and to develop a bike and ride promotion strategy.

Where promotion is concerned, the plan proposes expanding the spatial coverage of the City's Bike Week festival in early June, to ensure that events are held in all City Districts. A key proposal is to develop a Bike-to-School program in collaboration with local school boards, including the identification of safe cycling routes leading to schools, providing safe bicycle parking at schools, and offering bicycle safety training courses to students and their parents. The city commits to better promoting its bicycle facilities, programs, and events through the annual publication of a cycling guide, the distribution of cycling maps at public facilities and through the City's website. Finally, the plan also commits the City to maintaining its existing Road and Trail Safety Ambassador program. The program was developed by the City to respond to the large number of requests for cycling safety information. The "Ambassadors" are young cyclists who visit neighbourhoods to promote safe cycling.

In terms of safety and education initiatives, the plan commits the City to delivering stable funding for bicycle safety programs. The plan stipulates that the City is to continue delivering and improve access to standardized CAN-BIKE safety training courses, developed by the Canadian Cycling Association. The plan proposes that City review its cycling collision and fatality data and determine education, enforcement, and infrastructure

priorities accordingly. A related proposal is the development of educational materials to assist cyclists involved in collisions. The plan also envisions expanding the Toronto Police Service’s role in bicycle safety. It proposes increasing the number of bicycle patrol officers across the city, devising traffic enforcement priorities together with the Police Service, and having a representative of the Police Service on the City’s Bicycle Safety Staff Team.

### Implementation

Implementation of the most ambitious aspect of the bike plan, the bikeway network, has been proceeding slowly. Only 128 km of new bicycle routes were added between 2001 and 2007 (see Table 3).

**Table 3 - Status of Toronto Bikeway Network by bikeway type - June 2007** (source: City of Toronto, 2007)

bikeway type	2001 (km)	2007 (km)	Target
bike lanes	35	69	467
shared roads	37	118	317
park roads	20	20	20
off-road paths	150	163	290
<b>total</b>	<b>242</b>	<b>370</b>	<b>1094</b>

Nonetheless, some elements of the bike plan have been successfully implemented. These include:

- a bikeway network information system, with standardized bike route signage being installed on 190 km of on-street bicycle lanes and shared roads (Figure 8);
- the annual Kids CAN-BIKE summer camp, for children to learn bicycle safety;
- ongoing deployment of post-and-ring bicycle racks at a rate of around 1,000 per year;
- establishment of a bicycle locker program, with 82 lockers at 9 public transit stations as of 2007;
- bicycle racks are available on 24 bus lines (about 350 buses) and are to be available on the entire bus fleet by 2010;
- a number of public awareness campaigns targeting both cyclists and motorists, including “Please Don’t Squeeze Campaign”, “Watch for Bikes” and “Pass Bikes Safely Campaign”;
- a number of promotional programs, including Bicycle Friendly Business Awards, the Bicycle User Groups (BUG) network, the Cycling Ambassador Program, and the Bicycle Friendly Campuses Project.



**Figure 8 - Standardized bicycle route signage in Toronto** (source: City of Toronto)

The City’s most recent (2009) capital budget allots significant funding for the completion of the bikeway network, intended to accelerate implementation and complete the network by 2012. The soon-to-be-approved 2009 operating budget includes measures to hire several new staff members to oversee the ongoing implementation and to maintain a much expanded bikeway network.

## Resources

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#### Websites

BIXI ([www.bixi.ca](http://www.bixi.ca))

Cycling in Toronto ([www.toronto.ca/cycling](http://www.toronto.ca/cycling))

Cycling in Vancouver  
([vancouver.ca/engsvcs/transport/cycling/](http://vancouver.ca/engsvcs/transport/cycling/))

Public Bike System (<http://www.bixisystem.com>)

Voyagez Futez Accèsvélo  
([www.voyagezfute.ca/veloLibre.asp](http://www.voyagezfute.ca/veloLibre.asp))

Vélib ([www.velib.paris.fr](http://www.velib.paris.fr))