

# Calgary Bike Share Feasibility Study

Prepared for the

**City of Calgary**

By:

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# 1. Introduction

The City of Calgary is looking to increase the role of cycling in the city. The 2009 *Calgary Transportation Plan* identified an increasing need to provide transportation choices and a focus on sustainability, health and the environment. City staff also embarked on developing the *City of Calgary Cycling Strategy* that was recently presented to and approved by Council. The Strategy included recommendations for an extensive expansion of bikeway facilities in the Centre City and for a public bike share system to be launched in the Centre City as early as 2013 (C11 – Implement a public bike share system in the Centre City).

Although supported in concept, Council requested that more study be done to identify possible bike sharing business models and in particular to explore whether the program was feasible without local public funding. There was also a desire to better understand, if public money was required, that the community benefits of bike sharing justify this investment – in much the same way that other transit options are currently considered for funding. Council directive was as follows:

*“Direct administration to prepare a business case analysis of bike share reflecting potential sources of revenue (including private sector partnerships and sponsorships), costs, financial and non financial benefits, and experience in other cities and report back to SPC on Land Use, Planning and Transportation no later than December 2011”.*

## 1.1 Report Structure

This study introduces the concept of bike sharing, the system components, and the historical development of the technology over the past four decades. Chapter 2 includes an extensive review of the financial, health, environmental, and transportation benefits of bike sharing.

Experience in other cities, including a detailed review of how other Canadian cities have brought bike sharing to their cities, is included in Chapter 3. Several case studies from US cities are also presented. Chapter 4 builds on these case studies to assess the “preparedness” of Calgary to host bike sharing considering factors thought important to the success of bike sharing, such as resident and employment density, visitor attractions, transit, and a supportive bicycling infrastructure and policy environment.

Chapter 5 presents planning considerations including a definition of the area to be covered by the initial system, the recommended size of the program, proposed station locations and typical station placements, and considerations for future expansion of the program.

Possible business models (i.e. the ownership, administration, and operation of the system) are explored along with potential funding strategies in Chapter 6. This builds on the experience of other North American systems adapted to Calgary. This chapter also presents expected capital and operating costs for the system along with forecasts of user demand and revenue, potential sponsorship / advertising revenue, and other revenue sources. A “cash-flow” analysis is presented for the first five years of operations to determine whether the system will be able to sustain operating costs and pay-back initial capital costs.

The report is wrapped up with a general implementation plan that identifies next steps for local public and private partners.

## 1.2 Study Area

This study explores the potential for establishing a bike sharing program in the Calgary Centre City, which includes downtown and the surrounding communities of the Beltline (comprising the neighbourhoods of Connaught Centre, West Connaught Centre and East Victoria Crossing Centre), Chinatown, East Village, Eau Claire and the West End. The location of the Centre City with relation to the rest of Calgary is shown on Figure 1.1 and the borders of the study area include the Bow and Elbow Rivers to the north and east, 17<sup>th</sup> Avenue to the south, and 14<sup>th</sup> Street to the west.

## 1.3 What is Bike Sharing?

Bike sharing provides a mobility option for trips too far to walk, but not long enough to justify waiting for transit or too costly to make by taxi or private vehicle. A bike share system consists of a network of bikes placed at stations situated at key locations around the city or particular areas of the city. Users pay to access the system, after which they can use the system as many times as they wish during that period. Typically, there is a free ride period (30 – 45 minutes depending on the system) after which time additional fees are charged.

Cities such as Montreal, Toronto, Ottawa, Denver, Minneapolis, Washington DC, Boston, and over 300 other cities worldwide are investing in bike sharing as a relatively inexpensive and quick implementation urban transportation option. These cities, like Calgary, recognize the economic, environmental, and social benefits of bike sharing.

## 1.4 Bike Share History

The international community has experimented with bike share programs for nearly 40 years. Until recently, these programs experienced low to moderate success because of theft and vandalism. In the last five years, innovations in technology to increase accountability have given rise to a new generation of technology-driven bike share programs. The development of bike sharing is tracked by “generations” of technology as described in Table 1.1.

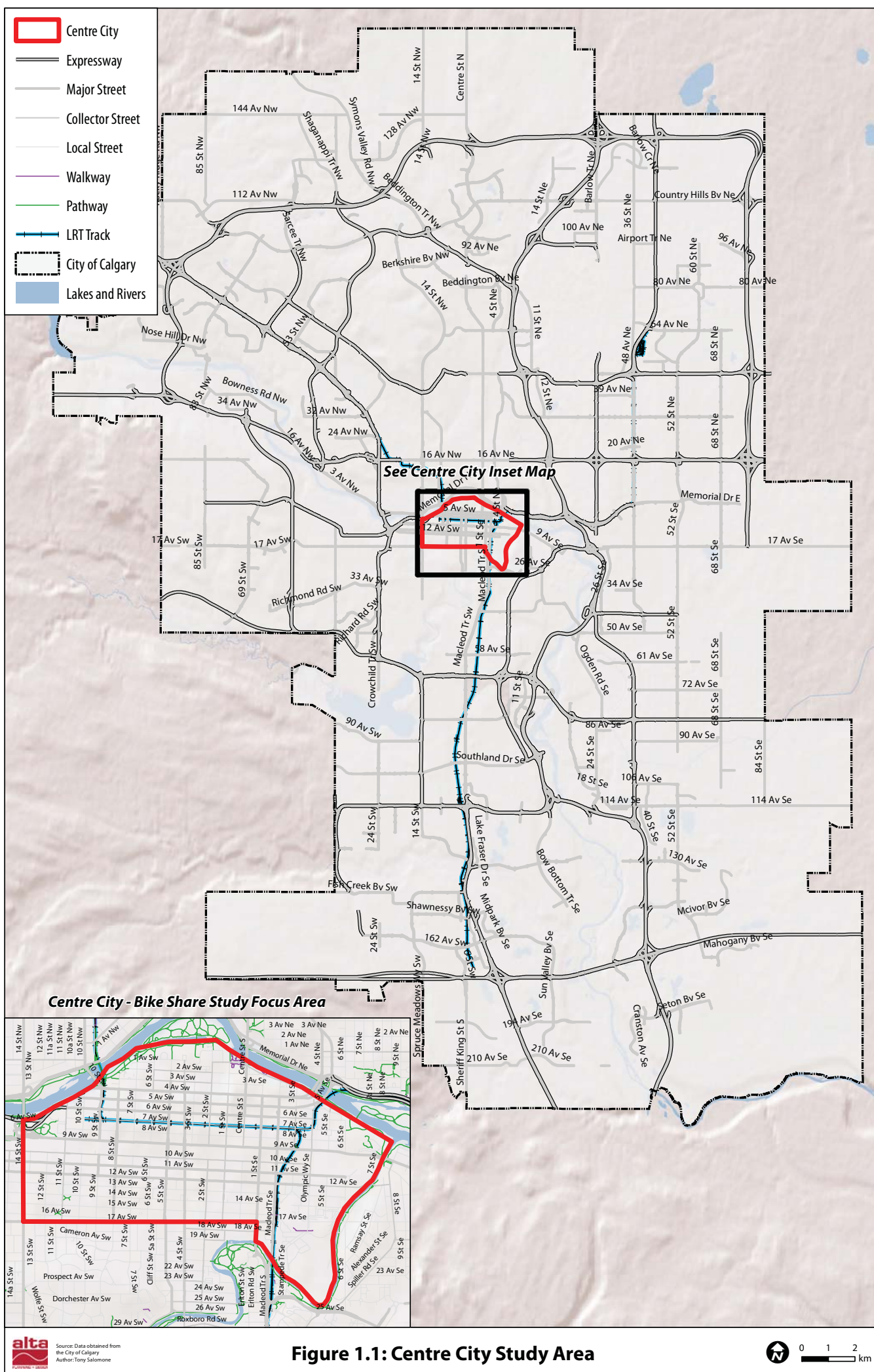


Table 1.1: Historic Development of Bike Sharing Technology

Generation	Features	Pros/Cons
1 <sup>st</sup> Generation	Distinguishing looking bikes (i.e. certain paint color)	Subject to theft and poor organization
2 <sup>nd</sup> Generation	Locking mechanism and check-out deposit	Minimal deposit not enough to significantly reduce theft
3 <sup>rd</sup> Generation	Credit card transactions and radio-frequency identification chips	Allow user identification and a security deposit to ensure accountability against theft and vandalism
4 <sup>th</sup> Generation	Solar power and wireless communication	Allows for modular systems that do not require excavation

#### 1.4.1 First and Second Generation Bike Share Systems

First-generation bike share programs began in the 1960's and included a fleet of bikes with a distinguishing feature (e.g., painted white) distributed around a city for free use. Theft and poor organization were the key reasons for program failure in many first-generation bicycle programs.

To add some accountability, second-generation systems introduced a locking mechanism and required a check-out deposit payable at pick-up and returned at drop-off. An example of this system is the Copenhagen Bicyklen, founded in 1995, which required a coin deposit to release the bicycle for use. However, the minimal deposit was not enough to significantly reduce theft<sup>1</sup>.



Coin deposit systems do not always provide enough incentive for the user to return the bike.

The primary problem with first and second generation bike sharing is a lack of accountability, resulting in:

- Little or no reason to return bicycles.
- Little regard for the condition of bicycles.
- Inadequate or no funding to maintain or advertise the system.

<sup>1</sup> It was estimated that 300 bikes or about 15% of the fleet was lost to theft in Bicyklen in 1996.



### 1.4.2 Third and Fourth Generation Bike Share System

Third-generation bike share systems are characterized by credit card transactions and RFID chips (radio-frequency identification). These crucial technology upgrades allow user identification and a security deposit to ensure accountability against theft and vandalism.

*In 2010 “our total costs for theft and vandalism were only about \$5,000.”*

*Bill Dossett, Executive Director of Nice Ride Minnesota.*

The so-called “fourth-generation” was coined to characterize modular systems that do not require excavation because they use solar power and wireless communication, as opposed to hardwired installation. In this way, the stations can be moved, relocated, expanded, or reduced to meet demand. Even with this technology available, some cities, such as London, have chosen to utilize a hardwired system. Recent high-profile bike share installations including those in Denver, Minneapolis, Miami Beach, Boston, and Washington DC utilize fourth-generation technology.

Portable fourth generation systems also simplify operations in cities with significant snowfall where winter retrieval of the equipment allows for snow removal, equipment maintenance, and redeployment in the spring when higher ridership resumes. Calgary’s winter, not unlike Minneapolis, Toronto, or Montreal, may indicate a seasonal operations pattern that includes winter closure of the system.

### 1.4.3 Fourth Generation System Elements

The components of a fourth-generation bike share system include a network of stations, a fleet of bicycles, as well as a software back-end and maintenance / redistribution teams to operate the system. These elements are described on Figure 1.2.

The bikes are typically upright bicycles, which have the advantage of being “one-size-fits-all” and encourage movement at a slower pace. They can also be fitted with additional gears if topography is considered a barrier. Upright bicycles are appropriate for intended use of the system on existing roadways, bike lanes, and the developed pathway system.



A fleet of bicycles - specially designed for short trips and constructed of customized components to limit their appeal to theft and vandalism.



A network of stations spread across a broad area to provide convenient access to bikes. Each station includes a terminal where transactions are made and docking points where the bicycles are secured when not in use. Recent technologies have introduced modular station platforms that can be relocated, expanded, and have solar power and wireless communications.



Maintenance: staff and programs to rebalance bikes amongst the stations and maintain the system infrastructure.



A software back-end that keeps track of transactions and ridership information and can be linked to real-time website and mobile device applications and user profiles that report the number of trips, distance travelled, calories burned, etc.

Figure 1.2: Elements of a 4<sup>th</sup> Generation Bike Share System.

## 2. Benefits of Bike Sharing

Bike sharing is truly transformative. Relative to its cost, bike sharing brings an overwhelming number of benefits. This section provides a summary of some of the financial, health, environmental, and transportation / mobility benefits of bike sharing.

### 2.1 Financial Benefits

Bike sharing is a relatively inexpensive and a quick to implement urban transportation option compared to other transportation modes (see Table 2.1). For example, the entire 1,100 bike Capital Bikeshare system in Washington DC cost \$6.2 million, less than the cost of a mile of LRT or urban freeway.

Table 2.1: Comparison of Capital and Operating Costs for Various Public Transportation Modes

Mode	Capital Cost (\$ million / km)	Farebox Recovery (fare / operating cost)
Bus	-	27%
LRT with stations	\$100 - \$150	52%
Heavy Rail	\$200	57%
Highway with intersections	\$60 - 80	-
Bike Share <sup>1</sup>	\$6.2 (entire system)	Up to 100%

Sources: <http://www.advancedtransit.net>, City of Calgary.

<sup>1</sup> According to officials from District Department of Transportation, the administrators of Capital Bikeshare in Washington DC, the system broke even in its first year of operations, as presented at the RailVolution conference on October 18, 2011.

Table 2.1 also shows the farebox recovery of public transport systems in the United States and although North American bike share systems are in early development, some early reports have shown that they are able to support operating costs from user-generated revenues alone (i.e. full farebox recovery). This may or may not be possible in Calgary; however where user fees do not cover the cost of operating the system, sponsorship of the stations, bikes, and other system infrastructure may be able to pick up the shortfall.

Bike sharing systems are also:

- High-profile additions to a city that in themselves become an attraction for visitors and tourists and generate positive national and international media exposure that would otherwise be difficult or costly to generate.

- Create “green” jobs with on-going positions for managing and operating the system. The size of system being considered in Calgary (approximately 40 stations) could generate around 8 full-time jobs.
- Provide existing businesses an additional way to get customers to their front door or to provide employees with an inexpensive transportation option for commuting to work and running errands during the day (bike sharing could form part of a business’ Travel Demand Management toolbox).
- Provide businesses of all sizes an opportunity for brand development through station / bike sponsorship. Bike sharing also represents a positive “community amenity” contribution for many companies and property developers.
- Household budgets can benefit from bike sharing. On average, Calgarians spend approximately 13% of their household budget on transportation<sup>2</sup>. Bike sharing can reduce transportation costs, and in some cases, could eliminate the need for an extra vehicle.
- The wireless and modular nature of stations provides a number of benefits over other transportation infrastructure. The system can be installed quickly and inexpensively and stations can be expanded, reduced, or moved to optimize demands.

## 2.2 Health Benefits

The health benefits of bicycling are well recognized and include the potential to reduce obesity, heart disease, and other sedentary lifestyle diseases. Calgarians are increasingly recognizing these benefits - the Calgary Cycling Strategy states that “commuter cyclists consistently report exercise as the number one reason for riding to work”. It also recognizes that increased bicycling activity shows a commitment to vibrant and healthy communities, which are “better able to attract new residents”.

The synergies with health have attracted considerable interest from the health care industry with health care providers becoming major sponsors of bike sharing systems in Minneapolis and Denver.

## 2.3 Environmental Benefits

Bike sharing is practically carbon neutral. The stations are solar powered and environmentally friendly facilities and equipment can be chosen for operations (such as cargo bikes or electric vehicles for bicycle redistribution).

North American cities with bike sharing report that approximately 25% of trips replace a vehicle trip, reducing emissions, fuel use, and the need for hard space taken up by automobile parking.

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<sup>2</sup> <http://www40.statcan.gc.ca/l01/cst01/famil10f-eng.htm>

## 2.4 Transportation / Mobility Benefits

Bike sharing provides an additional mobility option for short urban trips for residents and visitors. Figure 2.1 illustrates how bike sharing fills an existing gap between trips too long to walk, but not long enough to justify waiting for transit or the cost of driving or catching a taxi. Bike sharing can also:

- Reduce reliance on the private automobile. Initial experience in North American cities has shown that approximately 25% of bike share trips replace a vehicle trip.
- Extend the reach of transit by providing a first- and last-mile transportation solution or providing service to under-served areas or areas that do not justify the cost of other transit options.
- Encourage more bicycling. In Paris, for example, consumers have bought more than 2 million bicycles since the city launched its Velib bike share program<sup>3</sup>. Approximately 66% of surveyed users in Minneapolis (2010) stated that they bicycle more since subscribing to Nice Ride.
- Introduce people to cycling that do not typically ride. The 2010 user survey in Minneapolis showed that approximately one-third of system users cycled less than once per month.
- Provide a mobility option for commuters arriving in the Centre City by other means – for example approximately 50% of commuters arrive in the City Centre using public transit and another 9% walk. Bike sharing provides them another means to move about the Centre City.
- Reduces barriers to cycling as there is no need to own or store a private bicycle. Shorter trips do not require showers or special clothing and therefore changing facilities.

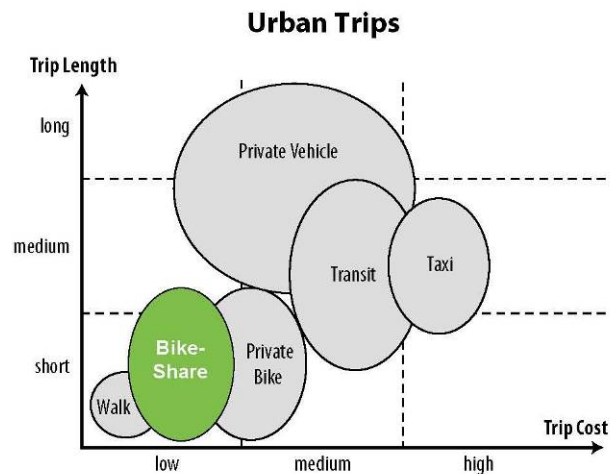


Figure 2.1: Urban Transportation Spectrum

## 2.5 Safety Benefits

Bike share systems have to date observed a solid safety record. In North American systems, few serious injuries or fatalities have been reported, and in Washington DC a total of 14 crashes were reported in the first year of operation, of which one was serious in nature. Approximately one million trips were made during this same period – an injury crash rate of 0.83 injuries per million miles (the average trip length was approximately

<sup>3</sup> [http://www.ecf.com/4575\\_1](http://www.ecf.com/4575_1)

1.2 miles per trip), which is lower than the injury rate of 7.3 injuries per million miles ridden for private bicycling.<sup>4</sup>

Some of the factors contributing to this safety record could include:

- Increased driver awareness due to increased media, increased numbers of cyclists on the street, and because many drivers now use the bike share system or own a bicycle. A similar phenomenon is observed in bicycling in many cities including Portland, Oregon that has seen an increase in bicycling associated with a reduction in bicycle crash rates as shown on Figure 2.2.
- The safe design of the bicycle as a visible, slow-speed, upright bicycle fitted with internal safety features such as lights and bells. Further, the bikes are regularly inspected to ensure that all safety features are in proper working order.
- The health benefits due to increased physical activity far outweigh risks associated with exposure to air pollution and deaths from traffic accidents among cyclists compared with car users, according to a recent study in the British Medical Journal that examined the impacts of the Barcelona 'Bicing' bike share system<sup>5</sup>.

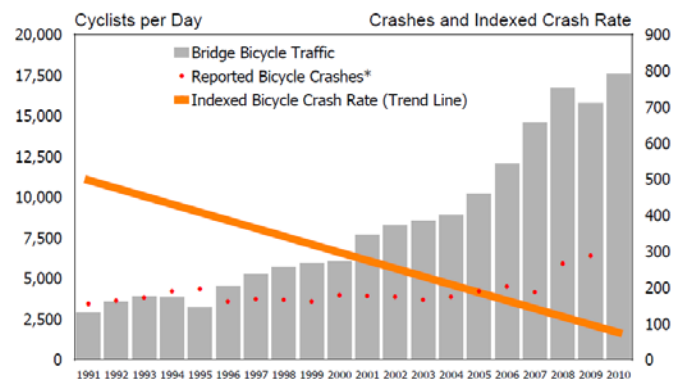


Figure 2.2: Bicycle Crash Rate Trend in Portland, OR.

<sup>4</sup> <http://bicycleuniverse.info/transpo/almanac-safety.html>

<sup>5</sup> <http://www.montrealgazette.com/health/Bike+sharing+schemes+save+lives+study/5211529/story.html>

## 3. Experience in Other Cities

Several bike share systems have been reviewed as part of this study to provide a snapshot of various characteristics that may be relevant to the City of Calgary. The review includes a summary of the size and extent of each system, the system's effectiveness in generating ridership, the ownership / administrative / operating (business) model chosen, and the funding strategy used for capital and operating costs.

The review includes the Canadian cities of Montreal, Toronto, and Ottawa that all have operating bike share systems, as well as the experience so far in Vancouver, which has issued an RFP for a future bike share system in that city. Experience is also drawn from US cities with bike sharing including Denver, Minneapolis, Washington DC, Boston, and Miami Beach. Most of these cities operate systems of a similar scale as that being considered in Calgary (approximately 40 stations) and many are in cities that deal with snow removal and cold climate issues.

Fact sheets for each of the bike share systems considered are included in **Appendix A**.

### 3.1 Canadian Bike Share Systems

Several Canadian cities currently operate bike share systems including Montreal, Toronto, Ottawa/Gatineau, and a small system in the resort town of Golden, British Columbia. The City of Vancouver has also issued an RFP to provide bike sharing in that city.

Montreal was the first North American city to significantly invest in fourth-generation bike sharing. The technology for the Bixi system was developed by Public Bike System Company (PBSC), financed through a loan from Ville de Montreal. The Bixi technology has been sold to other cities including Toronto and Ottawa, London (UK), Melbourne (Australia), and Minneapolis, Washington DC, and Boston in the United States. The system launched in Montreal in 2009 with 300 stations and has since expanded to 405 stations. In 2010, a total of 3.3 million trips were made on the system.

The systems in Toronto and Ottawa are expansions of the Bixi program. In Ottawa, the National Capital Commission owns the 10 station / 100 bike system and contracts operations to PBSC. In Toronto, PBSC owns and operates the 80 station / 1,000 bike program that it purchased through a loan guaranteed by the City of Toronto and that is paid back by sponsorship and user revenues. It is anticipated that as the system grows, user-generated revenues will be sufficient to cover the operating costs of the system.

The Vancouver Metro area has also explored the concept of a bike share system that would initially start in the downtown core and expand to other parts of the region including the nearby cities of North Vancouver, Richmond, and the University of British Columbia campus. The City of Vancouver has issued an RFP for providing the initial system and has also explored the potential for a non-profit organization to administer or operate the system. The requirement in British Columbia for cyclists to wear a helmet is an important consideration and potential vendors are exploring helmet vending machines and other means of providing access to helmets. In Golden, British Columbia, the waiver included when members sign-up for the system identifies the provincial helmet requirement, but states that the town and any entities connected with Golden Community Bike Share are not responsible for providing helmets or liable for the risk of riding without a helmet. Helmets are provided at one of the two bike share stations.

### 3.2 US Bike Share Systems

Following the lead of Montreal – several US bike share programs launched in 2010 and 2011. These introductions saw new vendors enter the market and the creation of several innovative business models, which continue to develop. These systems included:

- Denver B-Cycle: a 51 station / 510 bike system owned and operated by Denver Bike Sharing, a specially created non-profit organization. The equipment for this program is provided by B-Cycle, a partnership of Humana, Trek Bicycle Corporation, and Crispin Porter + Bogusky, who have also provided equipment for systems in Boulder, CO and Madison, WI.
- Nice Ride Minnesota: a 124 station / 1,200 bike system owned and operated by a specially created non-profit organization. The capital for this program was funded through a combination of federal grant money, city funding, and a presenting sponsor. The system recorded over 200,000 rides in 2011.
- Capital Bikeshare (Washington DC / Arlington, VA): a 110 station / 1,100 bike system funded through federal grant money and some local public funding. The system is sustained solely on user-revenues and there is no corporate sponsorship of the bikes, stations, or other infrastructure. In its first year the system recorded just under one million trips and signed 16,726 annual members, 1,664 monthly members, 4,118 weekly members, and 86,019 casual (24-hour) users.
- DecoBike (Miami Beach): is a privately owned and operated North American bike share system. A private operator was responsible for raising the capital for the initial 100 station / 1,000 bike system and obtaining sponsorships that supplement user-fees to sustain operations. This system (as well as the 2-station system in Golden, BC) utilizes technology developed by the Sandvault Group in Richmond, BC.
- Boston Hubway: a 61 station / 610 bike system funded through federal grant money, a presenting sponsor, and individual station sponsorships.

Although not as relevant in size to Calgary, the models proposed in New York City and Chicago offer an interesting contrast in how cities are funding bike sharing. In the case of New York, the City issued an RFP that required a system be provided with no use of public funds and the entire system will be provided by a private owner / operator (although the City will assist with public engagement, launch, and permitting and will share in profits generated by the system). Alta Bicycle Share, the firm chosen to operate the system, is currently seeking sponsorship that would cover capital costs and supplement user-generated revenues to sustain operations.

Chicago has issued an RFP (currently under consideration) that utilizes federal grant money and some local public funding for the capital cost and launch of the system. Operating costs would be borne by the operator through memberships and user fees.



### 3.3 Summary

Fact sheets for each of the bike share systems described above are included in **Appendix A** (as well as several other North American systems). **Table 3.1** summarizes the business models and funding strategies employed for bike share systems in North America. The experience of these cities is referred to in several sections of this report including Section 6 that explores potential business models for bike sharing in Calgary.

**Table 3.1: Review of North American Bike Share Business Models**

	Owner	Operator	Funding / Revenue Sources					
			Federal Grants	Local Funds	Loan	Presenting Sponsor	Station Sponsors	User Fees
Montreal	Non-profit	Non-profit			✓	✓		✓
Toronto	Non-profit	Non-profit			✓	✓		✓
Ottawa	Agency	Non-profit		✓		✓		✓
Denver	Non-Profit	Non-Profit	✓			✓	✓	✓
Minneapolis	Non-Profit	Non-Profit	✓	✓		✓	✓	✓
Washington DC	Agency	Private	✓	✓				✓
Boston	Agency	Private	✓			✓	✓	✓
Miami Beach	Private	Private					✓	✓
New York	Private	Private				✓	✓	✓
Chicago (RFP)	Agency	Private	✓	✓		✓	✓	✓

## 4. Calgary's Preparedness

This assessment focuses on the Centre City of Calgary – the area including Downtown, the Beltline, Chinatown, East Village, Eau Claire, the West End, and Stampede Park. The area was shown previously on Figure 1.1 and is bound by the Bow and Elbow Rivers to the north and east, 17<sup>th</sup> Avenue to the south and 14<sup>th</sup> Street to the west.

The Centre City has many of the characteristics to support a successful bike sharing system including high employment density, well supported visitor and recreational attractions, an extensive public transport system, and a growing resident population. The local political and policy environment is supportive of the growth of walking and cycling as a means of creating a more livable and vibrant city and in fact the Cycling Strategy identifies the need to increase bikeway infrastructure in the Centre City.

Bike share systems are most successful where there is a mix of land uses and trip-making throughout the day to attract users. In the Calgary Centre City these would include City Centre residents, downtown commuters, students of the downtown college campuses, Calgary residents travelling downtown for shopping, recreation, entertainment, or other purposes, and visitors and tourists. The system will offer a mobility option for a variety of trip purposes including:

- Residents making short trips around the Centre City including to get to work, connect to transit, or to reach recreational / entertainment destinations.
- Short recreational trips, e.g. along the Bow River pathway or on Prince's Island.
- Commuters travelling into downtown that need to run errands through the day such as going to meetings, lunch, etc.
- As part of a linked trip with transit including as part of the first- or last-mile of the trip (extending the reach of transit).
- Connecting visitors from their hotels to local destinations including tourist attractions, entertainment districts, convention and meeting facilities, and restaurants. Coupled with the airport BRT and other transit services, bike sharing can reduce the need for renting a private vehicle.
- Extending the commuter shed of future transit investments such as the southeast transit corridor.

Factors considered important to the success of bike sharing are reviewed below. Where possible, comparisons have been made to other North American cities that have operating bike share systems in Table 4.1. Under-performance in any one of these areas does not exclude the feasibility of a bike share system but each factor influences the potential success of the system. A summary on the preparedness of the community is provided at the end of this section along with a discussion of some of the potential issues that may pose as barriers to success.

Table 4.1: Comparison of Key Bike Share Characteristics between Calgary and North American Cities with Bike Share Systems

	Population	Land Area (km <sup>2</sup> )	Population Density (persons / km <sup>2</sup> )	Age Distribution	Income Distribution (>=\$100k)	Annual Visitors	Employment Density (employees / km <sup>2</sup> )	Bikeway Infrastructure
Calgary	1,091,000	727	1,500	25-34: 17% 35-54: 33%	>=\$100k: 30%	4.7 million	1,100	712 km of multi-use pathways, 12 km of bicycle lanes, 15 km of marked shared lanes, 328 km of signed routes
Calgary Centre City	30,000	5.6	5,400	-	-	-	28,500	Limited, but growing network within Centre City
Montreal	1,620,000	365	4,440	25-34: 17% 35-54: 30%	>=\$100k: 16%	7.4 million	-	More than 400km of facilities. Expanded network part of Transportation Plan passed in 2008
Toronto	2,500,000	630	3,970	25-34: 15% 35-54: 31%	>=\$100k: 28%	9.9 million	-	117 km of bike lanes, 145 km of shared roadways, 168 km of off-road paths
Ottawa	810,000	2,778	290	25-34: 13% 35-54: 32%	>=\$100k: 28%	-	-	Almost 700 km of cycling facilities, recently installed first downtown bike lane
Washington DC	590,000	177	3,320	25-34: 18% 35-54: 28%	>=\$100k: 30%	17.3 million	3,750	More than 77 km of marked bike lanes
Boston	625,000	129	4,840	25-34: 25% 35-54: 25%	>=\$100k: 25%	12 million	4,328	Limited but growing network; Bike master plan in process.

## Calgary Bike Share Feasibility Study

	Population	Land Area (km <sup>2</sup> )	Population Density (persons / km <sup>2</sup> )	Age Distribution	Income Distribution (> = \$100k)	Annual Visitors	Employment Density (employees / km <sup>2</sup> )	Bikeway Infrastructure
Miami Beach	90,000	18	4,870	25-34: 21% 35-54: 30%	>=\$100k: 23%	11.9 million	2,592	-
Chattanooga	170,000	370	460	25-34: 15% 35-54: 27%	>=\$100k: 12%	3.3 million (2004)	409	-
Denver	580,000	397	1,470	25-34: 22% 35-54: 27%	>=\$100k: 19%	12.1 million	1,084	Over 128 km of multi-use trail, 64 km of bike lanes, 34 km of sharrows, and almost 645 km of signed bike routes
Minneapolis	380,000	142	2,670	25-34: 22% 35-54: 28%	>=\$100k: 19%	18.3 million	2,117	Minneapolis has 74 km of streets with dedicated bicycle lanes and 135 km of off-street bicycle paths.

## 4.1 Population

Calgary is the third largest municipality in Canada, with a population of 1 million people. The two largest Canadian cities (Toronto and Montreal) as well as the fourth largest city (Ottawa) all operate bike share systems. Although the city-wide population density (1,360 persons per square km), is low compared to many North American cities with bike sharing (see Table 4.1) it is similar to Denver and higher than Ottawa. The Centre City is home to approximately 30,000 people with approximately 5,500 persons per square km, which is a population density much higher than the city average and exceeds the population density of several urban bike sharing service areas. There is an increasing inventory of residential condominiums under construction and estimates predict the Centre City population will grow to between 50,000 and 70,000 residents by 2035 at a density of up to 12,000 persons per square km (Centre City Plan 2007).

### Age

Comparisons of user surveys and general age distributions in Montreal, Washington DC, and Minneapolis are shown in Table 4.2 along with the age distribution of the general population in Calgary. User surveys in other cities have shown that certain populations are over-represented as bike share users. These ‘early adopters’ include populations aged 25 – 34 year old, who represent the largest group of bike share users between 39% and 56% although only representing 17% to 22% of the general population. The 35 – 54 year old age range also makes up a significant portion of users with over a third of Nice Ride and Capital Bike share users being in this age range – compared to 28% to 30% of the general population.

Table 4.2 – Age Distribution of Users from other Bike Share Systems and of the General Population (in parentheses)

Age Range	Bixi Montreal (Montreal Population)	Nice Ride (Minneapolis Population)	Capital Bike Share (Washington DC Population)	(Calgary Population)
< 18 years <sup>1</sup>	6% (20%)	0% (23%)	0% (23%)	(24%)
18 – 24 years <sup>1</sup>	18% (7%)	8% (10%)	10% (8%)	(7%)
25 – 34 years	56% (17%)	39% (22%)	49% (18%)	(17%)
35 – 54 years	15% (30%)	40% (28%)	34% (28%)	(32%)
55+ years	4% (26%)	13% (18%)	7% (23%)	(20%)
Total	100% (100%)	100% (100%)	100% (100%)	(100%)

Sources: PBSC, Capital Bikeshare (Washington, DC) Customer Survey, 2010; Nice Ride (Minnesota) Fall Subscriber Survey; City of Calgary, *Calgary & Region Economic Outlook: 2011-2016, Q1 2011*. Accessed from: <http://www.calgaryeconomicdevelopment.com/live-work-play/live/demographics>

<sup>1</sup> US and Canadian data sources use slightly different age breakpoints. Table 4.2 represents US breakpoints, whereas Canadian breakpoints are <19 years old (rather than <18 years) and 20 – 24 years old (rather than 18 – 24 years old).

The median age of Calgarians is younger than other Canadian cities (35.8 years old compared to 37.9 and 39.2 years old in Toronto and Montreal), which overall is supportive of early uptake rates for bike sharing<sup>6</sup>. Early adopters are also likely to come from students at the downtown campuses of Bow Valley College and the University of Calgary. These campuses would be an important part of the first phase of the system.

### Income

The household income levels of bike share users surveyed in Minneapolis and Washington DC is compared to the income levels of these cities' populations in Table 4.3. In general, higher income brackets are disproportionately more likely to use the bike share system than low income populations, e.g. approximately 46% of Capital Bike Share users and 39% of Nice Ride users reported incomes over \$100,000. This could have to do with a higher proportion of high income residents living and working in the system service area (which is also the case in the Calgary Centre City).

**Table 4.3 – Income Level of Users from other Bike Share Systems and of the General Population (in parentheses)**

Income Range	Nice Ride (Minneapolis)	Capital Bike Share (Washington DC)	Calgary
< \$20,000	6% (20%)	3% (18%)	(5%)
\$20,000 - \$39,999	14% (21%)	9% (16%)	(14%)
\$40,000 - \$59,999	13% (17%)	16% (15%)	(21%)
\$60,000 - \$79,999	15% (13%)	15% (12%)	(19%)
\$80,000 - \$99,999	13% (10%)	12% (10%)	(14%)
\$100,000 - \$150,000	24% (12%)	22% (15%)	(11%) <sup>1</sup>
\$150,000 +	15% (7%)	23% (14%)	(15%) <sup>1</sup>
Total	100% (100%)	100% (100%)	(100%)

Sources:

Capital Bikeshare (Washington, DC) Customer Survey, 2010; Nice Ride (Minnesota) Fall Subscriber Survey, 2010, US Census data (2010) accessed from: [http://www.clrsearch.com/Washington\\_Demographics/DC/Household-Income](http://www.clrsearch.com/Washington_Demographics/DC/Household-Income), [http://www.clrsearch.com/Minneapolis\\_Demographics/MN/Household-Income](http://www.clrsearch.com/Minneapolis_Demographics/MN/Household-Income), Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-563-XCB2006015 (Calgary, Code825).

<sup>1</sup> US and Canadian data sources use slightly different household income breakpoints. Table 4.3 represents US breakpoints, whereas Statistics Canada uses \$100,000 - \$125,000 (rather than \$100,000 - \$150,000) and \$125,000+ (rather than \$150,000+).

<sup>6</sup> Statistics Canada (2010), retrieved from: <http://www.calgaryeconomicdevelopment.com/live-work-play/live/demographics>

Figure 4.1 shows that the median personal income of Calgarians is generally higher than other Canadian cities (\$54,500 per year compared to \$38,500 and \$34,500 per year in Toronto and Montreal respectively), which is supportive of early uptake rates for bike sharing.

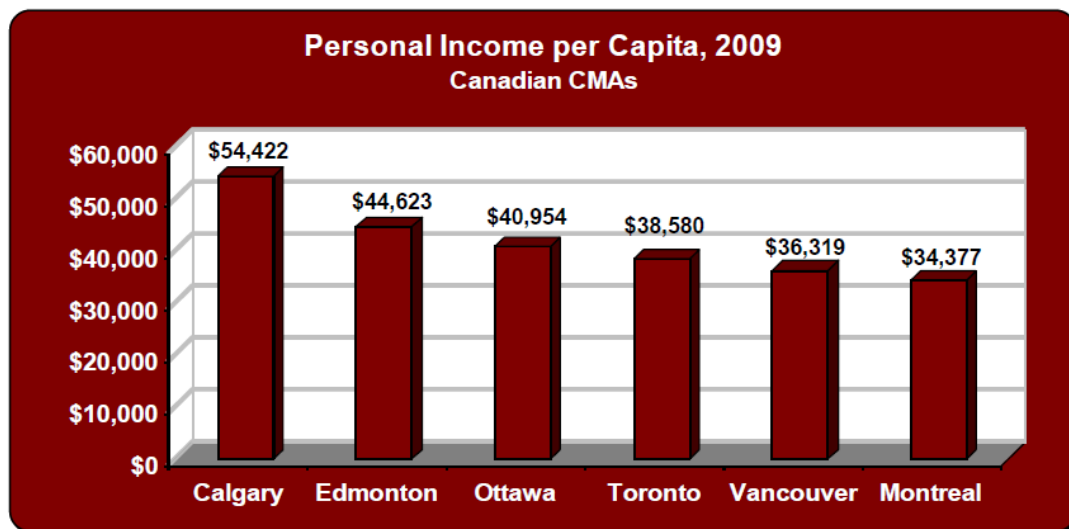


Figure 4.1: Median Personal Income for Canadian CMAs (2009).

Accessed from: <http://www.calgaryeconomicdevelopment.com/relocate/calgarys-economy/income>

## 4.2 Employment

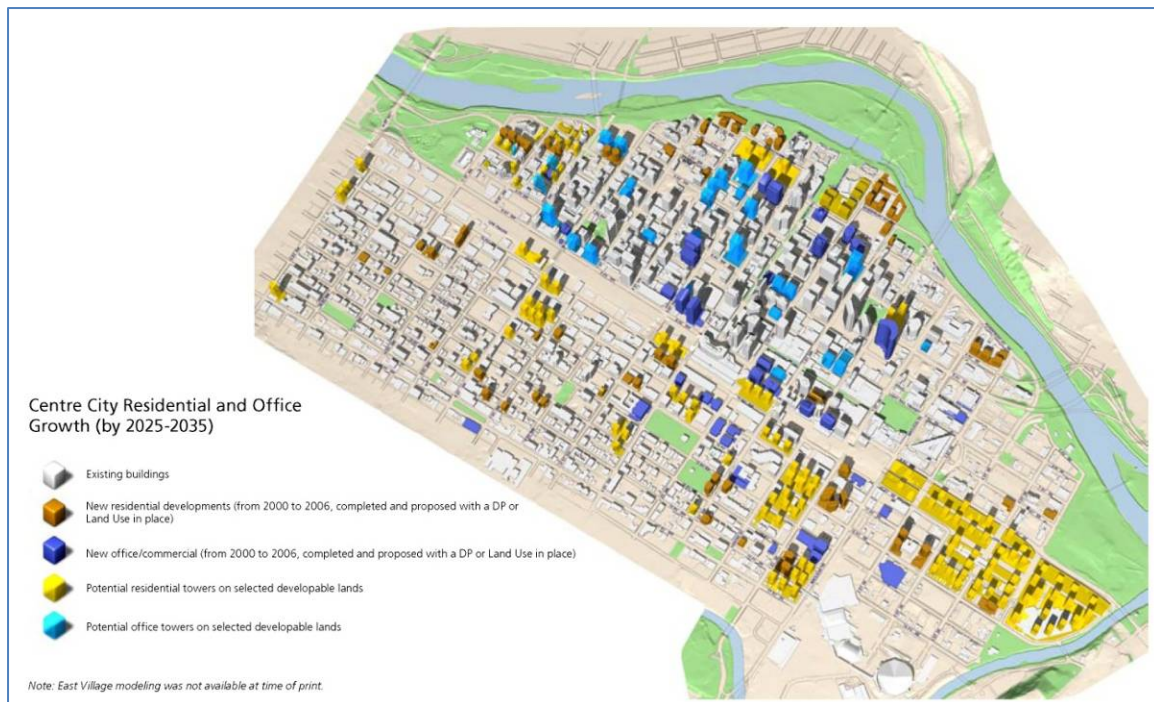
The Centre City is a dense employment hub for the region and includes over 6,000 businesses employing approximately 160,000 people – an employment density of approximately 28,500 employees per square kilometre. This is higher than the employment density of the service area of many North American bike share cities, including Boston (22,500 employees/ km<sup>2</sup>), Minneapolis (9,500 employees/ km<sup>2</sup>) and Denver (7,000 employees/km<sup>2</sup>). The *Centre City Plan* expects that employment could increase significantly by 2025.

Figure 4.2 is a 3-D visualization of existing, recent, and potential Centre City redevelopment. It gives a scale of the density of the Centre City and when layered with the land use / zoning map on Figure 4.3, shows the diversity of trip attractions and destinations within this area.

## 4.3 Visitors and Entertainment

According to Tourism Calgary, the Calgary Census Metropolitan Area (CMA) draws over 4.7 million annual visitors. Although this is less than cities of comparable size with bike sharing systems (see Table 4.1), many of these visitors are drawn to the Centre City – in fact there are over 20 hotels and hostels in the Centre City that observe some of the highest occupancy rates in the area.





**Figure 4.2: Scale of Centre City Residential and Office Growth**

(Centre City Plan 2007)

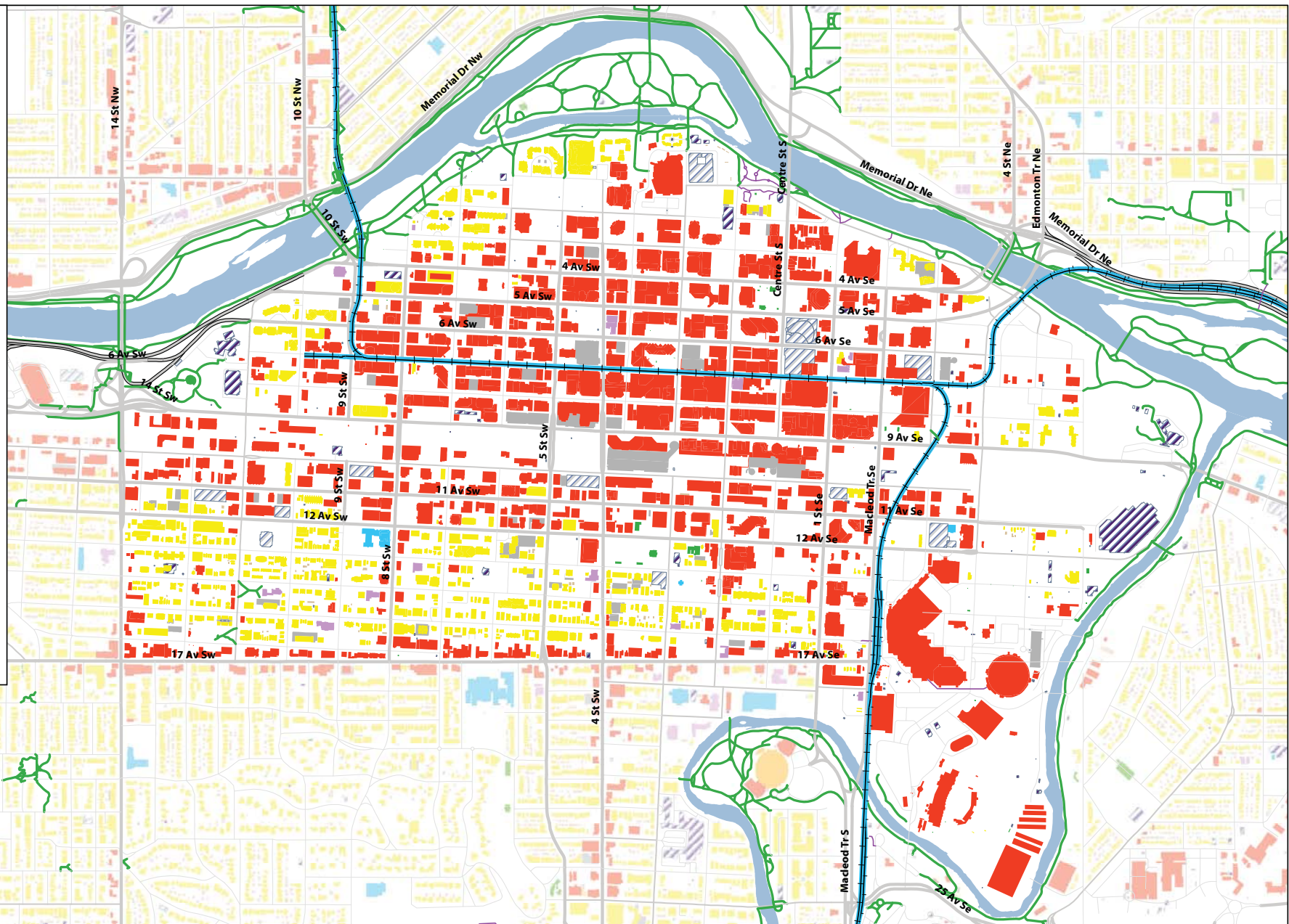
There are a number of tourist, shopping, and entertainment attractions in the Centre City that will be important features of the bike share system including Prince's Island, Stephen Avenue, Eau Claire, the Calgary Tower, and Fort Calgary. As well the City Centre includes 20 public parks and several museums and theatres. There are also a number of attractions just outside of the Centre City that may benefit from inclusion in the first phase of the system including the Kensington neighbourhood.

Stampede Park and the Saddledome may not be permanent station locations, but could provide attended event-day stations where riders can drop off a bike before an early season hockey game or on their way to the Calgary Stampede grounds. The attendant would check-in each bike and make bikes available at the end of the event. Minneapolis currently offers this type of service at Minnesota Twins home games. Similar services could be provided for any of the 25 annual festivals held in the Centre City including the Canada Day celebrations.

**Zoning Designations (Building Type)**

**City Centre Area**

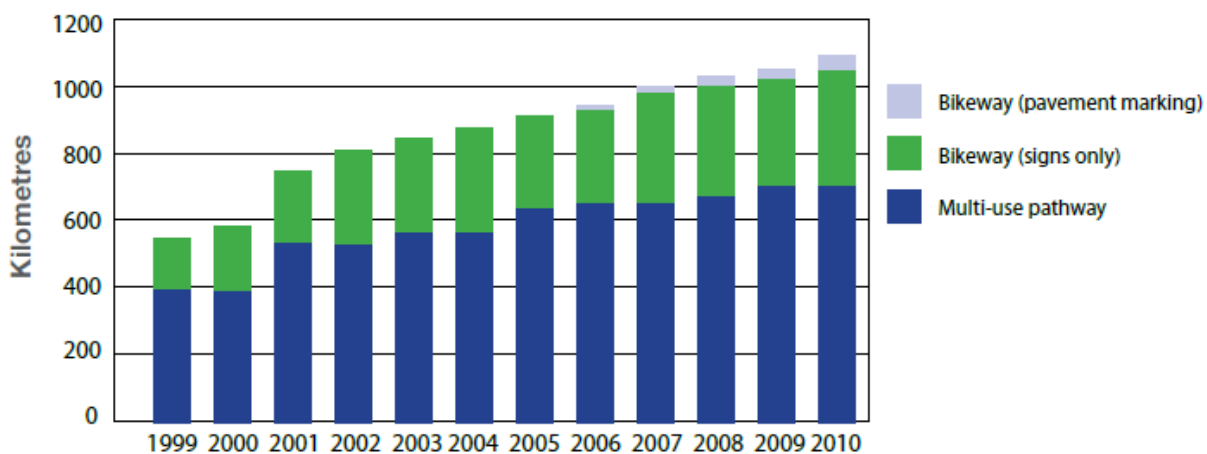
- Shopping Centres
- Commercial
- Schools/Colleges
- Residential
- Parks
- Stadiums/Arenas
- Religious
- Residential Garage
- Parking Garages
- Building Under Construction
- Vacant
- Expressway
- Major Street
- Collector Street
- Local Street
- Walkway
- Pathway
- LRT Track
- Lakes and Rivers



## 4.4 Bikeway Infrastructure

The City of Calgary has invested significantly in increasing its bikeway network – in particular the *Calgary Cycling Strategy* identifies that the “multi-use pathway and on-street bikeway network has almost doubled from 550 kilometres in 1999 to 1,067 kilometres in 2010” as shown on **Figure 4.4**. In 2010, the bikeway network in Calgary consisted of:

- 712 kilometres of multi-use pathways.
- 27 kilometres of marked on-street bike lanes or shared lane markings.
- 328 kilometres of signed bikeways (no markings).



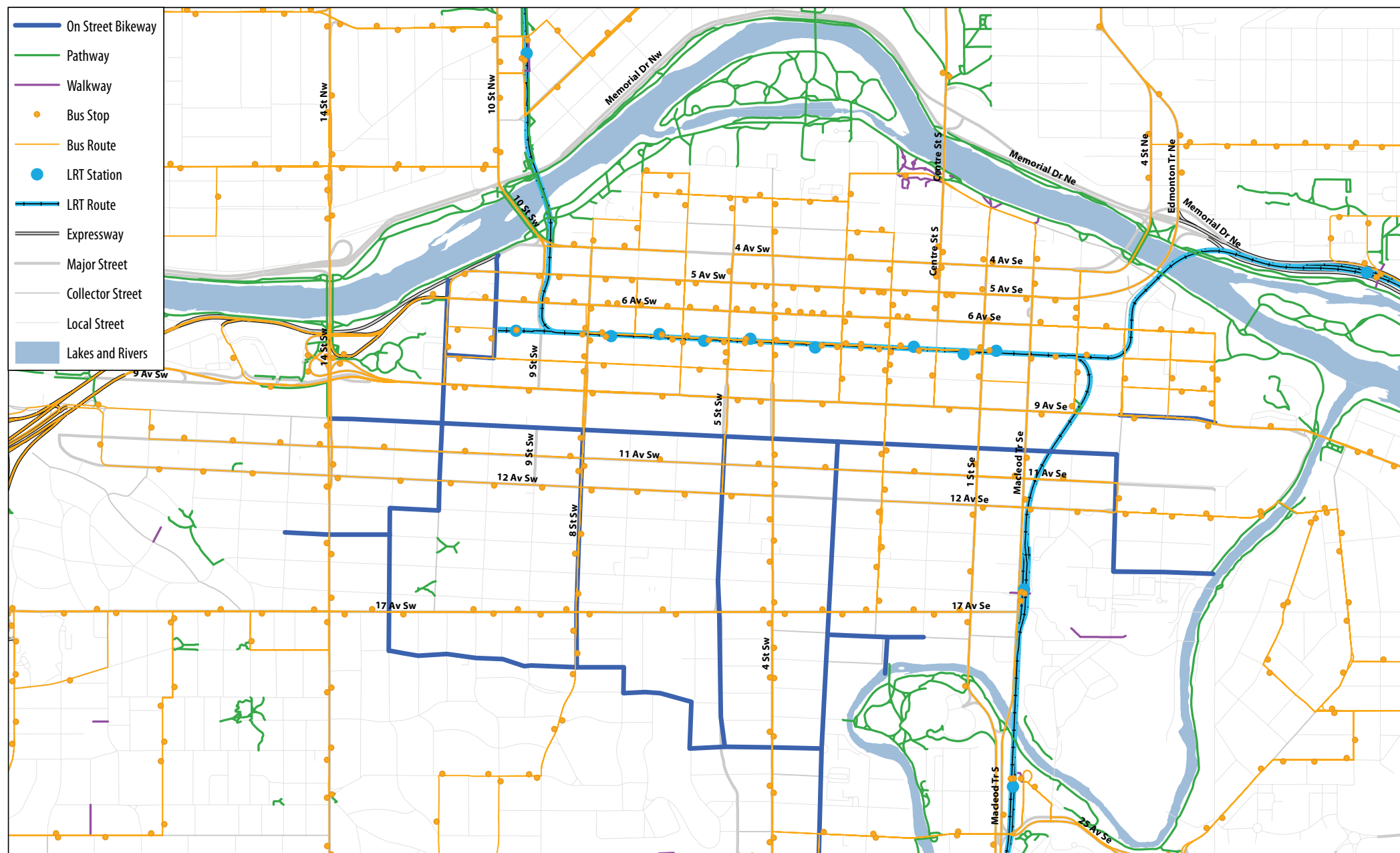
**Figure 4.4 – City of Calgary Bikeway Expansion**

(Source: Calgary Cycling Strategy)

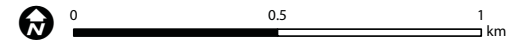
The existing bikeway network in the Centre City is shown on **Figure 4.5**. The central feature of the existing bikeway network is the multi-use pathway system along the Bow River and Elbow River that offers cyclists a comfortable way to travel along the north and east edge of the Centre City, provides access to a number of attractions and recreational destinations (such as Prince’s Island and Stampede Park), and connects to an extensive multi-use pathway system beyond the Centre City.

There are limited marked on-street bikeways in the Centre City. The existing network includes bike lanes on 11 Street SW between the Bow River pathway and 12 Avenue S and on 9 Avenue S between 4 Street and 6 Street E.; PM peak hour bike lanes westbound on 10 Avenue S from 3 Street E to 11 Street W.; shared lane markings on 10 Avenue S eastbound and westbound from 3 Street E to 11 Street W.; and on 2 Street W from 10 Avenue S to 26 Avenue S.





**Figure 4.5: Existing Centre City Bikeways, Walkways and Public Transit**



There are also a number of lower traffic volume streets that already offer comfortable cycling connections, such as 15<sup>th</sup> Avenue that could easily be formalized as a neighbourhood greenway and 3<sup>rd</sup> Street / Barclay Mall from the Bow River to 8 Avenue S that is already traffic calmed. These streets offer a comfortable, parallel alternative to high traffic corridors that are less suitable to new and novice cyclists (e.g., 15<sup>th</sup> Avenue offers a parallel alternative to 17<sup>th</sup> Avenue).

The City is looking to fill the bikeway infrastructure gap in the Centre City as acknowledged in the *Cycling Strategy*, recognizing that an “expanded, comfortable, convenient on-street bicycle network” would complement the existing pathway network. *The Cycling Strategy* identified a network of bikeways in the Centre City as shown on Figure 4.6.

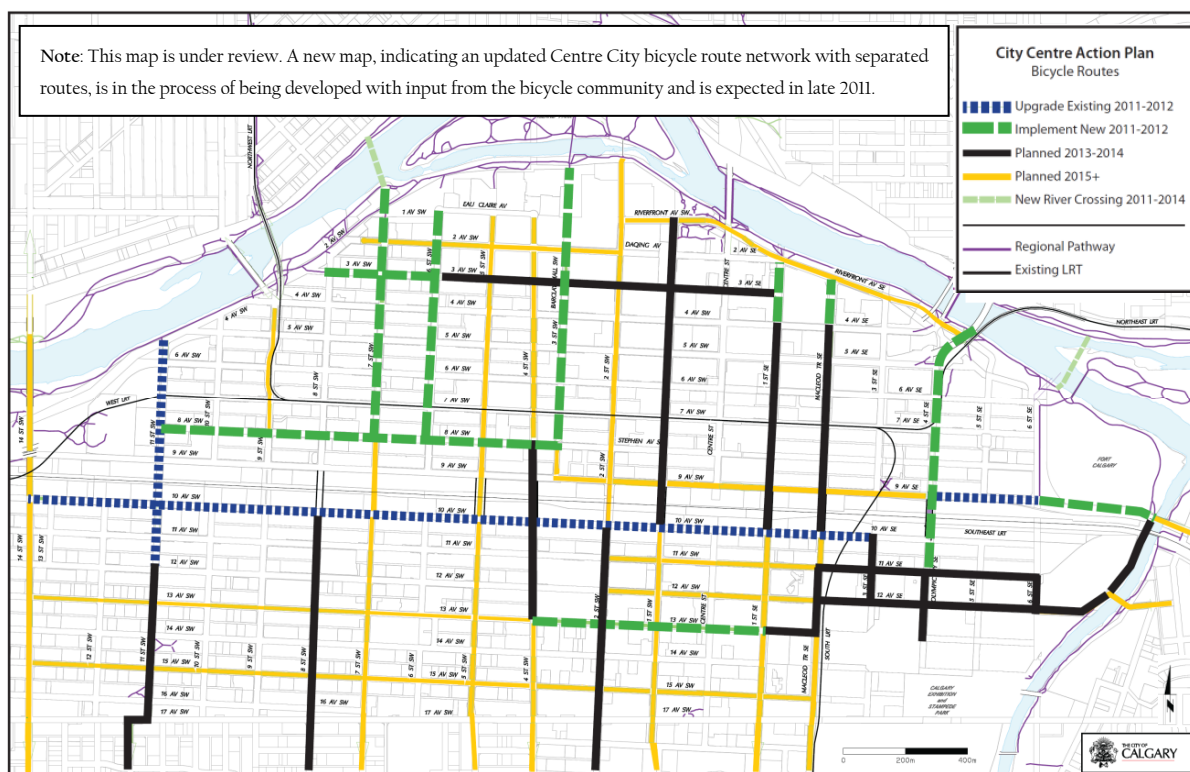


Figure 4.6 – Centre City Action Plan Bicycle Routes Map

Source: *Cycling Strategy* (2011)

Although Council was supportive of the concept of creating more bikeways in the Centre City, staff was directed to obtain input from the bicycle community on the preferred routes. This process is currently underway with a plan to identify a north-south, east-west network with separated routes.

Bike share systems have generally been implemented in cities with established bikeway networks or in conjunction with an expansion of the bikeway network, as is the case in Boston, which is currently implementing a comprehensive bikeway network as part of its bicycle master plan.

Bike share systems have been successful in cities with both well established bicycle infrastructure (bike lanes and cycle tracks) as well as in cities where the bicycle infrastructure is just starting to be developed / expanded. Calgary's pathway and local street network, coupled with a spine network of separated facilities will offer a sound basis for bike share users in the Centre City to feel comfortable and have a variety of route options to make the system successful.

### 4.5 Transit Integration

Calgary Transit offers an extensive transit network including 159 routes covering over 4,000 route kilometres<sup>7</sup>. The Centre City includes three existing light rail lines that travel through the Centre City along 7<sup>th</sup> Avenue, and offers a free fare zone between 3<sup>rd</sup> Street SE and 9<sup>th</sup> Street SW that records approximately 23,000 rides per week. A fourth line – the West LRT is scheduled to open in December 2012. There is also an extensive bus network providing coverage to all parts of the City and Calgary International Airport. Transit infrastructure in the Centre City was shown on **Figure 4.5**.

Bike sharing can extend the reach of transit. The Calgary Centre City has a high density of transit stops and there is generally a transit stop within close proximity to most Centre City destinations. However, reaching a given destination may require a transfer and associated waiting time. Bike sharing can increase the appeal of taking transit by offering people the ability to cycle from the nearest Centre City stop, reducing wait time and allowing them to quickly reach their final destination. Integrating bike share stations at or nearby existing transit stops will be an important element of system planning.

Existing bike / transit policies in Calgary allow bikes to be brought onto trains during off peak times and carried on buses fitted with bike racks (currently most of the bus fleet does not have racks, though Calgary Transit recently completed a one-year pilot study of bike racks on every bus on three transit routes). The City has also made significant investment in bicycle parking at transit stations with approximately 122 bike lockers available for monthly rental at 13 CTrain Stations and new stations are required to include bicycle racks and lockers when they open.



Bike sharing in the Centre City offers an opportunity for commuters to park their bicycle at their origin transit stop and still have access to a bicycle in the Centre City. A recent survey of Centre City commuters found that approximately 50% of commuters arrived into the City Centre using public transit. Extending the reach of transit is a key reason many cities implement bike sharing and is a critical element of station siting. The extremely high share of public transit ridership is a positive attribute of the City Centre that would support bike sharing.

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<sup>7</sup> Calgary Transit website: <http://www.calgarytransit.com/html/statistics.html>

## 4.6 Weather

Weather in Calgary will influence bike share demand. Figure 4.7 shows average monthly temperature and Figure 4.8 shows average monthly precipitation. In general, the region experiences pleasant summer temperatures and cold, snowy winters. The highest demand months will occur during the warmer months between June and September, coinciding with the peak visitor season.

The weather in Calgary is favorable to supporting bicycle sharing, with very pleasant conditions for six months of the year. Bike sharing has been implemented in several other cities that experience colder winters, including Montreal, Denver and Minneapolis. Fourth generation bike share systems utilize wireless and modular station infrastructure so can be removed from the street and stored during winter. This is current practice in Montreal, Denver, and Minneapolis although the cost of removing and storing an increasingly growing system may alter these cities' decision to leave or remove the system in the future. For the size of system being considered in Calgary (approximately 40 stations), it is likely that the system will be brought in for winter so that it is not an obstruction or damaged from snow removal and storage. Service can extend into May and October depending on snowfall and a decision can be made as conditions develop about when to close the system and store it for winter.

Figure 4.7 and Figure 4.8 below indicate that the proposed initial system service period of May through October corresponds to the warmest months in Calgary. This period experiences only minimal snowfall in the months of May and October. While the warmer months do experience rainfall, Calgary does not experience a rainy season that would deter people from riding a bicycle day after day.

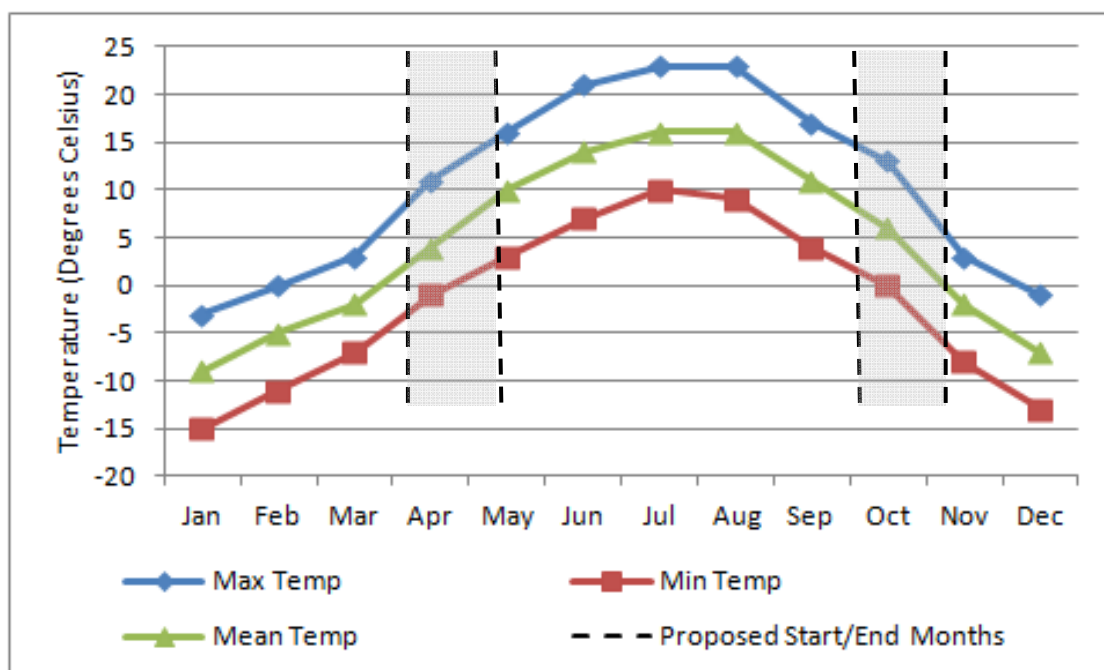


Figure 4.7 - Average Monthly Temperature in Calgary

([www.theweathernetwork.com/statistics/C02082/caab0049](http://www.theweathernetwork.com/statistics/C02082/caab0049))



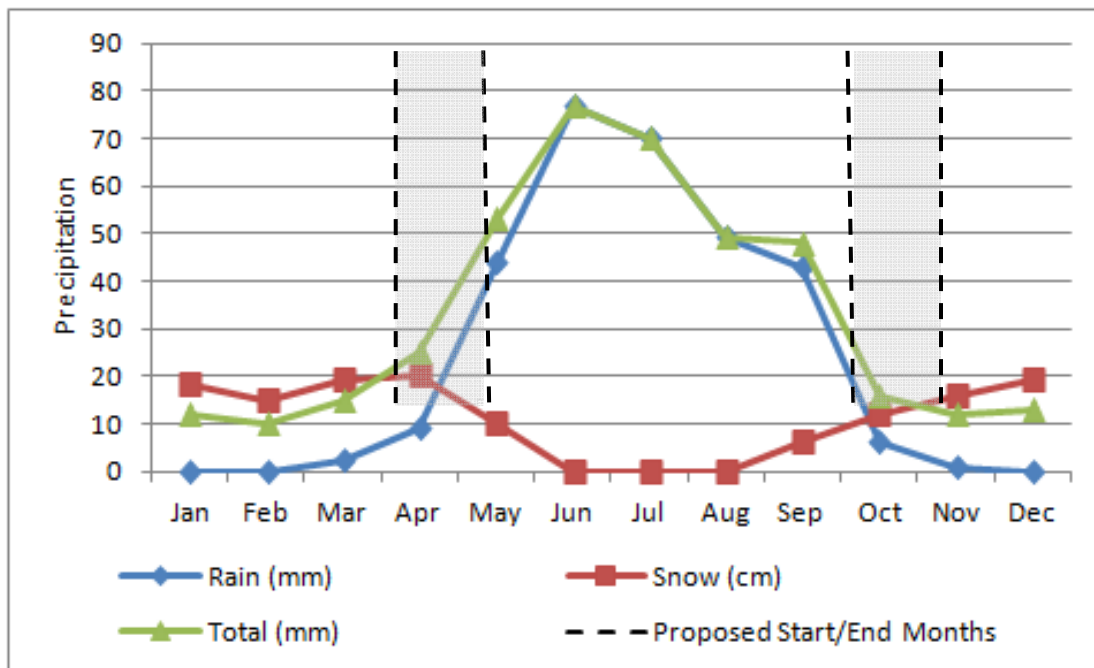


Figure 4.8: Average Monthly Precipitation in Calgary.

(Meteorological Service of Canada, [www.theweathernetwork.com/statistics/C02082/caab0049](http://www.theweathernetwork.com/statistics/C02082/caab0049))

## 4.7 Topography

The topography of the Centre City is generally flat. Topography does not pose a barrier to the use of the system.

## 4.8 Policy Environment

The policy environment in Calgary is positive towards enhancing the role of cycling and alternative mobility options to encourage growth of the Centre City and the overall attractiveness of Calgary as a livable and sustainable community. The *Centre City Plan*, *Calgary Transportation Plan*, and the *Cycling Strategy* offer the framework for encouraging the creation of a bike sharing system.

Other policy considerations include the City's current signage and advertising code and whether that provides any restrictions on the amount, size, or placement of sponsorship or advertising on the map frames, station panels, docks, or the bicycles themselves.

Our understanding is that sponsorship using less intrusive recognition of sponsors (e.g., a small logo and text saying "this station is brought to you by Company X") will be acceptable and that there may even be opportunities to offer select graphic advertising on the map frames of stations to generate additional income if necessary.

## 4.9 Summary of Community Preparedness

The Centre City has many of the features required to host a successful public bike share system including:

- A growing resident population with age and income demographics that have been shown in other cities to be supportive of early adoption of the system.
- High employment density with a significant number of jobs and businesses and commuter patterns that would make bike sharing an attractive option for many to move about the Centre City throughout the day.
- A significant number of visitors and tourists and numerous entertainment and recreational attractions.
- Numerous events and festivals where temporary bike share stations could be set up to provide a means for people to arrive at these events without private vehicles or the need for parking.
- An extensive and well used public transport system to which bike share could be linked to further extend its reach and provide a practical means of moving around without an automobile.
- A political and policy environment that is supportive of the growth of walking, cycling, and transit.
- A growing bikeway network is planned in the Centre City.

Potential issues that could impact the success of the system include the extent of bikeway infrastructure. Council has recognized the need for bikeway infrastructure in the Centre City and staff are currently gathering public input on preferred routes and facility types. This will provide a basic framework for potential bike share users to ride comfortably and safely to a variety of destinations with increased network development to follow in subsequent years and will address the barrier to cycling for the 80% of Calgarians who don't feel comfortable riding in traffic.

Advertising and signage codes are not expected to be a significant issue for sponsorship of the bikes, stations, or other infrastructure. Council will need to make a determination as to whether additional street-furniture advertising is an acceptable trade-off to help fund the program.

## 5. Program Definition for Calgary

This section will consider an appropriate size and service area for a bike share system in the Centre City of Calgary and define parameters for the system such as the spacing of stations, the number of bikes per station, and the number of extra docks. It will also identify typical station placements and identify considerations for expanding the system in the future.

### 5.1 Service Area and Phasing

The Centre City provides a dense, mixed use environment to support an initial bike share launch in Calgary. A number of strategic additions outside the Centre City area may enhance the success of the initial system including the Kensington neighbourhood (an attractive commercial and retail neighbourhood close to the Centre City) and stations along the multi-use pathway on the north shore of the Bow River (to encourage short recreational trips along the riverside pathway system).

Launching the system initially in the highest demand areas will accelerate visible success and maximize the chance of the system being profitable. The decision to expand beyond the Centre City (and subsequent phases) will depend on available funding and the success of the system. System success is typically measured in terms of visible achievements such as high ridership, positive public response, neighborhood and corporate requests for service area expansion, and on-going financial performance. Essentially, the system will grow if the expansion can be sustained through existing funding or an additional influx of user fees, private sponsorship, grants, and/or public funding.

Areas with high potential demand were identified through a heat mapping exercise that allocated points to where people “live, work, shop, play, and take transit”. The heat map is shown on **Figure 5.1** and future phases of the system may include the area around the University of Calgary, University Heights, Brentwood, Southern Alberta Institute of Technology, and the Foothills Hospital; and the area around Mount Royal University and Lincoln Park south of the Centre City.

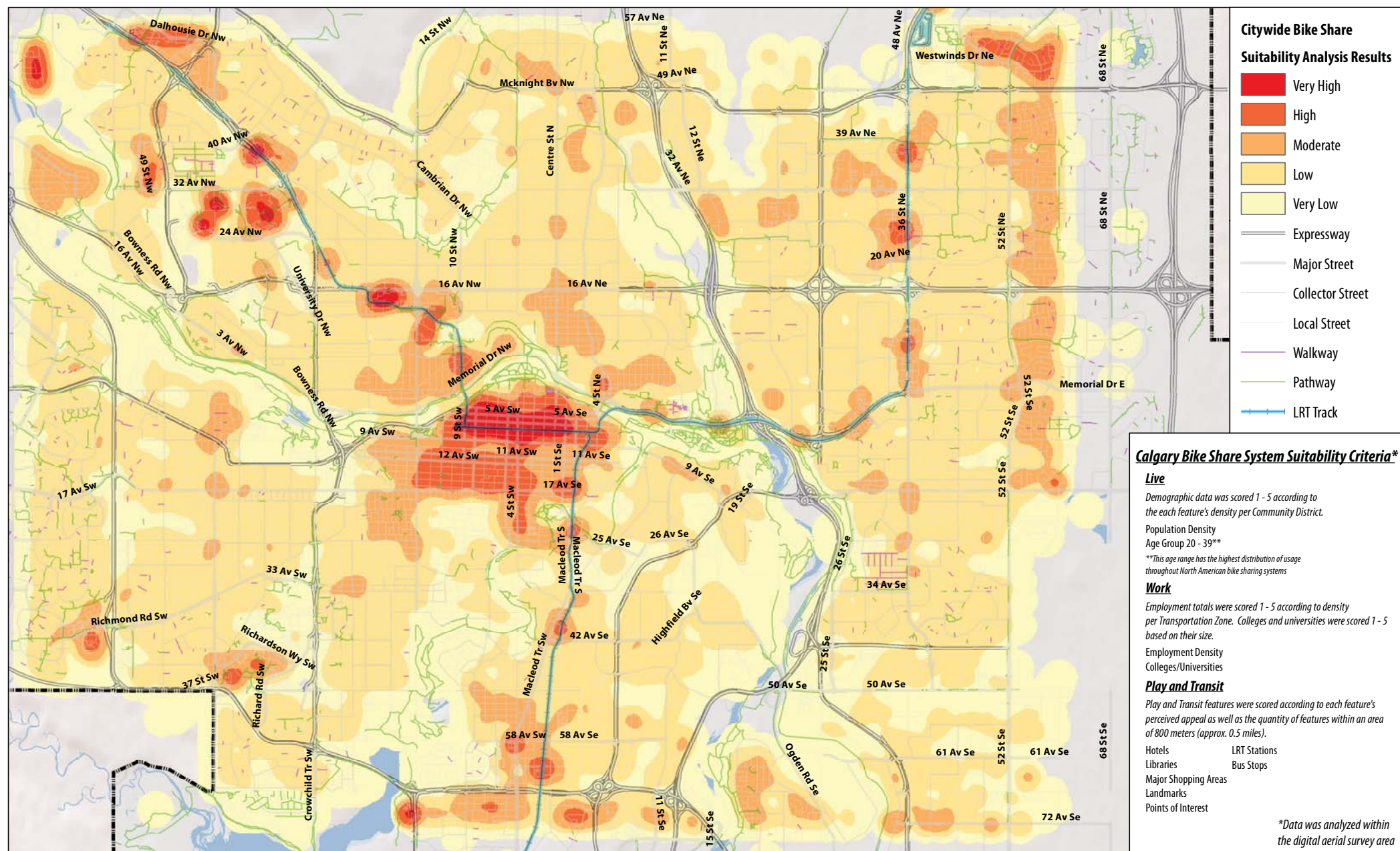
### 5.2 System Parameters

Other considerations in system planning include: providing stations at an appropriate spacing so users can easily access bikes; ensuring that the system is not too small to be effective; and identifying an appropriate dock-to-bike ratio to balance capital and rebalancing costs.

#### 5.2.1 Station Density

The size of the system is a function of the coverage area and the desired spacing of stations. Average station spacing in European and North American bike share systems is typically between 300 metres and 400 metres - a density of approximately 6 - 11 stations per square km. This range provides access to a bike within a short walk of anywhere in the service area and provides a nearby alternative to return a bike if the destination station is full. For the Centre City - an area of 5.6 square km - this represents a system size of approximately **40 stations**, 35 in the Centre City and several others at attractions just outside the Centre City.





**Figure 5.1: Map of Potentially Suitable Areas for Bike Share Stations in Calgary**

### 5.2.2 Minimum System Size

A bike sharing system that is too small can severely limit its effectiveness. A system of 10 stations spread over at least a five square km area is considered the absolute minimum to provide an effective mix of trip origins and destinations and to justify the cost of operations. A proposed system of 40 stations for the Centre City of Calgary (5.6 square kilometers) meets this requirement. The following minimum considerations should be noted when planning the system:

- The coverage area at which bicycling becomes a more attractive option than walking. The median walking trip is approximately five minutes, in which time a person can walk approximately 400 metres, but can cycle approximately 1,250 metres.
- The system must provide a variety of trip origins and destinations or there is no reason to use the bikes.
- The system should provide a reasonable station density so that users can easily access a station. Typical station densities are a station every 300m to 400m. As station spacing is increased, at some point users will consider they have to walk too far to access a bike and will not make the trip or will take a different mode.
- A system should be created at a reasonable size to justify the cost for an operator to service the system.

### 5.2.3 Station Plan

Preliminary recommendations for bike share station locations and station size were made for the Centre City and are shown on **Figure 5.2** along with each station's "area of influence" – that is the area around the station most likely to draw trips – the further from the station the less trips that are expected, up to a 400m radius from the station. Station placements consider:

- Key transit stops.
- Tourist attractions, landmarks, civic facilities.
- Tourist accommodations and hotels.
- Neighbourhood and commercial centres.
- Higher density housing and employment centres.

Final station placement will need to consider any revisions to the bikeway improvement plan – ideally (but not essentially) stations should be placed along bikeway routes. As well, visibility and physical space requirements will need to be assessed in detail to determine the most appropriate sidewalk, on-street, public space, or private property station installations. Public or other input will also be relevant in identifying station locations.

#### 5.2.4 Number of Bikes and Docks

Most North American systems operate at an average ratio of 10 bikes per station. This ratio is also appropriate for Calgary. Some stations will be smaller, some larger, but stations should not be less than five bikes to ensure that bicycles are available for users.

It is important that there are also sufficient empty docks for riders to return bikes. A dock-to-bike ratio of 1.9-to-1 has been found in other systems to provide the best balance between the cost of the system, the ability to return bikes, and the cost to rebalance the system. Ratios as low as 1.5-to-1 have been used but generally result in higher rebalancing costs.

The 400 bikes and 760 docks associated with the initial launch in the Centre City were distributed amongst the 40 stations based on the expected demand at each station. The resulting number of docks for each station is shown on Figure 5.2.

#### 5.2.5 Station Design Requirements

Fourth generation station technology has a number of advantages including being modular systems that do not require excavation because they use solar power and wireless communication, as opposed to hardwired. Stations can be moved, relocated, or expanded to meet demand.

Stations locations should be visible and accessible and need to consider other modes of travel, e.g. they should not be placed so as to block pedestrian travel paths, placed in bus zones, or blocking building entrances and servicing. There may be opportunities to place stations under existing cover, although stations do require a certain amount of vertical clearance and solar access.

Station dimension vary depending on the technology, but for example, the Public Bike Share Company stations come in “plates” that host four docks (or three docks and a payment kiosk). Each plate is approximately 3,000 mm long and 840 mm deep. When a bike is parked in the dock, the overall depth is approximately 1,800 mm. The map frame is on a separate plate and is approximately 380 mm long and 1,000 mm deep. Typical station dimensions are shown on Figure 5.3.

### 5.3 Station Examples

The footprint of the station can be calculated from the number of docks (although this will vary depending on the equipment vendor). Examples of station placements are included in Figure 5.4. The following are possible station installations in the Centre City:

- Sidewalk placement.
- On-street parking conversion.
- Public plaza.
- Privately owned public space.

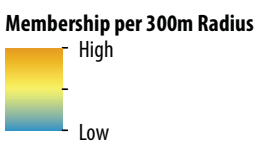


**City of Calgary Bike Share System  
Suitability & Demand Analysis**

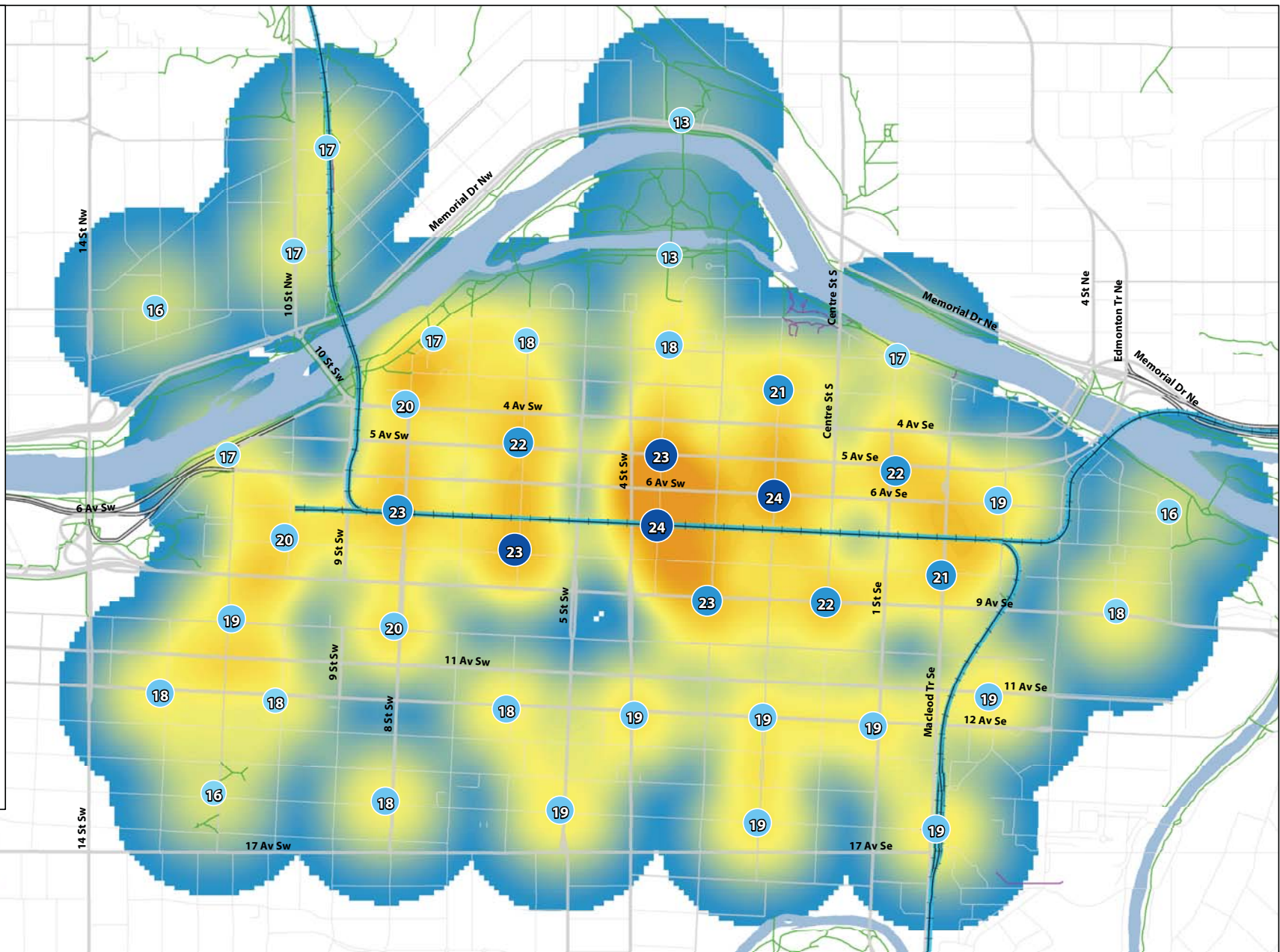
-- Centre City Area --

Average Annual Station Demand	Total Docks per Station
Over 10,000	23-24
8000 - 10000	21-23
6000 - 8000	18-20
Less Than 6000	15-17

**Station Area Influence**



- Expressway
- Major Street
- Collector Street
- Local Street
- Walkway
- Pathway
- LRT Track
- Lakes and Rivers





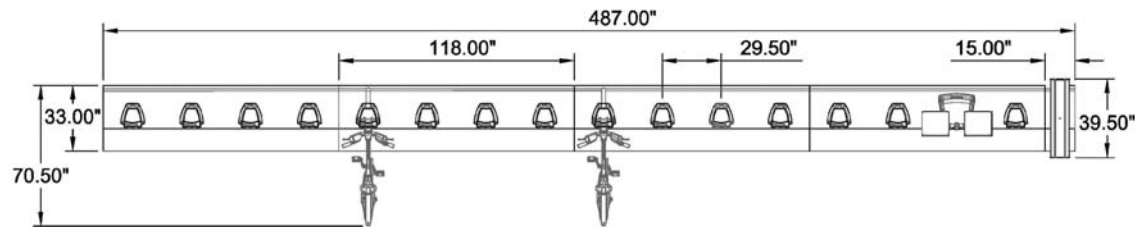


Figure 5.3: Public Bike Share Station Plate Dimensions.



Figure 5.4: Example Station Placements – Sidewalk (Melbourne Bike Share), In-Street (Nice Ride Minnesota), Public Plaza (Des Moines B-Cycle).

## 5.4 Other System Considerations

Three important issues that were considered in the context of the Calgary bike sharing system are the proposed winter weather policy, how safety and helmet usage will be addressed, and the impacts of the City's sidewalk riding policy.

### 5.4.1 Winter Weather Policy

At least initially, it is recommended that the bike share system be removed from the street and stored for winter. This will ensure that the equipment is not damaged by snow clearing and will avoid the need for costly maintenance to clear the stations and bikes of snow and ice during months that will generate very little ridership. The system can stay open into May and October (or beyond) depending on snowfall and a decision can be made as conditions develop about when to close and remove the system.

As the system grows and the cost of removing the system becomes more expensive, a decision can be made as to whether there is enough demand on clear winter days or sufficient benefit from maintaining advertising exposure to keep the system in place during winter.

### 5.4.2 Helmets

Bike share systems have so far been found to be exceedingly safe (see Section 2 for a summary of the safety benefits of bike sharing) and it is recommended that the program acknowledges to users when they sign up for membership that the use of a helmet is recommended. Additional means of providing users with helmets will add cost to the system, but other cities have explored:

- Helmet vending machines, as provided in Melbourne (also being explored in Vancouver and Seattle).
- Partnering with local retailers, as is done in Boulder, Colorado, Boston, Massachusetts and Melbourne, Australia.

Equipment providers in Canada and the United States have developed prototype designs for helmet vending machines integrated into the station. These vending machines would provide reusable helmets that are cleaned and inspected for safety after every use. Although these machines are not currently operational, vendors are continuing to explore these technologies and operators are investigating ways to most efficiently operate and maintain these services. Similar to renting the bikes, riders would be charged a deposit for the helmet, part or all of which would be returned if the helmet is returned in an undamaged and usable state. It is important that the integrity of each helmet is checked between each use, which is no different from how helmets are shared at bike rental companies.

There are a number of funding opportunities available to provide helmets to users. In Melbourne and Boston the programs are subsidized by road safety and community health grants. Helmets may also present a unique sponsorship opportunity that could be separated from other elements of the bike share system (this could be attractive to health care providers or other public health organizations).

### 5.4.3 Sidewalk Riding

The City of Calgary Municipal Traffic Bylaw states that cyclists are not permitted to ride on sidewalks unless they are under 14 years of age or if they are delivering newspapers. However, the bylaw does state that the Traffic Engineer may designate portions of sidewalks where bicycles may be ridden. Such sidewalk locations typically have signage to indicate that bicycle use is permissible.

This bylaw has implications for a bicycle share system, as the sidewalk would be a common location for a station. For sidewalk stations, the City of Calgary would need to consider whether it wanted to make sidewalk riding allowable (to the nearest safe access to the street) or determine how they will communicate the by-law requirements to users (e.g., notify as part of the member acknowledgement, post signage at these stations, etc.). Given that the purpose of the existing by-law is to manage conflicts with pedestrians, the appropriate solution may vary depending on the width of the sidewalk, the amount of pedestrian activity, etc. Education for bicycle users could be valuable in ensuring all cyclists follow City by-laws.

### 5.5 Program Definition for Calgary Summary

Bike sharing in Calgary should initially be launched in the Centre City area with a few stations on the north side of the Bow River along the multi-use pathway system (to encourage short recreational trips along the riverside pathway system) and in the Kensington neighbourhood (an attractive commercial and retail district nearby the Centre City). The system should provide stations at frequent spacing (300m – 400m apart) to provide access to bicycles within a short walk of anywhere in the Centre City.

The Centre City system would include a total of **40 stations, 400 bikes, and 760 docks**. Stations would be provided at key attractions, transit stops, and employment / residential nodes and could include sidewalk, in-street, public plaza, or private property installations.

Expansion of the system will depend on available funding and the success of the system – typically measured in terms of visible achievements such as high ridership, positive public response, neighborhood and corporate requests for service area expansion, and on-going financial performance. Essentially, system expansion will occur if funding can support it.

Future phases of the system should consider areas with the highest potential demand and may include the area to the north-west of the Centre City that includes the University of Calgary, Southern Alberta Institute of Technology, the Foothills Hospital, and the Brentwood and University Heights neighbourhoods. It may also offer a logical extension of the light rail system to Mount Royal University and surrounding neighbourhoods.

## 6. Business Model

North American bike share systems operate under many different business models. In fact, each existing system (and those in planning) has identified a governance and organizational structure that fits the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. The funding strategy is closely related to the organizational model chosen, e.g., if relying on public funds it makes sense to have a system administered by a public agency.

Organizational structures and funding strategies that have been adopted to date in North American bike share systems are reviewed in the context of Calgary. The intent is to provide sufficient information for the City to be able to choose a preferred organizational model and funding strategy to launch bike sharing in Calgary.

### 6.1 Organizational Model

The organizational model refers to who will own, administer, and operate the system. These functions can be performed independently by different groups or collectively as part of the services delivered by one organization. A summary of North American bike share organizational models is included in Table 6.1.

Table 6.1: Bike Share Operating Models in North America

Name	Stations / Bikes	Operations	Ownership of Capital Infrastructure
Montreal Bixi	405 / 5050	Owned and operated by Public Bike System Company (PBSC), a non-profit organization.	PBSC (non-profit)
Toronto Bixi	80 / 1,000	Program owned and operated by PBSC. City of Toronto provided a \$4.8 million loan guarantee.	PBSC (non-profit)
Capital Bixi (Ottawa / Gatineau)	10 / 100	NCC funding of \$785,000 for equipment and launch. Operated by PBSC.	National Capital Commission (government agency)
Denver B-Cycle	50 / 500	Non-profit set up by city.	Denver Bike Sharing (non-profit)
Nice Ride Minnesota	116 / 1,200	Non-profit set up by city.	Nice Ride Minnesota (non-profit)
Des Moines B-Cycle	4 / 18	Already existing local non-profit (Des Moines Bicycle Collective).	Des Moines Bicycle Collective (non-profit)

Name	Stations / Bikes	Operations	Ownership of Capital Infrastructure
San Antonio B-Cycle	14 / 140	Governed by non-profit set up by city – operated by bike rental company through tender.	San Antonio B-Cycle (non-profit)
Miami Beach DecoBike	100 / 1,000	Completely private system, privately owned and operated, concession agreement only.	DecoBike (private company)
Capital Bikeshare	119 / 1,110	Operator direct contract with both Washington DC and Arlington County.	DDOT and Arlington County (government agencies)
Boston New Balance Hubway	61 / 610	Public – private partnership; operator direct contract with the City of Boston, other municipalities to contract directly with operator (RFP issued by regional planning agency).	City of Boston (government agency)
Chattanooga Bike Share (2012 launch)	30 / 300	Public – private partnership; operator direct contract with local transit agency (which received federal funding).	Outdoor Chattanooga (government agency)
New York City Bike Share (2012 launch)	600 / 10,000	Completely private system; privately owned and operated.	Alta Bicycle Share
Ecobici, Mexico City	85 / 1,000	Private advertising-funded system.	Clear Channel Communications

So far in North America, ownership and operations have been organized as a combination of public agencies, non-profit organizations, and the private sector. Based on Table 6.1 and other examples globally, business models can be classified as:

- Operating non-profit (either pre-existing or established specifically) owns and operates the system.
- Administrative non-profit (either pre-existing or established specifically) owns and administers the system; operated by a private contractor.
- Privately owned and operated.
- Publicly owned; operated by a private contractor.
- Publicly owned and operated (no North American examples).
- Owned and operated as part of a street-furniture advertising contract.
- Transit agency owned and operated (no North American examples).

### **6.1.1 Operating Non-Profit**

Similar to Nice Ride Minnesota and Denver Bikesharing, a Non-Profit Organization (NPO) is formed whose mission is to create a bike sharing system. The NPO undertakes all aspects of creating the system, including funding it, establishing system guidelines, procuring and installing equipment, launching the system, and providing expertise for operations.

The board of directors of the non-profit should have a mixture of representation from private sector individuals and representatives from participating municipalities. The non-profit should be supported politically by the participating municipalities, and be the body through which public or sponsorship funding flows.

In other cities where an operating NPO has been established, there has not been an operating contract between the jurisdiction(s) and the NPO to define required service levels, reporting and other operational metrics, giving less control to the jurisdictions and less accountability. As well, the absence of operational expertise requires starting from scratch in terms of the installation, launch, and operations of the system.

### **6.1.2 Administrative Non-Profit with Private Operating Contractor**

In this scenario an NPO is formed whose mission is to create a bike sharing system. The non-profit undertakes funding the system, establishing service guidelines, procuring the equipment, and choosing an operator. The NPO hires a private contractor to launch and operate the system. The non-profit could also undertake marketing functions or outsource these services to a third party. Therefore, the NPO undertakes the “administrative” aspects of running the system, but not the operational aspects. This scenario minimizes public and financial risk, while maximizing control, transparency, and flexibility of funding.

The board of directors of the non-profit should have a mix of representation from the private sector, participating municipalities, larger sponsors, and eventually the operator. The non-profit should be supported politically by the participating municipalities, and be the body through which public or sponsorship funding flows. Corporate sponsors can make use of taxation and public benefits of sponsoring a system administered by a non-profit, as compared to a privately owned system.

### **6.1.3 Privately Owned and Operated**

Similar to Miami Beach DecoBike and the upcoming New York City system, municipalities contract with an operator for street space only. The operator provides all funding for equipment and operations. Although this structure requires no public funding for capital or operations (a positive for the municipalities), it gives less control and transparency to the contracting jurisdictions, and adds significant risk that such systems might fail due to the unknown long-term stability of funding.



### **6.1.4 Direct Contract with Operator**

Similar to Capital Bixi (Ottawa), Capital Bikeshare (Washington DC) and Hubway (Boston), municipalities are responsible for funding and administering the system but contract operations to a private operator with an established set of performance standards. In multi-agency settings, each jurisdiction acts as a separate client to the operator. Each jurisdiction can have a different source of funding and different revenue sharing arrangements with the operator.

### **6.1.5 Publicly Owned and Operated**

In North America, municipalities have opted out of operating a bike sharing system directly because of the operational complexities, staff capacity, expertise, and liability issues involved in such an undertaking.

### **6.1.6 Street Furniture Contract**

Most European bike share systems and the Ecobici system in Mexico City are provided and operated in exchange for a portion of that city's street furniture contract. Canadian and US cities have opted out of this structure for several reasons. First, there is both resistance to and legal difficulty of creating new billboards and/or other structures which are usually required as part of the contract to help fund the systems. Second, cities forego a significant amount of potential advertising revenue in signing such contracts (which may take away funds already used for other city programs). Finally, the operating contractor does not have financial incentives to improve system operations or expand the system. For example, Clear Channel Communications, which implemented the only such contract in the United States in Washington DC's SmartBike system, did not want to expand the system. Therefore, Washington DC replaced the system with Capital Bikeshare.

### **6.1.7 Transit Agency Owned and Operated**

Despite the synergies with transit, there are very few examples of bike sharing systems that are owned or operated by transit agencies, the exceptions being OV-Fiets in the Netherlands and Deutsche Bahn's Call-A-Bike system in multiple cities in Germany. Copenhagen has recently announced that their public transit operators Metroselskabet and DSB S-tog will be issuing an RFP for bike share equipment and operations.

In the United States, Boston and Chattanooga received Federal Transit Authority funding through the local transit agencies (MBTA and CARTA, respectively), but these agencies have acted as funding pass-through entities, not operating entities. Transit agencies can also offer support for the system through provision of planning and staff support, providing right-of-way and lands on which to place the stations, and considering how transit and bike sharing ticketing and fare structure might be coordinated. Originally, Chattanooga envisioned the potential of CARTA having an operational role. However, upon a deeper understanding of the uniqueness of bike share operations, CARTA opted out of this role.

There are several organizational models that could be appropriate for the bike sharing system in Calgary. The advantages and disadvantages of the models described above are considered in Table 6.2 and can be used to make a determination of the most appropriate model.

**Table 6.2: Review of Possible Bike Share Organizational Models**

	Advantages	Disadvantages
Non-Profit Owned and Operated	<ul style="list-style-type: none"> <li>• Flexibility of funding sources available to a non-profit, which includes grant funding, public funding, and sponsorship.</li> <li>• Positive public image generated by a non-profit organization.</li> <li>• Maintains some level of city / agency control and input on site locations and operations.</li> <li>• Minimizes public image and financial risk to agencies and sponsors.</li> <li>• Profits re-invested into growing the system.</li> </ul>	<ul style="list-style-type: none"> <li>• Adds another level of organization (compared to private or public administered systems)</li> <li>• Requires non-profit to generate operating expertise from scratch, which can affect important system decision and initial service levels.</li> </ul>
Administrative Non-Profit – Private Operator	<ul style="list-style-type: none"> <li>• As above, plus:</li> <li>• Private operator brings expertise and an operating contract provides a greater incentive to meet performance levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Adds another level of organization (compared to private or public administered systems).</li> </ul>
Privately Owned and Operated	<ul style="list-style-type: none"> <li>• Private sector brings expertise and financial stake in the system provides an incentive for system success.</li> <li>• Minimizes public image and financial risk to agencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Obtaining corporate sponsorship may be more difficult for private system compared to public or non-profit system, especially for smaller systems.</li> <li>• System growth will be targeted towards most profitable areas – social and geographic equity objectives may not align with this strategy.</li> <li>• Less control and transparency for city / agency on how or where the system is operated.</li> </ul>
Publicly Owned and Operated	<ul style="list-style-type: none"> <li>• Flexibility of funding sources includes grant funding, public funding, and sponsorship.</li> <li>• Maximizes agency control of the</li> </ul>	<ul style="list-style-type: none"> <li>• Maximizes public image, liability and financial risk to agencies.</li> <li>• Requires agency to generate operating expertise from scratch, which can affect</li> </ul>



	Advantages	Disadvantages
	<p>operation and growth of the system.</p> <ul style="list-style-type: none"> <li>• Profits used to grow the system, perhaps into lower demand areas.</li> <li>• Bike sharing fits public service mandate and agencies have existing administrative frameworks that can be expanded to include bike sharing.</li> </ul>	<p>important system decision and initial service levels.</p>
Publicly Owned – Private Operator	<ul style="list-style-type: none"> <li>• As above, plus:</li> <li>• Private operator brings expertise and having an operating contract provides a greater incentive to meet performance levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Although still more risk than, say, non-profit or privately owned system, the risk to public agencies is much less if they contract out operations.</li> </ul>
Street Furniture Advertising Contract	<ul style="list-style-type: none"> <li>• Service provided at “no cost” to City (see disadvantages).</li> <li>• No additional effort required for funding.</li> <li>• Minimizes public image and financial risk to agencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Agency has little control or transparency into the operation and growth of the system.</li> <li>• Requires City to either increase the amount of street furniture advertising or replace advertising revenues that may be being used to fund other programs.</li> </ul>
Owned and Operated by Transit Agency	<ul style="list-style-type: none"> <li>• Flexibility of funding sources includes grant funding, public funding, and sponsorship.</li> <li>• Maximizes agency control of the operation and growth of the system.</li> <li>• Profits used to grow the system, perhaps into lower demand areas.</li> <li>• Bike sharing fits transit service mandate and agencies have existing administrative frameworks that can be expanded to include bike sharing.</li> </ul>	<ul style="list-style-type: none"> <li>• Maximizes public image and financial risk to transit agency.</li> <li>• Requires agency to generate operating expertise from scratch, which can affect important system decision and initial service levels.</li> <li>• Transit agency may be too focussed on transit synergies at the expense of other benefits the system can provide.</li> </ul>

## 6.2 System Costs

There are two primary costs associated with the bike share system - start-up (capital and launch) and operating. This section summarizes cost estimates for each of these components and presents a five-year cost forecast for a 40 station system. Detailed, line-by-line cost items are presented in **Appendix B**.

### 6.2.1 Capital and Launch Costs

There are a number of “general system start-up” costs that are associated with establishing the system. These would not be required (or would be significantly less) for future expansion of the system making it less costly per bike to expand the system. These “up-front” costs are noted in Appendix A and include hiring employees for management and administrative positions as well as a number of direct expenses such as procuring a storage warehouse, purchasing bike and station assembly tools, website development, communications and IT set-up, and pre-launch marketing. General system start-up costs are expected to be a onetime cost of approximately \$380,000.

“Phase start-up costs” are those required to install and launch each phase of the system and include things such as equipment purchase, site planning and permitting, bike and station assembly, and station installation. A detailed list of these costs is included in **Appendix B**. The first phase of the system, 40 stations in the Centre City, is estimated to cost approximately \$2.1 million (one-time cost).

### 6.2.2 Operating Costs

Operating costs are the cost to operate and maintain the system. These include hiring employees for operational tasks such as maintaining the stations, bikes, and other infrastructure, rebalancing the system, providing customer service, etc. There are also a number of direct expenses associated with maintaining an operations facility, purchasing tools and spare parts, upkeep of software, communications, and IT, and general administrative costs such as insurance. A vendor management fee / profit is also included in this estimate. A list of items included in calculating operating costs is included in **Appendix B**. For a 40 station system in the Centre City, operating costs are expected to be approximately \$1.1 million per year.

### 6.2.3 Potential Public Contributions

Apart from providing local public funding, city agencies play a key role in minimizing costs for the bike share system by providing station right-of-way and streamlining the permitting process. There may be other line items that can be provided in-kind through existing city infrastructure, services, or staff. These could include use of existing city storage and warehouse space, utilizing the existing city vehicle fleet for bike share vehicle needs, map design and production, assistance with marketing and promotion, use of legal services, etc.

## 6.3 System Revenues

Most North American bike share systems have pieced together funding from whatever sources are available including public grants, local public funding (although many cities have decided not to use public funding), sponsorship, and user revenues.

### 6.3.1 User-Generated Revenues

The bike share system in Calgary will rely in part on user-generated revenues to offset the capital and operating costs associated with the system. User-generated revenues are calculated by applying the adopted rate structure to estimates of usage by membership type.

Users pay two types of fees to use the system:

- Access fees: paid up-front to register to use the system. These are offered for a variety of time periods ranging from a 24-hour subscription to annual membership.
- Usage fees: charged to the user based on how long they use the system. Most systems offer a “free ride” period, typically between 30 and 60 minutes where the user pays no additional costs if the bike is returned within that time period. Fees are charged to users who exceed the free ride period.

The logic of the rate system is to: (1) make annual membership attractive to the resident population, (2) make the rates comparable to other bike share system rates, accounting for cost of living differences, (3) encourage use to the extent it does not compete with existing bike rental vendors, (4) provide reasonable and comparable prices to other public transportation modes, and (5) discourage trips longer than the free ride period (typically 30 to 60 minutes).

Table 6.3 shows a summary of membership options and pricing in North American bike share systems (please note that tax is treated differently for different systems – some of the prices below are plus tax, some are tax-inclusive).

All of the systems listed have pricing structures that encourage short trips, with no extra fees if bikes are returned within the free ride period, typically between 30 and 60 minutes depending on the system (although new systems may introduce low fee rates for the first 30 minutes) and escalating fees for subsequent 30 or 60 minute periods. Table 6.4 summarizes usage fees for North American systems.

The length of the free-ride period varies between systems. For most systems, the free-ride period is 30 minutes, but some systems have increased this to 45 minutes (in Montreal - for annual members only) or 60 minutes (in Boulder). The decision to lengthen the free-ride period beyond 30 minutes needs to consider:

- The impact to and encroachment on the bike rental market. The original intent of bike sharing is to provide a short trip mobility option not in competition with bike rental shops that accommodate users for longer trips.
- Reduction in user fees, particularly from casual users. Providing a 45-minute or 60-minute free-ride period lengthens the window for a user to return the bike. Currently, 16% of casual subscribers’ trips in Minneapolis and 19% of casual subscribers’ trips in Washington DC are between 30 and 60 minutes and subject to user fees (\$1.50 per trip). Although this distribution may change with a new

time-limit structure, this represents lost revenue. It is feasible to have a longer free-ride period for annual members only, which would result in minimal revenue loss, while retaining the 30 minute period for casual users.

- Increasing to 45- or 60-minutes is convenient for tourists and visitors. Accommodating this market may attract added interest from the tourist industry to become potential sponsors, which may subsidize reduced revenue from user fees.

Table 6.3: Membership Options and Access Fees for North American Bike Share Systems

System	Number of Bikes / Stations	Annual	Monthly (30-day)	Weekly (7-day)	5-Day	3-Day	24-hour
Montreal Bixi	5,050 / 405	\$78	\$28	-	-	\$12	\$5
Toronto Bixi	1,000 / 80	\$95	\$40	-	-	\$12	\$5
Capital Bixi	100 / 10	\$78	\$28	-	-	\$12	\$5
Capital Bikeshare <sup>1</sup>	1,100 / 118	\$75	\$25	-	-	\$15	\$7
Nice Ride Minnesota <sup>1</sup>	1,200 / 116	\$60 <sup>2</sup>	\$30	-	-	-	\$5
Denver Bikesharing <sup>1</sup>	500 / 50	\$65	\$30	\$20	-	-	\$6
Miami DecoBike <sup>1</sup>	1,000 / 100	-	\$15-\$25 <sup>3</sup>	-	-	-	\$24 <sup>4</sup>
Boston Hubway <sup>1</sup>	600 / 61	\$85	-	-	-	\$12	\$5
Boulder <sup>1</sup>	200 / 25	\$50	-	\$15	-	-	\$5
Madison <sup>1</sup>	350 / 35	\$65 <sup>2</sup>	-	\$30	-	-	\$10
Des Moines <sup>1</sup>	18 / 4	\$50 <sup>2</sup>	\$30 <sup>2</sup>	-	-	-	\$5
San Antonio <sup>1</sup>	140 / 14	\$60 <sup>2</sup>	-	\$24	-	-	\$10

Notes:

<sup>1</sup> Prices in US dollars.

<sup>2</sup> System offers reduced student rates.

<sup>3</sup> Available only to residents with a minimum 3 month commitment. The \$15 membership allows rides up to 30 minutes without additional fees, the \$25 membership allows rides up to 60 minutes without additional fees.

<sup>4</sup> Current fee structure costs \$4 for a 30-minute rental, \$5 for an hour long rental, up to \$24 for an 8-hour rental.

Table 6.4: Usage Fees for North American Bike Share Systems

System	Usage Fees (cumulative)						
	0-30 min	30-60 min	60-90 min	90-120 min	Each 30 minutes thereafter	Each 1 hour thereafter	Max 24-hour charge
Montreal Bixi <sup>1</sup>	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	-
Toronto Bixi	\$0	\$1.50	\$5.50	\$13.50	\$8.00	-	-
Capital Bixi	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	-
Capital Bikeshare <sup>2</sup>							
<i>Members</i>	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	\$70.50
<i>Casual Users</i>	\$0	\$2.00	\$6.00	\$14.00	\$8.00	-	\$94.00
Nice Ride Minnesota <sup>2</sup>	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	-
Denver Bikesharing <sup>2</sup>	\$0	\$1.00	\$5.00	\$9.00	\$4.00	-	-
Miami DecoBike <sup>2</sup>	\$0	\$4.00	\$8.00	\$12.00	\$4.00	-	-
Boston Hubway <sup>2</sup>							
<i>Members</i>	\$0	\$1.50	\$4.50	\$12.50	\$6.00	-	\$80.00
<i>Casual Users</i>	\$0	\$2.00	\$6.00	\$14.00	\$8.00	-	\$100.00
Boulder <sup>2</sup>	\$0	\$0	\$4.00	\$4.00	-	\$4.00	-
Madison <sup>2</sup>	\$0	\$2.00	\$7.00	\$12.00	\$5.00	-	\$75
Des Moines <sup>2</sup>	\$0	\$0	\$1.25	\$2.50	\$1.25	-	\$65
San Antonio <sup>2</sup>	\$0	\$2.00	\$4.00	\$6.00	-	\$4.00	\$35

Notes:

<sup>1</sup> Bixi Montreal offers annual members a 45-minute free ride period.<sup>3</sup> Prices in US dollars.

The proposed rate schedule for Calgary is shown in Table 6.5 and has been developed from the rate structures and cost of living in other cities. The cost of living is generally lower in Calgary as compared to Toronto and Washington DC, similar to Boston, but more expensive than in Montreal, Ottawa, and other US cities. As a result, an access fee structure of \$85 annual membership, \$35 monthly, and \$5 for a 24-hour pass is recommended for Calgary. Note that a number of other cities (e.g. Denver and Washington D.C.) are exploring higher 24-hour membership fees, e.g. \$6 or \$7 per day, which could also be considered in Calgary.

Table 6.5: Cost of Living and Usage Fee Comparison

City	Cost of Living Comparison <sup>1</sup>	Price Structure		
		Annual	Monthly	24-hour
Calgary (Proposed)	1.00	\$85	\$35	\$5
Montreal	0.84	\$78	\$28	\$5
Toronto	1.06	\$95	\$40	\$5
Ottawa	0.94	\$78	\$28	\$5
Minneapolis <sup>2</sup>	0.79	\$60	\$30	\$5
Denver <sup>2</sup>	0.81	\$65	\$30	\$6
Washington DC <sup>2</sup>	1.15	\$75	\$25	\$7
Boston <sup>2</sup>	1.00	\$85	-	\$5

Notes:

<sup>1</sup> Cost of living comparisons sourced from: [www.expatisitan.com](http://www.expatisitan.com)

<sup>2</sup> Prices in US dollars

Usage forecasts were based on Alta's Bike Share Demand Model, an empirical model developed using data from bike share systems in Washington DC and Montreal (a detailed description of the Alta Bike Share Model is included in **Appendix C**). The model was applied to the proposed service area in Calgary and the results adjusted to account for specific local conditions, e.g., the expected month-to-month profile of cycling and the effects of winter closure.

It is important to note that Washington DC's Capital Bikeshare is just one year old, while the Montreal system is less than three years old. Usage figures from Montreal show consistent growth with each year of operation, as have other systems around the world. A "ramp up" profile for a three-year period to system maturity was applied to these results. This profile is based on trends observed in Montreal and other cities. The resultant monthly demand for the first five years of operations is shown in **Table 6.6**.

Table 6.6: Five Year Forecast of Expected Monthly Bike Share Demand in Calgary Centre City

Month	Monthly Demand (Trips)				
	Year 1	Year 2	Year 3	Year 4	Year 5
January	Closed	Closed	Closed	Closed	Closed
February	Closed	Closed	Closed	Closed	Closed
March	Closed	Closed	Closed	Closed	Closed
April	5,000	7,000	8,000	8,000	8,000
May	36,000	44,000	52,000	52,000	52,000
June	42,000	51,000	60,000	60,000	60,000
July	47,000	57,000	67,000	67,000	67,000
August	47,000	57,000	67,000	67,000	67,000
September	40,000	48,000	56,000	56,000	56,000
October	31,000	37,000	44,000	44,000	44,000
November	Closed	Closed	Closed	Closed	Closed
December	Closed	Closed	Closed	Closed	Closed
Annual Total	263,000	320,000	375,000	375,000	375,000

Trips were then broken into those taken by casual users and those taken by annual members based on splits observed in Minneapolis and Washington DC and adjusted based on visitor / population ratios for Calgary. Observed rates of trips / member were applied to each category to estimate the number of annual members and the number of casual subscribers (e.g., casual users make an average of four trips per 24-hour subscription in Washington DC).

The five-year trip and membership forecast is presented in Table 6.7. Assumptions used to develop membership and usage forecasts are included in Appendix D.

Table 6.7: Five-Year Usage Forecast for Calgary Bike Share

	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Annual Trips</b>					
Centre City	263,000	320,000	375,000	375,000	375,000
Trips / Bike / Day	2.7	3.3	3.8	3.8	3.8
<b>Annual Members</b>					
Number	3,000	3,500	4,250	4,250	4,250
Trips	191,000	233,000	273,000	273,000	273,000
<b>Casual Users</b>					
Number	18,000	21,750	25,500	25,500	25,500
Trips	72,000	87,000	102,000	102,000	102,000
<b>Revenues</b>					
Member Subscription	\$255,000	\$310,000	\$365,000	\$365,000	\$365,000
Member Usage Fees	\$35,000	\$40,000	\$45,000	\$45,000	\$45,000
Casual Subscription	\$90,000	\$110,000	\$130,000	\$130,000	\$130,000
Casual Usage Fees	\$265,000	\$320,000	\$375,000	\$375,000	\$375,000
<b>Total User Revenue</b>	<b>\$645,000</b>	<b>\$780,000</b>	<b>\$915,000</b>	<b>\$915,000</b>	<b>\$915,000</b>

Table 6.7 shows an annual forecast demand of approximately 263,000 trips in Year 1 (2.7 trips / bike / day) ramping up to approximately 375,000 trips in Year 5 (3.8 trips / bike / day). User-generated revenues will start out at approximately \$0.65 million in Year 1, but are expected to reach approximately \$0.9 million per year at system maturity.

Forecasts for Calgary were compared to usage and membership statistics for existing systems in Washington DC, Minneapolis, Montreal, Denver, and Paris for the following metrics:

- Trips / bike / day: the first year forecast for Calgary of 2.7 trips / bike / day is within the range of other systems. It is slightly more than first year statistics for Washington DC (2.5 trips / bike / day – likely because the DC system is open year-round whereas Calgary's system will operate only in the high demand months) and lower than Montreal (3.2 trips / bike / day) and Paris (3.7 trips / bike / day). Table 6.8 includes a comparison with other bike share systems.
- Members per bike ratio: the Calgary system is expected to have a members per bike ratio of 7.5, which is within the range of other bike share systems (see Table 6.9).
- Trips per member ratio: the Calgary bike share system is expected to operate at approximately 88 trips per member, which is higher than first-year levels in Washington DC and Minneapolis, and lower than in Montreal (see Table 6.9).



**Table 6.8: Trip Comparison for First Year of Operation**

	Operating Days	Trips	Bikes	Trips / Bike / Day
Calgary	244	263,000	400	2.7
Montreal	212 <sup>1,2</sup>	3,400,000	5,000	3.2
Toronto	169	336,000	1,000	2.0
Capital Bikeshare	375 <sup>3</sup>	1,045,000	1,100	2.5
Minneapolis	150 <sup>1</sup>	100,817	600	1.1
Denver	224 <sup>1</sup>	102,981	500	0.9
Paris	365 <sup>4</sup>	27,500,000	20,600	3.66

Notes:

<sup>1</sup> The number of operating days during the 2010 season. This varies season to season depending on conditions.

<sup>2</sup> Represents 2010 data from the third season of operation.

<sup>3</sup> Based on the first 375 days of operation of Capital Bikeshare.

<sup>4</sup> Based on first season Velib data (July 2007 to July 2008) that recorded 27.5 million trips with 20,600 bikes.

**Table 6.9: Membership Comparison in First Year of Operation**

	Bikes	Members	Members / Bike	Annual Trips	Trips / Member
Calgary	400	3,000	7.5	263,000	88
Montreal <sup>1</sup>	5,000	32,371	6.5	3,400,000	105
Toronto	1,000	3,750	3.8	336,000	90
Capital Bikeshare	1,100	18,919	17.2	1,045,000	55
Minneapolis	600	1,295	2.2	100,817	78
Denver	500	1,784	3.6	102,981	58
Paris	20,600 <sup>2</sup>	200,000	9.7	27,500,000	138

Notes:

<sup>1</sup> Represents 2010 data from the third season of operation.

<sup>2</sup> Based on first season Velib data (July 2007 to July 2008) that recorded 27.5 million trips with 20,600 bikes.

The comparison of predicted statistics for Calgary to operating bike share systems confirms that the usage and revenue estimates are realistic.

### 6.3.2 Sponsorship Revenues

Advertising and sponsorship are common means of supplementing revenue for bike sharing systems. North American cities to date have generally steered away from systems supported by street furniture advertising contracts that are popular in Europe. This is mainly due to existing advertising contracts being in place. However, there may be opportunities to sell some advertising on the station map panels or, as in other systems, to offer sponsorship opportunities on the bikes or stations. These opportunities are described below.

#### Advertising

Advertising includes a contract with a company to provide a regularly changing graphic and message, typically on the map frame or on other street furniture independent of the bike share system (see Figure 6.1). The advertiser and the display may not be associated with bike sharing or bicycling in general. The ability to provide street furniture advertising would need to be negotiated with the local agency.

Many European systems are funded through sale of street furniture advertising contracts in return for capital, launch, and operation of the system. However, the street furniture advertising model has not been applied in Canada and the US in part due to the premium on advertising space, more restrictive advertising regulations, and the transparency of operations. As well, many North American cities, including Calgary (transit stops) have existing street furniture advertising contracts. Delivering bike sharing as part of a street furniture contract is not recommended for Calgary, but providing graphic advertising on the station map frames could increase system revenues (as compared to sponsorship alone – see below).

#### Sponsorship

Sponsorship is different from advertising in that it typically involves a long-term relationship between the sponsor and the vendor, where stickers are put on the infrastructure (bikes, stations, and/or website) with a logo and/or statement that “Company X supports Calgary Bike Share”. Sponsorship can come in a variety of forms, shown in Figure 6.2, including:

- Title sponsorship: where a company pays for full and exclusive sponsorship rights to the system and its components, i.e. stations, bikes, etc. Sponsor’s name is included in referring to the system, e.g., London Barclay’s Cycle Hire.
- Presenting sponsor: receives recognition in mention of the system, e.g. “Denver Bikeshare presented by Kaiser Permanente”. In most cases (e.g. Toronto, Boston, Denver), presenting sponsorship includes branding some of the station and bikes, however presenting sponsors do not have exclusive rights to the system and share sponsorship with other organizations. A detailed valuation of presenting sponsorship would need to be conducted and negotiated with any potential sponsor(s).
- Station and bike fleet sponsorship: generally presentation of the sponsor’s logo and/or a simple message, e.g., “this station is sponsored by company X” placed on the map frame, kiosk, and / or the docking points at a station or logos placed on the bicycle frames, baskets, or fenders. The value of station and bike sponsorship depends on the market and uptake is variable.



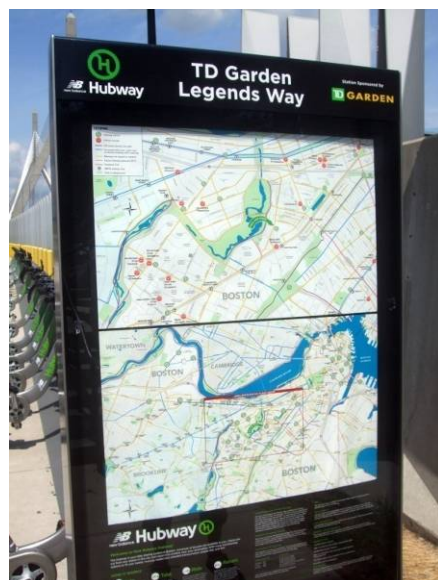
Figure 6.1: Street Furniture Advertisement in Vienna, Austria.



Title Sponsorship: Barclays Cycle Hire, London, UK.



Presenting Sponsor: Denver B-Cycle.



Station Sponsorship: Boston Hubway.



Bike Sponsorship: Decobike, Miami Beach.

Figure 6.2: Bike Share Sponsorship Examples.

The most likely sponsorship scenario for Calgary will be to secure a presenting sponsor (or sponsors) and several smaller station sponsors. Similar models in North American bike share systems include:

- Toronto: existing sponsors were brought along by PBSC (the system owner and operator) from the Montreal Bixi system. This minimizes the effort of having to find new sponsors and pay marketing commission. These presenting sponsors were signed for approximately \$600,000 per year (\$800 per bike per year) and as part of the deal are provided logo placement on the map frames, bike fenders, and docking stations on 75% of the equipment (the remaining 25% is available to other sponsors although not yet sold).
- Boston: the presenting sponsor (New Balance) was signed for approximately \$600,000 for three years (\$333/bike/year) and is provided its logo on all the station map frames and bike fenders in the system but shares this space with station sponsors who pay an annual fee for logo placement on the station map frame and a certain number of bikes. At the time of system launch (July 2011), approximately 60% of station sponsorships had been sold for \$50,000 each for three years (\$16,667 per year). Advertising is also sold on one side of the map panel to supplement sponsorship revenue.
- Denver: a three-year presenting sponsorship was secured with Kaiser Permanente Colorado for \$450,000 (\$300 / bike / year). Station sponsorship is also available with sponsors paying \$30,000 for one year or \$20,000 per year for 3 years for a website listing, logo placement at a station kiosk, and logo placement on 10 bikes (current uptake uncertain).
- Minneapolis: Blue Cross Blue Shield of Minnesota contributed \$2.5 million as the presenting sponsor of Phases 1 and 2 of the Nice Ride system. The presenting sponsor takes up all the bike advertising space as part of its contract. As a result, station sponsorship is valued somewhat lower than in Denver at \$10,000 per station per year.<sup>8</sup> Anecdotally, approximately 35% of stations were under sponsorship in July 2011.

The value of sponsorship varies depending on the market and should be studied independently. Experience so far indicates that the market value of sponsorship increases once the system is launched and potential sponsors can see what they are buying. Potential sponsors may be interested for the following reasons:

- As advertising exposure for their business.
- As a means of being a good 'corporate citizen' and providing a community amenity.
- As a means of satisfying commute trip reduction and travel demand management goals.

If Calgary adopted a combined presenting / station sponsorship model where presenting sponsorship was sold for \$500 per bike per year (five year deal) to generate initial capital and was supplemented with station sponsorships sold at 60-percent of stations each for \$16,667 per year (similar to Boston), sponsorship revenues would total **\$1.0 million** upfront (from presenting sponsorship) and **\$0.4 million** per year (from station sponsorship).

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<sup>8</sup> It is understood that Nice Ride is considering changing their stations sponsorship model to offer tiered station sponsorship pricing, valued according to the level of exposure. This is an effort to increase the uptake of sponsorship (goal of 100%) with an expectation to raise an average of approximately \$5,000 per station.



### 6.3.3 Other Revenue Sources

New and innovative revenue sources are continually being developed for bike sharing. Some other possible revenues include:

- Sell advertising at the stations. Some systems, such as Boston, sell billboard advertising on one side of the map frame to supplement sponsorship income. Council may need to make a determination as to whether additional street furniture advertising is acceptable beyond the City's existing contract.
- Additional sponsorship: there are other sponsorship opportunities not considered herein that could generate additional revenue including sponsorship of the webpage, back of receipt, membership keys, helmets, mobile applications, etc.
- Federal / provincial / transit grants: to date, Canadian cities have not had access to federal, provincial, or transit grants as US cities have. In the future, these opportunities may be created, or there may be innovative ways to tailor existing grants to bike sharing. However, relying on grant funding should be a "fall-back" option as the availability and timeliness of grant moneys can be unreliable.
- Incorporate station sponsorship, purchase, or placement as part of the travel demand management toolbox available to new development and redevelopment. As well, existing or new businesses (as well as university and hospital campuses) can become corporate members of the program to provide their employees (and students) membership to the system as an employee benefit. This aids the system in delivering large numbers of guaranteed memberships and riders to the program.
- Carbon off-setting: there are numerous examples in the transportation industry of funds collected from carbon off-setting programs being directed towards transportation projects, although primarily these projects have been in the developing world such as the TransMilenio bus transit system in Bogota, Columbia. More recently, similar use of carbon off-setting funds has been considered as a revenue source for bike sharing programs. A preliminary assessment of the value of carbon offsets for the Calgary bike share system is included in **Appendix E** and show that revenues will be minimal, but may be attractive to private and corporate members and attract a premium price (above market rates) for this service.

## 6.4 Funding Strategy

Table 6.10 provides a comparison of system costs and revenues from the proposed combination of user fees and sponsorship. In terms of capital costs, initial revenues from a five-year presenting sponsorship contract and first year station sponsorship will not be sufficient to cover capital and launch costs. While annual user and station sponsorship revenues will cover the cost of operations and provide a \$200,000 per year surplus, at the end of five years the system is estimated to still record a shortfall of approximately \$350,000.

In Canada to date, cities have had to assist with capital investment. In Ottawa, this involved the NCC funding the capital cost and in Toronto involved a loan guarantee (although the loan is actually taken out by PBSC and paid back with system revenues). Although there may be some economies to be had by using existing City resources and infrastructure, these will not be sufficient to cover the expected \$1 million first year shortfall and have not to date been undertaken in any large-scale systems.

Table 6.10: Comparison of Five-Year System Costs and Revenues

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
<b>Costs</b>						
Capital and Launch	-\$2,400,000					
Operating		-\$1,100,000	-\$1,100,000	-\$1,100,000	-\$1,100,000	-\$1,100,000
<i>Sub-Total</i>	-\$2,400,000	-\$1,100,000	-\$1,100,000	-\$1,100,000	-\$1,100,000	-\$1,100,000
<b>Revenues</b>						
User-Generated		\$650,000	\$800,000	\$900,000	\$900,000	\$900,000
Presenting Sponsorship	\$1,000,000					
Station Sponsorship	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000
<i>Sub-Total</i>	\$1,400,000	\$1,050,000	\$1,200,000	\$1,300,000	\$1,300,000	\$1,300,000
<b>Annual Profit / Shortfall</b>	-\$1,000,000	-\$50,000	\$100,000	\$200,000	\$200,000	\$200,000
<b>Cumulative Profit / Shortfall</b>	-\$1,000,000	-\$1,050,000	-\$950,000	-\$750,000	-\$550,000	-\$350,000

As mentioned above, apart from public funding, there may be opportunities to sell advertising on the station map frames at a premium price – although a decision on this would be needed from Council – or to sell sponsorship or advertising on other system elements such as the website, mobile applications, back of receipts, on membership keys, etc. There may also be grants, foundation funding, and other sources for small additions to system revenue, however these sources should not be relied upon.

In terms of covering annual operating costs, some systems such as Capital Bikeshare in Washington DC, have seen ridership levels that generate user fees sufficient to sustain the cost of operations. This is not expected to be the case in Calgary – most likely a result of lower residential and visitor populations in Calgary compared to Washington DC. However, with the addition of annual station sponsorship revenues, operations can be sustained with an expected annual surplus of \$200,000 per year, which could be used to pay back initial capital costs or to over time expand the system.

## 6.5 Role of Local Partners

Important local partners will include public agencies, local businesses and the corporate community, existing and new non-profit agencies, local bike shops, bicycling advocacy groups, neighbourhood / business / and visitor associations, large employers, and hotel / guest services. The potential roles of these groups are described below:



- Public Agencies – potential funders, owners, administrators, operators. Public agencies may be able to offer support by providing in-kind services (staff hours, permitting costs, etc.), property / right-of-way for locating the stations, marketing and outreach, political support, grant writing skills, new staff positions, and a large membership potential.
- Local businesses / corporate community – potential system or stations sponsors. As well, large employers, educational campuses, hotels, and visitor attractions are potential corporate members that could deliver large numbers of members and users to the system.
- Non-profit organizations – potential owners, administrators, operators. These could be established non-profits or newly formed organizations specifically to administer or operate the system (e.g., Minneapolis / Denver). There are funding and public image benefits to non-profit involvement.
- Bike shops – potential partners, operators, maintenance staff. Bike sharing is designed to minimize its competition with bike rentals by encouraging short trips through the graduated fee structure and providing upright, limited gear bikes. Bike rentals and retailers can benefit from more people being introduced to bicycling. Local bike shops can also play a role as equipment suppliers (e.g., helmets) and could offer contract services for maintenance and/or operations.
- Bicycling advocacy groups – supporters that can generate interest through their constituency. Bike sharing offers them the possibility of increased constituency with more people bicycling. They can also be subcontractors to undertake education and outreach about bicycle share.
- Neighbourhood / business / visitor associations – visible media and political champions. The support of these groups is also important in establishing large-scale community support for the system, and attracting corporate support and sponsorship.

## 7. Implementation Program

The next steps for bringing bike sharing to Calgary will include:

- Identifying the **business model** that is most appropriate for Calgary. This should include a decision as to who will own, administer, and operate the system. The decision will have implications on funding (see below), e.g., assigning a private company to own and operate the system may limit sponsorship opportunities, but could bring along existing relationships.
- Identifying a **funding strategy** that considers both capital and operational costs. Operations can likely be sustained by a combination of user fees and station sponsorship. Capital costs are likely to exceed the amount that can be obtained through sponsorship. A decision will need to be made as to how to fund this shortfall and could include:
  - Supplementing revenue with advertising placed on the station map panels.
  - Seeking federal, provincial, or transit grant money (to date no Canadian cities have been successful in finding grants for bike sharing).
  - Investing local public funding (as in Ottawa) or guaranteeing a loan (as in Toronto). The latter is no guarantee that an operator will want to take on the financial risk of capital that will likely take up to seven years to pay back.
- Obtaining the support of **public agency staff and officials**. This is critical to taking an “ask” out to bike share operators and to potential sponsors. In other cities, such as Seattle, political support for the program was identified as a critical element for corporate sponsors to get involved in the system.
- Following the decision making period, the City of Calgary may be in a position to **issue an RFP** for an equipment vendor and / or operator (depending on the business model and funding strategy chosen). The RFP will be an opportunity to engage the private sector and understand what financial risks they are willing to take – e.g., Ottawa received no interest from operators to take on the risk of paying for system capital but PBSC responded to take on the financial risk of operating the system once the NCC funded the capital cost.
- The **public / private partnership** will be responsible for:
  - Refining the assumptions in this business plan.
  - Developing a sponsorship package.
  - Approaching corporate partners about sponsoring the system and getting together funding (existing vendors/operators may bring along established sponsor relationships from other systems).
- **Agency staff** should be involved in developing a streamlined permitting process for station siting and providing other in-kind and material support identified as appropriate.
- Once a **vendor and operator** are chosen and a contract is signed, the following activities will need to occur prior to system launch. The lead time required for these activities prior to launch is approximately six months:
  - Undertake community education and outreach for the system.
  - Manufacture and deliver the equipment.
  - Create a system name and logo.
  - Undertake hiring.

- Obtain warehouse, vehicles, and equipment.
- Obtain permits.
- Assemble stations.
- Install stations.
- Undertake pre-launch marketing.
- Set up system back-end including the website, call centre, etc.
- Launch event.

## 8. Conclusion

This study considers the benefits of bike sharing and its potential as a mobility option in Calgary's Centre City. It looks at the preparedness of the community to host bike sharing, considers experience from other North American cities with bike sharing, outlines a potential program for the Centre City and explores potential funding strategies and business models.

Numerous cities in the United States are recognizing the financial, health, environmental, and transportation benefits of bike sharing. For the benefits that it provides, bike sharing is relatively inexpensive compared to other transportation modes and the modular nature of the stations allows quick installation and the opportunity to move or expand stations to optimize performance. Bike sharing is also practically carbon neutral, adds green jobs to the community, introduces new users to the health benefits of cycling, and has so far observed very few crashes while exceeding expectations for demand.

Over 300 cities worldwide are investing in bike sharing including Montreal, Toronto, and Ottawa in Canada, and cities such as Denver, Minneapolis, Washington DC, Boston, and Miami Beach in the United States. These cities have varied in how they have brought bike sharing to their city, e.g., in Toronto, the system is owned and operated by a non-profit company with the City of Toronto guaranteeing a loan to purchase and install the equipment. In Ottawa, the NCC funded the capital cost with a private operator taking on the financial risk of operating the system.

Compared to these cities, the Calgary Centre City has many of the characteristics to support a successful bike sharing system including high employment density, well supported visitor and recreational attractions, an extensive public transport system, and a growing resident population. The local political and policy environment is supportive of the growth of walking and cycling as a means of creating a more livable and vibrant city and the Cycling Strategy has been approved in concept to increase bikeway infrastructure in the Centre City.

The proposed Centre City bike share system will include a total of 40 stations, 400 bikes, and 760 docks across an area of 5.6 square kilometres. Preliminary station locations have been identified (but will need to be confirmed by the system operator) and are provided at an average spacing of 400 metres. This density provides access to a bike within a short walk of anywhere in the service area and provides a nearby alternative to return a bike if the destination station is full. Typical station placements include: on sidewalks, public spaces, on-street (potentially converting on-street parking), and on private properties (in consultation with land owners).

Future phases of the system should consider areas with the highest potential demand and may include the area to the north-west of the Centre City that includes the University of Calgary, Southern Alberta Institute of Technology, the Foothills Hospital, and the Brentwood and University Heights neighbourhoods. It may also offer a logical extension of the transit system to Mount Royal University and surrounding neighbourhoods. Expansion will depend on available funding and the success of the system, typically measured in terms of visible achievements such as high ridership, positive public response, neighborhood and corporate requests for service area expansion, and financial performance.

North American bike share systems operate under many different business models. In fact, each existing system (and those in planning) has identified a governance and organizational structure that fits the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. The funding strategy is closely related to the organizational model chosen.

Business models that may be appropriate for Calgary include:

- Operating non-profit that owns and operates the system: provides the positive public image benefits and the ability of non-profits to attract corporate sponsorship. It maintains some level of control for agency partners while minimizing risk. Non-profit operations require expertise to be generated from scratch.
- Administrative non-profit owns and administers the system; operated by a private contractor: provides the same advantages as above, but adds the expertise and accountability of a private operator.
- Privately owned and operated: the private sector brings expertise and takes the financial risk for the system. Obtaining sponsorship is often more difficult for a private operator and the agency has less control over operation and growth of the system and the re-investment of profits within the community.
- Publicly owned; operated by a private contractor: has been successful elsewhere because of the flexibility of funding sources, the ability for the agency to control operations and growth, whilst providing the expertise of the private sector to provide a positive user experience. This model provides the most control, but maximizes public image and financial obligation and risk for the agency.
- Publicly owned and operated (no North American examples): to date public agencies have been resistant to undertaking the responsibility of operating the system.
- Owned and operated as part of a street-furniture advertising contract: has not been applied in North America, primarily due to existing contracts, transparency of operations, and the premium on advertising space, the funds of which may currently be funding other city programs.
- Transit agency owned and operated (no North American examples): despite the synergies with transit, agencies have been hesitant to take on responsibility for operations but have acted as funding agencies and have explored integrated ticketing, etc.

System costs include: general system start-up costs such as administrative and overhead costs to establish a framework for the system; phase start-up costs including equipment and launch costs; and operating costs that include renting and maintaining warehouse space and staff costs associated with administration, maintenance, repairs, rebalancing, etc.

System revenues will include:

- User-generated revenues that will come from membership fees paid to access the system and usage fees incurred by riders that exceed the “free ride period”. The proposed rate structure is based on other cities and adjusted for the relative cost of living as follows:
  - Annual subscription: \$85.
  - Monthly subscription: \$35.

- 24-hour (casual) subscription: \$5.

Usage forecasts were calculated from an empirical model developed from usage statistics observed in Washington DC and Montreal and adapted to Calgary. Ridership is expected to increase from approximately 260,000 trips in Year 1 (2.7 trips / bike / day) to approximately 375,000 trips in Year 5 (3.8 trips / bike / day).

User generated revenues are estimated to increase from approximately \$0.65 million in Year 1 to \$0.9 million at system maturity.

- Sponsorship of the system, most likely from a presenting sponsor that would sign a contract prior to the launch of the system and generate funds to offset the capital cost of the system. Presenting sponsor rates from other cities suggest that a five-year contract may be worth \$1 million. In addition, station sponsorships can be sold to other corporate partners and could be worth up to \$0.4 million per year (assuming uptake of 60% of stations at \$16,667 per year – as seen in Boston).

The financial pro-forma compares five-year costs and revenues to determine the expected financial performance of the system. A diverse funding strategy will be required.

Initial revenues from presenting sponsorship and the first year of station sponsorship will not be sufficient to cover the capital and launch cost of the system. Annual user fees and station sponsorship revenues will cover the cost of operations and provide a \$200,000 annual surplus that will make it possible to pay back the capital investment over a period of seven years.

In Canada to date, cities have had to assist with capital investment. In Ottawa, this involved the NCC funding the capital cost and in Toronto involved a loan guarantee (although the loan is actually taken out by PBSC and paid back with system revenues). Although there may be some economies to be had by using existing City resources and infrastructure, these will not be sufficient to cover the expected \$1 million first year shortfall. Apart from providing local public funding, other means of generating this up-front revenue could include:

- Selling billboard advertising on one side of the map frame to supplement sponsorship income. Council may need to make a determination as to whether additional street furniture advertising is acceptable beyond the City's existing contract.
- Selling sponsorship to other elements of the system such as the webpage, back of receipt, membership keys, helmets, mobile applications, etc.
- Applying for federal / provincial / transit grants: to date, Canadian cities have not had access to federal, provincial, and transit grants as US cities have. In the future, these opportunities may be created, or there may be innovative ways to tailor existing grants to bike sharing. However, relying on grant funding should be a "fall-back" option as the availability and timeliness of grant moneys can be unreliable.
- Incorporate station sponsorship, purchase, or placement as part of the travel demand management toolbox available to new development and redevelopment. As well, existing or new businesses (as well as university and hospital campuses) can become corporate members of the program.



- Carbon off-setting: revenues from carbon-offsetting are likely minimal, but may be attractive to private and corporate members and attract a premium price (above market rates) for this service.

Potential issues that could impact the success of the system include the extent of bikeway infrastructure. Council has recognized the need for bikeway infrastructure in the Centre City and staff are currently gathering input from the bicycling community on preferred routes and facility types. The Cycling Strategy is committed to the implementation of bicycle routes in the Centre City. This will provide a basic framework for potential bike share users to ride comfortably and safely to a variety of destinations with an increased network developed in subsequent years.

The next steps towards implementing a bike share system in the Calgary Centre City include deciding on the preferred business model and funding strategy, gaining political support, and then issuing an RFP to establish a public / private partnership (depending on the business model chosen) that can move forward with securing funding, finalizing the program parameters, and streamlining the permitting process for station siting. The selected operator will need up to six months to order, ship, install, promote, and launch the system.

## **Appendix A**

### **North American Bike Share Examples**

## Boston

Local System Name	Hubway
Technology Provided by	Public Bike System
Web Address	<a href="http://www.thehubway.com/">http://www.thehubway.com/</a>
Launch Date	July 28, 2011

### Size / Local Conditions

# of Bikes	610
# of Stations	61 (10 bikes/station)
Population of city	645,169 (census 2009)
Bike infrastructure of city	Growing network of bike lanes, cycle tracks and pathways
Climate conditions	Annual average temp = 56° Cold winters with snow and warm, humid summers
Year round or Seasonal	Closes in winter

### Economic Considerations

Price structure	\$85 annual, \$12 3-day, \$5 daily + usage fees: first 30 minutes free; \$8 for each additional 30 minutes; \$100 max per day
Funding	Public-private partnership; Operator direct contract with City of Boston; other municipalities to contract directly with operator.
Management	Private Vendor, Alta Bicycle Share
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike Subscribers: Insert subscriber key into reader at bike dock
Type of Bike	Standard Bixi Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, black and green color

### System Summary + Analysis

The New Balance Hubway bike share system serving Boston will likely expand into Cambridge, Somerville and Brookline. Boston is becoming increasingly bicycle-friendly and will link well with Cambridge.



## Boulder

Local System Name	Boulder B-Cycle
Technology Provided by	B-Cycle
Web Address	boulderbicycle.com/
Launch Date	May 20, 2011

### Size / Local Conditions

# of Bikes	200
# of Stations	25 (8 bikes/station)
Population of city	91,481 (census 2006)
Bike infrastructure of city	Over 300 miles of bike lanes, designated routes and paths
Climate conditions	Annual average temp = 50° Cold winters and mild summers
Year round or Seasonal	Closes in winter



Photo courtesy of B-Cycle

### Economic Considerations

Price structure	\$50 annual, \$15, weekly, \$5 daily, first 60 minutes free, \$4 for each additional 30 minutes
Funding	Federal grant (\$250,000) and community fundraising
Management	Non-Profit
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console Membership: Unlock bike with B-Card
Type of Bike	Standard B-Cycle, which is a converted Trek Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, 3 color choices

### System Summary + Analysis

Although Boulder is an extremely progressive biking city and seemingly perfect for bike sharing, some questions remain as to how much bike sharing will be accepted in a community where a large majority already own bicycles, and most people live in single-family homes, eliminating the bike storage constraint found in larger cities. Boulder is one of the most bike-friendly cities in the United States and weather is quite pleasant for 7 - 8 months of the year.

## Denver

Local System Name	Denver Bikessharing
Technology Provided by	B-Cycle
Web Address	<a href="http://www.denverbikessharing.org">www.denverbikessharing.org</a>
Launch Date	April 2010

### Size / Local Conditions

# of Bikes	500
# of Stations	50 (10 bikes/station)
Square Miles Covered	5 sq mi (approx)
Average Station Density	10 stations per sq mi
Membership / Ridership	1,784 annual members, 33,000 casual members, 102,981 rides in 8 months

Population of city	566,974 (census 2006)
Bike infrastructure of city	Well-developed network of bike lanes, marked shared lanes, signed bike routes, and multi-use trails
Climate conditions	Annual average temp = 50° Cold, snowy winters and mild summers with little humidity
Year round or Seasonal	Closes December through March

### Economic Considerations

Price structure	\$65 annual, \$30 monthly, \$20 weekly, \$5 daily + usage fees: first 30 minutes free; \$1 for 30-60 min; \$4.00 for each 30 min more
Economic Model	Non-profit created by city; public and private funding
Funding	Began with \$1 million in city and county funding
Management	Non-Profit, Denver Bikessharing
Reported Theft / Vandalism	2 bikes stolen
Long-term Local or Walk-up Renters	Both

### Equipment

Hard-wired or Solar Powered	Both
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console Membership: Unlock bike with B-Card
Type of Bike	Standard B-Cycle, which is a converted Trek Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, 3 color choices



Photo courtesy of Rand McNally

### System Summary + Analysis

Denver's bike share system was the first large-scale system to launch in the U.S. and it has been well received by the community. For a city of its size, Denver is a bike-friendly city, achieving bronze-medal status by the League of American Bicyclists. Other than snowy winters, climate conditions are ideal for 7 - 8 months of the year and outdoor activities are extremely popular.

## Des Moines

Local System Name	Des Moines B-Cycle
Technology Provided by	B-Cycle
Web Address	<a href="http://desmoines.bcycle.com/">desmoines.bcycle.com/</a>
Launch Date	September 2010

### Size / Local Conditions

# of Bikes	18
# of Stations	4 (4 - 5 bikes/station)
Square Miles Covered	0.5 sq mi (approx)
Average Station Density	8 stations per sq mi
Membership / Ridership	109 casual riders, 20 annual memberships (as of September 25, 2010)



Photo courtesy of Learfield News

Population of city	193,886 (census 2006)
Bike infrastructure of city	5 miles of on-street bike lanes, 40 miles of paved trails

Climate conditions	Annual average temp = 50° Cold winters and mild summers
Year round or Seasonal	Closes in winter

### Economic Considerations

Price structure	\$50 annual, \$30 monthly, discounts for seniors and students, \$5 daily, first hour free, \$1.25 for each 30 min more
Economic Model	Non-profit found funding to bring system in
Funding	Began with \$120,000 for pilot program
Management	Non-Profit
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Both
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console Membership: Unlock bike with B-Card
Type of Bike	Standard B-Cycle, which is a converted Trek Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, 3 color choices

### System Summary + Analysis

The bike share system in Des Moines is very small and has only been active for a few months, making very difficult to evaluate. The system was brought to Des Moines as an initiative of a local non-profit. The City of Des Moines has a fairly extensive trail network and ambitions for more bicycle infrastructure, as identified in their recent bicycle master plan.



## Golden

Local System Name	Golden Community Bike Share
Technology Provided by	Sandvault Group Global Solutions
Web Address	<a href="http://www.town.golden.bc.ca/upload/hlet.pdf">http://www.town.golden.bc.ca/upload/hlet.pdf</a>
Launch Date	May 26, 2011

### Size / Local Conditions

# of Bikes	15
# of Stations	2
Square Miles Covered	-
Average Station Density	-
Membership / Ridership	Not reported

Population of city	3,811 (census 2006)
Bike infrastructure of city	-

Climate conditions	Annual average temp = 51° Cold winters and mild summers
Year round or Seasonal	Closes in winter

### Economic Considerations

Price structure	\$60 seasonal, \$35 monthly: first 30 minutes free; \$2.50 for each 30 min more
Economic Model	-
Funding	-
Management	Non-profit
Reported Theft / Vandalism	n/a
Long-term Local or Walk-up Renters	Long-term Local only

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Members receive a membership card that must be used at the station console to access a bicycle.
Type of Bike	Step through design, 3-speed, basket, rack behind seat, gold color

### System Summary + Analysis

Golden is a small resort town surrounded by three mountain ranges and five national parks. The Golden Community Bike Share system is a small system with two stations and 15 bikes. The system was launched with the goals of increasing active transportation and health, and reducing greenhouse gas emissions and bicycle theft.



Photo source:

<http://goldenactivetransportation.com/2010/10/bike-share-is-here/>

## Miami Beach

Local System Name	DecoBike
Technology Provided by	Sandvault Group Global Solutions
Web Address	<a href="http://www.decobike.com/">www.decobike.com/</a>
Launch Date	December 2010
<b>Size / Local Conditions</b>	
# of Bikes	1,000
# of Stations	100 (10 bikes/station)
Square Miles Covered	6.5 sq mi (approx)
Average Station Density	15 stations per sq mi
Membership / Ridership	TBD
Population of city	86,916 (census 2006)
Bike infrastructure of city	Few on-street bike lanes and paths that run along the beach
Climate conditions	Annual average temp = 76° Warm winters and hot, rainy summers
Year round or Seasonal	Year-round



Photo courtesy of DecoBike

### Economic Considerations

Price structure	\$15 monthly, \$14 daily, \$49 for 5 days, first 30 min free for memberships and day passes, \$4 for 30 min, \$5 for 60 min, \$6 for each 1 hour more
Economic Model	100% private funding through investor
Funding	Undisclosed
Management	Private Vendor, DecoBike
Reported Theft / Vandalism	NA
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar, minimal select hardwired
Station Based or Other	Station-Based
User Interface	Members: BeachPASS membership card Casual riders: Pay with credit card at console
Type of Bike	Step through design, internal brakes, dynamo lighting

### System Summary + Analysis

The DecoBike system has been designed to serve primarily beach-goers and tourists in Miami Beach. It was just launched at the time of this report, so its success cannot yet be gauged. It will be interesting to see over time if this system is able to also actively engage residents and employees to bicycle for transportation. Because the Miami Beach system is North America's largest completely privately funded system, planners are curious to see how the system performs.

## Minneapolis

Local System Name	Nice Ride
Technology Provided by	Public Bike System
Web Address	<a href="http://www.niceridemn.org">www.niceridemn.org</a>
Launch Date	June 10, 2010

### Size / Local Conditions

# of Bikes	700
# of Stations	73 (9.5 bikes / station)
Square Miles Covered	8 sq mi (approx)
Average Station Density	9 stations per sq mi
Membership / Ridership	2010 (Year 1): 100,000 rides, 1,300 annual members, 29,000 casual riders, 20% trips replaced cars
Population of city	372,833 (census 2006)
Bike infrastructure of city	43 miles of on-street bike lanes, 84 miles of off-street trails

Climate conditions	Annual average temp = 45° Cold winters and hot, humid summers
Year round or Seasonal	Closes in winter

### Economic Considerations

Price structure	\$60 annual, \$30 monthly, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$4.50 for 60-90 min, \$6 for each 30 min more
Economic Model	Non-profit created by city; 1/3 private and 2/3 public sponsored
Funding	Began with \$3 million in federal, city and sponsor funding
Management	Non-Profit, Nice Ride Minnesota
Reported Theft / Vandalism	2 bikes
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike; Subscribers: Insert membership-key into reader at bike dock
Type of Bike	Standard PBSC bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, green and blue color

### System Summary + Analysis

Nice Ride was the second large-scale system to launch in the US and has been well received. As of May 2011, 2,500 members are signed up for the program and Nice Ride Minnesota is expanding the system into St. Paul and other parts of Minneapolis. Phase 2 will increase the system to 113 stations and 1,200 bikes.



## Montreal

Local System Name	Bixi
Technology Provided by	Public Bike System
Web Address	<a href="http://www.bixi.com">www.bixi.com</a>
Launch Date	May 2009

### Size / Local Conditions

# of Bikes	5,050
# of Stations	405 (12 - 13 bikes/ station)
Square Miles Covered	24 sq mi (approx)
Average Station Density	17 stations per sq mi
Membership / Ridership	30,000 members after 2 seasons, 3.3 million rides in 2010 season, 118,000 new users in 2010
Population of city	1,620,693
Bike infrastructure of city	Extensive network of cycle tracks, bike lanes and "route verte" - a provincial-wide path system
Climate conditions	Annual average temp = 45° Cold, snowy winters and mild, rainy summers
Year round or Seasonal	Closes in November



Photo courtesy of Alta

### Economic Considerations

Price structure	\$78 annual, \$25 monthly, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$4.50 for 60-90 min, \$6 for each 30 min more
Economic Model	Publicly funded through city parking authority
Funding	Began with \$33 million loan from parking authority
Management	Public-private organization, Bixi
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike; Subscribers: Insert BIXI-key into reader at bike dock
Type of Bike	Standard PBSC bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, grey color

### System Summary + Analysis

The Bixi system has been embraced by the city of Montreal. After the initial launch of 2,500 bikes, they soon increased the numbers to 3,500, then up to 5,000 bikes. Though closed through the winter last year, the city is testing a partial system to run year-round. Its popularity is aided by a very extensive bike network throughout the city that has contributed to significant increases in bicycling for daily transportation.

## Ottawa

Local System Name	Capital Bixi
Technology Provided by	Public Bike System
Web Address	<a href="http://www.capital.bixi.com">www.capital.bixi.com</a>
Launch Date	May 18, 2011



Photo source: CBC News

### Size / Local Conditions

# of Bikes	100
# of Stations	10 (10 bikes/station)
Square Miles Covered	1.3 sq mi (approx)
Average Station Density	8 stations per sq mi
Membership / Ridership	Not reported

Population of city	812,129 (census 2006)
Bike infrastructure of city	Network of multi-use paths, bike lanes, paved shoulder routes and signed routes.
Climate conditions	Annual average temp = 51° Cold, snowy winters and mild, humid summers
Year round or Seasonal	Closes in winter

### Economic Considerations

Price structure	\$78 annual, \$28 monthly, \$12 3-day, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 31-60 min; \$4.50 for 61-90 min, \$6 for each 30 min more
Economic Model	Operating costs anticipated to be covered by revenues by 2nd year
Funding	Began with \$785,000 purchase of bikes and stations by National Capital Commission
Management	Public-private organization, PBSC
Reported Theft / Vandalism	n/a
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike; Subscribers: Insert membership-key into reader at bike dock
Type of Bike	Standard PBSC bike, step through design, internal brakes, carrying rack, lighting, 3-speed, grey color

### System Summary + Analysis

The Capital Bixi bike share system is another North American system that uses the Bixi technology originally developed for Montreal. The initial infrastructure was purchased by National Capital Commission.



## San Antonio

Local System Name	San Antonio B-Cycle
Technology Provided by	B-Cycle
Web Address	<a href="http://www.sanantonio.bcycle.com/">http://www.sanantonio.bcycle.com/</a>
Launch Date	Spring 2011



### Size / Local Conditions

# of Bikes	140
# of Stations	14 (10 bikes/station)
Square Miles Covered	2.6 sq mi (approx)
Average Station Density	5 stations per sq mi
Membership / Ridership	NA
Population of city	1,300,000 (census 2006)
Bike infrastructure of city	Combination of on-street and off-street trails

Climate conditions	Annual average temp = 69° Cool winters and very hot summers
Year round or Seasonal	Year-round

### Economic Considerations

Price structure	\$60 annual, \$24 weekly, \$10 daily + usage fees: first 30 minutes free; \$2 for each additional 30 minutes; \$35 max per day
Economic Model	Non-profit (San Antonio Bike Share); private operator (Bike World)
Funding	Seed money from stimulus funds through the Department of Energy and Centers for Disease Control
Management	Private Vendor, Bike World
Reported Theft / Vandalism	NA
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar	Unknown
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console Membership: Unlock bike with B-Card
Type of Bike	Standard B-Cycle, which is a converted Trek Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, 3 color choices

### System Summary + Analysis

San Antonio's bike share system is centered around the tourist attractions of the central city. It is administered by a non-profit and operated by a bicycle rental company that won an RFP process.



## Toronto

Local System Name	Bixi Toronto
Technology Provided by	Public Bike System
Web Address	<a href="http://www.toronto.bixi.com">www.toronto.bixi.com</a>
Launch Date	May 3, 2011

### Size / Local Conditions

# of Bikes	1,000
# of Stations	80 (12.5 bikes / station)
Square Miles Covered	-
Membership / Ridership	n/a

Population of city	2,503,281 (census 2006)
Bike infrastructure of city	155 miles of on-street bike lanes and shared roadway, 100 miles of bike paths
Climate conditions	Annual average temp = 48° Cold winters and hot, humid summers
Year round or Seasonal	n/a

### Economic Considerations

Price structure	\$95 annual, \$40 monthly, \$12 3-day, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$5.50 for 60-90 min, \$8 for each 30 min more
Economic Model	Funded through City-guaranteed loan to be paid back through sponsorship
Funding	Began with \$4.8 million City-guaranteed loan, PBSC to pay down loan
Management	Public-private organization, PBSC
Reported Theft / Vandalism	n/a
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike; Subscribers: Insert membership-key into reader at bike dock
Type of Bike	Standard PBSC bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, black color

### System Summary + Analysis

As of May 2011, Toronto is the most recent city in North America to launch bike sharing. The city required a \$600,000 per year sponsorship guarantee and 1,000 advance annual subscriptions to the program to guarantee the loan to create the program. PBSC will pay down the loan with sponsorships and user revenues.



## Washington DC / Arlington

Local System Name	Capital Bikeshare
Technology Provided by	Public Bike System
Web Address	<a href="http://www.capitalbikeshare.com">www.capitalbikeshare.com</a>
Launch Date	September 2010

### Size / Local Conditions

# of Bikes	1,110
# of Stations	114 (9-10 bikes/station)
Square Miles Covered	27 sq mi (approx)
Average Station Density	4 stations per sq mi
Membership / Ridership	15,000 members, 500,000 rides, 10,000 casual users
Population of city	817,140 (census 2009)
Bike infrastructure of city	Growing network of bike lanes, signed bike routes, and trails
Climate conditions	Annual average temp = 58° Cool winters and warm, humid summers
Year round or Seasonal	Year-round



Photo courtesy of Alta

### Economic Considerations

Price structure	\$75 annual, \$25 monthly, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$4.50 for 60-90 min, \$6 for each 30 min more
Economic Model	DC 100% publicly funded; Arlington 65% privately funded
Funding	Began with \$6 million CMAQ and local funding for District, \$200,000 private funding for Arlington
Management	Private Vendor, Alta Bicycle Share
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

### Equipment

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike Subscribers: Insert subscriber key into reader at bike dock
Type of Bike	Standard PBSC bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3-speed, red color

### System Summary + Analysis

This Public Bike Share System was introduced after the SmartBike DC system had operated for two years previously. Although it is very new, considering that it has over 5,000 members and 100,000 rides within the first 2.5 months of operation, this system is widely seen as a success.

## Washington DC

Local System Name	SmartBike DC
Technology Provided by	Clear Channel
Web Address	<a href="http://www.smartbikedc.com/">www.smartbikedc.com/</a>
Launch Date	August 2008

### Size / Local Conditions

# of Bikes	120
# of Stations	10 (12 bikes/station)
Square Miles Covered	3 sq mi (approx)
Average Station Density	3 stations per sq mi
Membership / Ridership	1,600 members as of April 2010
Population of city	599,657 (census 2009)
Bike infrastructure of city	Growing network of bike lanes, signed bike routes, and trails
Climate conditions	Annual average temp = 58° Cool winters and warm, humid summers
Year round or Seasonal	Year-round, 6am - 10pm, 7 days a week

### Economic Considerations

Price structure	\$40 annual fee
Economic Model	Attached to public advertising contract
Funding	Undisclosed
Management	Private Vendor, Clear Channel
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Long-term Local only

### Equipment

Hard-wired or Solar	Hard-wired
Station Based or Other	Station-Based
User Interface	Subscribers receive user card, activate card online. Must have user card at station console to access bicycle.
Type of Bike	Bike design has a low top tube, well-protected chain, basket, and bell

### System Summary + Analysis

Smartbike DC was the first system implemented in the United States, and the only one run by the advertising company Clear Channel. Although it is being replaced by the larger Capital Bikeshare system, it is widely seen as a good entry point for the larger system in DC. The SmartBike DC system failed to expand due to contract disputes between the District Department of Transportation and Clear Channel Outdoor. This system also suffers from low use because of the small numbers of stations that are located in a compact area and its inaccessibility to walk-up renters.



Photo courtesy of Smartbike DC

## **Appendix B**

### **Bike Share Cost Estimates**

## Calgary Bike Share

### General System Startup Costs

	# Postions				Period
<u>Employee Expenses</u>	Pre-Launch	Average Salary	+ Ben + Taxes		4
<b>General &amp; Admin</b>					
Executive Oversight	0.2	\$ 100,000	\$ 50,000	\$	10,000
General Manager	1	\$ 75,000	\$ 37,500	\$	37,500
Marketing and Public Relations	0.5	\$ 50,000	\$ 25,000	\$	12,500
Finance and Accounting	0.5	\$ 50,000	\$ 25,000	\$	12,500
Human Resources	0.25	\$ 40,000	\$ 20,000	\$	5,000
General Administrative	0.5	\$ 40,000	\$ 20,000	\$	10,000
<b>Operations</b>					
Operations Management	0.5	\$ 55,000	\$ 27,500	\$	13,750
IT	0.5	\$ 55,000	\$ 27,500	\$	13,750
Station Techs	0.5	\$ 50,000	\$ 25,000	\$	12,500
In-Shop Bike Maintenance	1	\$ 45,000	\$ 22,500	\$	22,500
<b>Direct Costs</b>					
<b>Operations Facilities and Equipment</b>					
Facility/Warehouse Set up / Rent	\$ 10 psf	4000 sf		\$	10,000
Furnishings				\$	500
Utilities				\$	100
Supplies and Equipment				\$	20,000
Redistribution Vehicles	\$ 1,200 per month	1 vehicles		\$	2,400
All-Purpose Maintenance Vehicles	\$ 800 per month	1 vehicles		\$	1,600
Fuel				\$	400
<b>IT and Communications</b>					
Web Site Design and Programming				\$	15,000
System Software Setup				\$	15,000
Employee Communications	\$ 60 per month per €	2,000 per employee		\$	8,981
<b>Bike Share Launch and Upkeep Materials</b>					
Marketing and Promotional Materials				\$	80,000
Map Design				\$	10,000
<b>Other Administrative Direct Costs</b>					
Legal				\$	10,000
Travel				\$	6,000
Insurance (launch period)				\$	50,000
<b>Total</b>				\$	<b>379,981</b>

## Calgary Bike Share Startup Costs

	Unit Cost	Units	Costs
19-dock, 10 bike solar station, including kiosk and platforms <sup>1</sup>	\$ 46,000	40	\$ 1,840,000
Site Planning and Permitting (per station)	\$ 2,000	40	\$ 80,000
Station Assembly (per station)	\$ 1,000	40	\$ 40,000
Station Deployment Vehicle Costs (per station)	\$ 750	40	\$ 30,000
Bike Assembly (per bike)	\$ 30	400	\$ 12,000
Map Production	\$ 35	40	\$ 1,400
Bike Spare Parts	\$ 50	400	\$ 20,000
Station Spare Parts	\$ 800	40	\$ 32,000
On-Street Bike Maintenance Vehicles	\$ 3,000	1	\$ 3,000
General System Startup Costs			\$ 379,981
<b>Total</b>			<b>\$ 2,438,381</b>
<i>Per Bike</i>			<i>\$ 6,096</i>
<i>Per Station</i>			<i>\$ 60,960</i>
<i>Per Docking Point</i>			<i>\$ 3,208</i>

<sup>1</sup> Includes bicycles



## Calgary Bike Share Operations Costs

### Employee Expenses

#### General & Admin

	Average Salary	Benefits + Taxes	# Postions	Cost
Corporate and Technical Support	\$ 75,000	\$ 37,500	0.5	\$ 56,250
General Manager	\$ 60,000	\$ 30,000	1	\$ 90,000
Marketing and Public Relations	\$ 45,000	\$ 22,500	0.5	\$ 33,750
Finance and Accounting	\$ 45,000	\$ 22,500	0.5	\$ 33,750
General Administrative	\$ 45,000	\$ 22,500	0.5	\$ 33,750

#### Operations

Operations Manager	\$ 50,000	\$ 25,000	1	\$ 75,000
Shift Managers	\$ 45,000	\$ 22,500	1	\$ 67,500
Rebalancers	\$ 30,000	\$ 7,500	4	\$ 150,000
In-Shop Bike Maintenance	\$ 35,000	\$ 8,750	1	\$ 43,750
On-Street Bike Maintenance	\$ 30,000	\$ 7,500	1	\$ 37,500

### Direct Costs

#### Operations Facilities and Equipment

Facility/Warehouse Set up / Rent	\$ 10 psf	Square feet	3,000	\$ 30,000
Furnishings		% of rent	5%	\$ 1,500
Utilities		% of rent	20%	\$ 6,000
Supplies and Equipment	Per station \$ 200	Total Stations	40	\$ 8,000
Redistribution Vehicles	\$ 1,200 per month	# Vehicles	1	\$ 14,400
All-Purpose Maintenance Vehicles	\$ 800 per month	# Vehicles	1	\$ 9,600
Station Relocation Vehicle Costs	\$ 750 per station	# Relocations	5	\$ 3,750
Fuel		% Vehicle cost	10%	\$ 2,400
Vehicle Maintenance		% Vehicle cost	15%	\$ 3,600

#### IT, Communications and Customer Service

Software License, Support, Upgrades	\$ 108 per month per station	Total Stations	40	\$ 52,000
Station Communications	\$ 35 per month per station	Total Stations	40	\$ 16,800
Employee Communications	\$ 60 per month per employee	Employees	11	\$ 7,920
Customer Service	\$ 2,000 per year per station		40	\$ 80,000

#### Bike Share Launch and Upkeep Materials

Marketing and Promotional Materials				\$ 60,000
Employee Uniforms	\$ 200 per employee per year	Employees	11	\$ 2,200
Bike Spare Parts	\$ 20 per bike per year		400	\$ 8,000
Station Spare Parts	\$ 300 per station per year		40	\$ 12,000
Annual Bike Replacement	3% annual fleet replacement		400	\$ 13,500

#### Other Administrative Direct Costs

Insurance (Liability, Equipment, Auto, Workers Comp)				\$ 30,000
Legal				\$ 5,000
Travel				\$ 5,000

#### Vendor Management Fee (10%)

10% annual costs				\$ 99,292
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#### Total

				\$ 1,092,212
Per Bike				\$ 2,731
Per Station				\$ 27,305
Per Docking Point				\$ 1,437

#### Notes:

It is assumed no local or provincial sales taxes are applicable.

## **Appendix C**

### **Bike Share Demand Model**

# Alta Bike Share Demand Model

19<sup>th</sup> September 2011

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Bike share system planning generally consists of three stages: defining the system area, size, and phasing strategy; estimating likely user demands that can be used to forecast revenue and other performance targets; and determining the location and placement of bike share stations, bikes, and docks. To date, North American bike share systems have had to rely on international practices to provide broad planning guidelines for system development. The success of a number of North American systems means that there is now a base of information from which to establish a more formalized planning process based on actual usage, membership, and revenue figures. This report identifies the development of planning tools in each of these areas that have been used to develop the proposed King County Bike Share system.

## Demand Forecasting

Variables traditionally thought to explain bike share station demands were explored through a regression analysis of October 2010 data collected from Capital Bike Share operations in Washington DC and from the BIXI system in Montreal. Equations were developed from this analysis and were used to predict monthly station demands.

Monthly data was used to remove the variation that can occur between days and weeks and the resulting predictions can be expanded or contracted to represent daily, weekly, or annual demands using profiles developed from operating bike share systems (this study uses profiles developed from the BIXI system in Montreal as it is the only North American system to have been operating long enough to develop annual profiles). October was chosen as a month where all systems were operating at their highest supply of stations and bikes and represents a balanced mix of annual and casual users.

Variables considered in the analysis were collected for a 300m radius area around each station. This distance represents a walk time of less than 5 minutes from a station and is thought to represent the boundary between spontaneous trip making and deciding to use another mode or not make a trip at all.

### 4.1 Regression Analysis

Regression analyses were conducted on data from Capital Bike Share in Washington DC and BIXI in Montreal to verify the variables that most influence monthly bike share station demands. From this, regression equations were developed for both cities that represent the range of expected demands.

Bike share stations and their “influence areas” (i.e. 300m around each station) are illustrated on **Figures 1 and 2** for Montreal and Washington DC respectively. Stations in Montreal are generally much closer together than in Washington DC and as such the “effective influence area” is smaller (e.g. if stations are spaced 300m apart, the equation will only consider variables within the non-overlapping area 150m around the station). In Washington DC, where there is less station overlap, the demand equations will use more of the influence area (in many cases the entire 300m) and therefore represents the higher end of the demand range.

The resulting equations found that monthly demand was best represented as a function of population aged between 20 – 39 (number of persons), the number of jobs, the number and type of transit stops, and the distance of the station from the center of the system.

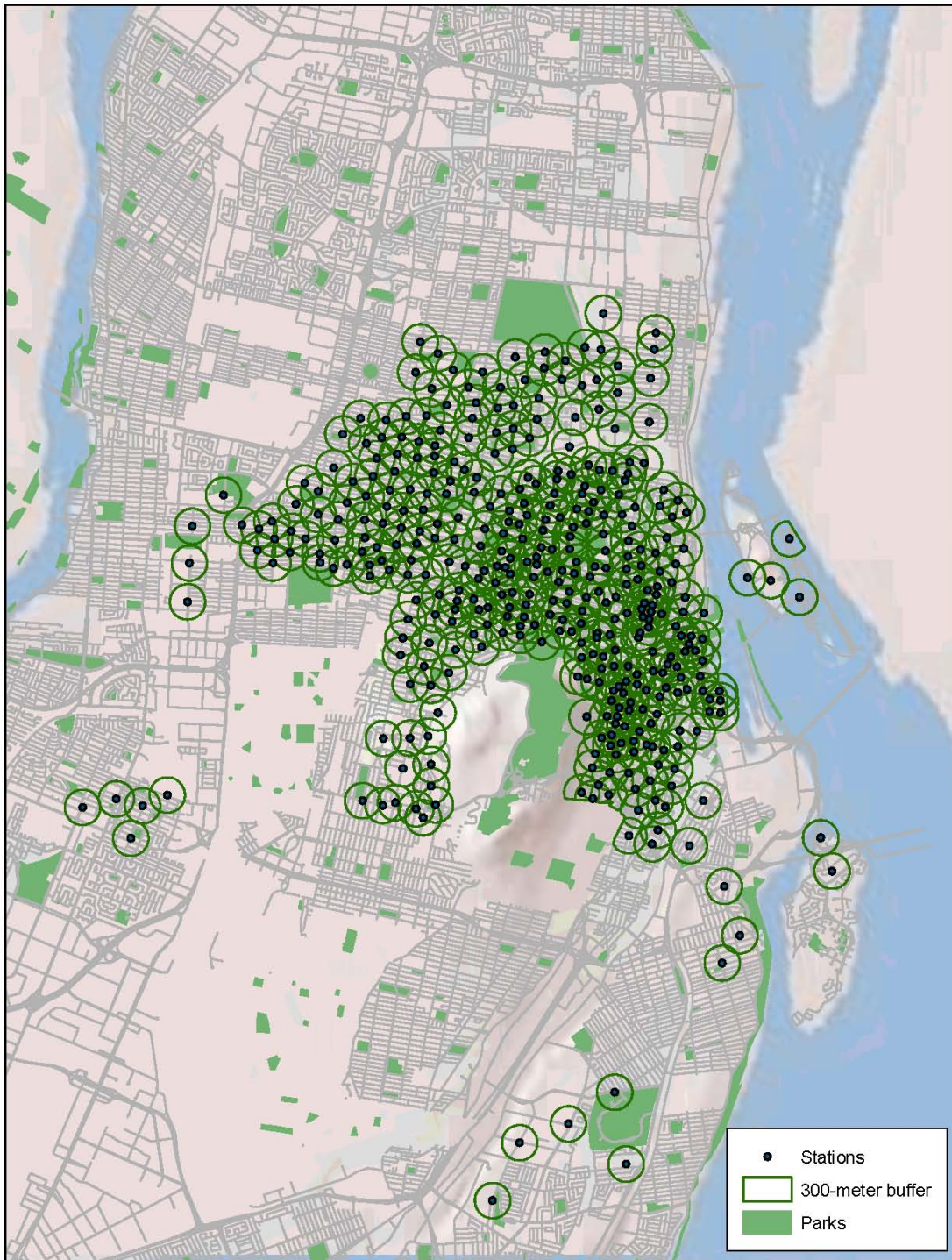


Figure 1: BIXI (Montreal) Station Locations and Influence Areas.



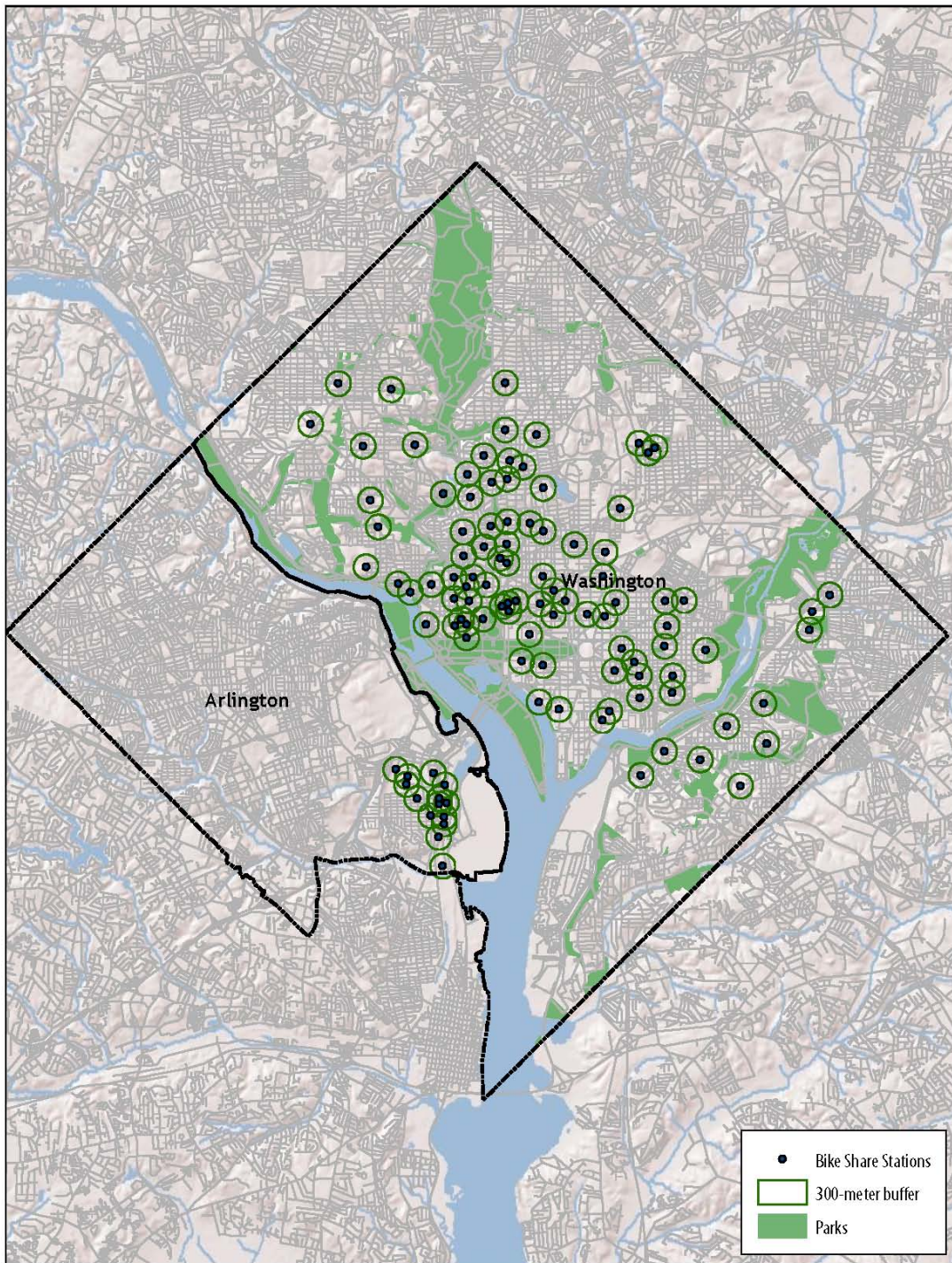


Figure 2: Capital Bike Share (Washington DC) Station Locations and Influence Areas.



## **Appendix D**

### **Membership and Usage Assumptions**

## Calgary Bike Share - Annual (Unfactored) Demand Forecast

Number of bikes: 400  
Number of stations: 40

Month	Profile of Monthly Use	Monthly Demand
January	0.0%	0
February	0.0%	0
March	0.0%	0
April	2.2%	6,207
May	14.4%	40,344
June	16.6%	46,551
July	17.7%	49,654
August	17.7%	49,654
September	14.9%	41,896
October	11.0%	31,034
November	5.5%	15,517
December	0.0%	0

**TOTAL ANNUAL TRIPS**

**280,858**

**Trips Per Bike/Day**

**2.88**

## Calgary Bike Share - Revenue Estimate

	Rider Type		Ramp-Up Period		
Month	Casual	Member	Year 1	Year 2	Year 3
January	10%	90%	85%	105%	125%
February	15%	85%	85%	105%	125%
March	20%	80%	85%	105%	125%
April	25%	75%	90%	110%	130%
May	25%	75%	90%	110%	130%
June	30%	70%	90%	110%	130%
July	30%	70%	95%	115%	135%
August	30%	70%	95%	115%	135%
September	25%	75%	95%	115%	135%
October	25%	75%	100%	120%	140%
November	20%	80%	100%	120%	140%
December	10%	90%	100%	120%	140%

\* Assumes 5% per month growth in first year, 4% per month second year, and 3% per month third year

Trips / Day / Casual Member  
Trips / Month / Annual Member

4	Capital Bike Share (CaBi)
7.7	Capital Bike Share (CaBi)

Duration	Casual	Members	Casual Fee Structure	Member Fee Structure
0-30 mins	59.33%	96.62%	\$ -	\$ -
30-60 mins	17.48%	2.66%	\$ 1.50	\$ 1.50
60-90 mins	8.97%	0.33%	\$ 4.50	\$ 4.50
90-120 mins	5.74%	0.13%	\$ 10.50	\$ 10.50
120-150 mins	2.56%	0.05%	\$ 16.50	\$ 16.50
150-180 mins	2.56%	0.05%	\$ 22.50	\$ 22.50
180-210 mins	0.85%	0.02%	\$ 28.50	\$ 28.50
210-240 mins	0.85%	0.02%	\$ 34.50	\$ 34.50
240-270 mins	0.35%	0.01%	\$ 40.50	\$ 40.50
270-300 mins	0.35%	0.01%	\$ 46.50	\$ 46.50
300-330 mins	0.46%	0.05%	\$ 52.50	\$ 52.50
330-360 mins	0.46%	0.05%	\$ 58.50	\$ 58.50
>360 mins	0.07%	0.01%	\$ 76.50	\$ 76.50

Capital Bikeshare (2011)

Assumes Capital Bikeshare pricing for comparison purposes

Subscription Fees

\$ 5.00	\$ 85.00
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Assumes Capital Bikeshare pricing for comparison purposes

Calgary Bike Share - Revenue Estimate

Month	Casual Trips		
	Year 1	Year 2	Year 3
January	0	0	0
February	0	0	0
March	0	0	0
April	1,000	2,000	2,000
May	9,000	11,000	13,000
June	13,000	15,000	18,000
July	14,000	17,000	20,000
August	14,000	17,000	20,000
September	10,000	12,000	14,000
October	8,000	9,000	11,000
November	3,000	4,000	4,000
December	0	0	0
Total	72,000	87,000	102,000

Year 1	Member Trips	
	Year 2	Year 3
0	0	0
0	0	0
0	0	0
4,000	5,000	6,000
27,000	33,000	39,000
29,000	36,000	42,000
33,000	40,000	47,000
33,000	40,000	47,000
30,000	36,000	42,000
23,000	28,000	33,000
12,000	15,000	17,000
0	0	0
191,000	233,000	273,000

Year 1	Total Trips	
	Year 2	Year 3
0	0	0
0	0	0
0	0	0
5,000	7,000	8,000
36,000	44,000	52,000
42,000	51,000	60,000
47,000	57,000	67,000
47,000	57,000	67,000
40,000	48,000	56,000
31,000	37,000	44,000
15,000	19,000	21,000
0	0	0
263,000	320,000	375,000

Duration	Casual Trips		
	Year 1	Year 2	Year 3
0-30 mins	42718	51617	60517
30-60 mins	12586	15208	17830
60-90 mins	6458	7804	9149
90-120 mins	4133	4994	5855
120-150 mins	1840	2223	2606
150-180 mins	1840	2223	2606
180-210 mins	608	735	862
210-240 mins	608	735	862
240-270 mins	248	300	352
270-300 mins	248	300	352
300-330 mins	331	400	469
330-360 mins	331	400	469
>360 mins	50	61	71
	72000	87000	102000

Year 1	Member Trips	
	Year 2	Year 3
184544	225125	263773
5081	6198	7262
630	769	901
248	303	355
86	105	123
86	105	123
38	47	55
38	47	55
19	23	27
19	23	27
96	117	137
96	117	137
19	23	27
191000	233000	273000

Year 1	Total Trips	
	Year 2	Year 3
227262	276742	324289
17666	21405	25091
7089	8573	10050
4381	5297	6210
1926	2328	2729
1926	2328	2729
647	782	917
647	782	917
268	323	379
268	323	379
427	517	606
427	517	606
70	84	99
263000	320000	375000

Membership Numbers	Year 1	Year 2	Year3
Casual Members	18,000	21,750	25,500
Annual Members	2,987	3,636	4,286

Trip Numbers	Year 1	Year 2	Year3
Casual Trips	72,000	87,000	102,000
Annual Member Trips	191,000	233,000	273,000
Total	263,000	320,000	375,000
Trips / Day	1,078	1,311	1,537
Trips / Bike / Day	2.69	3.28	3.84

User-Generated Revenue Summary	Year 1	Year 2	Year3
Annual Memberships	\$ 255,000	\$ 310,000	\$ 365,000
Casual Subscriptions	\$ 90,000	\$ 110,000	\$ 130,000
Annual Member Trip Fees	\$ 35,000	\$ 40,000	\$ 45,000
Casual Subscriber Trip Fees	\$ 265,000	\$ 320,000	\$ 375,000
TOTAL	\$ 645,000	\$ 780,000	\$ 915,000

27%  
73%

## **Appendix E**

### **Calculation of Carbon Offsets from Bike Sharing**

Table E.1: Estimate of Annual Carbon Offset Funding from Calgary Bike Share

	Initial Launch (Phase 1A)
Expected annual bike share trips	375,000 (Year 3)
Percentage of bike share trips previously taken by automobile <sup>1</sup>	25%
<i>Automobile trips saved by bike sharing</i>	93,750
Average bike share trip distance <sup>2</sup>	3.2 kilometres
<i>Vehicle kilometres travelled saved by bike sharing</i>	300,000
CO <sub>2</sub> (or equivalents) emissions per kilometre of automobile travel <sup>3</sup>	0.5 kilograms
<i>CO<sub>2</sub> (or equivalents) emissions saved by bike sharing</i>	150,000 kilograms 150 metric tons
Price to offset 1 metric ton of CO <sub>2</sub> (or equivalents)	\$10 - \$100 / ton <sup>4</sup>
<b>Cost of Carbon Offsetting</b>	<b>\$1,500 - \$15,000</b>

<sup>1</sup> Based on results of surveys in Minneapolis and Washington DC in 2010 that showed approximately 20% and 28% percent of bike share trips, respectively, were previously made by automobile.

<sup>2</sup> Based on average trip distance (station – station) recorded in Denver (2010). Note: the average trip distance (station – station) recorded in Washington DC was 1.9 kilometres (2010).

<sup>3</sup> Sightline Institute: <http://www.sightline.org/maps/charts/climate-CO2byMode>.

<sup>4</sup> Range based on: [http://www.ecobusinesslinks.com/carbon\\_offset\\_wind\\_credits\\_carbon\\_reduction.htm](http://www.ecobusinesslinks.com/carbon_offset_wind_credits_carbon_reduction.htm) and <http://blogs.reuters.com/felix-salmon/2010/12/02/how-much-carbon-does-bike-sharing-save/>