Functional Analysis for
Hamilton Bike Share Transit System

Drafted in Partnership with:
City of Hamilton and Green Venture

Peter Topalovic – Final Version, January 2013
Matthew Sweet – Final Integrated Version, September 2012
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EXECUTIVE SUMMARY

City of Hamilton staff, community partners and interested stakeholders have been evaluating the implementation of a bike share transit program to feed the A-Line and B-Line transit corridors, encourage the use of sustainable modes of transportation, decrease residen dependence on single-occupancy vehicles, increase physical activity in daily commuting amongst households and foster a culture of cycling in the City. The city conducted a feasibility study and coordinated an information session and bike share expo in August 2010 to identify and assess a variety of bike share program models, and to determine best suited models for Hamilton.

It was determined that the best suited model for a bike share prog Generation. This model includes a number of bikes housed at strategically placed stations, which are fully integrated with other transportation modes such as rapid transit, car share and conventional transit. Planning has begun for a 35 station 300 bicycle system for the City of Hamilton which will focus on providing a new and convenient method of accessing higher order transit modes along the B-Line and A-Line corridors, including GO Transit nodes. Bike sharing systems work best under a specific set of conditions and are typically used by a specific target demographic. By isolating those areas of the city where population demographics best match those that are identified as supporting bike share programs in other cities, and by identifying neighbourhoods within those areas in which opportunities to expand transit services exists, a set of 35 recommended station locations emerges.

Bike Sharing is quickly emerging as a desirable mode of travel that integrates seamlessly with transit and eliminates barriers to using transit such as the first and last mile of the commute. It offers a fast and convenient way to get to oneôs centres in North America, Europe and Asia have set up systems including Toronto, Montreal and New York City. However, in recent years a number of medium-sized urban centres such as Ottawa, Minneapolis, Chattanooga and Madison, Wisconsin, have set up moderately sized systems with much success.

City of Hamilton Transportation division staff, wishing to build on the success of other medium sized urban centres, approached Green Venture, Hamilton CarShare, City of Toronto staff who

manage the Toronto Bixi project, Mohawk College students and McMaster University students to develop a functional analysis which outlines the procurement, start-up, and operation a bike share program in Hamilton.

The anticipated target area is located within Hamiltonôs downtown core. This area to west boasts a total population of over 53,000 residents, with an additional 30,000 staff and students at McMaster University[1] and 21,000 staff and students at Mohawk College. It includes many commercial businesses and also attracts visitors and tourists. The Mohawk College Fennel Avenue Campus and McMaster University West Hamilton campus have a total student population of nearly 30,000 students.

This plan proposes that 300 bikes and 35 stations are purchased. The main factor affecting profitability of the bike share is the number of people who purchase subscriptions. In its initial stages, the program must build reserves that will be needed in future years for bicycle and equipment replacement due to age and potential expansion. This report will illustrate the sensitivity of the business case to the number of subscriptions sold and will propose a series of measures to guarantee revenues.

This functional analysis identifies the financial case for the City of Hamilton, and provides the necessary information for city officials to make an informed decision regarding the risk of committing funds to support this endeavour.

[1] Census data used to determine populations does not include McMaster students that rent their properties.

TABLE OF CONTENTS

BACKGROUND, SITUATIO NAL ANALYSIS AND SERVICES

What is a bike share system?

A public bike share system consists of a number of shared bicycles that can be picked up and dropped off at various stations in a city. The bicycles are available for everyone to use on a short-term basis (usually 30 minutes or less) for a small fee. It is typically owned by the municipality, and operated by the municipal government or by a private company (either for-profit or non-profit) on behalf of the municipal government. Participation is open to the public through paid membership. Memberships, whose term can vary from daily to yearly, must be purchased before using the bicycles. People have many reasons for using public bicycles, ranging from commuting and shopping to recreation and tourism. Other cities with bike share systems have noted a marked increase in bicycle use (both public and private bikes) after a bike share system is introduced. This is due to the high visibility of the shared bikes leading to an increase in the bike culture in the city, which in turn is good for the health of the community.

The organization running the bike share system would be responsible for all aspects of the operation. This would include having employees to oversee the business, as well as technicians to maintain and repair the bikes. Bicycles often need to be re-distributed among the stations with a truck and trailer to account for migration of bicycles from some stations to others at certain times of the day. Some bike share organizations remove the bikes from the streets and put them into storage during the winter, while others leave them out all year round, which is what is proposed for the Hamilton area, as winters are mild.

Industry Overview

Comparison of other Bike Shares around the world

In 2008, there were just over 200 bike share systems around the world. As of 2010, there were more than 350 bike share systems operating worldwide.[2] Paris, Lyon, Barcelona, Brussels, London, Minneapolis, Miami Beach, Washington DC, New York City and Melbourne, Australia

[2] Ref: Peter Midgley, Bicycle-Sharing Schemes: Enhancing Sustainable Mobility In Urban Areas, United Nations Department Of Economic And Social Affairs, Commission on Sustainable Development, Nineteenth Session, New York, 2-13 May 2011

all have notable (and large) bike share systems. Within Canada, there are currently 3 bike share systems: Montreal (established in 2009 with 5000 BIXI bikes), Toronto (established in 2011 with 1000 BIXI bikes), and Ottawa (established in 2011 with 100 BIXI bikes).

As of 2004, no publicly-owned and operated smart bike sharing program anywhere in the world turned a profit in terms of revenues exceeding annual operating costs[3]; however, by 2012, with additional federal funding in the United States and the covering of capital costs in most new systems, including the system in Ottawa, most new systems break even. The issue with systems in 2004 were that most had to use operating costs to repay loans and interests. When capital costs are covered through grants and other programs, the loan interest payments can be avoided. This explains why more recently, London (UK), Miami Beach, and Minneapolis have all had first year revenues that exceeded their first year operating costs. This does not account for capital costs or costs associated with the planning and installation of the system.[4] Capital and start-up costs are above and beyond the annual operating costs, and present a significant barrier to implementation.

The city of Lyon, France, was considered less than friendly to bicycles in the past. Since the launch of the public bike sharing program there in 2005, bicycle trips are up 500%, a quarter of which are taken on the shared bikes. The bike sharing system is credited with raising the profile of cycling in the city, which has led to a snowball effect and dramatic increases in bicycle use. [5]

Let us consider the best attributes of the successful European and North American systems and adapt them to climate and demographics in Ottawa. The key elements of the most successful bike share systems include the following:

- **A robust bike**: Shared bikes are made for use on urban streets by all kinds of people. Bicycles must be sturdy, easy to ride and stop, and have lights and cargo carriers.
- **Easy access**: The system must be fast and easy to use for both annual subscribers and casual users such as tourists.
- **Online registration**: Subscribers sign up online. Memberships could be linked to bike shares in other cities.

[3] Ref: DeMaio, Paul, and Gifford, Jonathan, *Will Smart Bikes Succeed as Public Transportation in the United States*, Journal of Public Transportation, Vol. 7, No. 2, (2004) p. 8

[4] Ref: http://www.straight.com/article-398920/vancouver/grab-helmet-time-public-bike-share

[5] Ref: Bike Sharing Guide ï Transport Canada, 2009

- **Availability where/when needed**: A blanket of self-serve bike stations throughout the area allow people to conveniently take and return bikes where they live, work, eat, shop, go to school and access public transit. Maps at stations and online show availability at all times. Crews will maintain and re-distribute bicycles to where they are needed.
- **Modular and self-contained bicycle stations**: Solar powered, easily re-located stations are preferable to allow future flexibility and easy removal in winter months if desired.
- **Usage fees designed to encourage rapid turnover**: Fees escalate with time to ensure bikes are returned to service quickly and encourage usage for short-term trips.

Situational Analysis

There are a number of trends that could affect the desire of people to participate in a bike share system. These include: rising energy costs, convenience, reduction of first and last mile commuting barriers to transit use, resource costs, increasing traffic congestion and resulting pollution, increasing environmental awareness, climate change, and physical activity/health consciousness.

Energy costs have risen steadily for many years in Canada, and are projected to rise more rapidly in the future. Energy costs are projected to rise much faster than the rate of inflation. From August 2010 to August 2011, gasoline prices rose over 30%. With increasing environmental awareness, people are becoming more aware of traffic congestion and the resulting pollution, along with the ill effects this has on overall health and climate change. These impacts are all motivating people to find alternate modes of transportation to the automobile.

Although travel distance by mode varies from country to country and city to city, most people are willing to walk up to 10 minutes. Cycling distances generally fall within the 1km to 5km range. Bike sharing can therefore fill an important niche in the urban transportation system in terms of trip length and costs as shown in Figure 1: Trip Cost vs. Length. This is especially true for trips that improve access to transit that are just over the walkable range to a transit stop. A bike share system can overcome barriers to transit use by reducing commute times from a residence to a transit stop or station, making transit a more appealing mode of transportation.

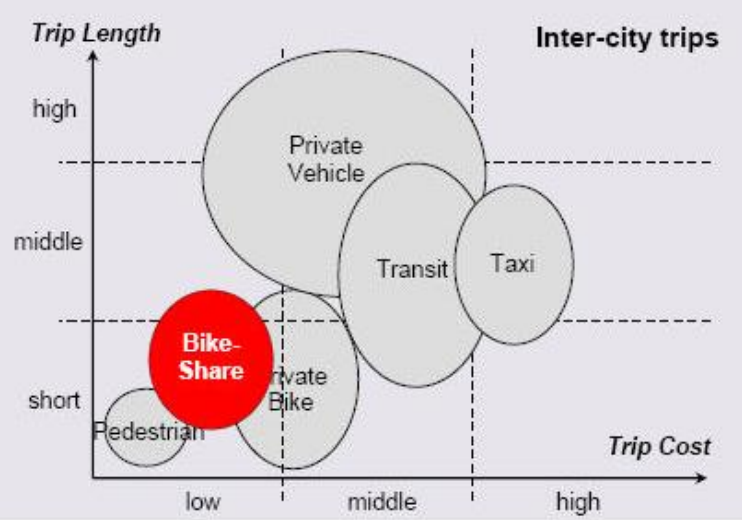

Figure 1 - Trip Cost vs. Length

Market Study

Before implementing a bike share program, market research must be done to determine whether there is sufficient demand. A survey of residents and tourists, conducted by telephone, via the internet, talking to people in the field, or a combination thereof, would provide invaluable data to measure the level of support for a bike share system and willingness to pay for this type of service. A market study investigates the following:

- number of short trips and the mode of transportation used
- awareness of the public bicycle concept
- interest in using public bicycles, if they were available
- amount people are willing to pay to use public bicycles, if they were available
- support for dedicating existing road and parking space for public bicycles
- support for necessary methods (including public funding and advertising) to help fund public bicycles.

A survey with these types of questions was conducted in the Greater Vancouver area in 2008.[6] This questionnaire and results could be used as a starting point to develop a similar survey in Hamilton.

The City of Hamilton conducted an online survey of public opinion relating to a possible bike share in Hamilton in 2010. The results can be found in *Bike Share Feasibility Report, Dec 20,*

[6] Ref: Translink (2008). *Public Bicycle System Market Research January 17- 23, 2008.* Public document (http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/435700/Public_Bicycle_System_Report_Feb08.pdf).

2010 by J. Bauman et al. The authors state that the results of the online survey are not statistically significant due to certain biases in the sample who responded to the online survey. The online survey was promoted by email, Listserves, websites and Facebook. The sample reached through these promotions, who actually took the time to complete the survey, come from a demographic that is more likely to use a bike share than the general population. Another survey was conducted in the fall of 2011 in the projected operating area. While small, this data, combined with previous data collected, indicates preliminary interest in bike sharing.

There is enough demographic data to support the operation of a public bike share system in Hamilton; however, there is an opportunity to augment the data collected with additional data gathered by a third party, if more research is requested. Unfortunately, due to the relatively new concept of bike sharing, it is difficult to get a valid set of un-biased data through market analysis, and results may not be conclusive. Municipal representatives in Toronto and Montreal caution that since bike sharing is not a well understood concept, a phone survey of the general public may not yield significant results. A strategy used in Toronto was to hold a bike share system membership drive to gauge support for the system before moving forward with implementation.[7] It was decided that using StatsCan and TTS (Transportation Tomorrow Survey) data would be sufficient in predicting usage. This usage is predictable provided that a minimum of 35 stations and 300 bikes are used, according to Toronto and Montreal representatives.

Beyond determining the overall feasibility of a b
payò data from twill help determine the nature of the business model that could be used if the system were implemented. The data on general interest and willingness to pay will also help determine the service area and quantify the target audience for the system.

Barriers to Entry

As with most business endeavours, providing bike share services has barriers to entry. However, steps can be taken to mitigate or minimize the impacts of these barriers.

Barriers to Providing Bike Share Services

- Competition
- Increased liability risk to the organization

[7] *Ref: City of Toront0 (2010).* Proposed Public Bicycle Program (PW32.7). *Public document (http://www.toronto.ca/legdocs/mmis/2010/pw/bgrd/backgroundfile-28853.pdf).*

- Cash flow
- Securing initial capital costs and ongoing sponsorships
- Community and political support
- Perception of safety

Competition

A bike share program in Hamilton will not face any competition at present. There are currently no bike share programs in Hamilton and it is currently not easy to rent a bike in the City, although some bike shops do rent a small fleet of bikes In other cities, bike share programs have led to increases in bicycle usage overall[8], which will be a benefit to the local bike shops. Studies have shown shared bikes may run parallel to transit routes, but they have not been shown to reduce the level of people who purchase transit passes or use transit[9]. In Toronto and Montreal and other North American systems, the percentage of bike share usage in the target area mimics the percentage of transit ridership city wide.

Increased Risk to Organization

Getting involved with any new venture presents additional inherent risks to the organization operating the bike share. These risks include: customer interactions, new health and safety considerations (accidents, collisions, etc.) to name a few. Insurance will likely be the biggest concern and is projected to cost somewhere on the order of $30,000 to $50,000 per year.

Cash Flow

Memberships are paid up-front, providing some cash flow. It would be expected that this would be more heavily weighted to the spring months when people are more likely to purchase their yearly memberships. Weekly and one-day memberships will be used by tourists and casual users which will provide further cash flow throughout the cycling season. Advertising on bikes and bike stations will also provide a monthly cash flow during the bike season. There will likely be very little cash flow during the off-season.

Another method to raise funds annually is to enter into bulk yearly pass purchases with institutional partners and corporate partners including McMaster University and Mohawk College. These institutions currently have bulk transit pass programs and could easily support

[8] Midgley, P, Bicycle-Sharing Schemes: Enhancing Sustainable Mobility in Urban Areas, United Nations Department of Economic and Social Affairs, May 2011.

incremental increases in fees in the respective student unions as these institutions saw value in a bike transit system for students.

Securing initial capital costs and ongoing sponsorships

Public funding would be required in order to pay all of the upfront capital costs incurred to start the bike share program. Incurring debt to pay the capital costs is not acceptable as other bike share systems have shown that the income stream is not sufficient to service such a large debt.

Taking into account all of the sources of income, the projected bike share program in Hamilton will almost certainly run at a deficit for the first few years and could have a small surplus in the later years if residents use the system at rates projected in other cities with bike shares. See the Operating Budgets section for more detailed information on a projected 12 year cash flow.

Description of Services

It is recommended that the preferred model for the Hamilton community is a 4th Generation Bike Share system. This decision was based on several key considerations.

- 4th generation systems, such as BIXI, have proven successful in several different cities around the world, providing nearly instant returns and operational surpluses
- 4th generation systems minimize the risks of theft and vandalism which are prevalent in previous generations, by including GPS monitoring of all bicycles and requiring credit card access to the system
- Public Bike System Company, B-Cycle and other companies are prepared, as part of the cost of purchasing and installing a system, to work with the City of Hamilton in identifying the best layout of stations, and provide training or services for full operation of the system.
- 4th generation systems represent the most modern, flexible and user friendly bike share available and has the best chance of being successful amongst the general public in Hamilton[10]
- A modern bike share system with fixed stations located at transit stops can help feed the transit system and make it quicker and more convenient to access rapid transit stations.

[9] FourSquare Integrated Transportation Planning, Arlington County TDP: Capital Bikeshare ïService and System Evaluation, 2012

[10] Ref: J. Bauman et al, Bike Share Feasibility Report, Dec 20, 2010.

Fully Automated

A 4th generation bike share system is fully automated. The user must already have a membership or purchase a day use pass at a bike share station using a credit card. When a membership is purchased, a damage deposit is put on the credit card. When a bike is checked out, the bicycle is tracked to the user so that any damages can be assessed to the last user of the bike.

Easy to Use

Shared bicycles are designed to be easy to use, adaptable to users of different sizes, mechanically reliable, resistant to theft or vandalism and distinctive in appearance.

Well Designed and Sturdy

Bike sharing systems use sturdy bikes that are designed to be used between 10 and 15 times a day in all weather conditions. They typically have the following features:

A) a handlebar mounted bag rack or a basket
B) an adjustable seat
C) a sturdy frame with no top tube
D) wide, air filled tires
E) gears and brakes enclosed within the wheel hubs
F) front and rear lights powered by a generator in the front hub
G) an enclosed chain
H) mudguards and reflective strips on the wheels

They are typically equipped with a bell, kickstand, portable lock and some type of tracking mechanism. [11]

Discourage Theft

To discourage theft, bicycles typically have a single standardised design and a distinctive look in order to distinguish them from all other bicycles. In addition, to make them unattractive to

[11] Ref: Bike Sharing Guide ï Transport Canada, 2009

potential thieves, they are made using non-standard components ï wheels, tires, seat post, screws, bolts, and so on. As a result, the components are not interchangeable with regular, commercial bicycle parts. The drawback of using custom components is that they are likely to be more expensive than standard components, meaning that the initial cost of the bicycles and ongoing maintenance costs are higher.

Easily Integrated

Most bike share systems use fixed stations, which are permanently fastened to the ground and hard-wired into the local electrical and phone systems. Montreal, Toronto and Ottawa BIXI systems have introduced portable modular stations. Service terminals and the bicycle stands are mounted onto sets of rectangular platforms to form two types of modules: main modules having a service terminal and three bicycle docks and secondary modules having only bicycle docks. Each station requires one main module while the number of secondary modules can vary, depending on the required number of bicycle docks at the given location. As the stations are solar powered and wirelessly networked, they are completely self-contained and no wiring is required for installation. As a result, station installation consists merely of placing the modules in the desired location; there is no need for anchoring them to the ground. It is therefore time-, labour-, and cost-efficient. BIXI docking stations can be erected or disassembled in 20 minutes and they can be moved easily to respond to demand or t o p r o v i d e ñ m e g a ò d o c k i n g s t a t i o n s f o r

The easy installation and removal of stations offers a number of advantages: the distribution of stations can be adapted on-the-fly to match actual demand, allowing the system to be rapidly optimized at little cost; stations can be placed at temporary locations for special events, such as festivals; and stations can be removed for the winter. However, this is only necessary in areas where snowfall is very heavy. Even in Montreal, a pilot to have stations remain active in winter months is underway.

A Healthier Community

The implementation of a bike share system will ultimately decrease the reliance on automobile use, as it presents them with an alternative transportation option. A decreased reliance on automobile transportation, which can be seen as an increase in active transportation, has been linked to several environmental and health benefits. These benefits being lower levels of harmful emissions due to a decline in automotive use, an increase in physical and cognitive capabilities through the encouragement of exercise, and a greater sense of social cohesion throughout the community. Through the combination of these benefits, health care costs can be expected to decrease as well. Consequently, the residents of the City of Hamilton in areas served by the bike share transit system could improve their health and quality of life. Figure 2 shows data from major cities in North American and European countries and demonstrates the correlation between sustainable mode split such as increased cycling and obesity. While there are many factors that influence obesity rates, it is interesting to note that many of the cities in the countries that have the lowest obesity rates are more cycling friendly and have some type of bike share transit system.[12]

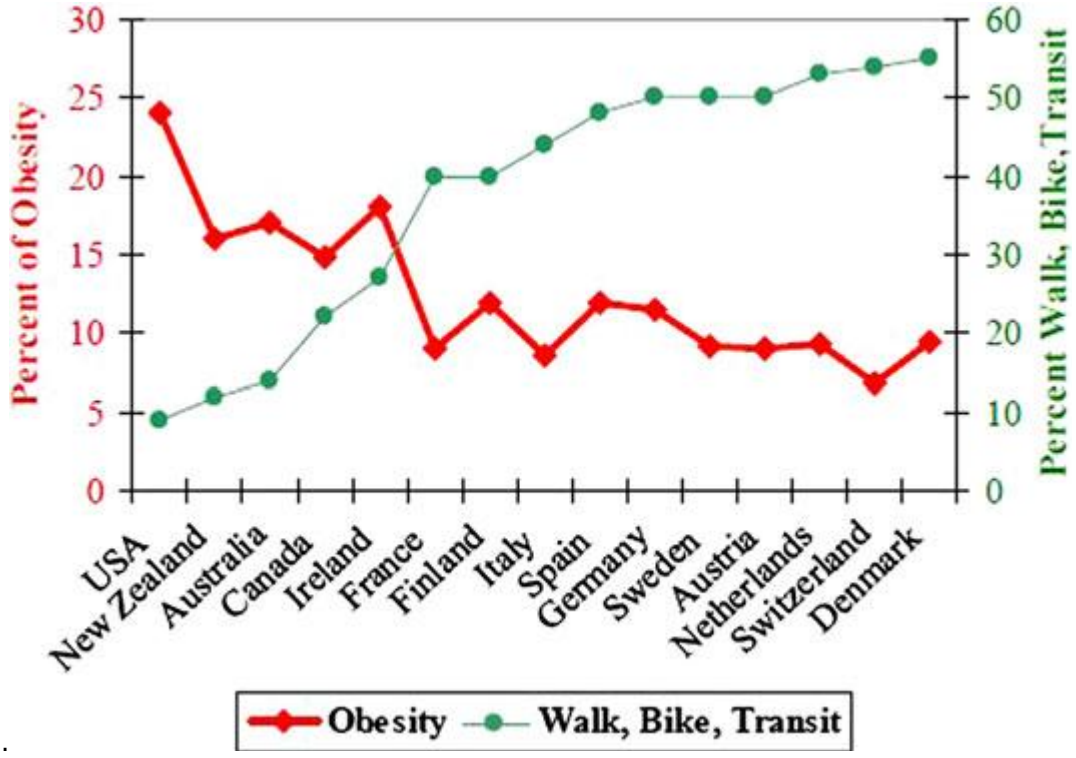

Figure 2 - Percent of Obesity compared to Percent of walking, cycling and transit

[12] Topalovic, P., Carter, J., Topalovic, M., Krantzberg, G. (2012). Light Rail Transit in Hamilton: Health, Environmental and Economic Impact Analysis. *Social Indicators Research, 108(2),* p.329-350.

Aligned with Provincial Public Transportation Vision

If the BIXI system is chosen, it may be an option to work with BIXI to allow Montreal and Toronto users to use the bicycles in Hamilton, and vice versa. An arrangement would need to be made as to how revenue sharing would be managed (e.g. a direct trade-off with an equal number of members sharing each way, so that no revenue sharing would be needed). This would need to be investigated further if this type of arrangement were to be put in place. This would also provide increased access to GO stations and regional transit, helping to meet the vision of Metrolinx, specifically Big Move 2: Maximize and Expand Active Transportation and Big Move 4: Create an Ambitious Transportation Demand Management Program.[13]

Station and Bike Placement

The placement of bike stations reflects a balancing between program visibility, aesthetics and traffic and pedestrian flow. In order for the program to be successful, bike stations must be easy to find and located in places that users want to go. At the same time, narrow or very busy sidewalks may mean that there is limited room for bike stations.

Paris' general implementation strategy is to place stations near transit stops and aside sticking to the average bike station density guidelines tested in the Lyon bike share of about 28 stations/square mile. This density, also referenced as one bike station every 300 meters or one bike station every 4-5 blocks, is the density needed to ensure that users can find a bicycle when they need one and return it easily when they are done.[14]

Bike station sizes would vary depending on the expected volume of traffic and proximity to other bike stations. Important factors include: population density, worker density, proximity to cultural or recreational attractions, and proximity to retail shopping opportunities. Importantly, bike share programs need to have more docking stations than bicycles (typically 40-50% more) to ensure that users can always find a place to leave their bicycle.

In general, 10 bicycles, parked at a bike station, can fit into one car parking space. Proposed general guidelines for the placement of bike stations are as follows. Bike stations should be placed:

[13] Ref: Metrolinx (2008), "The Big Move", http://www.metrolinx.com/thebigmove/Documents/bigmove/TheBigMove_020109.pdf
[14] Ref: Atelier Parisien d'Urbanisme (APUR), "Etude de Localization d

- ¶ In areas of high population and employment density
- ¶ Close to educational institutions
- ¶ On wide sidewalks or in the roadbed. Bike stations should not impede pedestrian or vehicular traffic.
- ¶ With enough frequency to ensure program visibility and use
- ¶ Along existing or proposed bike lanes whenever possible
- ¶ Near train/transit stations, major bus stops, car share locations
- ¶ Near major cultural and tourist attractions
- ¶ Adjacent to major public spaces and parks.

An analysis of potential bike share station locations in Hamilton has been completed. Refer to the section of this document entitled ñStation Locationò for more detailed information on the analysis used to determining the best locations for bike share stations.

Sidewalk Bike stations

Bike stations placed on the sidewalk should be placed in line with other forms of street furniture and trees. Where possible, limit the intrusion of the bike stations into pedestrian pathways. Wide sidewalks and wide roadway medians could provide options for small bike stations. Bike stations could also be placed along the frontage of municipal parking lots and city property, and on private property (for example on college or university campuses) in partnership with landowners. As with Paris, underutilized space under viaducts and elevated railroads and roadways could also be used for bike stations.

Roadbed Bike stations

Roadbed bike stations should be placed primarily on side roads, just off major roads to provide additional protection for riders and the bicycles themselves. Advertising panels on the bike stations could serve a double purpose, protecting on street bike stations from damage from cars while also drawing attention to the bike share program. Roadbed bike stations should be placed near to bike lanes and could potentially be placed in parking spaces adjacent to fire hydrants and serve a dual purpose of deterring parking in front of the hydrant.

Roadbed bike stations are beneficial because they do not impact pedestrian or vehicular traffic flows, and do not require costly modifications to existing storm drains and sewers. Roadbed bike stations would take the place of parking spaces, although the reduction in parking would be

minimal as it would be spread over a large area.

Bike stations in Existing Public Spaces

Bike stations should be placed directly adjacent to major public spaces, such as Gore Park, the Farmers Market, City Hall and perhaps Pier 8 and Bayfront Park. It is best to place them in areas where late night foot traffic is higher and be sure they have 24 hour access. Bike stations should be a priority in or alongside parks and plazas near transit.

Figure 3 - Examples of bike stations located on sidewalks, roadways and in public spaces [15]

[15] Ref: Bike Share Planning in Seattle and King County, Council Briefing, June 28, 2011

STATION LOCATION A NALYSIS

Bike sharing has become a popular method to fill gaps in urban transportation networks. It has the potential to supplement existing public transportation networks. Short distance trips, representing either standalone or final connection trips that would otherwise be taken on transit, can be shifted to bike share. The result is a relatively low cost, quickly implemented alternative transportation system that promotes active lifestyles and environmental stewardship.[16]

User surveys in Montreal show that the primary users of the Bixi system are young, educated professionals. Mean age of respondents was 35.9; median age was 33. 85% of respondents have a post-secondary education.

Several cities have conducted surveys of their bike share users to determine the primary users and uses of their system. Nice Ride in Minneapolis, MN contacted all of its annual membership holders after its first year of operation. The key findings of those user surveys are found below.

[16] Midgley, 2011

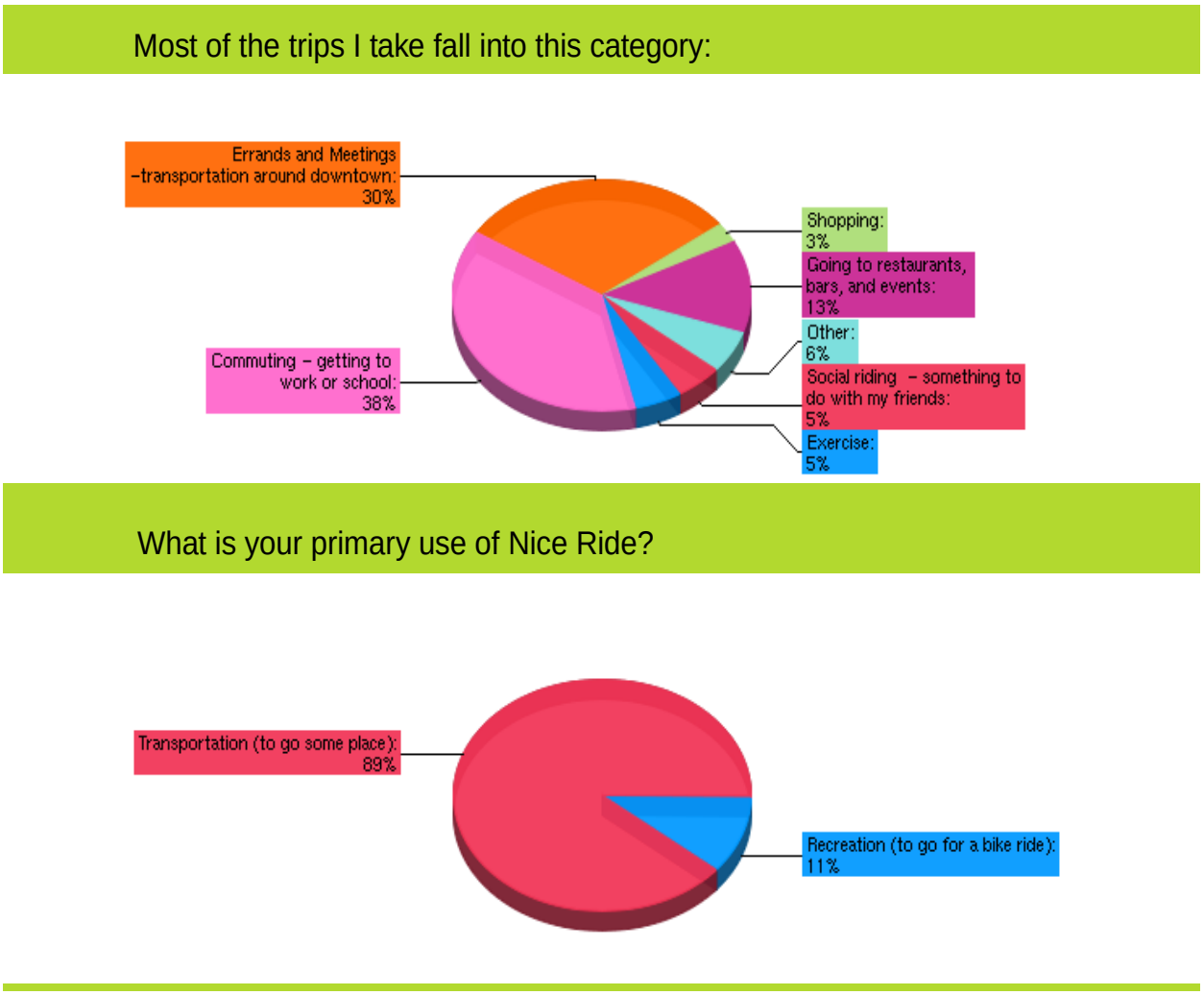

Figure 4 - Nice Ride Survey Results - Uses

Regular users of the Nice Ride system used the bicycles for a specific transportation purpose rather than for recreation. Work related trips account for over two-thirds of all trips.

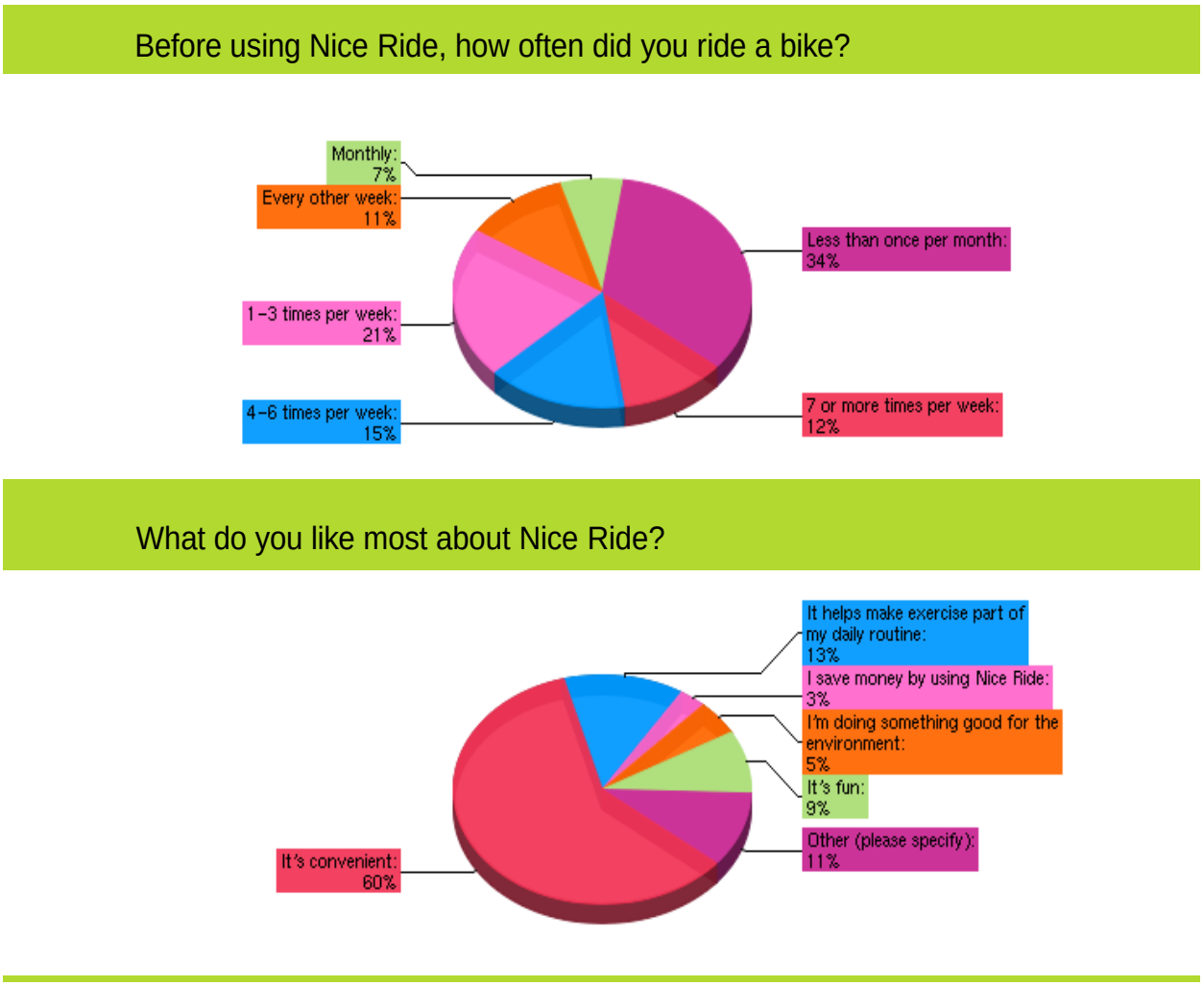

Figure 5 - Nice Ride Survey Results - Frequency and Preference

Nice Ride users are evenly split between regular cyclists and those who rarely rode before using the system. The clear benefit that drives users to the system is convenience.[17]

Bike share is proven to impact the travel patterns of users. Residents of Washington, D.C, home of Capital Bikeshare, report that bike share has changed their daily travel behaviour (45%) and led them to utilize transit more frequently (25%). Users of Capital Bikeshare report that the availability of the bike share system is a factor in their decision to drive less frequently (37%). Thus far, other cities have seen reasonable mode shift from vehicles after implementing a bike share system.

[17] Dossett, B, Nice Ride User Survey, Nice Ride Minnesota St. Paul, 2011.

Type of Trip Replaced	Bicing Barcelona	BIXI Montreal	V ® l i b ô	V ® l o ô v
Bus or Metro	**51%**	**33%**	**65%**	**50%**
Car or motorcycle	**10%**	**2%**	**8%**	**7%**
Taxi		**8%**	**5%**	
Walk	**26%**	**25%**	**20%**	**37%**
Bicycle	**6%**	**28%**		**4%**
New Trip		**4%**		**2%**

Table 1 ï Trip Type Replaced by Bike Share [18]

Several cities are beginning to pursue bike share with a focus on extending, complimenting or enhancing their public transportation services. Nice Ride in Minnesota reports a 10% increase in transit ridership since the introduction of the bike share system. Capital Bikeshare in Washington, D.Côs most frequently used trip avoi connect users to major points in the rapid transit network. In Barcelona, 37% of users of the Bicing system combine their bike share trip with another mode of transportation. This provides more evidence that bike share can be used effectively as an extension of existing public transportation systems. While the data in figure 6 shows a replacement of trips, it must be noted that this does not reflect trip chaining, where one part of the trip was replaced by a bike share trip, but the other leg of the trip still involves transit or other sustainable mode.

[18] Midgley, 2011

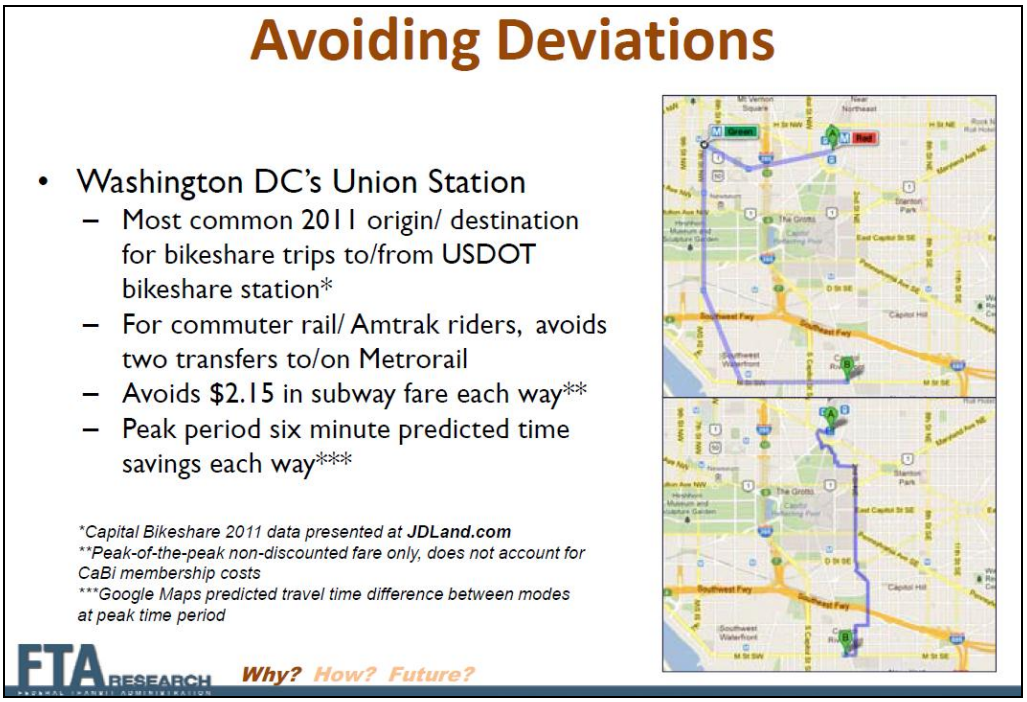

Figure 6 - Capital Bikeshare Most Common O/D Trip[19]

Many cities are also exploring ways to bike corridors and traffic control order transit stops in order to provide greater options to their users. Some systems have begun to explore the bpass their transit services and their bike share systems (Buck, 2012).

All pictures courtesy of godcgo.com

Figure 7 - Capital Bikeshare Co-branding

Rationale for Data Collected

The following sets of data were collected based on the best practices and experience of other bike share systems worldwide. This data attempts to identify the areas of Hamilton in which people, who are most likely to use a bike share might live, work and play. Key identifiers include:

- population density

- household income level
- household age
- household education level
- short distance trip-making
- already using active modes of transportation
- proximity to key trip generators / attractors

In order to determine the areas of Hamilton best able to support a bike share system, data has been collected from the 2006 Census of Canada and the 2006 Transportation Tomorrow Survey. Further data collected to narrow down more specific locations will include the results of a bike use survey in the downtown core in strategic areas identified as anchors. Proximity to existing cycling infrastructure such as bike lanes and multi-use paths will also be considered as an important incentive to use the bike share system.

Identifying Suitable Wards for Bike Share

Most bike share systems worldwide focus service on the downtown core of their respective cities. This is due to the higher density of both population and jobs generally found in downtowns as well as the higher probability of short trips using active modes of transportation. Looking at the data from the 2006 Census of Canada and 2006 Transportation Tomorrow Survey, an area that includes Wards 1, 2, 7 and 8 emerge as the most likely to support a bike share. Ward 1 includes Westdale / Ainslee Wood neighbourhoods and McMaster University. Ward 2 includes the downtown, Kirkendall and Strathcona neighbourhoods. Ward 7 includes Concession Street and surrounding neighbourhoods. Ward 8 includes Mohawk College, St Josephôs mountain campus and surrounding neighbou

Population Density

Ward 2 has overall the highest population density in the City of Hamilton. Ward 1 has lower density but the presence of McMaster University skews the data. The jobs present at this institution and student population in excess of 30,000 makes up for the difference in density.

[19] Buck, D, Transit with Bikesharing: Overview of Practice and Potential, US Department of Transportation, 2012. http://www.bareiss.net/bikenewlondon/webinar_darrenbuck_usdot.pdf

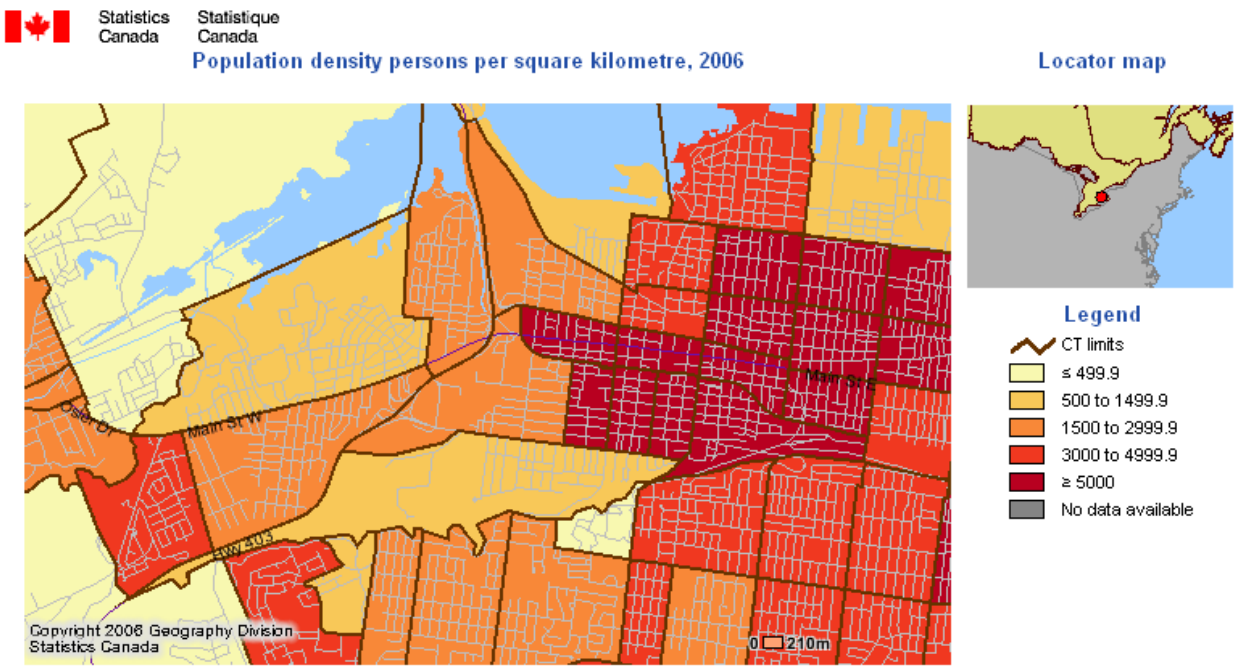

Figure 8 ï Population Density

Educational Attainment

Ward 1 has a higher proportion of post-secondary educated residents than the average in Hamilton. Ward 2 is lower but still slightly above average compared to the surrounding wards. Overall the City of Hamilton has a lower proportion of residents with post-secondary education than many other cities.

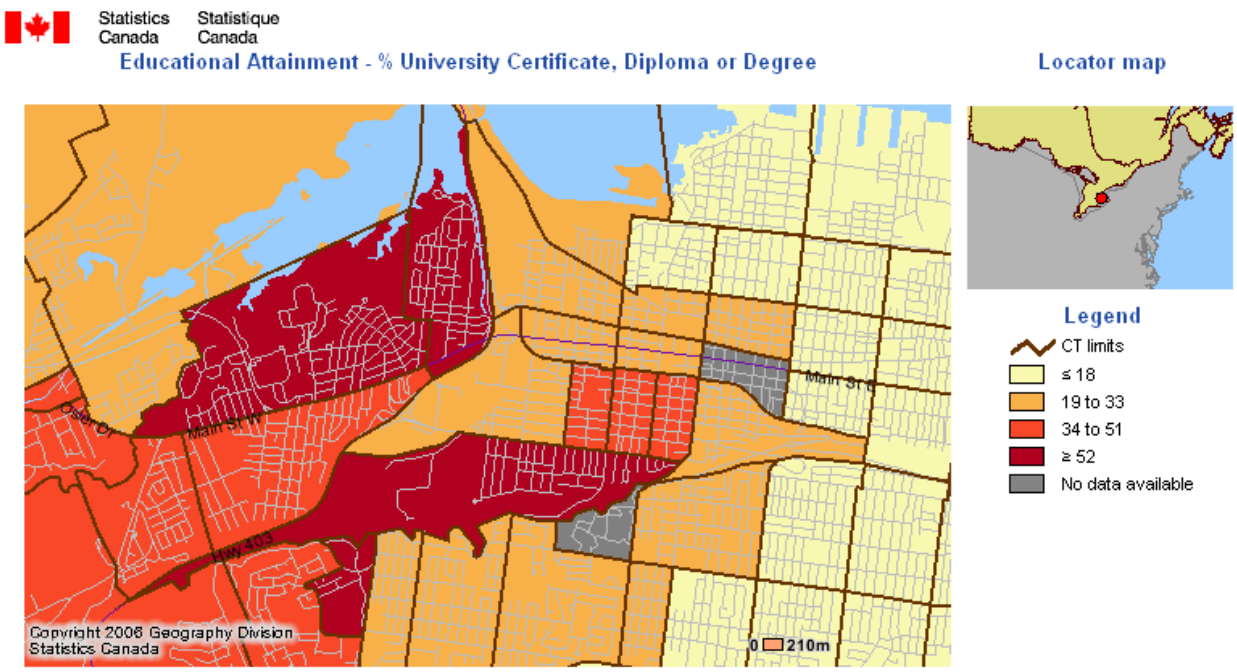

Figure 9 ï University Level Educational Attainment

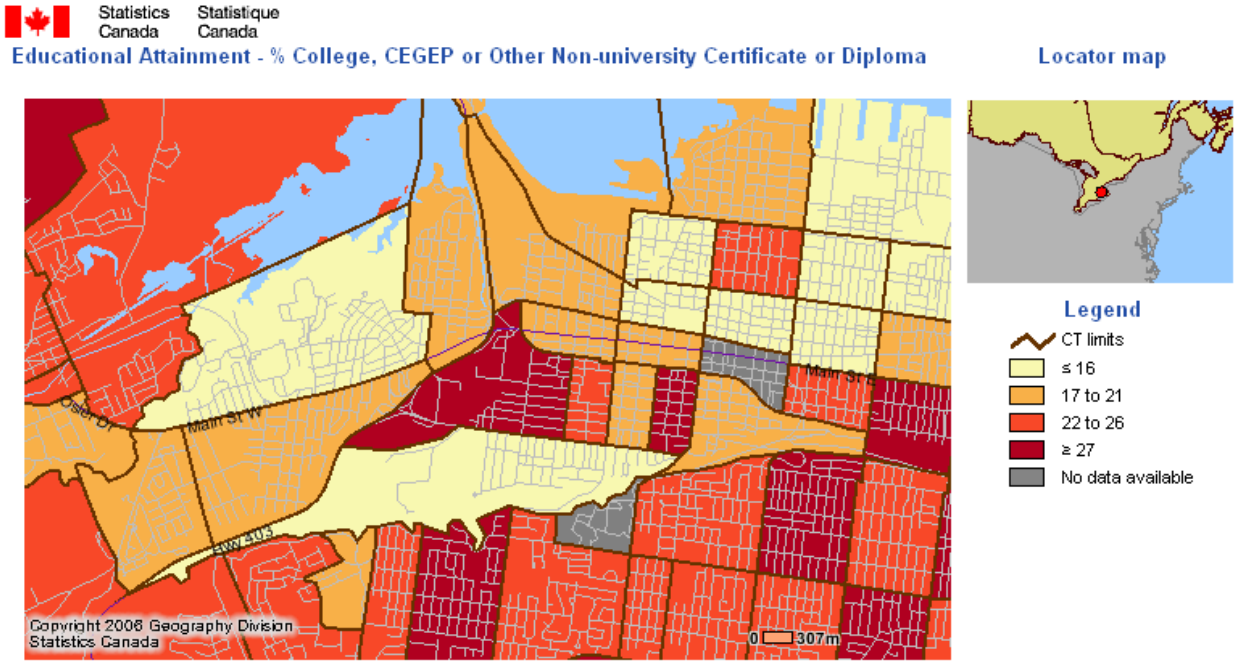

Figure 10 ï Non-University Post-Secondary Educational Attainment

Existing Travel Patterns

A good proportion of residents in Wards 1 and 2 have a daily commute less than 5 kilometres in length. This distance of commute is ideal for active modes including cycling.

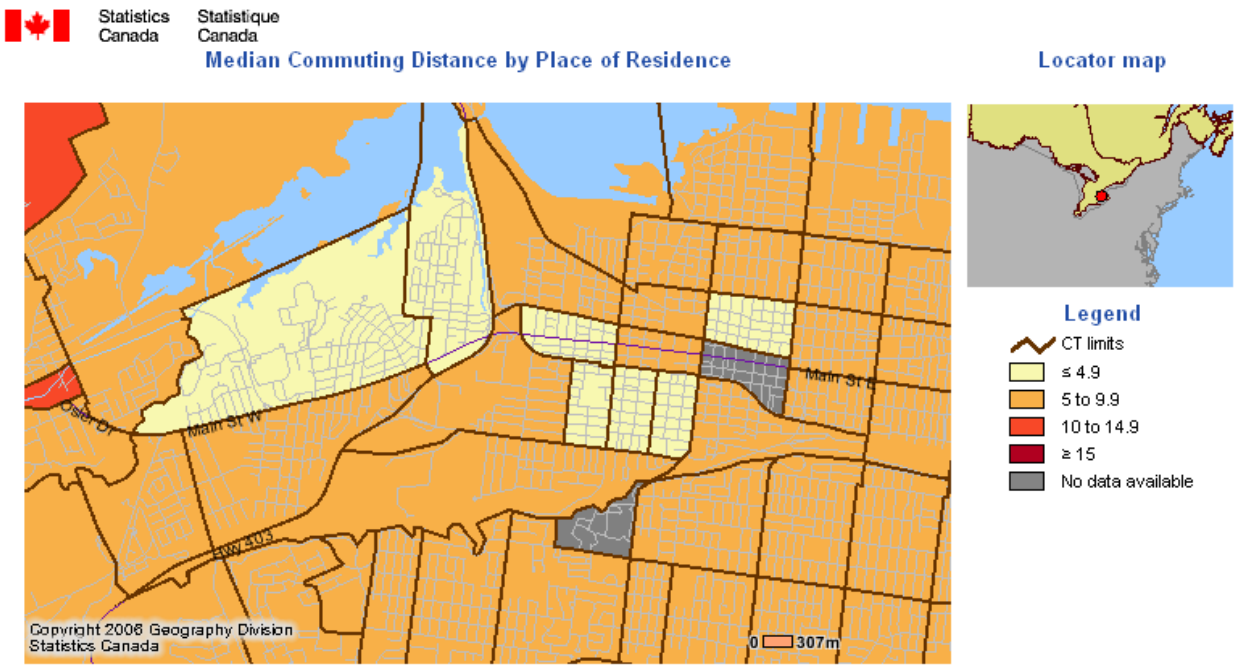

Figure 11 ï Commute Distance

TTS data on active transportation modes shows that these wards have the highest proportion of internal trips among all in the city (same origin ward as destination ward).

Ward	Internal Walking Trips	Internal Cycling Trips	Internal Transit Trips
1	8353	1575	3763
2	5920	217	2614
7	6163	201	2182
8	5012	149	1450
Next Highest	4855 (Ward 4)	197 (Ward 3) *	1109 (Ward 6)
*Ward 12 shows a high number of internal cycling trips in the TTS dataset (363); this finding is not supported by other data			

Table 2 ï TTS Data on Trips using Active Modes

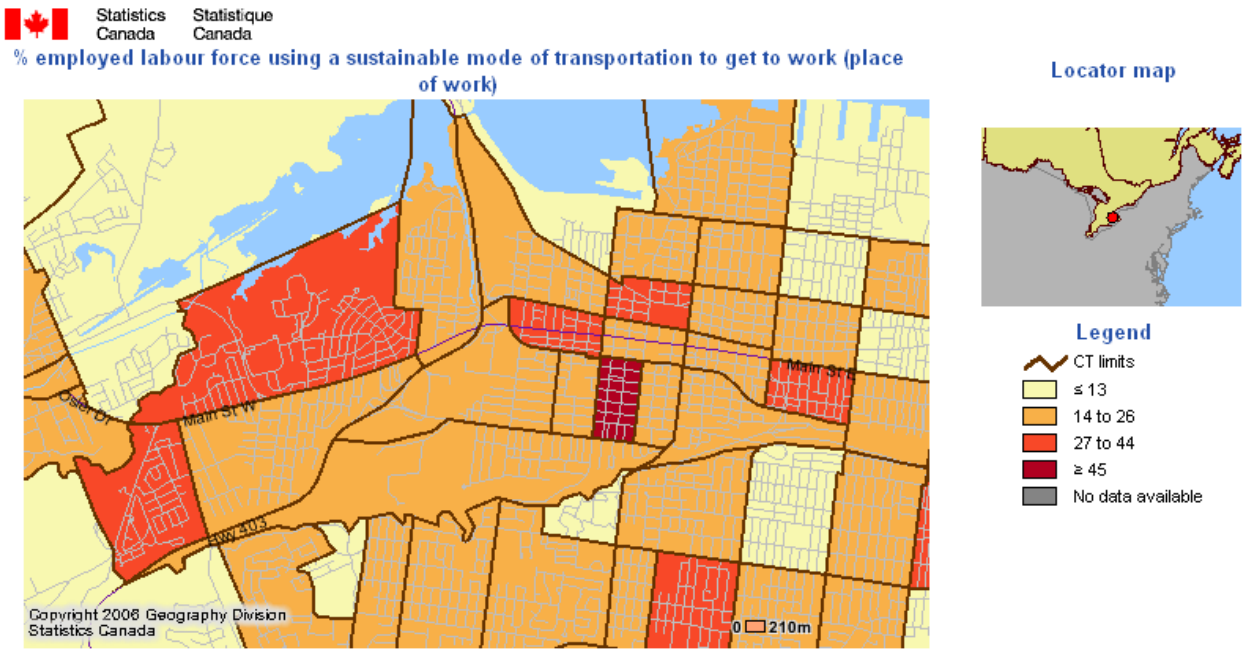

Figure 12 ï Employed Workforce using a Sustainable Commute Mode

Job Density

Downtown Hamilton has been clearly identified as the job centre of Hamilton. A 2010 survey showed that over 23,000 jobs are located in the downtown, in an area referred to as the Downtown Community Improvement Project Area. This area is within Ward 2. The combined density in the CIPA is 189 people and jobs per hectare. McMaster University and Hospital in Ward 1 represent a major job node in the city as well.

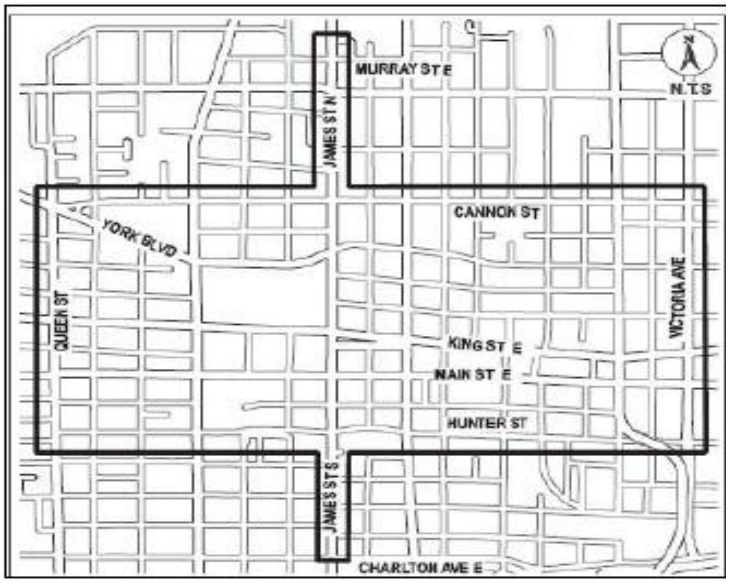

Figure 13 ï Downtown Community Improvement Project Area

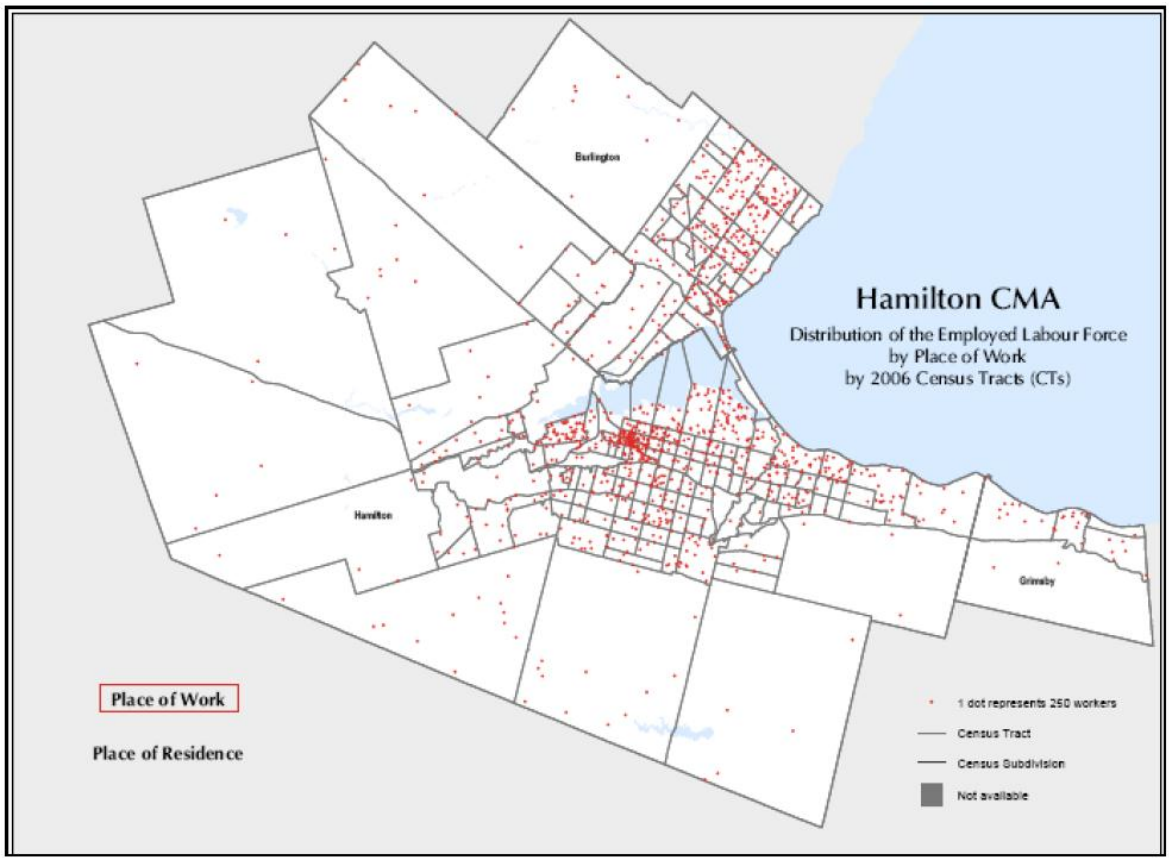

Figure 14 ï Job Distribution, City of Hamilton

Transit and Cycling Network

Transit service in the downtown area is extensive. Routes from Hamilton Mountain all terminate at the downtown MacNab Terminal. Several east-west routes traverse downtown as well, with some terminating at the Hunter St GO terminal. Areas of opportunity exist related to the existing transit service. There are very few routes which travel north-south in the downtown and Westdale areas. This creates several situations in which transit users must take circuitous routes to access express B-Line services along King and Main Street. Neighbourhoods in these circumstances should be prioritized for bike share stations as a means to access higher order transit services, such as express B-Line bus service and GO Transit service. Bike share presents a more cost effective alternative to providing conventional connecting bus service to higher order systems.

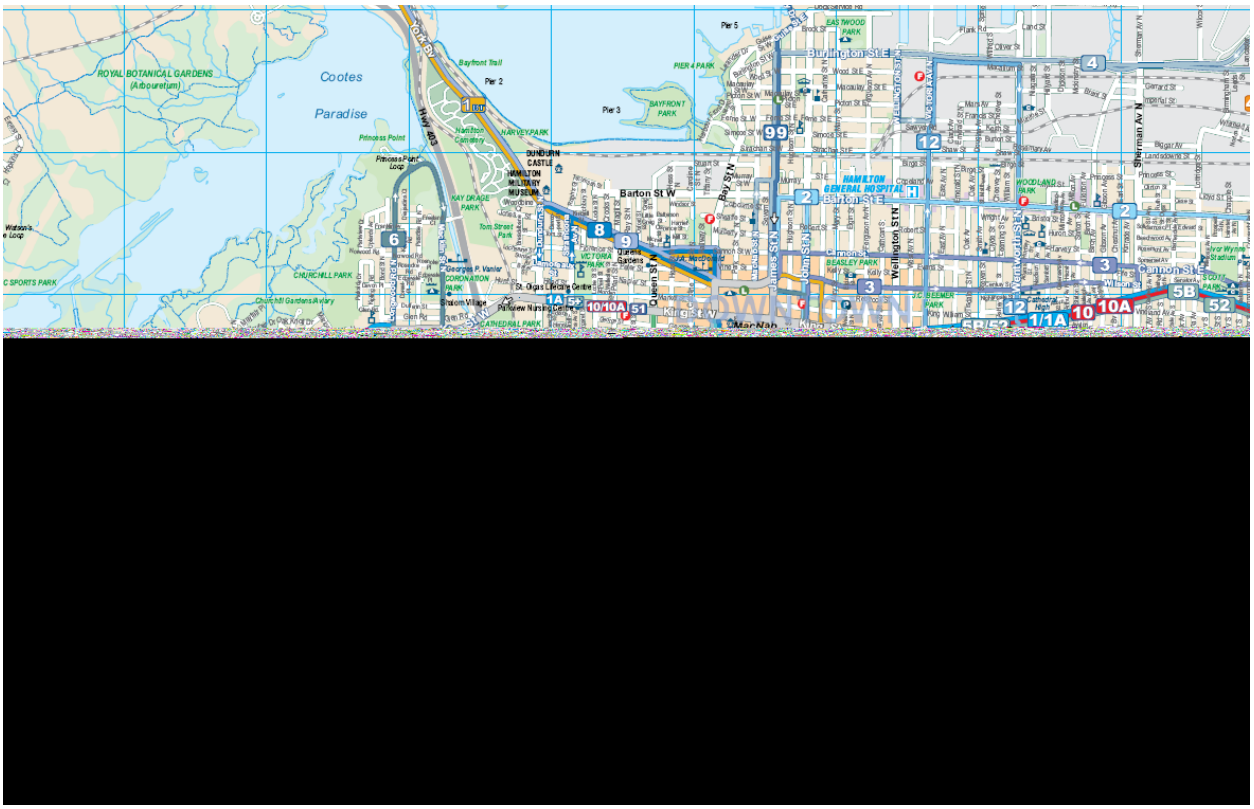

Figure 15 ï Transit Network

Cycling infrastructure in Hamilton continues to expand and improve. The City was awarded the Bicycle Friendly City certification at the Silver level by the Share the Road coalition. Although at the moment the amount of on-street painted bike lanes is still limited in some areas of the city, off-street multi use paths include the newly opened rail trail linking Kirkendall neighbourhood with Westdale neighbourhood.

current price of $110 per bicycle per year to provide this service. BIXI can create a website similar to the ones being used in Toronto and Montreal. This allows users to access maps showing station locations and bike availability at each station in real time using their handheld electronic device. The cost has been quoted as $42,000 to create this website, and approximately $10,000 per year to maintain and update it.

APPENDIX A ðRESIDENTIAL AND BUSINESS DEMOGRAPHICS

Census Data for Hamilton

Census Data by area in Hamilton

http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/prof/92-597/index.cfm?Lang=E

Census Tract	Area	Pop'n (number)	Pop'n Density (number/sq km)	25-34 yo (number)	35-44 yo (number)	Median Income all private households ($)	Univ Cert, Diploma or Degree (number)	% of total pop'n with Univ Ed (Percent)	Total employed labour force 15 years and over (number)	% of total pop'n Employed (Percent)	Work in census subdivision of residence (number)	% of total pop'n work in subdiv (Percent)	Transp to work walk or cycle (number)	% of total pop'n walk or cycle (Percent)
0036.00	Hunter to King, James to Wellington	2542	7022	465	375					0%		0%		0%
0037.00	Hunter to King, Queen to James	2586	8176	520	385	18368	690	27%	1060	41%	605	23%	175	7%
0038.00	Aberdeen to Hunter, Bay to James	3668	10985	680	415	29318	990	27%	1665	45%	1050	29%	325	9%
0039.00	Aberdeen to Hunter, Queen to Bay	5140	14860	1315	845	34366	1745	34%	2890	56%	1730	34%	585	11%
0040.00	Aberdeen to Hunter, Locke to Queen	2037	5958	395	365	46977	570	28%	1230	60%	835	41%	245	12%
0041.00	Hunter to King, 403 to Queen	2134	5201	455	285	37961	535	25%	1180	55%	640	30%	245	11%
0042.00	Mtn to King, 403 to Locke	2730	1837	465	490	53522	645	24%	1630	60%	930	34%	210	8%
0043.00	Ewen to Longwood, 403 to Main	3633	1910	485	470	45025	1180	32%	1810	50%	910	25%	210	6%
0044.00	Mtn to Ewan, 403 to Main	4585	3751	815	550	40290	1320	29%	2200	48%	1330	29%	215	5%
0045.00	CNIB to Longwood, N of Main	3351	1063	400	340	80906	1575	47%	1960	58%	1305	39%	560	17%
0046.00	Churchill Pk to 403, N of 403	3212	2570	480	525	48334	1230	38%	1585	49%	935	29%	260	8%
0047.00	King to York, 403 to Queen	2871	2333	405	410	35004	510	18%	1355	47%	745	26%	225	8%
0048.00	King to Cannon, Queen to James	1761	4754	370	300	25736	235	13%	665	38%	425	24%	160	9%
0049.00	King to Cannon, James to Wellington	2597	5861	405	365	25513	285	11%	800	31%	460	18%	180	7%
0063.00	Cannon to tracks, James to Wellington	3182	5587	470	520	29213	220	7%	1200	38%	645	20%	160	5%
0064.00	Cannon to tracks, Queen to James	1821	3193	275	290	37772	210	12%	790	43%	450	25%	150	8%
0066.00	Tracks to lake, Bay to Wellington	5252	3603	730	795	43450	380	7%	2325	44%	1430	27%	240	5%
	All of this area	53102	5216	9130	7725	39485	12320	23%	24345	46%	14425	27%	4145	8%
Hamilton	All of Hamilton Metro area	692911	505	83290	106025	60567	117800	17%	347485	50%	180815	26%	19010	3%
Ontario	All of Ontario	12160282	13	1535650	1916405	60455	2417330	20%	6164245	51%	3056365	25%	389105	3%

APPENDIX B ðWEB RESOURCES

Background

The Bike-Sharing Blog
www.bike-sharing.blogspot.com

Bicycle Sharing Systems

Barclays Cycle Hire
London
www.tfl.gov.uk/cyclehire

Bicing
Barcelona, Spain
http://www.bicing.cat

BIXI
Montreal, QC
www.montreal.bixi.com
Toronto, ON
www.toronto.bixi.com
Ottawa, ON
www.capital.bixi.com

Bycyklen
Copenhagen, Denmark
www.bycyklen.dk

Capital Bikeshare
Washington, DC
www.capitalbikeshare.com

DecoBike
Miami Beach, FL
www.decobike.com
Melbourne Bike Share
Melbourne, Australia
www.melbournebikeshare.com.au

NiceRide Minnesota
Minneapolis, MN
www.niceridemn.org

Vélib
Paris, France
www.velib.paris.fr

V ® l o ô v
Lyon, France
www.velov.grandlyon.com

Villo!
Brussels, Belgium
http://en.villo.be/

Car Sharing

Community Car Share
Hamilton, ON
http://communitycarshare.ca/

APPENDIX C – CASE STUDIES

BIXI has put together several case studies on their website. They can be viewed at the following web address:
http://www.bixisystem.com/what-we-achived/case-studies/

NiceRide Minnesota shares a lot of information on their website at:
www.niceridemn.org

Minnesota Nice Ride financial statistics for their first year of operation, with 65 stations and 700 bikes:

- Capital cost of $3 million ($4,285/bike).
- Their business plan estimated the system annual operating expenses at $1.5 million for 1,000 bicycles and 75 bike stations ($1,500/bike per year).
- Actual first year Revenue was $300,000.
- Revenue Sources:
- 29,077 x $5 for 24 hr subscriptions = $145,385
- 1,295 x $60 annual subscriptions = $77,700
- Other usage fees = $77,000
- Total Revenue = $300,000 as given in NiceRide presentation (this is $429/bike in the first year)

Bike Share Feasibility Report

Compiled and Revised

Jesse Bauman
(McMaster University)
Matthew Sweet
Peter Topalovic
Alan Kirkpatrick

December 20, 2010

Executive Summary

This document is composed of two distinct components; the bulk of the document is a feasibility study produced by McMaster B. Arts and Science student Jesse Bauman; the additions are the executive summary and the Appendix which serve to add the context of developments in the p lanning of a bike share system by City of Hamilton staff since the completion of the initial feasibility study.

Bike Share systems have developed from highly informal borrowing models to the current so - called 4th generation bike share systems which featur e GPS tracking of bikes, credit card and membership payments, and portable docking stations.

Smart Commute Central York performed its own feasibility study on implementing a bike share system in Newmarket, upon which the Bauman feasibility study is based. The Bauman study recommends a library -lending model for bike share in the City of Hamilton. It also recommends sending out requests for proposals from bike share companies, investigation of potential capital funding opportunities, and development of a m arketing campaign in advance of implementation.

In August of 2010, the City of Hamilton welcomed representatives from Bixi and Bcycle, bike share operators from the cities of Montreal, QC and Denver, CO respectively, to demonstrate their systems and techn ologies to stakeholders and the general public. Both of these systems are considered to be 4th generation bike shares.

Feedback from that expo strongly favoured investigating a 4 th generation bike share model for the City of Hamilton.

Introduction

Project evolution

In partnership with Smart Commute Hamilton and Metrolinx, the City of Hamilton presents this report in order to consider the feasibility of a public bike share system (PBS) in Hamilton. This report builds on research conducted by Metrolinx and Smart Commute Central York, who also considered the opportunities and challenges relevant to a potential bike share in the Town of Newmarket. Smart Commute Central York produced three reports. This reports uses their Phase 3 Final Report as a model and builds upon the research contained therein. The Phase 3 Final Report was the feasibility study completed by York Region for the Town of Newmarket. The Phase 1 and Phase 2 Final Reports provide background research, establish best practices for public bike systems and other relevant criteria for gauging feasibility; this report also builds upon the research completed in those two Reports, and largely focuses on the Smart Commute Hamilton-McMaster Bike Share Proposal, drafted in the summer of 2009.

Project Relationship to Provincial Policy Initiatives

This report continues certain objectives highlighted by a number of provincial releases, most recently *The Big Move,* the 2008 regional transportation plan for the GTHA. Included in that plan are goals such as Big Move #4, which is to "complete walking and cycling ... -share programs," ... Action 2.2, "... bike-sharing ... programs ... urban cent *The Big Move* grew from the comprehensive 2005 *Places to Grow* report, which included downtown Hamilton as one of its urban growth centres. As an urban growth centre, downtown Hamilton is designated as an important area for investment and planned growth; to develop major transit infrastructure; and to serve as a high density major employment centre. *Places to Grow* identifies and supports "a trans urban growth centres through an extensive multi-modal system." This report considers a public bike share system in the described policy climate. A PBS in Hamilton should address the majority of the policy goals outlined above.

Project Relationship to Hamilton Goals and Initiatives

This report describes a public bicycle system that would support and align with numerous City goals, visions and initiatives. The most important are described below:

Cycling Master Plan builds upon the previous "Shifting Gears Master Plan" from 1992, and guides development and operation of Hamilton's cycling i philosophy is that every cyclist should be able to reach a network of trails without traveling more than one kilometre. The Plan demonstrates the City's serious commitment to cycling as a viable mode of transportation, and to providing comprehensive and accessible cycling infrastructure. Bike Share supports two of three core policies of the plan, which are and cycling," and to "continue to improve and exp infrastructure."

Corporate Strategic Plan imagines Hamilton as "the best place in innovation, engage citizens and provide diverse e focus areas: fostering Environmental Stewardship and creating a Healthy Community. A bike share system would provide action for those two areas in particular, thus contributing to the realization of the Plan.

Innovate Now! Public Works Strategic Plan is the articulation of the goals of Public Works to gain recognition as ñthe centre of environmental and in immediate objectives is to make Public Works a ñl helping to reduce the environmental footprint of transportation in Hamilton. Public Bike Share supports that directive.

Transportation Master Plan directs and regulates development of transportation infrastructure, and demand management, in Hamilton. Bike Share directly relates to the 2007 Plan, which includes as key objectives ña choice of integrated travel modes, public transit and carpooling.ò

Transportation Demand Management Work Plan is a part of the Strategic and Environmental section of Public Works, which focuses on promotions and initiatives that reduce the number of single occupancy vehicles on the road in Hamilton. The Plan lists a bike share system as a project.

Public Health Services Strategic Plan/Hamilton Walks includes six focus areas, which emphasize improving local air quality and improving the overall health of communities through physical activity. Active and Safe Routes to School are Public Health Service programs that promote walking and cycling. Healthy Living Hamilton, with support from Public Health Services, organizes Hamilton Walks. In addition to those already discussed, Hamilton Wal transportation.

Clean Air Hamilton is an organization of academics, government employees and local industry and community members, whose purpose is to improve ai objectives is to promote ñbehavioural changes amo bike share supports that goal by providing alternative opportunities, and sustainable modes of transportation.

Commuter Challenge is an annual initiative whose primary goal is to reduce dependence on single passenger automobile trips. Hamilton runs events for Commuter Challenge, which are rapidly growing in popularity. A public bike system shares the same objectives.

Vision 2020 is a collective imagining of Hamiltonôs futu businesses and organizations. It has been updated every five years since its adoption in 1992. The Vision acknowledges that it is imperative to consider the interconnected economic, social and environmental impacts of our decisions, and is based on four ba needsò and ñmaintaining a city where Bike share support principles.

Project Relationship to Existing Cycling Culture in Hamilton

It is important to consider the extent to which a outlines those committees, organizations or initiatives that demonstrate a commitment to cycling as an alternative mode of transportation, with an emphasis on the groups who seem capable of sustaining such a commitment.

Hamilton Cycling Committee
According to their terms of reference (last updated June 200 Government on all matters related to cycling, to monitor implementation of the Hamilton Cycling Plan

[and] to participate in planning for bicycling facilities" among other things. A member from the HCC should be included as a stakeholder. The HCCôs st and should be beneficial in design and implementation.

HSR's Bike N' Bus Program
All HSR buses now feature external racks, so that each bus can carry two bicycles at a time. This new feature allows public transit users to extend trips and combine modes of transportation, making both cycling and bussing more attractive and feasible.

Hamilton Cycling Club
The Hamilton Cycling Club organizes various group rides ïracing, recreation, training and touring. They are a strong part of the cycling community in southern Ontario, and introduce many in the region to cycling in its many forms. Including a member from the HCC could be helpful in marketing the bike share, and as a liaison with other parts of cycling community.

Transportation for Liveable Communities
TLC is a working group of the Ontario Public Interest Research Group (OPIRG) McMaster. As a group they advocate for greater access to alternative transportation, emphasizing the link between those forms of transportation and healthy livable cities. A bike share network aligns with those goals, and should be supported by TLC, who could also be helpful promoting the program.

MACycle Co-op and Recycle Cycles
MACycle and Recycle Cycles offer affordable used bicycles for sale, in addition to providing repair assistance to community members. The former tends to service McMaster University and the surrounding community, whereas Recycle Cycles tends to attract more residents from downtown Hamilton. Both promote cycling as an alternative mode of transportation, and look to make cycling more accessible and affordable for people who might otherwise choose different means of transportation. The current MACycle Director is a research consultant for the bike share program and can act as a liaison to the McMaster community.

Local Bike Shops
There are 14 bike shops in Hamilton, Dundas, Ancaster, Waterdown and Burlington. Some provide rental services on a small scale already. It is imperative that some business owners be included as stakeholders.

Market Analysis

The market analysis presented in this Report examines the City of Hamilton, as well as the Downtown Hamilton urban growth centre (as identified in the 2008 *Big Move* document) and focuses on indicators deemed relevant to a potential PBS. Chapter 6 includes a discussion of relevant market indicators.

Profile of the City of Hamilton

This section of the report profiles the City of Hamilton and relevant data for the Downtown Hamilton urban growth centre.

The City of Hamilton is the fourth largest in Ontario, as of 2006.[1] Hamilton Downtown is highly concentrated, particularly around the Jackson Square shopping centre. Over 23,000 students are enrolled at McMaster University, which is located on the West end of the city, approximately five kilometers from

Jackson Square. A prominent escarpment runs East-West through the Southern part of the City, but this Report does not consider a PBS that in c l u d e s k i o s k s l o c a t e d **Figure 1** shows the ñMount Hamiltonôs position in the GTHA.

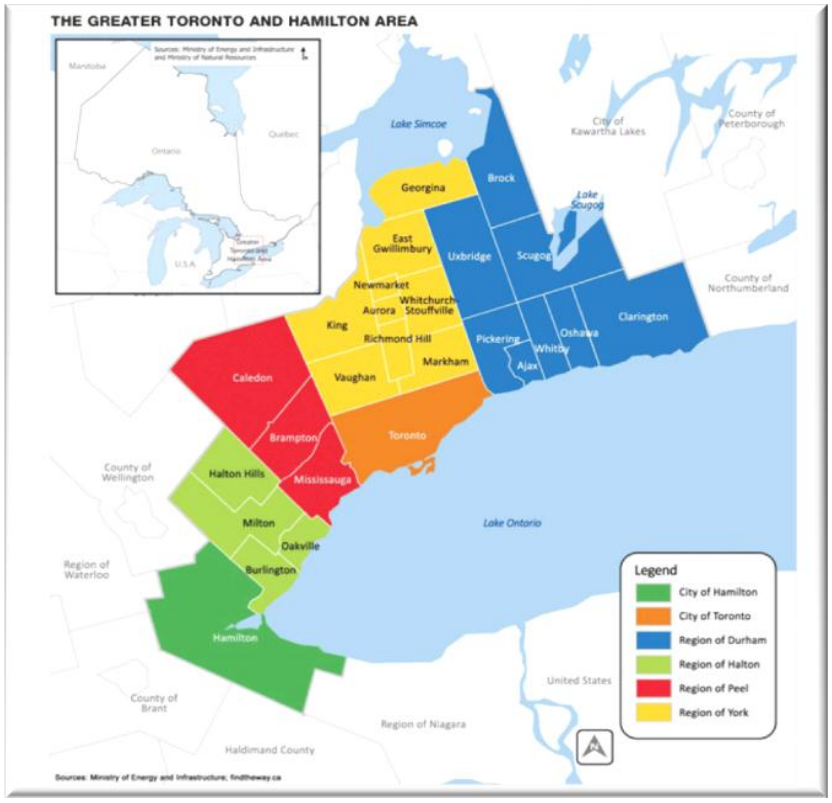

Figure 1 ïLocation of the City of Hamilton within GTHA
Source: Ministry of Energy and Transportation (http://www.findtheway.ca)

The central urban growth centre in Hamilton, referred to hereafter as Downtown Hamilton, is bounded by the escarpment on the South, Barton street on the North, Sherman avenue on the East and Queen street on the West. As shown in **Figure 2,** Downtown Hamilton includes the Hamilton GO and HSR Stations, the Main Branch of the Hamilton Public Library, Lloyd D. Jackson Square and Hamilton City Centre.

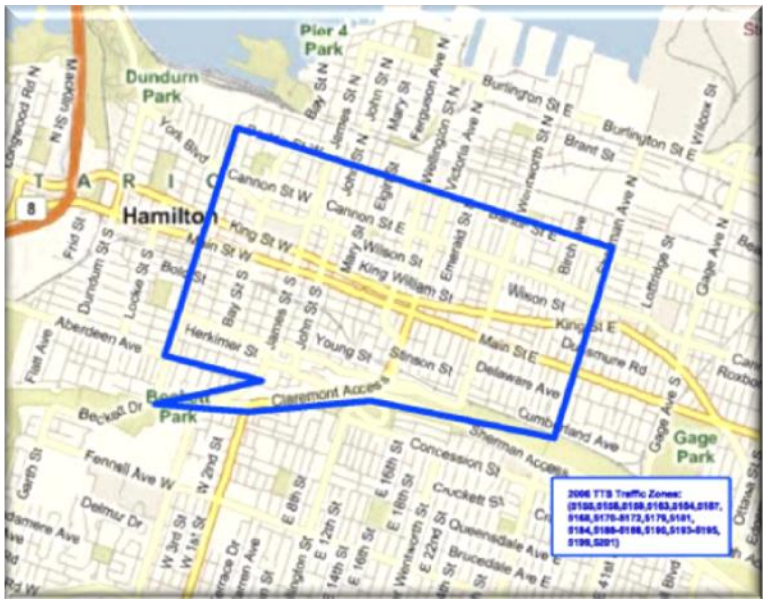

Figure 2: Downtown Hamilton Urban Growth Area
Source: Microsoft Live Search Maps (2010)

Figure 3 presents population growth in the City of Hamilton growth in the past, and suggests similar growth in the future.

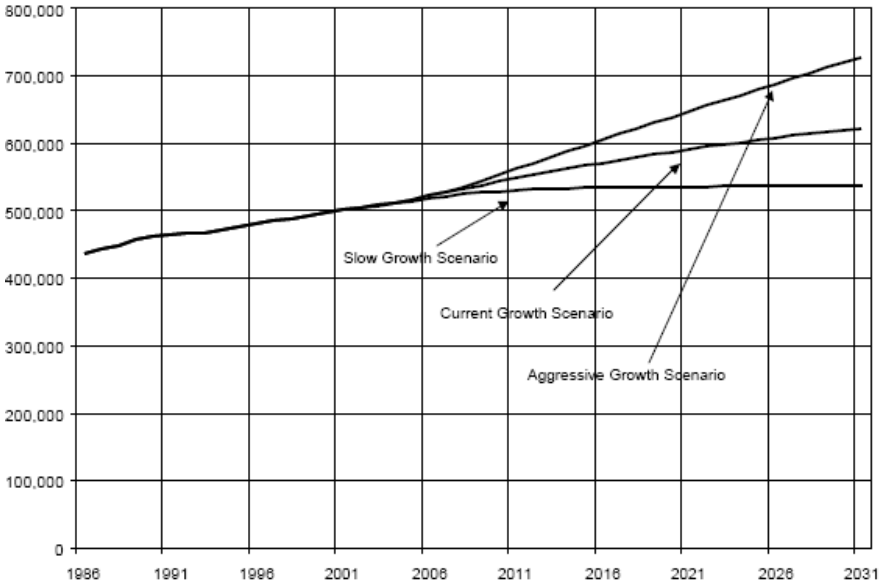

Figure 3: City of Hamilton Total Population, Actual 1986 to 2001, Projected 2002 to 2031
Source: Statistics Canada and the Centre for Spatial Economics

Table 1 presents demographic information for the City of Hamilton. Long term (i.e. 2021-2031) modal share projects are displayed in **Table 2** and historical weather data is presented in **Table 3**. Cycling policies, programs, infrastructure and partners for the City are shown in **Table 4.** Together, those three tables suggest a potential market for a PBS in Hamilton, and the discussion of opportunities and threats in Section 6.2 builds upon the information presented here.

Table 1: Key Demographic Indicators for the City of Hamilton

Description	City of Hamilton	Hamilton Downtown (Urban Growth Area)
Population[1]	504,599	50,812
Population Density (per square kilometre)[1]	451.6	6,633.4
Employment Density (per square kilometre)[2]	1,070.0	No data.
Total Land Area (square kilometer)[1]	1,117.21	7.66
Median Age of Residents[1]	39.6	38.1
Percent of the Population Between Ages of 15 and 54[1]	56.12%	61.60%
Median Household Income (2005)[1]	$66,810	$38,343
Location of Employment for the Residents[1]	At home: 5.52% Outside Ontario: 0.51% No fixed address: 9.90% Municipality of residence: 59.06% Different county: 25.01%	At home: 4.15% Outside Ontario: 0.44% No fixed address: 11.37% Municipality of residence: 57.95% Different county: 26.09%
Modes of Transportation used by Residents[3]	Walk: 7.21% Cycle: 0.66% Transit: 11.10% Motor Vehicle: 80.86% Other: 0.17%	Walk: 0.06% Cycle: 0.49% Transit: 10.44% Motor Vehicle: 88.85% Other: 0.16%
Percent of Trips that are Short Distance (0-5km)[3]	No data.	66%
Average Number of Vehicles Owned by each Household[3]	No data.	1.2

Table 2: Long-Term (2021 to 2031) Modal Share Projections:[4]

Description	Modal Share
Single Occupancy Vehicle Trips	52%
Municipal Transit	12%
Walking or Cycling	15%
Annual Transit Rides Per Capita	80-100

Sources:
[1] 2006 Statistics Canada Census Data (www.statcan.gc.ca).
[2] 2006 Retrieved from Hess, P., A. Sorenson & K. Parizeau. (May 2007). Urban density in the Greater Golden Horseshoe. Centre for Urban and Community Studies, University of Toronto.
[3] 2006 Transportation Tomorrow Survey (*https://www.jpint.utoronto.ca/drs/index.html*)
[4] Hamilton Transportation Plans, Opportunities and Constraints *(http://www.metrolinx.com/Client%20Documents/1/cityofhamilton0707.pdf)*

Table 3 : Historical Weather Data for the City of Hamilton

Days with minimum temperature:												
<=0°C	28.7	25.4	23.5	9.6	0.37	0	0	0	0.19	3.2	14.2	25.6
Days with snowfall:												
>=0.2cm	11.1	9	5.1	1.5	0	0	0	0	0	0.04	2.5	8.9
Days with rainfall:												
>=5mm	5.5	4.7	8.9	11.7	11.8	10.6	10.7	10.7	11.7	11.7	12.1	7.8

Source: Government of Canada ï C a n a d a ô s N a t i o n a l C l i m a t e A r c h i v e ; 1971 to 2000) for Hamilton Royal Botanical Gardens weather stations (http://www.climate.weatheroffice.ec.gc.ca/).

Table 4 : Cycling Polices, Programs, Infrastructure and Partners in the City of Hamilton

Transit Service	
Lower-Order Public Transit Service	33 Hamilton Street Railway bus routes
Higher-Order Public Transit Service	GO Transit bus service Go Transit rail service (downtown Hamilton station) ñ A l i n e ò - l a i m d e ò ñ E x p r e s s Proposed Light Rail Rapid-Transit System (feasibility analysis stage)
Cycling and Transit Integration	
Bike Racks on Buses	Entire GO Transit network Entire HSR network
Bicycle Parking	Hamilton GO station (downtown) provides secure bike storage for annual fee GO Centre and McMaster stations provide covered bicycle racks Smart Commute Hamilton has secure bike parking in two downtown parking garages Metrolinx has committed $166,987 for secure parking in the City
Potential Community Partners: Governments, TMAs and Transit Agencies	
Government	Metrolinx Ontario Ministry of Transportation Transport Canada City of Hamilton Hamilton Public Libraries
Smart Commute TMA	McMaster University Mohawk College City of Hamilton Hamilton Health Sciences Horizon Energy Smart Commute Hamilton
Transit Agency	GO Transit Hamilton Street Railway Hamilton Car Share

Online Survey of Public opinion

With input from Metrolinx, Smart Commute Hamilton and the City of Hamilton, study consultants developed an on-line survey that collected public opinion relating to a possible PBS in Hamilton as well as general attitudes towards cycling and transit in the city. The survey was distributed widely, by e-mail, through various institutional list-servs (City of Hamilton, Smart Commute Hamilton, McMaster Students Union, Outdoor Club and Sustainability Office, and OPIRG McMaster) website advertising (Transportation for Liveable Communities, SCH, ñR

Questions related to cycling in Hamilton asked about potential barriers to cycling in the city, and areas of improvement. Regarding the possibility of a PBS, questions asked about general interest and knowledge of PBS, desirable kiosk location and expected nature and frequency of use. There were 496 respondents. We should acknowledge certain biases in the results: an individual requires computer and internet access to complete the survey; to gain access to the survey an individual must either frequent the aforementioned websites or receive those list-servs -- in general these people come from a demographic that might be relatively open or sympathetic to bicycle travel; and, having learned of the on-line survey, an individual must be moved to take the time to complete the survey. The results are not statistically significant, but nonetheless suggest a large group of individuals interested in a PBS in Hamilton, and as the survey results demonstrate, committed and willing to participate. Moreover, we were able to approximate where respondents live in Hamilton, and to our surprise, it appears that the majority of respondents were not McMaster University students. The results are therefore important to this Report. Select graphs from the survey and a complete summary of results can be viewed in Appendices B and C.

Summary of Key Online Survey Findings

- 84% of respondents were interested in using a PBS in Hamilton;
- 22.2% of people reported making less than five short trips (<5kms) a week, and 23.1% and 18.8% of people, respectively, said that they made between six and 10, and 11-20 short trips weekly;
- ¢ K Ŝ f ŀ NJ∃ Ŝ ă ű cycling in Hamilton was insufficient on-road cycling facilities (79.5%) followed by feeling uncomfortable riding on the roads and the winter (both 61.1%), and concern about bicycle theft and security (42.6%);
- 33.9% of respondents would use a PBS a few times a month, and 26.5% would use the service a few times a week;
- 17.1% of respondents said they would not be interested in using the service;
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- Numerous rental locations (87% of respondents) and availability at transit stations/bus stops (63.5%) were reported as the most important features of a PBS in Hamilton;
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  PBS in Hamilton; and,
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There were also a number of significant relational correlations:

- Younger respondents (in the 18-25 and 26-30 years old categories) make more short trips, suggesting a positive alignment, in Hamilton, between typical PBS users and typical PBS use;
- 18-25 year olds were most likely to use a PBS a few times a week;
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Hamilton Bike Share Market Evaluation

This section reviews the experiences of other groups and organizations that have developed or delivered similar bike share systems. Considering processes, planning, and design decisions helps to discern best practices and potential challenges for the Hamilton case. This section borrows from research and analysis found in the Phase 3 Report for the Newmarket Bike Share Program.

Operational Models

Research from Phase One of the Newmarket Study reveals four broad types of bike share systems, based upon review of international PBS implementation. As bike share systems are growing in popularity, there may be systems, not yet reviewed, which could lend valuable insight to the Hamilton model. Presently, there are four types, as identified in the Newmarket Report, related to this study.

Community Bike Share (member -based)

This model employs either a limited number or one rental location. Bicycles are typically simple, off-the-shelf recycled or refurbished models. Program personnel register users manually (though in some cases on-line bike rental requests are possible), sign bicycles in and out, and where it is needed, request maintenance. Typically, an annual registration fee and membership is required. This tends not to cover operating costs, and bicycles can be rented for one to three days.

While a municipality might act as funding partner or sponsor, a local community group or charity typically acts as the lead agency. That groupôs s well maintenance and repair duties. The latter are sometimes outsourced to a local bicycle shop. The same community group coordinates marketing efforts in concert with local partners and sponsors. Government covers the operating subsidy, or else corporate grants and sponsorship. When labour is provided by volunteers, operating costs can be quite minimal, mainly bicycle parts and printing costs.

University or Employer Bike Share

This model is similar to the community bike share, but offers membership to university students or employees instead of offering registration to the general public. Again, a small number of lending stations (1-5), and simple everyday bicycles are employed. System personnel manually register users, lend and return bikes, and request mechanical service. Students or employees borrow bikes, free of charge, for one or two days. The university model gets funding from general university resources or a student levy, whereas company or organization funds provide support for the employee model.

Program planning and implementation is led by the university (e.g., sustainability office) or employer (e.g., workplace health committee) who is responsible for day to day rental and billing. The university or employer is also responsible for hiring technical personnel and volunteer recruitment, or contracting an organization to take care of maintenance. Marketing can be outsourced, or else is the responsibility of university/employer.

Public Smart Bike or Call -a-Bike (fee for use, Public -Private Partnership)

This model employs numerous stations throughout an urban area. Stations are able to automatically process payment, rent and return bicycles and communicate mechanical updates. Bicycles are purpose built, meaning they are sturdy, rugged and otherwise specifically suited to urban commuting. A central computerized tracking system handles registration, billing and mechanical service dispatch. There are

significant personnel requirements, for system management, bike repair and redistribution, and marketing. After the registration fee, bicycles are free to rent for a half hour, after which rates increase exponentially. Bicycles are available for rent and return anywhere throughout an urban area in the Call-a-bike model. There are no fixed locations or stations and access to bikes is through mobile phone (the bike lock code is sent through SMS). Bikes are similar to the Smart Bike system described above, but also include Radio Frequency Identification (RFID) tags which allows tracking of bikes and aids in redistribution. This system has similar personnel demands, for management, repair, distribution and marketing. Usage is billed by minute, in addition to the membership fee.

The lead agency is usually the local municipality or the public transit operator, who generally outsources all operations ïregistration, day-to-day rental and billing, maintenance and repair ïto an advertising company. Marketing efforts are led by the municipality or public transit operator. Billboard advertising space is granted to an advertising company in return for system operation.

Public Smart Bike or Call-a-Bike (fee for use, public funding)

This model resembles the public-private partnership model, but the public model does not outsource operations to an advertising company. Therefore the municipality or transit operator does not lose advertising revenue, but it must then subsidize the program from its own revenue streams. This might require private advertising or sponsorship, or relevant transportation related fees and taxes. The bicycle fleet might be designed-lñoiunseò or purchased ñoff the shelfò fr

Local vs. Areawide Operations

Further analysis of these systems and examination of specific case study examples of existing programs demonstrated that these four types of systems can be further classified into two categories: (1) the small-scale bicycle lending library; and (2) the large-scale fee-for-use system.

Type 1 is typically a localized bike lending program for a specific target group (bike share members, university students and staff or workplace employees). This means that the user base is constrained by some variable (e.g., employment or membership).

This type of system is referred to as a *local system*. These systems usually have just one rental location, are free to use, have fairly long rental periods (from a few hours to a few days) and are generally only available during working hours (not 24 hours per day). System administration and billing (if applicable) is usually completed manually by system personnel, and bikes are simple off-the-shelf consumer models or recycled donations. Generally speaking, the funding subsidy comes from general expenditures (a universityôs or an employerôs) and/or grants.

Type 2 is a more widely available bike share system for the general public (commuters, tourists and others). This type of system is therefore referred to as an *area-wide system,* and lacks the constraining variable which partially defines Type 1 systems. These systems provide dense coverage of rental locations, are available 24 hours per day and free to use for the first half hour, though costs increase rapidly beyond the first half hour to encourage short-term use. Bicycles are custom designed for the system, and administration and billing is automated. In general, funding subsidies are provided from public sources, either through government expenditures or advertising revenue.

Residential Target Market

Important Resident Target Market (RTM) indicators, according to best practice research, are:

- Presence of young people;
- Presence of university/college campuses;
- Presence of major places of commerce and employment; and
- Presence of major interest points (museums, theme parks, etc.).

In the City of Hamilton 56.12% of the population is between the ages of 15 and 54; in the Hamilton Downtown Urban Growth Area that number is slightly higher, at 61.60%. Marketing should target this key group. McMaster University should be included, though it falls outside of the Downtown Urban Growth Area. Although Mohawk College satisfies numerous RTM indicators, its physical isolation suggests that its inclusion in a PBS should occur at a later phase, once the program is firmly established. Hospitals, public libraries and major places of commerce and employment should also be targeted.

Recommended Operational Model(s)

Best practice research demonstrates that a large-scale ósmart bikeô system with stations, or a large-scale ócall-a-bikeô system with unstaffed stations, are suited to communities with a minimum population of 200,000 people. Given the current population of Hamilton, this model will be considered in a different report (forthcoming).

Also due to the cost of those more technologically advanced models, the three sub-types of the local system described above also deserve consideration. The university system is not desirable because of the locations of McMaster University and Mohawk College outside of the downtown, as well as the goal of making the public bike share accessible to individuals outside those institutions. For that same reason, the employer based system is also less preferable, and Smart Commute Hamilton should consider the more public option of a community-based type of system. This report pursues the latter options, while another report considers the smart- or call-a-bike system.

Advantages

The public, community based system has numerous advantages: start-up capital costs are relatively low; longer lending periods appeal to people who may want to cycle as part of a longer trip chain; and making the system available to a large portion of the general population promotes active transit and cycling in particular.

Disadvantages

Generally, limited number of rental locations makes one-way trips difficult; the lack of automation in the registration and rental system requires more personnel hours relative to the size of the system, and might discourage casual users; and, longer lending periods can mean that there are fewer bikes available to borrow at any given time.

Hybrid Model

Because Hamilton has a relatively dense downtown core, and large education and health institutions outside that area, Smart Commute should follow the basic recommendations of a small-scale community based model, but should consider incorporating elements of the larger scale system. While it may not be economically feasible to have a large number of bike stations, incorporating technology typical of smart-bike systems should prove beneficial. This could be financially feasible partly due to the existing capabilities of the libraryôs tracking system. Some such as registering users and reporting bike repair requirements ïbut sign-in/out procedures could be partially automated.

Proposed Hamilton Pilot Project

(NOTE: SINCE PUBLICATION THE "SMART GENERATION" MODEL OF BIKE SHARING SYSTEMS HAS BEEN SELECTED BY PUBLIC WORKS AS ITS PREFERRED MODEL, PLEASE SEE APPENDIX FOR MORE INFORMATION)

Smart Commute Hamilton and the City of Hamilton have proposed to implement a bike share pilot program in the City of Hamilton. The "Hamilton Pi awareness of citizens and facilitate a shift towards cycling in particular and sustainable transportation in general. The Smart Commute Hamilton-McMaster Bike Share Proposal (2010) outlined a potent in Hamilton that would collaborate with Hamilton Public Libraries. This report recommends a phased implementation starting no earlier than the spring of 2011.

Outline for library hybrid model

Phase One Outline

Phase one should begin with development of a Hamilton PBS Task Force, a group that would administer the project. This Task Force could be made up of representatives from partner organizations and those involved in PBS Stakeholder Meetings. In addition to Task Force development, the first phase also includes: hiring a full time project coordinator; finalizing business and marketing plans; finalizing hub locations by formalizing community partnerships; developing website and program materials; and, most importantly, releasing a Request for Information (RFI) or Request for Proposal (RFP) to relevant PBS corporations so as to obtain a workable physical solution to the check in/out procedure.

Phase One Development

Docking Stations

Tentatively, stations would be comprised of a physical docking station with an RFID-enabled padlock and reader/antenna. The final design of this docking station is uncertain until designs are submitted in response to the Smart Commute RFI/RFP. Electronic locking technology is versatile, and any mechanical lock can be programmed so as to track use and fur designs include RFID-enabled padlocks on bike lockers or programmable U-Locks and traditional bike racks. Due to cost and streetscaping issues, bicycle lockers are not recommended. Following conversations with the Buffalo Blue Bike coordinator, this report advises against leaving bicycles outside, overnight, in downtown areas with low foot traffic. That coordinator also suggested partnering with organizations willing to house bicycles overnight, in problem areas. More detailed information concerning bike, locks, keys and RFID technology is included in **Appendix A**. The following implementation actions remain:

- Design, release and respond to RFI/RFP;
- Secure physical locations for hubs;
- Purchase hardware;
- Install physical stations and RFID reader/antenna at each location. Integrate docking technology with website and library network;
- Train library staff to use integrated PBS/library software
- Ensure system design allows PBS Coordinator administrative access to network; and
- Launch website, which allows users to check location/status of bicycles throughout network.

Staffing

Due to uncertainty inherent in PBS development, it is impo s s i b l e t o d e f i n e C o o r d i n a
The following is a tentative list:

- General administration of Hamilton PBS;
- Liaising with Task Force and SCH;
- Marketing strategy and material development;
- Collecting, disseminating, analyzing usage data;
- Managing bicycle maintenance, supervising volunteers or completing work individually;
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- Preparing and presenting an annual report and regular frequent reports

Hamilton Public Library could also support the program in the following ways:

- Administering user registration and the borrowing/return of RFID keys;
- Responding to questions from library members;
- Maintaining, charging and programming the RFID keys;
- As per library policy, contacting users who do not return bicycles in time, and taking appropriate punitive measures (fines, etc.); and
- Maintaining communication with Coordinator.

Promotion

As stated earlier in this Report, marketing is widely accepted as a key element in successful PBS systems. A marketing strategy should include the following:

- Create, advertise and distribute a map, which identifies locations of bike stations along with key destinations and relevant attractions within the City of Hamilton. Should also contain information about trails, route suggestions and other cycling facilities within the City;
- Development of digital materials, to distribute amongst institutions identified in Phase Three Outline and include on PBS website;
- Developm Ŝ y ű ƨ ∓ LJ NJ ǎ y ű Y l ű Ŝ NJ ǎ l f ă ű ƨ Ř ǎ ă ú NJ ǎ ō dz ű Ŝ Y LJ ƨ ă ű
- An approach to obtaining sponsorships and advertising agreements for Hamilton PBS.

Phase Two Outline

Various measures to improve the quality, efficacy and efficiency of the system will be taken during this phase. Feedback from the user base and independent assessments should be pursued, and if necessary software updated. Other PBS coordinators highlight the importance of flexible software as PBS development is difficult to estimate. Depending on program success and funding, additional hub locations and bicycles could be added to the fleet during this phase. Development of a reporting schedule to Task Force will begin, as will Task Force monitoring.

Phase Two Development

The following indicators could be used to measure the success of the program, and to identify areas that are successful or demand greater attention:

- Quantitative and qualitative account of promotional materials, distribution of said materials, and number of individuals reached by materials;
- Total user information: number of registered users at a designated time (after one week, month, year);
- Average membership usage rate: number of member borrowings/total number of members at a certain time (for example, the lunch hour, averaged over certain time period);
- Average fleet usage rate: the number of borrowed bikes or total number of bikes at certain times;
- Bicycle utilization rate: number of hours each bicycle is used compared to hours of availability;
- Bicycle/station vandalism/theft statistics
- User cycling habits: how often members use PBS vs. other modes of transit, tracked over a time period; and,
- Program adherence to budget.

Phase Three Outline
This phase will be similar to the second phase. Reporting and monitoring by Task Force will continue, and those procedures should be formalized. This report suggests monthly reports to the Task Force; reports should identify website statistics, budget updates, number of bicycle loans from each location, number of registered users as well as issues identified and resolutions, etc.

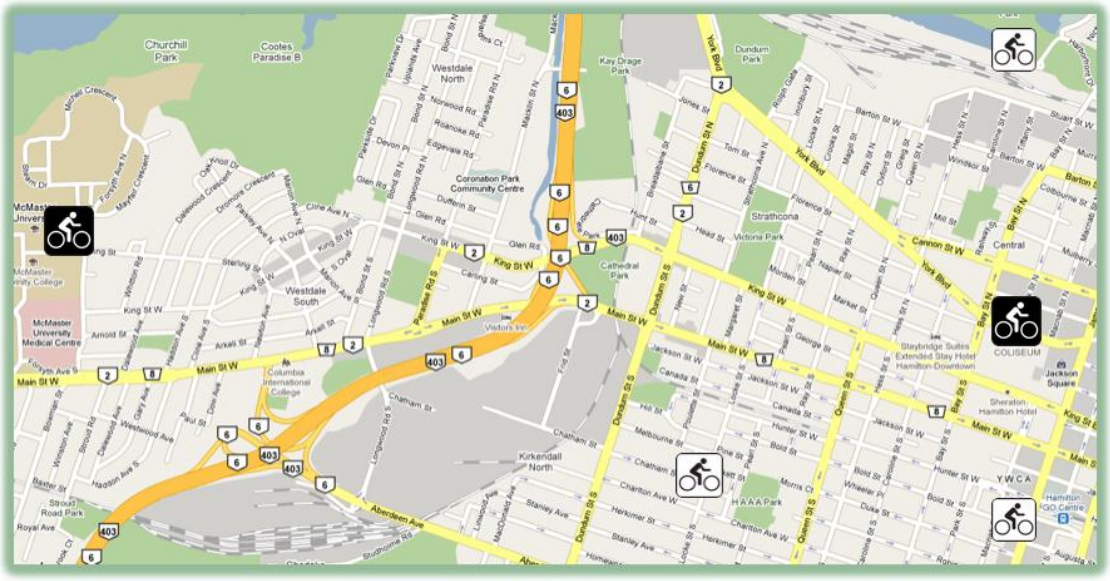
Through all three phases, PBS should be promoted through radio and local television media, presentations, Library communications (newsletters, list-servs, etc.), posters, regional and City websites and list-servs, Task Force member websites and list-servs, social networking sites, and local websites and blogs (for example, ñRaise the Hammerò and ñTrans

Outstanding Issues of Concern for Library Model:

- Liability insurance (and age limit for borrowing bicycles);
- Equipment insurance;
- Funding model, and source of funds;
- Potential for revenues; and,
- Secure partnerships with organizations willing to host bicycles overnight (especially relevant for downtown locations, unless heavy foot traffic)

Kiosk Location Map

The following map outlines desired hub locations. As always, the more hubs available the greater chance for program success. McMaster University and the HPL Main Branch are, given the RTM indicators, obvious hub locations. Depending on funding available, this report also recommends placing hubs on Locke Street South, at the Go Station on Hunter Street, at the Waterfront Park and downtown Dundas (not shown on map, due to scale).



Legend:

: Priority Hubs

: Secondary Hubs

Source: Google Maps

Project

Case Study Review

This section of the Report includes a summary of research done on pre-existing PBS in the Phase One Newmarket Report. The Newmarket study team examined six current PBS and the Toronto Community Bicycle Networkôs BikeShare program, which is no longer in operation. Only systems sufficiently similar in scope to Hamilton to be reviewed here.

Lessons learned, successes and challenges revealed in the case study systems are briefly reviewed in the table below. More detailed information can be found in the Newmarket Phase One Report, Chapter 3 and Appendix Table A-1 (online, at: http://www.smartcommute.ca/resources).

	Brief Description	Particular Successes and Challenges

University of Toronto's (Toronto, ON)	Bikechain started in 2008, and rents bicycles to students, staff and faculty at the University of Toronto. Bicycles are rented for up to two days, and extended at staff Requires $25 deposit to rent a bike but there is no membership fee. Rentals are available at the Bikechain shop in the Koffler Student Services Centre.	According to Bikechain staff, successful implementation requires: ¶ Devoted, committed and skilled mechanics who are willing to devote the long hours necessary to repairing and maintaining bikes ¶ Accessible and highly visible location (which Bikechain lacks) ¶ Constant funding source. Bikechain accomplishes this with a student levy Bikechain has found it difficult to expand due to limited bike storage and few locations for new bike racks. The coordinator reports that it is difficult to balance maintenance demands with potential growth. Liability is an issue, since insurance can be expensive and might require wearing a helmet (which is difficult to provide).

Blue Urban Bike Program (Carrboro, NC)	Since 2006 the Blue Urban Bike (BUB) program has run year-round. BUB has nine ñBU Carrboro and Chapel Hill, North Carolina. Each hub is located in a local business and requires an employee to check bicycles in and out through the exchange of a key for a membership card. There is a $10 annual fee, which allows members to rent bicycles for up to 24 hours at a time. Members must return a bicycle to the hub from where it was rented.	Requires business partners who are willing to provide in-kind employee time for check in and out of rental bicycles, which saves BUB resources. Trips are necessarily one way, because bikes must be returned to hub of origin, which makes the network less convenient.
Buffalo Blue Bicycle Program (Buffalo, NY)	Begun in 2006, the Buffalo Blue Bicycle (BBB) uses old or unused bicycles donated, left over from police auctions or collected from the garbage. Membership is either $25 for a seasonal fee (May to October) or a donation of six hours of volunteer service towards the BBB program. BBB reports, on average, 14 rentals per bike per season.	BBB estimates that t due to university and college students, who make up around 60% of program membership. BBB identified the check-in/check-out process as a large challenge. Program administrators developed a website to keep the system accessible and simple. Other institutions have taken the initiative to contribute to and expand the program. The University of Buffalo is planning a second workshop on campus, and the Psychiatric Centre has integration the blue bicycles into their wellness program. Due to a heavy reliance on volunteers BBB had to modify their bike fleet so as to reduce maintenance demands. Bicycles were converted to single-speed and retrof tires to reduce flats.
Community Bicycle Network	This program ran from 2001 to 2006, and in its last year was the largest and most successful PBS in North America (Bixi, in Montreal, is the largest). CBNôs bikes, 16 hubs and over 400	BikeShare was extremely popular with users, local and national media, and the general public in Toronto. Media helped to increase the profile of the organization in the city. BikeShare signed up over 2000 members in the six years the program ran.

	members. Using a web-based computer tracking system, BikeShare employed a full-time coordination and a part time mechanic. Cafes and community centres throughout downtown Toronto volunteered staff at each hub and managed check in and out of bicycles. Membership cost $25 or four hours of volunteering with CBN or other community agencies. Bicycles were recycled, painted yellow and standardized with a single-speed drive train, basket, lock, bell and reflector. CBN volunteers redistributed bicycles using bicycle trailers and cargo bikes. In 2003, CBN reported that, on average, each bike was borrowed over 15 times, and each member borrowed a bike at least six times.	CBN was unable to wean itself from grant money and so never reached financial self-sufficiency. BikeShare was unable to recover expenses through user fees. When grants from public and private ran out the system was forced to shut down and most bikes were sold.

Best Practice Review and the Hamilton Pilot Actions

The following list summarizes general best practices, based upon interviews and a literature review borrowed from the Newmarket Phase One Report. That list is contrasted with actions related to the Hamilton pilot proposal.

	Suggested Best Practice	Hamilton Proposal	Action
System Planning	¶ Minimum of one year to plan and test system before launch ¶ Preferable to phase the implementation process	✓ ✓	¶ Recommended launch in Spring 2011 or later should allow for at least year of planning; original document developed in Summer н л л ф Y ά- l l· Y McMaster Bike Share t ƛ f ƻ ű t NJ ƻ LJ ¶ Phase One describes launch of initial kiosks; Phase Two and Three describe possible expansion, monitoring and amendment
Stakeholder Consultation	¶ City of Hamilton residents, employees, students, visitors ¶ Public transit riders ¶ Bicycle retailers/rental businesses ¶ Residents/businesses near PBS kiosks: ƛ y Ř ƛ Ø ƛ Ř dz l· f ă Σ ƻ NJ ű K NJ ƻ and business improvement areas	✓	¶ BikeShare committee includes Smart Commute Hamilton members, the Hamilton Cycling Committee; updates on Feasibility Report have been provided at SCH meetings ¶ Should be advertising directed towards HSR and GO riders, at stop locations and transit centres, as well as contact information for input ¶ Contact Freewheel Cycles in Dundas, which offers limited rental services, and should include retailers in BS Committee ¶ Given limited scale of PBS in Hamilton, likely unnecessary
	Suggested Best Practice	**Hamilton Proposal**	**Action**

Research and Needs Assessment	¶ Assess/define target groups as well as potential service area	✓	¶ Current approximation of service area will be further refined through Phases Two and Three additional collaboration with BikeShare Committee and public consultations
	¶ Examine community need	✓	¶ On-line survey distributed to local residents, with constructive results
	¶ Gain municipal commitment to sustainable transportation, for example in policies and budgets	✓	¶ Smart Commute Hamilton and Metrolinx are primary supporters of PBS
	¶ Ensure a safe and convenient cycling infrastructure, or resource commitment to improving urban cycling conditions		¶ Presently, concerns regarding cycling infrastructure downtown, but recently updated Cycling Master Plan
	¶ Gain sufficient resources (capital and operati costs)		¶ Detailed budget, confirmation of funding and in-kind support, and estimate of potential revenues
	¶ Ensure there is sufficient urban space for kiosks	✓	¶ D ƛ Ø Ŝ y ű Ƙ Ŝ and limited number of kiosks, this is likely
	¶ Conduct best practice research	✓	¶ Summarized in this report; further research available in Newmarket Phase One Report
	¶ Select technology and syste		
	¶ Develop business strategy		

	Suggested Best Practice	**Hamilton Proposal**	**Action**

Partner Recruitment	¶ Gain support of Regional Transportation Authority	✓	¶ Feasibility Report supported by Metrolinx
	¶ Local Municipality	✓	¶ Feasibility Report a joint project with City of Hamilton and Smart Commute; no city councillors on BikeShare committee
	¶ Public Transit Operator		¶ Some involvement through Smart Commute Hamilton; stronger relationship necessary
	¶ Smart Commute	✓	¶ Feasibility Report supervised by Smart Commute Hamilton
	¶ Relevant businesses (bicycle repair shops, car sharing operators)		¶ Retailers should be included on committee, relationship with Hamilton CarShare should be further developed
	¶ Local cycling groups, non-profit organizations and municipal cycling advisory committees	✓	¶ Hamilton Cycling Committee involved with BikeShare committee, TLC invited strong relationship with MACycle Co-op at McMaster University
	¶ Local community centres, and public libraries	✓	¶ Positive and committed working relationship with HPL
	¶ Bicycle manufacturers, suppliers and industry associations		¶ Still to be recruited as potential sponsors

	Suggested Best Practice	**Hamilton Proposal**	**Action**
System Selection and Design	¶ Successful PBS are simple and quick to access and use, so should maximize convenience and ease-of-use	✓	¶ Integrating with library system so as to develop self-service kiosk is goal of system
	¶ Multiple payment and registration options (on line, phone, kiosk or cash)		¶ Registration would be at library or online, and

	¶ ! ά { Y l NJ ú . ƛ ļ Ŝ έ ă è ă ú Ŝ throughout an urban are requires a minimum population of 200,000 ¶ For smaller communities or service areas (as would bethe case with the system described this Report) a unique, manual system that more closely resembles a community PBS might be ideal ¶ Integrating a PBS access card with a pre existing transit pass		fees would be handled analogously to library fines ¶ A Smart Bike system is not the focus of this Report, though l l Y ƛ f ú ƨ y Ω ă population is sufficient ¶ This Report describes a custom designed, hybrid-type model which combines automation with an, at least initial, small scale ¶ Current goal is to integrate with library card, though use with y Ŝ ø ά t NJ Ŝ ă ú should be considered
Bicycle Design	¶ Bicycles must be distinctive and ar branded ¶ Bicycles must be simple, durable and unattractive to thieves ¶ If planning a Smart Bike system it is necessa to ensure a sufficient number of bicycles per inhabitant (typically one bike per 150 people in target area).	✓ ✓	¶ Eventually system design will incorporate those characteristics ¶ N/A

	Suggested Best Practice	**Hamilton Proposal**	**Action**
Station Design and Layout	¶ Smart Bike systems require a high density of kiosk locations so as to maximize convenien the optimal spacing is typically between 300 and 500 meters ¶ Kiosks should be installed at major destinatio and transit stations within PBS area. Genera criteria for determining station locations are: o Population density; o Employment density; o Proximity to transit stations; o Proximity to bicycle routes; o Proximity to educational institutions; and o Proximity to museums, parks, libraries, and	✓ ✓	¶ N/A ¶ Kiosk locations will be primarily influenced by those factors; McMaster University, ú K Ŝ I t [Ω ă are obvious locations and depending on number of kiosks in Phase One, salient

	other public facilities. ¶ Park-and-ride lots should be taken into consideration when determining kiosk location, as they can encourage completing car trips by bicycle ¶ Every kiosk location should include a map of nearby stations ¶ If possible, incorporate a solar power supply kiosks ¶ In colder climate where snow removal is an issue, fully fixed kiosks can be problematic	 ✓ ✓ ✓ ✓	points between those two will be considered ¶ An effort will be made to include kiosks near major transit centres, particularly the GO Station; there are no major park and ride stations in Hamilton ¶ An effort will be made to provide a system map at each kiosk ¶ Kiosk design will try to include a solar power supply ¶ As Hamilton receives considerable snow, kiosks will either be designed so as to be movable, or else integrated into streetscape so they are not obstructions

	Suggested Best Practice	**Hamilton Proposal**	**Action**
System Security	¶ GPS technology to track bicycle location ¶ Real time computerized tracking to identify individual user associated with specific borrowed bicycle ¶ Theft and vandalism presents a unique challenge for every different PBS, and require a degree of trial and error; as more PBS are rolled out, success stories will be shared	✓ ✓	¶ GPS will be considered budget permitting ¶ The HPL provides the ability to follow users and track bicycles ¶ This challenge will be ongoing.
Cyclist Safety	¶ PBS operator has responsibility to keep its users safe, because it might be impossible to put every user through a safety program, other cycling safety campaigns should align with system launch ¶ A safety waiver is necessary	 ✓	¶ Marketing and launch materials should include safety information ¶ Part of registration process includes necessary safety waiver

Business/Funding Model and Pricing	¶ Long term financing (capital and operating) should be planned and committed to from Fir Phase onwards ¶ Smart Bike systems, whose aim is to promot cycling, should employ a pricing incentive which allows the first half hour of use for free and then charging a fee for additional use beyond 30 minutes	✓	¶ Funding sources pending ¶ PBS in Hamilton would likely follow that pricing model, with a deposit of value
Pilot Testing, System Launch	¶ A full Smart Bike system should roll out with least 50% of its fleet following a small-scale pilot used to test the technology ¶ System launches are best done in the spring summer, and paired with a large event such ŀ ά ō ƛ ʅ Ŝ ű ƻ Ƴ ǿ Ƨ ǻ Ŝ Ɲ Ǆ Ŏ Ƙ Ɲ week	✓	¶ N/A ¶ Launch planned for spring, and should be paired with Smart Commute Hamilton initiatives

	Suggested Best Practice	Hamilton Proposal	Action
Marketing	¶ ! ά ſ ƻ Ŏ ŀ ſ Ŏ Ķ ŀ Ƴ Ǉ ƛ ƻ ƴ Σ έ celebrity, can be very helpful in publicizing a PBS and ensuring its success ¶ Continuous, on-going marketing maintains the Ǉ ƻ Ǉǳ ſ ŀ Ɲ ƛ ű è ƻ Ŧ ŀ ŧ . { appeal ¶ PBS marketing should be paired with genera cycling marketing, and encouraging purchase of personal bikes	✓ ✓	¶ A prominent local community member should be included in development of marketing materials ¶ Marketing campaign will continue after launch of PBS ¶ Municipal staff, Smart Commute Hamilton and other members of Bike Share committee should be included in development and implementation of marketing materials
Monitoring	¶ Throughout implementation, monitoring a ne PBS is essential, so operator can tweak stati locations, concentration of bicycles, and othe relevant system processes which might improve efficiency and performance ¶ Consistent and reliable monitoring also helps to make the case that a PBS should stay in	✓ ✓	¶ Phased implementation of Hamilton PBS places emphasis upon monitoring and adjustment, especially as system develops and expands ¶ ά w Ŝ Ǉ ƻ Ɲ ű ƛ ƴ ∃ be established once PB

	operation, or requires additional funds		launches, so as to closely follow successe and challenges

Remaining and important best practices requiring action:

- ¶ Sufficient resources for capital and operating costs not yet secured
  - o Business strategy must be developed
- ¶ Research must establish a resource commitment to improving cycling conditions in Hamilton
- ¶ Exact technology and system design still uncertain
- ¶ As important stakeholders, public transit riders and bicycle retailers/rental businesses require more extensive consultation
- ¶ Public transit operators and bicycle manufacturers, suppliers and industry associations should be recruited as partners
- ¶ System design should try to include multiple payment and registration options (on-line, phone, kiosk or cash)
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- ¶ PBS launch should coincide with other cycling safety programs, as PBS operator has some responsibility to keep users safe
- ¶ Initial PBS launch should include, at minimum, one half of full fleet
- ¶ A local champion should be acquired, so as to better market a PBS in Hamilton

Feasibility Assessment

Strengths and Weaknesses

This section presents various strengths and weaknesses in the proposed Hamilton PBS, based on previous information included in this report. Strengths ar success. Weaknesses are areas, which left unaddressed, would decrease the chances for success of a PBS in Hamilton. The Library Model is of primary concern to this section, but most identified characteristics hold in general (i.e. for Important characteristics follow, as do Boulder ô s select recommendations to address weaknesses.

Strengths:

Planning Time Frame:
Best practice indicates the importance of extended and phased planning. This Report represents one part of a planning process that began in summer of 2009, and will continue through 2010 and likely into 2011.

Phased Implementation:
This report recommends and describes a phased i 0 1 7Sc-4(0 1 7S58(t)-4(i)6(ce)-2( )11(i)-4(nd)(i)6(ce)-2( )11(i)-4(nd)(i)