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# The Implementation of a Public-Use Bicycle Program in Philadelphia

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# The Implementation of a Public-Use Bicycle Program in Philadelphia

## **Abstract**

Philadelphia has many worries: from a declining economy, to a population decrease, to severe gun violence. The city suffers from these worries as well as high taxes, poor transportation options and few jobs for many workers, all detrimental the quality of life of Philadelphia citizens. Severe congestion, high costs of car ownership as the mounting price of public have severely impeded personal mobility in the city. One answer to this detrimental problem can be found in Europe, through public-use bicycles (PUBs). In over 60 European cities, PUBs have made an enormous impact on personal mobility, allowing citizens to access the city through bicycles, used as a part of public transportation. Through user accountability and theft deterrents, PUB programs provide citizens with a highly efficient and reliable transportation option. Philadelphia could benefit greatly from such a program. Through a study of successful PUB programs throughout the world, Philadelphia can garner information regarding implementation, funding, operation, and infrastructure. All this information will be put forth in order to deliberate on the best practices of other models and see them replicated in Philadelphia. It is hoped that, in the future, Philadelphia will have a very successful large-scale public-use bicycle program, the first of its kind in North America.

## **Keywords**

Urban Studies; Philadelphia; bicycles

## **Disciplines**

Social and Behavioral Sciences | Urban Studies and Planning

## **Comments**

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**THE IMPLEMENTATION OF A  
PUBLIC-USE BICYCLE PROGRAM  
IN PHILADELPHIA**

Brittany Bonnette  
Urban Studies Senior Thesis  
University of Pennsylvania  
19 December 2007

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## **ABSTRACT**

Philadelphia has many worries: from a declining economy, to a population decrease, to severe gun violence. The city suffers from these worries as well as high taxes, poor transportation options and few jobs for many workers, all detrimental the quality of life of Philadelphia citizens. Severe congestion, high costs of car ownership as the mounting price of public have severely impeded personal mobility in the city. One answer to this detrimental problem can be found in Europe, through public-use bicycles (PUBs). In over 60 European cities, PUBs have made an enormous impact on personal mobility, allowing citizens to access the city through bicycles, used as a part of public transportation. Through user accountability and theft deterrents, PUB programs provide citizens with a highly efficient and reliable transportation option. Philadelphia could benefit greatly from such a program. Through a study of successful PUB programs throughout the world, Philadelphia can garner information regarding implementation, funding, operation, and infrastructure. All this information will be put forth in order to deliberate on the best practices of other models and see them replicated in Philadelphia. It is hoped that, in the future, Philadelphia will have a very successful large-scale public-use bicycle program, the first of its kind in North America.

## **INTRODUCTION**

Philadelphia is growing. The city is developing vigorously with a condominium boom, an alteration in the skyline (Comcast Tower), and the distinct possibility of casinos on the waterfront. All these changes point to a vast degree of growth occurring in the city in the years and development projects to come. Deemed the “Next Global City” by *National Geographic Traveler*, Philadelphia is progressing towards becoming a desirable place to live. However, she needs to adjust, modernize, and correct problems in order to become one of the great cities of

America today. Philadelphia must step out of the shadow of New York City and Washington, D.C.; Philadelphia must present herself as a city apart.

By confronting a current urban problem in an innovative manner, Philadelphia could step into the limelight. Over 60 cities in the world, predominately in Western Europe, have managed debilitating automobile congestion, emissions and decreased personal mobility with an ingenious public transportation option called Public Use Bicycles (PUBs). With no successful programs currently in North America, Philadelphia could step into the limelight while combating a perpetual urban problem. By implementing a PUB program, a modernized community-use bicycle program, Philadelphia could alleviate pressure on her current public transportation system, decrease automobile usage, and showcase the city as an American urban enclave of sustainable transportation. The implementation of a Public Use Bicycle Program in Philadelphia is possible and approaching.

The goal of this paper is to provide Philadelphia with a well thought-out work on the background, successes and failures of PUB programs. In doing so, this researcher hopes to pinpoint essential elements of successful programs and provide a guide for success in Philadelphia. In order to do so, the conventional transportation issues that confront the world today must be presented and alternative transportation methods explored. Looking at alternative, sustainable transportation methods, namely, Public Use Bicycles will provide the reader with a solid foundation of determining the success of these methods. The next step will be to discuss and assess the success of such PUB programs throughout the world. One such program, in Lyon, France, is considered one of the most successful; a case study of this program will provide Philadelphia with an infrastructure of success from which to learn. In turn, with a thorough understanding of the political and social climate of Philadelphia, this researcher will propose



three potential models of implementation for PUBs. These three models are currently being pursued within the city and the future looks bright for PUBs in Philadelphia.

## **I TRANSPORTATION: PAST, PRESENT AND FUTURE**

In assessing the need for sustainable transit options, it is very important to look at the overall transportation difficulties in order to observe general mobility climate. A prominent difficulty in urban development today is finding a balance between economic growth and individual mobility while respecting concern for the environment and the quality of life of citizens (European Communities, 2003, p. 9). This delicate balance has not been respected in America. America is an automobile nation; the car is the number one choice for Americans who wish to travel, commute and run errands. As a highly urbanized environment, with 79 percent of people living in urban environments, America is virtually inundated with the automobile (United States Census Bureau, 2002). The car is used inefficiently and without regard, as is evident in the fact that 75.7 percent of Americans travel to work daily by driving alone (Transportation Research Board, 2006, p.xvi). A technological advance which gave Americans independent and efficient mobility, the automobile has slowly dominated the lives of citizens. This dominance, evident in the abundance of cars and roads and parking lots, has stretched into planning sectors. With neighborhoods displaced and expressways crisscrossing cities, until recent years, it has been the automobile who wins the majority of urban wars and “dwarf and intimidate humans” (Lowe, 1990, p.7).

### **I.A Negative Impacts of Current Transportation Options**

This dominance is not limited to the city planning sector, as the European Union (EU) outlines in their publication entitled, Reclaiming City Streets for People: Chaos or Quality of

Life? The Directorate-General for the Environment of the EU outlines the ten global problems associated with increased automobile usage and congestion.

1. Accidents: Road safety directly impacts quality of life as over 43,000 people lose their life in automobile accidents every year in the United States(National Highway Traffic Safety Administration, 2005, p.1).
2. Air pollution: Carbon dioxide and nitrogen dioxide emissions have multiple effects including global warming, health problems and building decay. Health costs of particulates in urban areas can cost taxpayers enormous amounts of money, as is apparent in Great Britain. Their Department of Health estimates the costs to be around 500 million pounds per year due to automobile emissions (European Communities, 2004, p.11).
3. Energy consumption: Consumption of fossil fuels is a negative impact of automobile usage as individualized transport comes at the cost of oil and gas.
4. Noise pollution and vibration: These negative impacts of automobiles have great effects on the quality of life of citizens.
5. A loss of urban 'living space': Due to 'motorized transport infrastructure' like roads and parking lots, cars dominate center cities and open space alike.
6. Severance of communities: Congested infrastructure impacts the quality of life in communities.
7. Competitiveness: Original downtowns and town centers face competition from less congested, more expansive suburban retail centers.
8. Economic Efficiency: "Traffic congestion, pollution, and accidents result in significant direct and indirect costs."

9. Visual Intrusion: The urban environment is drastically altered as infrastructure such as expressways and parking garages are constructed.
10. Equity: There are a large amount of people who are unable to afford or drive an automobile and therefore they are subjected to the negative impacts of automobiles while not able to enjoy the accessibility benefits of car ownership.

These ten negative impacts provide a solid framework for confronting the issue of sustainable transit. Concern for the footprint of human activities, on the environment and on the quality of life of other citizens, has increased over the past two decades. With such social, environmental and economic costs linked to automobile use, it follows that for the health of the community unabated automobile usage should be altered. The question of how automobile dependence can be changed remains.

### **I.B Choices to be Made**

Continued car use aggravates the problems, since another car on the road is another automobile aiding to congestion and pollution. Therefore, a reduction in automobile usage is imperative in order to maintain the mobility of cars (Dekoster & Schollaert, 2000, p.10). There are many initiatives aimed at reducing congestion and producing “traffic calming,” which have as a goal sustainable transit and a betterment of quality of life. In pursuit of a better quality of life, citizens must be presented with viable transportation options and must realize the effect their choice is producing.

## **II ALTERNATIVE TRANSPORTATION OPTIONS**

### **II.A Public Transportation**

The most commonplace alternative to private automobile usage is public transportation. Public transportation provides those who are not able to drive, cannot afford cars, or wish to

avoid the hassle of traffic the opportunity to join with others of the city to travel to a collective location in a sort of carpool. This method of transit can be expensive, inefficient, slow and/or difficult to navigate. Older networks are found to be insufficient for today's needs and expansion is costly, slow, and problematic. However, as traffic and environmental impacts become more central to people's concerns, public transportation does and will continue to fill the void for those unwilling or unable to drive.

## **II.B Congestion Pricing**

Another option in combating the negative impacts of the automobile is "congestion pricing" in which vehicular road users in congested urban spaces are charged a price which is set to approximately offset the cost of use of such space. The cost is set to cover the congestion, road wear and tear and environmental impacts that this added vehicle causes (World Bank, 2002, p. xiii). Congestion pricing began to answer to the concerns of economic costs of congestion. A program began in London, England in February 2003 in response to the Confederation of British Industry calculations that time spent in traffic in the London area costs more than 10 billion Euros (14 billion dollars) per year in production and time lost (Dekoster & Schollaert, 2000, p. 20). With a price of 5 pounds (around 10 dollars) to travel into central London in a vehicle between the hours of 7AM and 6:30 PM. Implemented to attempt to limit the amount of automobiles and therefore traffic in the center city, the move was to lessen the impact on the environment, quality of life and also the local economy. The area included in this pricing has since been extended but there are many questions regarding the efficiency and advantages of this initiative. Congestion pricing is one method of handling traffic but it may not be doing anything to diminish car ownership or usage, just frequency and location. Further studies on congestion pricing continue to be conducted.

## **II.C Car Sharing**

A popular initiative aimed at decreasing automobile dependence and dominance is car sharing. Characterized by an organization or group of people who collectively incur the costs of automobile ownership, car sharing provides the benefits of car use while dispersing the responsibility and cost. The expenses, such as maintenance, gas, parking, and insurance are spread out therefore significantly decreasing the high costs to individuals associated with automobile ownership. Cities across America have non-profit organizations (around 18 car sharing organizations currently, according to carsharing.net) using this model to provide fleets of automobiles to citizens and members. Car sharing has a significant impact on congestion, pollution, gas usage, parking and ownership statistics. The foundation of the programs is that a large amount of urban inhabitants do not need constant and daily access to cars. If this is true, that means there are many automobiles which stay parked and unused, still taking up space, contributing to congestion and wasting money. It is hoped that in providing a populace with access to maintained, insured and environmentally friendly (such as hybrid) cars, many citizens will sell or defer from buying a vehicle.

## **III THE ADVENT OF SUSTAINABLE TRANSPORTATION**

While congestion pricing and car sharing are ways to limit private automobile usage and ownership, they do not actually provide an alternate mode of transit. The key to the future of sustainable transit is to offer not only fewer cars, but alternate, plausible and efficient modes for mobility. As stated by the National Peer Review of the Netherlands, in their paper on “Implementing Sustainable Urban Travel Policies,” the key to combating automobile dominance is “striking a balance between individual freedom, accessibility and environmental amenity in the pursuit of a sustainable society” (p.35).

### III.A Cycling and Walking

This individual freedom and mobility can be found in non-motorized transit options. Non-motorized transit is typically limited to cycling and walking which are deemed by many academics, “the most economically, socially, and environmentally sustainable forms of human locomotion” (Donaghy & Poppelreuter, 2005, p.197). In comparison to motorized transit, cycling and walking provide the most efficient use of urban space and resources. In a study quoted by the EU, a researcher recorded the number of people crossing a 3.5 meter-wide space in an urban environment during a one-hour period. His estimates are summarized in Figure 1 below:

Mode of Transportation	Number of people in 3.5 m/hour
Private Automobile	2000
Bus	9000
Bicycle (non-motorized)	14000
Walking (non-motorized)	19000
Tramway	22000

Figure 1: Efficient use of Urban Space, as defined by amount of people in a 3.5 meter area per hour

As is evident above, these non-motorized modes of transit are highly efficient and enable a more diverse and efficient use of space with a minimum of impact. The tramway, while highly efficient, achieves this efficiency through expensive and disruptive construction therefore the high impact can be said to outweigh the efficiency.

The efficiency and impact of walking and cycling is apparent in their title as “soft modes” of transportation. Soft due to their lack of negative impact on the urban environment, cyclists and pedestrians are virtually emission free and therefore do not pollute (Dekoster &

Schollaert, 2000, p.16). These modes inflict far fewer costs on roads through wear and tear and damage to the infrastructure (Donaghy & Poppelreuter, 2005, p.196) while also taking up less space in motion and at rest.

Cycling and walking, while beneficial to the community, also have positive impacts for the individual. They have low initial and limited continuous costs. A bicycle purchased or appropriate walking shoes are all the investment needed to partake in this mode of transit. The cyclists and pedestrian also derive positive health benefits from their chosen method of mobility. If incorporated as a daily activity, such as a daily commute to work or to the store, regular walking and cycling have proven to be the most “realistic way that the population as a whole can get the daily half hour of moderate exercise which is the minimum level needed to keep reasonably fit” (Donaghy & Poppelreuter, 2005, p.197). Numerous studies through out the world have shown regular moderate activity such as that from cycling or walking help reduce the risk of obesity, adult diabetes, hypertension, coronary heart disease, osteoporosis, depression, stress and anxiety (Donaghy & Poppelreuter, 2005, p.197). These health problems are the cause of many deaths in America and through out the world every year. Cycling and walking combine excellent personal and communal benefits, making them excellent sustainable transportation choices.

### **III.B Misconceptions of Cycling’s Drawbacks**

The benefits of cycling and walking are easy to understand and see, however the active decision to bicycle or walk instead of using motorized transit is difficult to make. The main arguments for car use are that it is comfortable, relaxing, independent and quick (European Communities, 1998, p.5). As per the previous arguments, recent literature has shown that car usage is typically none of those in a congested, polluting urban environment. There are also

many perceived factors that influence people's decisions regarding transportation, such as convenience, weather, and safety. These factors, however perceived, are easily dispelled when one looks at adequate research.

### **III.B1 Convenience**

Car use easily becomes a habit (Lefèvre & Pucher, 1996, p.22), furthering the claim that using a car, even for short trips, is more convenient. Convenience has to do with immediate costs and time-saving methods and perpetuate the habits of car use. A car, if it has gas, does not require immediate payment to use as public transportation does. Also, if one is accustomed to driving and not using public transportation or cycling, it is easier to navigate and therefore quicker to drive to known destinations. These are false conceptions of convenience however. As stated previously, car use is expensive, for the person as well as society. Gas, maintenance, insurance and parking costs add up very quickly and while not directly noticeable every time someone uses his car, they are quite hefty when viewed in total spending. The idea that cars are quicker is incongruous when talking about short distances in an urban setting, In American cities, 48 percent of trips made by all modes of transportation are less than three miles (Pucher, 1999, p.2) with 28 percent being less than one mile (Pucher, 1999, p.21). With such short distances to travel in congested city streets with limited parking, it seems obvious that cycling or walking would be the quickest way to travel. However, continued prejudices combat this logic.

### **III.B2 Weather**

In beautiful, sunny weather, one will most certainly see an increase in pedestrians and cyclists, simply due to the pleasure of being outside on such a day. It is obvious that nice weather can have a positive impact on the number of people using non-motorized transportation. The



difficulty arises in that most people, decision-makers included, believe that weather can have a negative impact on these transportation choices.

Atmospheric conditions which could restrict bicycle use are snow, rain, darkness, pollution, wind, cold, heat and humidity. However, if one looks at countries characterized by such conditions, it is evident that the majority of conditions do not affect cyclists. For instance, in Cambridge, England, with its typically wet and chilly climate, one observes 27 percent of journeys made by bicycle. In the cold and snowy Northern Europe, such as the Netherlands and Sweden, climate does not deter the cyclists. Västerås, a city in Sweden, has 33 percent of all trips made by bicycle and Amsterdam, in the Netherlands, has 20 percent of trips made by bicycle (Dekoster & Schollaert, 2000, p.27).

Clearly, cycling is not limited to mild climates. Northern Europe has much higher cycling levels than southern Europe, which exhibits the “ideal” bicycling climate of dry, warm, sunny days (Pucher, 1999, p. 23). While weather does play a role in cycling decisions, it tends to be over-exaggerated and with the proper policy, infrastructure and education in place, non-motorized transportation options can replace a large percentage of motorized modes.

### **III.B3 Safety**

Another perceived conception about non-motorized transit is that they are highly dangerous. As a rule, cyclists are a wheeled method of transit and therefore must travel on the streets, sharing the roads with motorists. The idea of joining the high speed, large vehicle traffic scares many people as does the potential for cyclist accidents and fatalities. Statically speaking, cyclists and pedestrians do run a greater risk of being injured or killed in traffic accidents per trip or per kilometer on the roads in comparison to motorists (Donaghy & Poppelreuter, 2005, p.196). However, many of these statistics are misleading. They are aggregate numbers and do not look at

individual age groups. A large amount of cyclists injured are young, under 18 years old, as they have yet to learn the rules of the road and tend to ride in a more reckless manner (Dekoster & Schollaert, 2000, p.34; Pucher, 1999, p. 5). Statistics are biased against cyclists as statistics include two age groups (the youngest and the oldest) which are commonly excluded from driving (Dekoster & Schollaert, 2000, p.34). Also, the statistics do not look at the hazard that motorists represent for cyclists and pedestrians, which is relatively high. It is important to note also, that cyclists and pedestrians represent nearly no hazard to others. This relationship between motorists and those using non-motorized modes of transportation is very important to investigate. In a study conducted using accident statistics for cyclists and pedestrians from North America and Europe, P. L. Anderson determined the influence of cyclists on motorists. His study is quite groundbreaking and is consistently quoted and referenced. He concluded that there is “safety in numbers”, as his paper title implies. Essentially, a motorist is less likely to strike a cyclist or pedestrian if more people walk and bicycle. Inversely stated, the number of accidents and fatalities (i.e. safety hazards/dangers) for cyclists and pedestrians decrease if the number of cyclists and pedestrians increase (Jacobsen, 2003, p.1). Therefore, the path towards safer roads and to dispel the misconceptions of cycling and walking danger, non-motorized transportation is to devote time to increasing the amount of the population who choose these soft modes of transit.

### **III.C Affects on Other Modes of Transportation (Mode shift)**

It seems evident that many prejudices exist against cycling and walking. These prejudices are hard to dissuade, as deep-seated beliefs govern the majority of society. These stereotypes and misconceptions will not change unless there are large policy changes. As the EU has been stating for many years, policy aimed at creating safer bicycle and pedestrian routes, enforcing traffic calming, and increasing awareness for non-motorized, soft modes of transportation is the best

manner to introduce and foster sustainable transportation in a city. The point is not to remove all automobiles from the road, nor have all transit be emission and pollution free. The goal is to forge a partnership between motorized and non-motorized modes in order to support a positive future.

### **III.D Multi-Modal Transportation**

In order to create a partnership between these various modes of transportation, it is important to promote the idea of multi-modal transit. In the United States, the preferred mode of transit is the automobile at 87.9 percent with other modes dispersed along the very low percentages, ranging from 0.4 percent for the bicycle to 4.7 percent for transit (Transportation Research Board, 2006, p.266). This further supports the domination of the automobile in America. The key to finding a manner to dispel this dependence is the idea of multi-modal transportation choices; when various methods of transportation are integrated and can be used collectively to travel to a destination. For example, one can drive to a park and ride facility, take the commuter train into work, and then walk to the office. Each stage is a different method of transit and allows the commuter to spread out his impact by limiting his car usage, taking advantage of public transportation and getting the health benefits from being a pedestrian. Multi-modal transportation has a positive affect on overall mobility as it decreases congestion and spreads out the costs and wear and tear on various infrastructures.

It is difficult at times, however, to include the sustainable transportation choice of cycling in multi-modal transportation. Bicycles are rarely well accommodated for at park-and-ride facilities and many operators of public transportation are individually able to decide their “bike-friendliness”. Recently, there have been great developments in the integration of bicycles and transit. Through capital investments in bicycle parking and bicycle racks/holders in buses and

trains, transportation agencies across America have made it possible to pursue cycling as another stage in the multi-modal journey (Schneider, 2005, p.2).

This increased awareness of cycling's cohesiveness with public transportation is a positive advancement but does nothing to curb perpetual deterrents to cycling. In addition to the misconceptions listed previously, bicycle theft also works to curb private bicycle use. It is very difficult to live in an urban environment and secure the safety of one's investment and mode of transportation. Locks, racks, and manned bicycle parking aid slightly in the combat against bike theft. Unfortunately, theft remains prevalent in urban environments and therefore acts as a deterrent to bicycle purchases and usage which in turn limits cycling's role in multi-modal transit.

## **IV INCORPORATION OF CYCLING IN THE PUBLIC SPHERE**

### **IV.A Public Use Bicycles (PUBs)**

To take full advantage of a multi-modal, sustainable model of mobility, cities must confront obstacles to increased bicycle use. Profoundly explored in Europe and greatly neglected in America, public-use bicycle (PUB) programs present a highly successful and exciting option. Also known as community bike programs, PUBs are founded on the claim that a bicycle can become an influential addition to public transport and provide "public-individual transit" options (NICHES, 2007, p.2). PUB programs have been developing since the 1960's and have been focused on the provision of bicycles for use by the populace at a nominal cost. Through much development, they have positively impacted many cities. To better understand the programs, it is necessary to look at its history, which can be divided into three generations.

### **IV.B First-Generation**

The first PUB programs originated in the Netherlands with the goal of providing alternate transit options to the public. Termed the “first generation” PUB, these “utopian bike sharing” programs are characterized by donated bicycles, painted a solid color in order to deter theft, and placed haphazardly through out a city, unlocked (Beroud, 2007, p.8). Credited with running the first program, Luud Schimmelpenninck started the ‘Amsterdam White Bikes’ in 1968 as a project to improve the mobility of Amsterdam residents (Beroud, 2007, p.9). Many cities through out the world have attempted to recreate this system, such as the Red Bike Project in Madison, Wisconsin, the Yellow Bike Project in Portland, Oregon, and a similar program in Milan, Italy (Beroud, 2007, p.9). However, there is an internal flaw in the program that has prevented large-scale success as with the other generations. Built on the idea of civic responsibility and community, the first generation programs lack theft deterrents. Left to be used by whoever may need them, the bicycles are easily stolen and relocated (Beroud, 2007, p.10). The system is neither reliable nor efficient as no one can track the movement and fluctuation of the bicycles through out the city. While many first-generation programs continue to function, they often face high rates of bicycle theft and low user numbers. Developments in technology and organization have been able to progress upon this foundation.

#### **IV.C Second-Generation**

The second-generation PUB programs have proven more successful. This success is based in the addition of deterrents to theft and a fixed location of bicycles. One of the first programs was founded in Copenhagen, Denmark in 1995, entitled Fonden Bycyklen i København (Beroud, 2007, p.10). Run seasonally from May to December, the bicycles are located at specific racks through out the city, attached by a lock which opens with a coin deposit and is restricted by good will to the confines of the city center. The coin deposit is meant to act

as an impetus to return the bikes to their proper locations; however the cost is low, around \$4, compared to the cost of a new bike. These bicycles are typically donated, the only modification being the addition of the lock. A lot of the bicycles are stolen and this depletes the supply and ruins the reliability of the service. If a PUB program is going to stand in as a viable mobility option in conjunction with public transportation and automobiles, it is essential that users find the bicycles in convenient locations and sufficient numbers (NICHEs, 2007, p.6). Both the first and second-generation PUBs provide welcome opportunities to cycle but do not provide adequate enough support nor reliable service to alter motorized transportation choices and influence people to make significant changes.

#### **IV.D Third-Generation**

The third-generation PUB programs have used modern technologies to combat these ills of the previous generations as well as provide a real public-individual transit network. A much more complex system, the third generation remains true to the idea of PUB, bicycles for the use by citizens at a nominal or no cost for a short period of time. However, the third generation uses technology to deter theft, ensure user accountability and provide reliable transit. The bicycles at the racks throughout the city are no longer donated and refurbished. The bicycles used in the third generation are modeled specifically for this program. These well-identified bicycles usually have fused parts to deter tampering and theft as well as locking mechanisms. They also ensure the accountability of the user of borrowed bikes by requiring deposits and registration or credit card information. The cost of usage ranges among programs although many are free for the first pre-specified time period and once this time period is reached, incremental pricing is applied. For example, the bicycle may be free to use for the first thirty minutes after rental, but after thirty minutes, a charge of one dollar may be applied. The purpose is to encourage turnover of bicycles

as well as to discourage extended period rentals. PUB programs are designed to be used as a point-to-point public transportation, not as a daily bicycle rental program. These PUB programs, however different, have one goal which is to bring individual mobility to public transportation. With this goal in mind, PUBs have adapted their technologies to combat the serious impediments to individual mobility; ensuring user accountability in two distinct manners.

#### IV.D1 Card

In most third generation programs, bicycles attach directly to the rack without the aid of a cable or a U-lock. The racks are connected to a computer system which, either individually or collectively, controls the rental of each bicycle. In order to borrow a bike, the user has to consult the system as to which bicycle to take. Typically a pre-purchased card (with a mandatory deposit for loss, theft or damage of bicycle) or a credit card enables the user to rent the bicycle. This card provides the operators with a way of tracking duration of use. It also enables the operators the opportunity to hold the user accountable should anything happen to the bicycle (Beroud, 2007, p.15).

#### IV.D2 Cell Phone

A program limited mostly to Germany, England and Austria, some third generation PUB programs are controlled by cell phones. These bicycles are dispersed through out the city, around train stations and office buildings, and are locked with cable locks, just as a private bicycle may be. The user has to call a number emblazoned on the bicycle and an operator will unlock the bicycle from a central location. The user does the same for when he has finished using the bicycle. As with the card method, cost is nominal, however, prior registration is required, as a deposit is collected for accountability purposes.

For all third generation PUBs, the user has access to a network of racks throughout the city. A well-run and organized network of PUB is the most important factor if success as this ensures the fast, convenient, and flexible transit system users are looking for. Most networks are controlled and serviced by a fleet which has roaming bicycle mechanics as well as a transfer service which redistributes bicycles from overcrowded stations to stations that may be empty. While highly technical, third generation bicycles provide a basic and well-run service geared towards “seamless mobility” (NICHES, 2007, p.1); offering users a viable option to public transportation or private automobile use.

## **V OVERVIEW OF INTERNATIONAL PUB PROGRAMS**

Third Generation PUBs are considered the most attractive way to expand sustainable transportation options in the city. They have been proven to be “an effective measure to promote urban cycling as a “normal” daily transport mode when introduced in an integrated strategy and combined with other measures that make cycling safe and convenient” (NICHES, 2007, p.4). The network can act an impetus to increased private bicycle use. The appeal of PUB is that it is simple to use, fast and flexible. It provides an energy- and time-efficient one way option at little to no cost without the hassle of purchasing, maintaining and storing a personal bicycle. It is for these reasons that more than 60 cities in the world have implemented such a program with many others in various stages of planning.

The diversity of programs in many European countries is astounding, with programs in Austria, Belgium, Denmark, France, Germany, the Netherlands, Italy, Spain and many others. It is important to note that the programs vary in many manners, from size, to cost, to operator, etc. These differences are important to examine in attempting to determine the best suited program for implementation in a city such as Philadelphia. One category that is essential to evaluate is



that of the operator. The infrastructure required for the third generation PUB systems is quite expensive, including the design and planning stages (what system to use, where to place the stations, etc.) as well as the capital infrastructure investment which includes operation, service and maintenance staff, bicycles, racks, and service terminals (NICHEs, 2007, p.4). These implementation costs are quite high and therefore it is difficult for a single city function or private organization to front all the costs. Therefore, it is imperative to look at the various funding sources of these programs. It is also important to note that these costs are significantly less than the expense of extending a subway line or creating a tramway.

### **V.A Various Funding Sources of PUBs**

The first third-generation PUB program was created in northwestern France in a city called Rennes. The Rennes program set the precedent for many other programs. Named *Vélo à la Carte* (*vélo* is the French word for bicycle), this third-generation PUB program began on June 6, 1998. With 200 bikes and 20 stations in a city of 210,000 people, Rennes was the advent of third-generation PUB programs. The most innovative aspect of their program was their manner of finding funding for the capital investments. The city of Rennes wished to revitalize cycling in their city and saw an opportunity to do so with Clear Channel, an American-based multinational outdoor advertising company. A contract was signed in which Clear Channel received advertising rights to all bus shelters and billboards of 2 to 8m<sup>2</sup> through out the city if they provided the city of Rennes with a PUB program (Beroud, 2007, p.43). This funding method has been followed by many other cities, such as Lyon and Paris (which are run by JC Decaux, a French-based outdoor advertising company). Characterized by a contract which grants advertising rights to street furniture for a PUB program, this method enables the city to rely on the large company for the start-up costs and development of technology. Essentially, the city

government foregoes potential advertising revenues for the opportunity to have a PUB program in their city. There are variables within the contracts as some offer exclusive rights to the advertising company for a set period of time, while some limit advertising to certain areas. Regardless, there are many controversies that have occurred due to this method of trading advertising space for PUBs.

This use of public space creates the most controversy. Various groups in large cities with PUBs have been outraged by the auctioning off of public space to gain a PUB network. Many complain that this is an invasion of public space by multinational advertising corporations and they worry that the city is giving up large amounts of revenue and not gaining enough in return. In Paris, JC Decaux is expected to receive 600 million Euros (860 million dollars) in ten years from advertising rights granted by the city for their *Vélib* system (Dworschak, 2007, p.2). The potential for the city to use money from an advertising contract to create its own program and possibly have money left over has yet to be evaluated. It is difficult to answer this as the PUB programs are expensive, albeit not even remotely close to the cost of subway expansion. For example, one *Vélo'v* in Lyon costs 1,000 Euros/year (\$1440) for purchase and maintenance which amounts to 4 million Euros/year (5.7 million dollars) for the bicycles themselves. If the program is not supported by advertising privileges, JC Decaux charges 2,500 Euros (\$3,600) for each bike (Dworschak, 2007, p.1). The cost of the computer network is unknown to public sources. The computer requires readers in the posts or at a computer terminal which automatically register every transaction and passes on the data to the control center. The computer within the station also tracks data regarding the bicycle's status, i.e. its brake and gear functions, its tire pressure, etc. This sort of technology is potentially very expensive to develop and maintain. Normally covered by the operators in such programs as in Paris and Lyon, the

expenses of the system are unknown for operators not associated with these advertising firms who have developed the technology. Other systems of technology exist for programs, but the only programs which have been large-scale and successful, have used the technology developed by JCDecaux and Clear Channel. It is difficult to quantify the cost of the total program, including maintenance, capital infrastructure investments, development of the technology, etc. and therefore it remains difficult to determine whether a city, in relinquishing advertising revenues, is receiving a fair trade.

## **V.B PUB Program Models**

### V.B1 Hamburg, Germany

This question will soon be answered as the city of Hamburg, Germany, has accepted a strictly advertising contract from JC Decaux and the Ströer Group which will amount to 508 million Euros (708 million dollars). The city of Hamburg has stated its desire to take this revenue and use it to purchase a PUB program, and have begun consulting bids (Dworschak, 2007, p.2). While total cost-benefits for a PUB/advertising rights exchange have not been calculated, the overall benefits have been obvious. This method of third-generation PUB network implementation has been the only one which has produced significantly large and impacting programs such as in Paris and Lyon. Other options for implementation do exist, as outlined below.

### V.B2 Barcelona, Spain

In Barcelona, a large PUB program called Bicing was inaugurated in March of 2007. With 1,500 bicycles, it is one of the larger PUB programs and has proven to be relatively successful. Run by Clear Channel, the system is not funded by advertising rights. According to Bicing's website (bicing.com), the system in Barcelona is funded by a motorist charging

program (e.g. parking, congestion charges). This is a unique program in which motorists are subsidizing a sustainable transit option and a large corporation is operating the system; it offers another option in pursuing implementation choices.

#### V.B3 Copenhagen, Denmark

While not a third generation program, Copenhagen, one of the oldest programs, deserves a mention. It is run as a not for profit organization which is funded by the sale of bike branding, a sort of advertising on the bicycle themselves. However, because this program is not a third-generation system, it is still plagued by accountability issues with users. While successful in its own right, the program's impact is difficult to measure as Copenhagen already boasts a large amount of bicyclists.

#### V.B4 Germany

In Germany, the state railway system, Deutsche Bahn, has created its own third-generation program. Named Call-a-Bike, the system provides interconnectivity service between the commuter trains and locales throughout the various cities. The whole program has over 4000 bikes and using the cell phone system, is rented out by the minute.

#### V.B5 Netherlands

The Netherlands also has a program run by their state railway system, OV-Fiets (OV= public transport, fiets=bicycle). The OV-Fiets program began in 2002 as a publicly subsidized pilot project (NICHEs, 2007, p.9). It is now a permanent service that is available at 100 rail stations throughout the nation. Users have to register with the program before they can use the service and are issued a card. The charge starts at 2.75 euros for 20 hours with a maximum rental period of 60 hours (NICHEs, 2007, p.9). The service requires a Dutch bank account, which limits usage to Dutch residents. OV-Fiets has proven to be successful in its own scope with

23,000 people registered as users of the system in 2006. In 2007, the National Dutch Rail Company, NS, took over the OV-Fiets foundation and expects the program to become profitable in the near future, the only PUB program to be potentially financially sustainable (NICHEs, 2007, p.9).

While the railway programs in the Netherlands and Germany present a viable PUB scheme, they have large obstacles that cannot be overcome. These programs are limited to residents and pre-registered users, therefore deterring tourists and casual users. Both programs require users to pay for any amount of time, which can also be a deterrent from usage (Beroud, 2007). These programs are also run nationally in smaller, compact European countries with state-owned rail systems, parameters which were influential in their success and are impossible to replicate in America.

#### V.B6 Tulsa, Oklahoma

Other PUB programs have been run by private institutions; these tend to be on a smaller scale. One such example is in Tulsa, Oklahoma where a medical foundation has donated money to create a PUB program near the park system to promote healthy living. At 3 stations with 75 bicycles, it has, however, no chance at providing a significant impact on modal shift in the area.

#### **V.C How to Measure PUB Program Success**

If the people will not use the program, it cannot affect transportation throughout the city. The key to usage is availability, affordability, and efficiency. The ease of use has to compete with the ease of driving or using the subway, therefore, the density of stations and bicycles is very important in the decision making of users. Due to this factor, Lyon and Paris have been very successful in attracting first-time users. Two models can be used to determine the potential coverage and therefore accessibility of PUB. One is to look at the density of PUB in the city, a

measurement which defines users' access to the stations. For example, according to Paris' website (vélib.com), there is a PUB station within 300 meters from any point within the city and officials are currently working towards a station within 100 meters. Another manner to evaluate accessibility is to look at the population of the city versus the amount of bicycles available. The argument is that, if there is a large population that wishes to use the PUB system and there are not enough bicycles to be used, it discourages usage. In Lyon, they have ensured one bike for every 150 inhabitants (Beroud, 2007, p.76). These two systems are important to combine so that a user does not need to walk more than a few minutes to find a station and can be assured that there are sufficient amounts of bicycles in circulation to ensure a bicycle for them.

There are many options in PUB programs. It has been shown that the third-generation of these community use bicycles is the most successful in achieving a modal shift to cycling. It has also been seen that, in order to provide a significantly accessible and viable option to using an automobile, these PUB networks need to be "large scale schemes in order to achieve a real impact" (NICHES, 2007, p.3). These findings will prove to be helpful in determining an effective program in Philadelphia. However, it will be most useful to take a deeper look at a genuinely successful PUB program that has been in operation for over two years.

## **VI CASE STUDY OF LYON: *vélo'v***

### **VI.A Implementation**

In researching PUB programs, it is important to look to Lyon, France as the forefront of these systems. While Rennes was the first third-generation program, Lyon, inaugurated in May 2005, is the first large-scale third-generation program. Lyon also possesses many similarities to the city of Philadelphia, from its topography to its size and infrastructure which makes it an excellent city to study.

Lyon's program grew out of the expiration of a previous street-furniture contract. JCDecaux won the bid for the contract, receiving full advertising privileges for thirteen years and in return, Lyon gained a PUB network. This city soon became the international example for automated rentals of bicycles in the public space. The program, called *Vélo'v*, began with 2,000 bicycles and is expected to reach 4,000 bicycles and 350 stations by the beginning of 2008. While nowhere near the 10,600 bicycles at 750 stations in Paris, Lyon's program has been operating for two years, therefore granting much more accurate and profound statistical data.

To evaluate the entire impact of the *Vélo'v* in Lyon is next to impossible; however there are specific areas in which Philadelphia should be interested. Lyon has been able to achieve the goal of providing attractive, effective and inexpensive (nearly free) alternative sustainable transportation for the populace and its success is evident in the numbers. On average, each bicycle within the system is used 16 times on a summer day. Within its first six months of operation, 2 million trips were made with the *Vélo'v*. These PUB trips replaced around 150,000 trips which would have normally been made by automobile (NICHES, 2007, p.2).

## **VI.B Environment**

In providing sustainable transit options which actually have a real impact on the emissions of a city, the *Vélo'v* has been very successful. In the October 2007 *Vélo'v* newsletter, JCDecaux stated that, in total, from its inauguration in May 2005 to September 2007, the *Vélo'v* bikes have traveled close to 26 million kilometers (16 million miles). If this many kilometers had been traveled by automobile, 5,200 tons of carbon dioxide emissions would have been produced. While this is very encouraging one cannot be sure that a shift in transportation mode (from automobile to PUBs) has occurred unless one looks at mode data.

## **VI.C Modal Shift**

Mode share is indicative of the choices people make in transportation options. Therefore, it is imperative to track these changes to observe whether the PUB program has had an affect on the decisions people make when confronted with the option of PUB. Through a survey conducted by Grand Lyon, the public urban planning organization for the city, various data was compiled regarding modal shift. The question “how would you have completed this trip had you not had access to a *Vélo’v*?” enabled Grand Lyon to see how *vélo’v* had effectuated a change in transportation choices. The answers were varied with 37 percent of respondents answering walking, 50 percent public transport, seven percent private car, four percent private bicycle and two percent who would not have made the trip without a *vélo’v* (NICHES, 2007, p.3; Beroud, 2007, p.32). With these responses, the questions arise as to whether a seven percent shift from private car to PUBs is a large enough shift to make an impact on automobile transit. According to the European Commission (NICHES), “*Vélo’v* shows a respectable impact on the reduction of private car use, shifting around 1,000 inner urban car trips each day to the bicycle” (NICHES, 2007, p.5).

It is also important to take note of the 50 percent of respondents who replied that they would have taken public transportation had they not been able to take the *vélo’v*. This could potentially be viewed as detrimental to the public transportation system. It is essential to evaluate the potential of *vélo’v* to be competition or a complement (Beroud, 2007, p.32)? The loss of customers of public transit services is quite low as Lyon has promoted the *vélo’v* as a complement to the services. Half of the *vélo’v* users still hold a public transit pass and many users purchase individual tickets for other trips (Beroud, 2007, p.32). Ten percent of all PUB users in Lyon use the *vélo’v* in conjunction with public transport as a part of trip chains (NICHES, 2007, p.5). In total, the *Vélo’v* program has done a remarkable job of integrating the



PUB into the fabric of Lyon's urban environment, as is seen through the numbers of automobile trips replaced by bicycles and the number of people who use the program as a complement to the urban public transportation network.

#### **VI.D Promotion of Cycling**

Lyon's remarkable ability to integrate the *vélo'v* into the culture fabric of the city is well documented in the increase of cycling across the board, not just through the PUB program. 96 percent of *vélo'v* users had never before used a bike in the center of the city (NICHES, 2007, p.3). This number is remarkable as it shows that *vélo'v* has fostered cycling beyond habitual cyclists. Within one year of *Vélo'v*, the use of bicycles increased by 44 percent (NICHES, 2007, p.3). What is unprecedented is that private use of bicycles has also increased thanks to the increased awareness and acceptance of cycling in the city (Beroud, 2007, p.40). There has been a remarkable increase in bicycles viewed on the road since the debut of the *Vélo'v* program. This shows that PUB programs, as well the advertising and educational programs which coincide with them, are an excellent tool for the promotion of cycling. Lyon, thanks to this increase in bicycle use across the board, has also seen an increase in bicycle sales. It is a common problem with PUB programs that bicycle rentals from typical cycle shops decrease. However, it has been shown that the *vélo'v* has had a positive influence on private bicycle purchases, coinciding with the increase of private bicycle use.

#### **VI.E Demographics**

It is important to note the demographics of *vélo'v* users as they present a detailed background of those apt to use PUBs. It is a diverse group but mostly skewed towards the younger spectrum; with nearly 55 percent of users less than 30 years old. This is typical as most cyclists tend to be of the younger generations (Beroud, 2007, p.68). The gender split is skewed

towards men, constituting 60 percent of users. 34.4 percent of users are employed in full-time jobs, from which, one can extrapolate that a good amount *vélo'v* usage is for commuting. Commute usage can also be seen through the quarter of users being students (Beroud, 2007, p.68). It is important to track these demographics in order to be able to target advertisements for the PUBs as well as educational programs.

### **VI.F Lesson to be Learned**

Successful in its ability to effectuate mode share, increase bicycle usage for people who had never biked before, and offer a viable sustainable transportation option for users, Lyon is the world example for automated rental of bikes in the public place (NICHES, 2007, p.2). Lyon has shown as well that size matters. The fact that one does not have to travel more than 300 meters (around 1000 feet) to reach a *Vélo'v* station means that the large scale program has made it sufficiently easy to make the decision to use PUB. With such a successful program, it is important to take its successes and implementation and use them to guide research on the potential implementation of such a program in Philadelphia.

## **VII PUB PROGRAM IN PHILADELPHIA**

The previous sections have shown that the PUB program is an excellent choice to effectuate change in transportation decisions. It is important to see how the success from Lyon and throughout the world can translate into North America. There are currently no large scale PUB programs in North America, a situation which may soon be rectified as a few cities prepare to investigate the possibilities of implementation. Therefore, there are no programs which can be observed and modeled after for a better insight into PUB programs in North America. The expertise and lessons learned from Europe acts as guidance for Philadelphia as Philadelphia pursues a large-scale PUB scheme. Observations on Philadelphia's bicycle culture can provide

the necessary background components to understand the climate within the city. In 2001, *Bicycling Magazine* gave the city an honorable mention for being one of the “Top ten large cities for bicycling in North America.” This award came on the heels of some progressive cycling measures, as outlined below.

## **VII.A Bicycle Network Plan**

In 2000, bicycle advocates in Philadelphia worked together with the city to put together a “Bicycle Network Plan” in which various goals and methods were outlined to make Philadelphia a more bicycle-friendly city. The essential thought was that bicycles are a key part of any transportation system and the “city must plan and implement an intermodal, balanced transportation system that will enhance and foster transportation within and between the city’s greatest assets, its neighborhoods, while serving the needs of the region” (McNamara, 2000, p.1). With this goal in mind, the city and advocates laid out a plan in which the city aim was to increase bicycle use from five percent to ten percent of all trips by 2005. If this five percent increase were to work, it would result in around 4.2 million vehicle miles traveled less daily. This would remove 79.5 tons of air pollutants daily from the Philadelphian urban environment (McNamara, 2000, p.1). Along with these positive benefits the plan addresses the issue of equality. More than 37 percent of Philadelphia residents are unable to drive yet they continue to pay taxes which contribute to road and infrastructure repairs that from which they do not directly benefit. Philadelphia remains a city devoted to private automobile usage with pedestrians and cyclists being squeezed out. The city must rectify this imbalance by creating a more extensive and efficient public transportation network, such as a PUB program. However, prior to implementation it is imperative, as was seen in Lyon and Paris, to have a sort of infrastructure established in the city to accommodate these bicycles.

## VII.B Infrastructure

Paris has around 200km (around 125 miles) of bicycle lane for over 9.5 million inhabitants. Philadelphia began with 50 miles of lanes in 2000, had 110 miles by 2002 and is progressing consistently towards 300 miles of bicycle lanes. Paris seems to be lagging behind Philadelphia. Regardless, the city of Paris started a PUB program in July 2007, called *Vélib*, that has seen over 4 million users within the first two months. This sort of success, as well as the success of the program in Lyon, has shown that with a basic infrastructure in place and a non-dormant cycling community, the PUB program can work. Both Lyon and Paris have been modifying and adding to their existing bicycle infrastructure from the start of their programs. While there are some concerns regarding the cycling infrastructure in Philadelphia, it is currently adequate enough to support a thriving bicycle culture. If one had to wait until a perfect infrastructure was in place, the PUB program would never start. As discussed previously, the increase of cyclists on the road has a positive influence on driver awareness and leads to fewer accidents (Jacobsen, 2003). This increase in safety can also have a positive affect on the government and the way the infrastructure is modified. As cities are exposed to the popularity and efficiency of the PUB program, they are more likely to input money and labor into creating a cohesive cycling infrastructure.

As a well laid out city, Philadelphia already possesses a proficient cycling infrastructure. Center City boasts low-speed streets with a lot of stop-and-go traffic that allows cyclists to navigate and travel in a relatively safe manner. Unlike New York City, where high-speed, wide boulevards and cross-town expressways make it nearly impossible to bicycle, Philadelphia has the advantage that traffic moves relatively slowly in the city. This benefits cyclists as well as future cyclists as congestion and finding parking is a constant difficulty and may assist in

moving many motorists' decisions towards trying a PUB program. Congestion and automobile ownership costs are already shown to be a large concern for many motorists as Philly Car Share, a public-use car lending program, has been tremendously successful in its first years of operation. According to a survey taken by the PhillyCarShare organization, Philadelphians have decided to sell or stop using their automobiles with a rate of 12,810 fewer personal cars used; results in 42 percent fewer miles and 1.6 million gallons of gasoline saved from driving less and driving more hybrids ([www.phillycarshare.org](http://www.phillycarshare.org)). This evident success of a sustainable transportation option shows that Philadelphia is ready to make a positive change in regards to congestion and parking problems in the city.

## **VII.C Demographics**

Philly Car Share data is a good way to gauge citizen's interest in alternative transportation but a separate barometer is necessary to judge the city's cycling demography and interest. In 2005, the Delaware Valley Regional Planning Commission conducted a survey on bicycle use in the urban setting of Philadelphia and the surrounding region. The survey was administered roadside for any cyclists who would stop as well as through mail-in responses, which were handed out roadside and mailed through Pennsylvania Department of Transportation (PennDOT) mailings. The survey itself is limited in scope as it is essentially a survey of habits of cyclists and not a survey of all citizens' habits. However, it is an excellent way to view the demographics of cyclists in the city and to see how and why they cycle.

The results start to outline the demographics of a cyclists in Philadelphia that in a way mirrors the majority of *vélo*'v users that the majority of users in the Center City and Fringe area of Philadelphia area male. The survey results show that 44 percent of respondents were between the ages of 25 and 34 years old which coincide with the Lyon demographics, which showed that

55 percent of users were under the age of 30. In Philadelphia, 68 percent of respondents were full-time employees and the next largest group at 13 percent was students. The numbers differ slightly from those of Lyon, which had 34.4 percent full-time employees as users, and 25 percent students. However, this difference is a positive as it shows that Philadelphians are already adept at commuting on bicycles, as one will see in the following census data. These numbers from the DVRPC Bicycle Travel Survey are very useful in looking at the bicycle culture in Philadelphia currently. The demographics of the cyclists are comparable to those of the *vélo*'v users in Lyon and this could point to Philadelphia's readiness to implement a PUB program.

#### **VII.D Census Data**

Census data provides a deeper look into all citizens' habits. In 2000, bicycle travel accounted for five percent of all trips made in Philadelphia. In an attempt to look at this number spatially, commute transportation choice data from the 2000 census was mapped in Geographic Information Systems (GIS). Bicycle commute data is very important as a large amount of PUB program users use the program as a way to replace their car or personal bike or public transportation to get to and from work. Figure 2 depicts the number of bicycle commuters living in each census tract in relation to overall county bicycle commuter levels. Therefore, one is able to compare bicycle commutership levels in the city of Philadelphia across the census tracts. Center City and University City (see Figure 3) levels of bicycle commutership are 3 to 13 times the county's average. This large grouping is significant in that it shows that, should a PUB program be implemented in Philadelphia, these neighborhoods already have more of a habit to commute using alternative transportation.

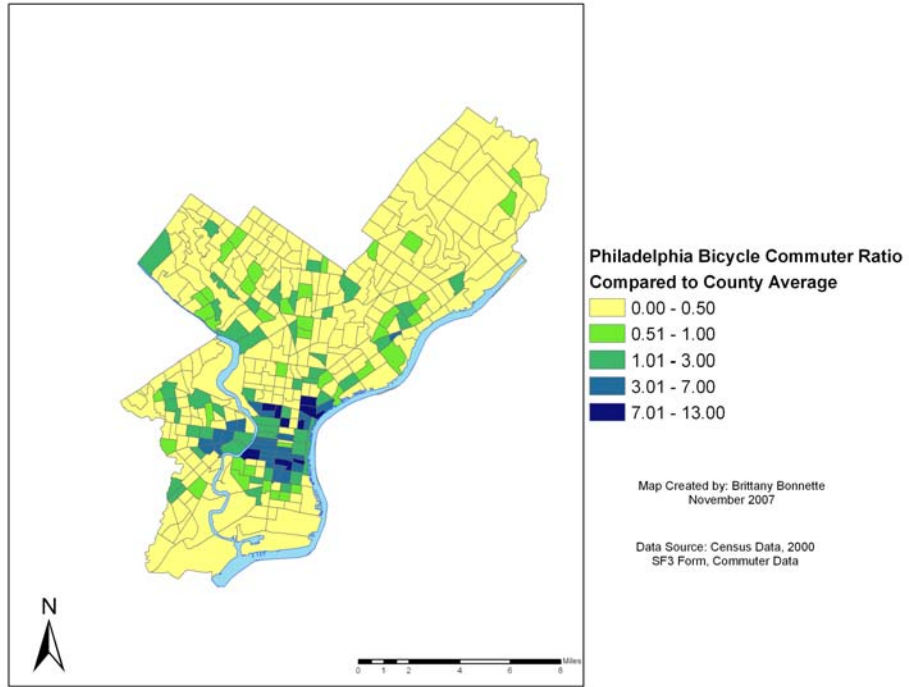


Figure 2: Philadelphia Bicycle Commuter Data, as compared to County Average: Below One= Below Average, Above 1= Above Average, Greater than 3=Very high rates of bicycle commutership

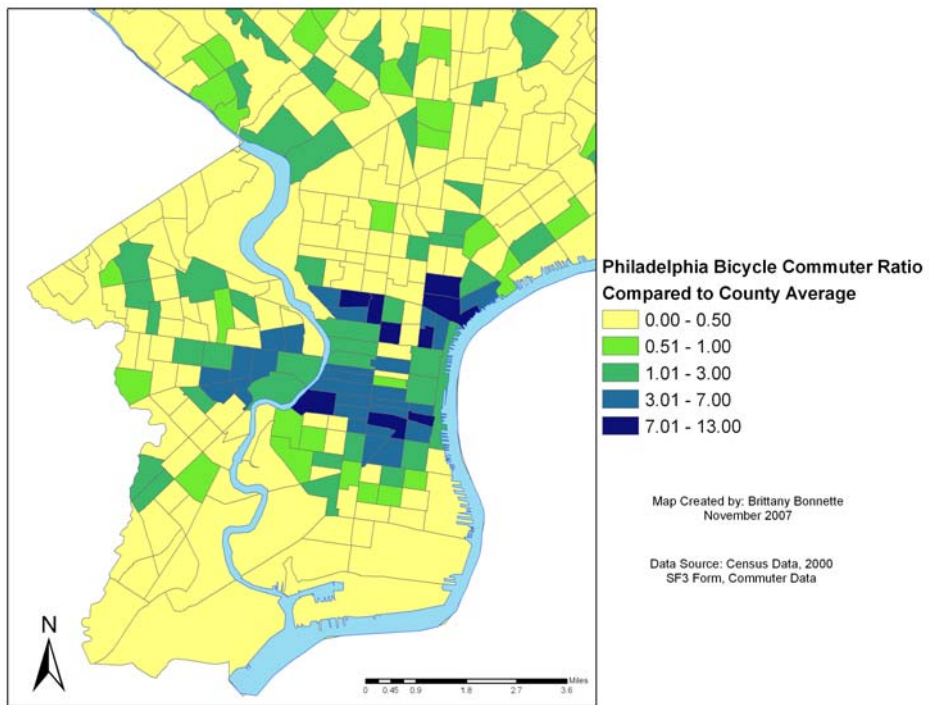


Figure 3: Philadelphia Bicycle Commuter Data for Center City and University City, as compared to County Average: Below One= Below Average, Above 1= Above Average, Greater than 3=Very high rates of bicycle commutership

## **VII.E Bicycle Theft**

PUBs are so successful because they require no maintenance, no storage and have nearly no danger of theft. These difficulties are all very strong deterrents to cycling for many non-cyclists as well as important reasons as to why private bicycle owners and non-cyclists together would be interested in PUBs.

Included in the DVRPC survey were questions regarding housing types. Philadelphia is well known as a city with many row homes. These attached dwellings, as well as apartments, are the typical housing stock in Philadelphia and their sizes make it difficult to have a bicycle and keep it safe. Among the respondents for the bicycle travel survey, 86 percent of respondents in the Center City Business District and fringe areas stated that they lived in an apartment building/condominium or single family twin, or townhome/rowhome. Storage and maintenance are two drawbacks to private bicycle ownership that PUB attempt to rectify by providing a bicycle with no added responsibilities except to return it to a station when the user is finished. The next ride, the user can use any other bicycle and be sure that the bicycle will be in good operating condition thanks to the traveling fleet of mechanics.

Another large setback to bicycle ownership is theft. The DVRPC survey asked respondents how important secure bicycle parking at destination was in making their decision to travel by bicycle. 77 percent of respondents stated that secure parking was either important or very important in their decision. This fear of bicycle theft is well-founded and understandable in looking at Figure 4. Using bicycle theft data from the years 2000 to 2006 from the Neighborhood



Information System at University of Pennsylvania's Cartographic Modeling Lab, Figure 4 shows bicycle theft counts for each census tract. In this six year span, over 13,000 bicycles were reported stolen in the city of Philadelphia. In looking at the inset for Figure 5, it becomes apparent where most thefts are occurring. Theft counts above 200 in the six year span are congregated around Center City and University City, where the level of bicycle commutership is so elevated. This data, showing high bicycle commutership and high bicycle theft danger, would lead one to believe that the city of Philadelphia is well-poised for an implementation of a PUB program.

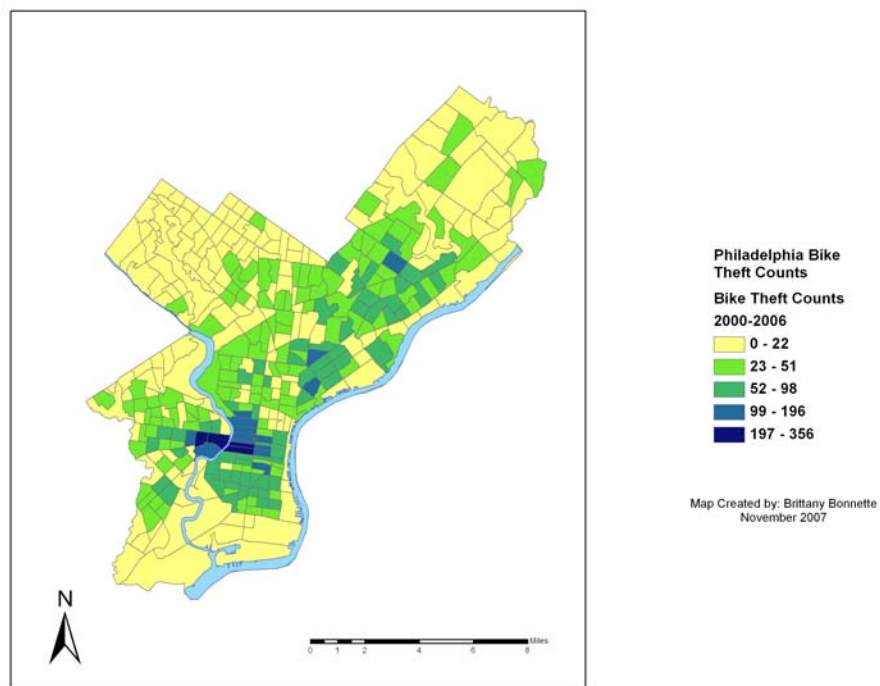


Figure 4: Total Bicycle Theft Counts for Census Tracts, as taken from NIS (CML)

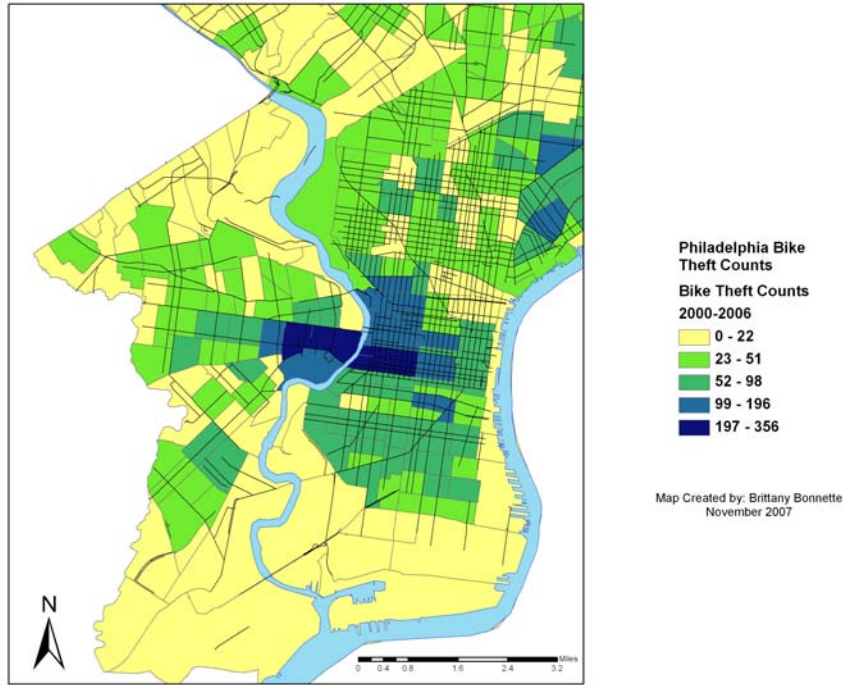


Figure 5: Zoom in on Center City and University City, Total Bicycle Theft Counts for Census Tracts, as taken from NIS (CML), for years 2000-2006

## VII.F Public-Individual Transit

Public transportation before PUBs was the most viable option for affordable collective mobility. In Philadelphia, the Southeastern Pennsylvania Transportation Authority (SEPTA) runs the public transit system and relies predominately on buses. There are two subways and one underground trolley system that operates for the whole of the city of 1.5 million people. Bus, trolleys, and commuter trains encompass the rest of SEPTA’s transportation offerings. A PUB program could complement the public transportation currently available in Philadelphia, by providing riders with a direct, point-to-point transportation option. SEPTA is the only option for many users, as it is cheaper to use than automobiles and employers and schools normally subsidize travel through SEPTA. In adding this sort of flexibility to the network, PUBs can

extend SEPTA's reach and ridership, which is a goal that SEPTA must pursue. With SEPTA and PUBs, Philadelphia could provide its citizens with a public transportation service that is affordable, reliable and flexible, the paramount of public-individual transit. The question that remains is how to get a PUB network implemented here in Philadelphia.

## **VIII IMPLEMENTATION OF A PUB PROGRAM IN PHILADELPHIA**

### **VIII.A Potential Operators**

The European Commission in the NICHES document outlines the necessary components of a city for a successful PUB program. Included in the list is “a strong commitment to sustainable urban transport planning and to the promotion of cycling as a serious transport mode.” The data previously provided, showing the numbers and amount of work being done on cycling in Philadelphia, it is sufficient to stay that Philadelphia fulfills this number one criterion. The second component is “a minimum standard of bicycle infrastructure for safe and convenient cycling” which Philadelphia possesses with close to 300 miles of bicycle lanes. “Sufficient space for racks/parking to guarantee the accessibility of bicycles” is a component that needs to be evaluated and discussed but the most important component is the last criterion. A city needs “sufficient resources for a large scale scheme to achieve a real impact” (NICHES, 2007, p.3). This is the most important question in Philadelphia as it has been shown that the city has the infrastructure, the need and the interest for a PUB program. The question comes down to how to fund it and implement it. This is where a look at the political and social climate of the city of Philadelphia needs to be presented.

NICHES also provides a checklist for cities wishing to implement a PUB program (see Figure 6). It offers a well laid out manner in which to evaluate a city's willingness and ability to succeed on the public-individual transportation scale.

Checklist	
City	Most suitable for medium to large cities (>200,000 inhabitants)
Costs	Compared to traditional public transport: relatively cost-efficient solution, but (depending on type of scheme) low to considerable start-up and running cost.  In most cases, financial back up needed to compensate lack of profitability
Implementation Time	Short term (<2 years)
Stakeholders involved	<ul style="list-style-type: none"> <li>• For service implementation and operation: Rail or public transport operators; street furniture companies; advertising companies; in some cases local authorities</li> <li>• For political and financial support: local authorities</li> <li>• User associations</li> </ul>
Challenges	Mutual respect between cyclists and pedestrians as well as car drivers needs to be strengthened (especially in cities with little bicycle use)

Figure 6: NICHES checklist for a successful PUB system

In looking at how Philadelphia measures up, it is important to focus on the “Costs” row. As previously stated, third-generation PUB schemes are expensive. It is important to note though, that the yearly operating budget (FY2007) for SEPTA is nearly 1 billion dollars (SEPTA, 2007, p.8). The need to have a technologically advanced system (i.e. third-generation)

as well as a large scale network precipitates the search for foundations or companies who will invest heavily, both monetarily and physically, in the PUB system for Philadelphia.

There are a few potential options, as discussed previously, when it comes to implementing a PUB program in Philadelphia. The focus in discussing these options will not be funding, as much research on actual costs of networks, station location, and PUB numbers must be completed before costs and need for funding can be fully understood. Therefore, the discussion centralizes on the potential operators, those who could actually implement and run a PUB program in Philadelphia.

#### VIII.A1 Private Institution

Private institutions, such as a university or a hospital, have funded many small-scale programs have been set up. For instance, in Tulsa, Oklahoma, the Warren Medical Research Foundation provided the funding to start a 3-station, 75-strong PUB program. Called “Tulsa Townies”, this small scale, third-generation program has managed to provide bicycles to those who may not have normally used them. Tulsa has seen a good amount of people using the system, which was created to harness the health benefits from outdoor activities. In Philadelphia, it is entirely possible to produce an equivalent or greater effort with the strength of private institutions such as the University of Pennsylvania, or Jefferson Hospital. The difficulty arises in the size; this sort of program is not within the scope of the size that Philadelphia would need. As NICHES has stated, in order to have an impact on the local bicycle and vehicular culture, the scheme has to be large scale, incorporating a network of bicycles, not just a few.

#### VIII.A2 Non-Profit Organization

There are many non-profit organizations in Philadelphia who possess the certain power and will; they work for the people of Philadelphia. While several of these organizations are

devoted to the increase of sustainable activities in Philadelphia, it has become apparent that one in particular boasts the knowledge and organizing power to succeed in implementing a PUB program in this city. The original PUB program (second generation) in Copenhagen is currently run by a non-profit, devoted to the extension of viable sustainable transportation options to all; there is reason to believe that PhillyCarShare can succeed in doing the same.

PhillyCarShare would be a viable option as a partner in the implementation of a PUB network in Philadelphia because of their unique ability to make sustainable transit choices popular. As noted before, Philly Car Share has managed to create a huge stir around alternative modes of transportation, specifically, automobiles. Bringing the idea and the action of automobile sharing into the forefront of Philadelphia culture, PhillyCarShare has proved that Philadelphians are willing to use their cars less when presented with a viable, affordable and efficiently run transportation option. The mission of PhillyCarShare is “to maximize the economic, environmental, and social benefits of reduced automobile dependence in the Philadelphia region through community-based car sharing.” While devoted essentially to automobiles, PhillyCarShare, with its expertise, could bring PUBs, or “community-based bike sharing” to their users and the city of Philadelphia. PhillyCarShare takes the expense, maintenance, inconvenience, and inefficiency out of private automobile ownership, just as a PUB program removes these negatives out of bicycle ownership.

With the typical user traveling on average 20 to 25 miles per trip in a PhillyCarShare vehicle, PUBs would be a complement to the increased mobility provided by the organization. With PUBs geared towards short-term usage for journeys fewer than five kilometers (three miles), PhillyCarShare would be expanding the alternative transportation realm for the citizens of Philadelphia. If added as a complement to the system of PhillyCarShare, PUBs would benefit

greatly from the technology and organizational infrastructure already successfully operating under the organization. One of the most expensive aspects of third generation PUB programs is the technology which allows users to rent bicycles and be held accountable for the duration of their usage and their treatment of the bicycle. Philly Car Share already possesses this technology, albeit for automobiles. A “key fob” allows the user to unlock/lock the vehicle, begin and end their rental as well as ensures user accountability as the organization is able to track the car and the length of rentals and its care. This fob could potentially be adapted to the use of PUBs and with joint access, one could integrate car sharing and bicycle sharing through out the city. Beyond the technology of PhillyCarShare, it is the organization’s structure, collective knowledge in the field of transportation as well as their relationships with the city and the users which would greatly benefit PUBs in Philadelphia.

While the organizational and technological capital provided by PhillyCarShare would greatly influence the success of PUBs in Philadelphia, there are some obstacles to such an implementation. The bicycles, as quoted before, can cost around 2,000 euros a piece (around \$2,900). The station and network systems costs are unknown currently. Another factor is the need for a large-scale network, which would require a large capital investment from the beginning. Due to the automobile’s use as a round-trip vehicle (driving to and from a location), PhillyCarShare began with only two vehicles and has built up their fleet from this small beginning. PUBs cannot begin small in the implementation; PUBs are by nature one-way vehicles, allowing for the user to arrive at the destination, deposit the bicycle and be finished with the rental. In order to succeed in Philadelphia, PUBs must have a large-scale network and cannot begin small. As stated previously, station location and density plays a large role in user’s choices. The network must be reliable and efficient and located in areas people travel to or from

in order to be successful as an alternative sustainable transportation method. With PhillyCarShare at the forefront, the technology and organizational capacities are extremely beneficial but funding for an expensive large-scale network must be found. Regardless, the idea of PhillyCarShare incorporating PUBs deserves to be investigated further as more data becomes available regarding the actual cost of specific networks and the number that is necessary to create a modal shift. The prospect of Philly Car Share as a partner in the PUB program is very exciting and could provide an excellent option for an operator of such a system.

#### VIII.A3 Outdoor Advertising Companies

The most successful PUB programs to date have been in those cities that have worked hand in hand with outdoor advertising companies like Clear Channel or JCDecaux to implement their programs. This exchange of advertising revenues for a PUB network has proven to work elsewhere; Philadelphia seems primed to negotiate a like contract for the city.

In the beginning of 2007, the city of Philadelphia under Mayor John Street and the city's Department of Public Property issued a "Request for Proposals for a Coordinated Street Furniture Program for the city of Philadelphia" (also known as an RFP). The RFP is a request for companies to present bids for the city "on the design, construction, installation, maintenance and the operation ... of "Street Furniture", namely bus shelters, benches, trash cans, etc.

(Philadelphia Department of Public Property, 2006, p.1). The goal of this RFP, as defined by the city, is "to provide citizens and visitors with amenities that increase the livability of the City, encourage an active street life, and improve the appearance of the City's streetscapes"

(Philadelphia Department of Public Property, 2006, p.1). The RFP continues to define the needs of the public, as quantified in specific amounts of transit shelters and trash cans necessary to "increase the livability of the City." The purpose of this RFP is to delineate the needs of the city



and to see what advertising firms can offer them in return. It is in exactly in this manner that the program in Lyon saw its beginning as an existing advertising/street furniture contract had expired and in negotiation of a new contract; a PUB program was included as a component of “street furniture”.

The original plan for the RFP was for the city to receive the street furniture as well as a specific, undisclosed price while the advertising company receives advertising privileges throughout the city; the timeline is for 20 years. Introduced into the City Council in September, three companies have made bids: WallUSA (a company now owned by JCDecaux), CBS Outdoors (which holds the current contract that expires December 31, 2007) and Clear Channel/Interstate Outdoor Advertising (which includes four former members of Mayor Street’s administration). The bid that Mayor Street has selected, as he sits in his lame-duck period, is that of Clear Channel/Interstate Outdoor Advertising. The contract has been exposed as providing a guaranteed \$50 million over 20 years as well as 5 percent of advertising revenues, according to the Daily News. A surprise addition of a two-year pilot program for bike sharing was included, however, on a very small-scale, and would be included with the other street furniture provided in this Clear Channel/Interstate contract. However, there has been a good amount of unrest regarding this RFP bid. City Council president, Anna Verna refused to introduce the necessary legislation into City Council and the contract will not be considered under Street’s administration. These complaints have also been voiced by Philadelphian organizations who oppose the current RFP such as the Next Great City Initiative, the Bicycle Coalition of Greater Philadelphia, and the Society Created for the Reduction of Urban Blight.

The stalling of the current RFP allows for a restructuring of contracts and the inclusion of a more cohesive and well-documented proposal for a PUB program. In the RFP, the city asks for

“coordinated designs that create a signature Philadelphia look and provide a more cohesive and less cluttered streetscape”. A PUB program could provide the signature look Philadelphia is looking for.

There are many other options that to be investigated but without exact price and revenue data, it is impossible to determine what method of PUB implementation is most “possible” in Philadelphia. The PUB program, Bicing in Barcelona, is financed by the payments received from the regulation of parking in the city itself. A municipal company, Barcelona de Serveis Municipals (BCM), manages the service. BCM awarded a 10-year tender to Clear Channel, in November 2006, with a cost of 22.3 million euros (around 32.2 million dollars) (Bicing.com). According to the November 2007 Bicing newsletter, the programs has 141 stations, 1,500 bicycles, 2.75 million users and 8 million kilometers (4.9 million miles) ridden on the bicycles, Bicing seems to be a success.

## **VIII.B Future of PUB Program in Philadelphia**

### **VIII.B1 Philadelphia Bike Sharing Forum**

The idea of implementation in Philadelphia is well-founded and well-seated in the urban environment. However, the next step is the “how”. As presented, there are many options. In order to investigate these options more deeply, stakeholders in the potential Philadelphia PUB program are organizing a forum in January of 2008. The Philadelphia Bike Sharing Forum, organized primarily by community activist Russell Meddin, has two major goals. The first goal is to increase the awareness of PUBs in the Philadelphia community. This goal will be achieved by having three speakers, of separate PUB programs, to come and speak regarding the manners in which their city has acquired and embraced them. Slated to speak are the head of Lyon’s program, Gilles Vesco, as well as Mitch Franzos, the head of an organization which has assisted

in Pittsburgh, Pennsylvania's small-scale PUB program and Nate Kvamme, the director of the "Freewheelin'" program in Louisville, Kentucky. The second goal is gather people together to form a collective body with a decided interest in PUBs.

#### VIII.B2 Philadelphia Bike Sharing Symposium

This collective body will hopefully be a force strong enough to stir up interest for the second half of the programs, the Philadelphia Bike Sharing Symposium. Bringing together city council members, various city departments and local organizations, the symposium will be held the following day, the 18<sup>th</sup> of January. The focus will be on the political and economic details and benefits of PUBs that have been seen in cities through out the world. It is the hope of the organizers that this symposium and forum will put PUBs in the limelight in Philadelphia as well as educate the citizens and governing members. With an educated public body, and the proper organizational infrastructure, Philadelphia could see a PUB in the near future.

### **CONCLUSION**

Philadelphia is on the verge of something new, fantastic and exciting; the city has the chance to be at the North American forefront of sustainable transportation. Empowering citizens to travel independently through the city, on vehicles that are emission-free, good for the health, efficient, and personal, this may drastically and positively alter the urban environment of Philadelphia. While there is much research left to investigate regarding the future of public-use bicycles in Philadelphia, one can conclude that the city and the citizens deserve such a program. As the new year begins, the future of PUBs in Philadelphia is bright and hopefully well-guided as interested citizens and community activists work to provide Philadelphians with the personal mobility one seeks and rarely finds in the urban setting.

## WORKS CITED

- Beroud, Benoît. (2007). *Vélo'v: un service de mobilité de personnes à transférer?* Lyon, France: Doctorate Thesis
- European Communities. (1998). *Analysis and development of new insight into substitution of short car trips by cycling and walking*. Italy
- Dekoster, J. & Schollaert, U. (2000). *Cycling: the Way Ahead for Towns and Cities*. Belgium: European Communities.
- DeMaio, P. (2003). Smart Bikes: Public Transportation for the 21st Century. *Transportation Quarterly* 57, 9-12.
- Donaghy, K. & Poppelreuter, S. (2005). *Social Dimensions of Sustainable Transport: Transatlantic Perspectives*. England: Ashgate
- Dworschak, M. (2007, November 9). Paris Rental Scheme Goes Global. *Business Week*, Retrieved November 14, 2007, [http://www.businessweek.com/globalbiz/content/nov2007/gb2007112\\_574198.htm](http://www.businessweek.com/globalbiz/content/nov2007/gb2007112_574198.htm)
- European Communities. (2004). *Reclaiming City Streets for People: Chaos or Quality of Life?* Belgium
- European Conference of Ministers of Transport. (2001). *Implementing Sustainable Urban Travel Policies*. Paris.
- Jacobsen, P.L. (2003). Safety in Numbers: More Walkers and Bicyclers, Safer Walking and Cycling. *Injury Prevention* 9. 205-209.
- Lefèvre, C. & Pucher, J. (1996). *The Urban Transport Crisis in Europe and North America*. London: Macmillan.
- London Assembly. (2005). *Draft Mayor's Transport Strategy Revision: Central London*

- Congestion Charging - westward extension*. London.
- Lowe, M. (1990). *Alternatives to the Automobile: Transport for Livable Cities*. Washington, D.C.: Worldwatch Paper 98.
- McNamara, Sue. (2000). *Bicycle Action Plan for the City of Philadelphia*. Retrieved October 15, 2007, [www.bicyclecoalition.org/Bicycle\\_Action\\_Plan.htm](http://www.bicyclecoalition.org/Bicycle_Action_Plan.htm)
- National Highway Traffic Safety Administration. (2005). *Traffic Safety Facts*. Washington, D.C.
- NICHES. (2006). *New Seamless Mobility Services: Public Bicycles*. Stockholm: Bührmann, S.
- Pucher, J., Komanoff, C. & Schimek, P. (1999). Bicycling Renaissance in North America? Recent Trends and Alternative Policies to Promote Bicycling. *Transportation Research Part A* 33, 625-654.
- Schneider, R. (2005). *Integration of Transit and Bicycles*. Washington, D.C.: Transit Cooperative Research Program.
- The World Bank. (2002). *Cities on the Move: A World Bank Urban Transport Strategy Review*. Washington, D.C.
- Tolley, R. (ed) (1990). *The Greening of Urban Transport: Planning for a Walking and Cycling in Western Cities*. London: Belhaven Press.
- Transportation Research Board of the National Academies. (2006). *Commuting in America III: The Third National Report on Commuting Patterns and Trends*. Washington, D.C.: Pisarski, A.
- United States Census Bureau. (2000). *Census 2000 Summary File 1*. Final National File. Retrieved from U.S. Census Bureau website: <http://www.census.gov/Press-Release/www/2001/sumfile1.html>.

## **WEB-SITES VISITED**

[www.bikesharephiladelphia.org](http://www.bikesharephiladelphia.org)

[www.bicyclecoalition.org](http://www.bicyclecoalition.org)

<http://bcgp.blogspot.com/>

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

[www.jcdecaux.org](http://www.jcdecaux.org)

[www.tcl.fr](http://www.tcl.fr)

[www.velov.grandlyon.com](http://www.velov.grandlyon.com)

[www.cyclocity.be](http://www.cyclocity.be)

[www.bicing.com](http://www.bicing.com)

[www.bike-sharing.blogspot.com](http://www.bike-sharing.blogspot.com)

[www.nextgreatcity.com/node/441](http://www.nextgreatcity.com/node/441)

<http://nextbike.de/>

[www.oybike.com](http://www.oybike.com)

<http://bicincitta.com>

[www.citybikewien.at](http://www.citybikewien.at)