BIKE-SHARE

OPPORTUNITIES IN NEW YORK CITY

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01 Executive Summary & Major Findings

Image: ©Project for Public Spaces, Inc. www.pps.org

EXECUTIVE SUMMARY

Bike-share programs represent a unique opportunity for the City of New York to re-envision transportation within the urban sphere. As a transportation system, bike-shares are ideally designed for densely populated cities like New York. Distances between many major destinations are small and almost 50% of New York's workforce lives within a reasonable bicycling distance (less than 5 miles) of their place of work. Importantly, bike-shares offer immediate transportation solutions as they can be built, installed and open for business in months rather than years. Bike-share programs offer options for economic growth and job creation, as well as providing considerable health benefits. Furthermore, a New York City bike-share program could help to further New York's image as an innovative "green" leader.

This report, "Bike-Share Opportunities in New York City," is a feasibility study designed to consider various bike-share models and assess their potential for New York City. Analyses include a summary of existing bicycling conditions in New York, estimates regarding the number of bicyclists and the number of New Yorkers who might use a bike-share program were it to be available, and a discussion of the funding mechanisms and procurement structures currently available for a bike-share program. In addition, "back of the envelope" estimates for the costs and revenues, based on a range of uptake assumptions (3%, 6% and 9%), are included. Recommendations for the implementation of a New York City bike-share are also discussed, including suggested program size and phasing, pilot programs, safety, fees and theft reduction.

The growth of bike-share programs in the past few years has been explosive. Typified by successful and influential bike-share programs like Velib' in Paris (20,600 bicycles) and Bicing in Barcelona (6,000 bicycles), bike-share programs are being introduced in major cities throughout Europe, North America and Asia. In China, the Hangzhou Public Bicycle System (10,000 bicycles) opened in May 2008 and may expand to as many as 50,000 bicycles. Washington DC opened a small program (120 bicycles) in August 2008 and has plans for expansion to 500 bicycles. Montreal will open Bixi, its bike-share program (5,000 bicycles), in the spring of 2009. London plans to unveil its bike-share program (6,000 bicycles) by 2010. Boston and Minneapolis have recently released RFPs for their bike-share programs (1,500 and 1,000 bicycles respectively), scheduled to open in 2010. Denver, San Francisco, Chicago, Philadelphia and Phoenix are all considering bike-share programs in the near future. In New York, at least three bike-share style rental programs were successfully tested in the summer of 2008 alone, suggesting New Yorkers' strong interest in the bike-share idea.

Most of the world's bike-share programs are built and run under franchise contracts with street furniture advertising companies. JCDecaux runs Velib' in Paris, Vélô Toulouse in Toulouse, and Velo'v in Lyon among others. ClearChannel Adshel runs SmartBike in Washington DC, as well as numerous programs throughout Scandinavia (ClearChannel Adshel's flagship program, Bicing, in Barcelona, is operated as a "fee for services" program, independent of advertising). CEMUSA runs a small program, nbici, in Pamplona, Spain. However, revenue streams from advertising are limited in New York due to the 2006 Coordinated Street Furniture Franchise contract which covers major advertising surfaces such as bus stops and newsstands. This report highlights other bike-share programs, such as Montreal's Bixi program, which suggest cost savings options that could be used in New York to fund a bike-share within a limited advertising or no advertising context.

MAJOR FINDINGS

General Findings

- Bike-share programs can be valuable aspects of the transportation networks of cities. Population density is an important part of a successful program. As such, a New York bike-share program should focus on medium- and high-density areas of the city.

- Small programs do not work. Successful bike-share programs that produce real and demonstrable transportation, economic and health benefits depend on a high concentration of bike-stations and widespread program coverage. Often, financial viability increases with larger programs.

- Bike-share programs are used by a wide variety of people of all ages. Commuters, recreational/errand riders, and tourists are the three main user groups. Most bike-share users are not competitive cyclists.

- Despite seasonal weather changes, bike-share programs are used throughout the year.

NYC Conditions

- Bicycling in New York is at an all time recorded high. NYCDOT counted 23,000 daily commuter bicyclists in 2008; Transportation Alternatives estimates 131,000 total bicycle riders daily in 2007. These numbers are expected to increase as more bike lanes are built, as traffic and transit congestion worsen and as transit prices rise.

- New York City's current bike lane coverage is already conducive to a successful bike-share program and the City has immediate plans to expand the bike land network. More bike lanes should be built with priority toward increasing connectivity and developing more protected lanes.

- Despite a dramatic increase in bicycling, bicyclist injuries have declined and bicyclist fatalities have remained essentially flat over the past decade.

NYC Demand

- New York has a smaller percentage of bicycle commuters (0.6%) than many major American cities but a larger total number of total bicycle commuters (15,000) according to the 2000 US Census and the American Community Survey (ACS). Local bicycle counts show significant populations of bicyclists in areas not indicated by the Census or ACS. The NYC Department of Health and Mental Hygiene's 2007 Community Health Survey indicates that 9% of New York City adults bicycle regularly.

- A large percentage of New Yorkers in the workforce live within a reasonable bicycling distance of their work. Even when bridges are accounted for, 12% of the New York City workforce currently walks or bicycles to their place work, 26% live within a 2.5 mile radius of their work and 45% live within a 5 mile radius of their work. These are all populations for whom bike-share commuting might be feasible.

- City residents (including those who reside outside the coverage area), out-of-city com-

muters (people who work in New York City but do not live here) and visitors to New York, are potential bike-share program users. These users may use the program as part of their commute, for other short trips or for touring the city.

- This report estimates demand and revenue using a range of assumptions (3%, 6% and 9% of potential user populations) about the number of people who would subscribe to a bike-share program. In Paris, Velib' subscription rates range between 6% and 9% of the total population.

Funding & Procurement

- A New York City bike-share program could be developed either as a city-built program (with operations contracted out under a city services contract) or as a franchise.

- Membership/use fees would be an important operations funding source in either option. Advertising revenue could be another potential revenue source but would require the program to be developed as a franchise.

- To maximize implementation speed while ensuring significant citywide coverage, this report recommends that a New York City bike-share begin as a city-built program with operations funding provided by membership/use fees, while franchise authorization is pending for program expansion.

- Membership/use fees are sufficient to meet the operating costs of bike-share program that covered Manhattan south of 81st St. and some parts of northwestern Brooklyn (around 10,000 bicycles). These are the parts of the city with the highest volume of trips and the largest tourist coverage.

- The use of advertising would require franchise authorization from the City Council. The authorization process for a franchise contract may be lengthy. Under a franchise contract, on-bicycle advertisement and advertisements on bike stations could be considered.

- The advertising revenues from a bike-share franchise could allow for significant program expansion. The combined revenues from advertising and membership/use fees would cover operating costs for a program that encompassed significant parts of the Bronx, Brooklyn, Manhattan and Queens. As in Paris, such a program could be a net revenue generator for the city.

Implementation

- *COVERAGE & DENSITY:* A New York City bike-share program should focus on the city's medium- and high-density areas, defined here as more than 32,000 people/square mile. Phased expansion should be employed to cover all these areas as phasing would allow the program to generate momentum and maximize the potential subscriber pool.

- Atelier Parisien d'Urbanisme (APUR) planners recommended a bike-share kiosk density of approximately 28 kiosks/square mile for Paris. Transport for London's (TfL) plans for the London bike-share program also use this density as a target. The analysis in this report is

based off this number, while recognizing that New York's necessary kiosk density may vary as population densities differ.

- *FEES:* Membership/use fees must stay low (below the price of transit) in order to attract users. This report believes that a New York bike-share program could consider moderate rate increases over programs such as Velib' or Bicing without reducing ridership. Price elasticity for bike-share use is unknown.

- Revenues from tourist or day passes can be significant; one day and weekly passes should be included in the membership options.

- *PHASING:* Initial bike-share phases should begin with a city-built program of 10,000 bicycles. Such a program would incur $30-40 million in capital costs and $22 million annually in operations costs. Operations costs would be covered by membership and use fees. These phase(s) would cover Manhattan south of 81st St. and parts of northwestern Brooklyn.

- Subsequent phases, culminating in a 49,000 bicycle bike-share program that would encompass significant parts of four of the five boroughs (81 square miles) and serve two-thirds of the city's population (5.2 million people), should be introduced as quickly as possible under the auspices of a bike-share franchise contract. A 49,000 bicycle program would cover most areas with 32,000 people/square mile and incur approximately $200 million in capital costs and around $100 million annually in operations costs. Advertising revenues, plus membership/use fees could fully offset the operations costs.

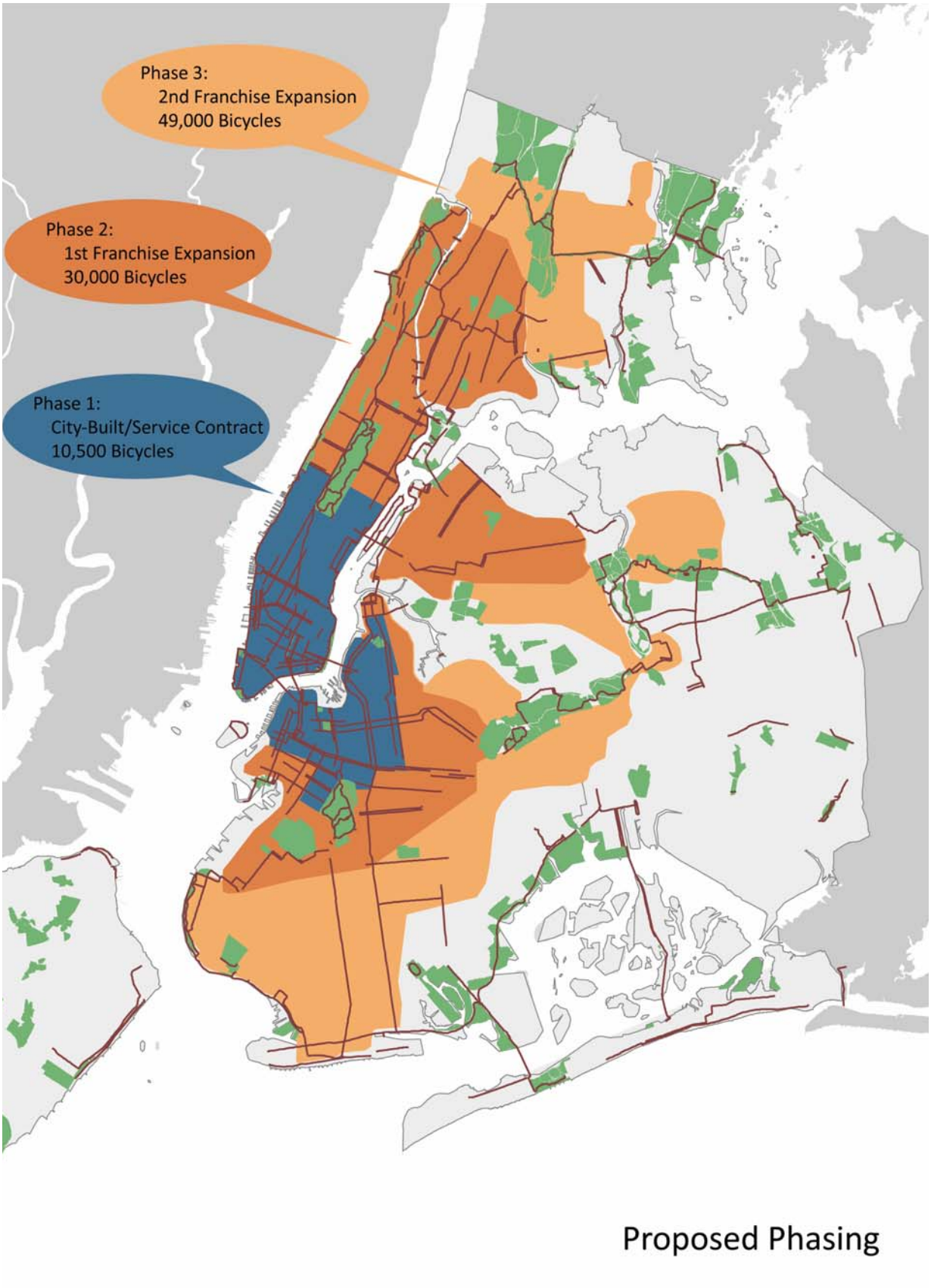
- *BIKE STATION DESIGN:* A bike station design that requires no, or minimal, excavation or installation work and no electrical wiring is best for New York City. The use of solar arrays as a power source is highly recommended. Solar arrays are currently in use in New York City to power the city's MuniMeters.

- *BIKE STATION PLACEMENT:* Options for bike station placement include: in curbside parking lanes, on wide sidewalks, along the periphery of public spaces and parks and in underused public spaces (under viaducts, paved medians etc.). Efforts should be made to locate stations near transit and existing bicycle facilities.

- *SAFETY:* Data shows that increasing the number of bicyclists is one of the most reliable ways to increase bicyclist safety. At the same time, increasing the number of bike lanes through the city is important, especially for newer bicycle riders.

- While the self-service structure of bike-share programs makes helmet distribution impossible as part of the program, numerous options, such as helmet distribution with membership, vouchers and increased public safety campaigns can mitigate some of these safety concerns.

- *THEFT:* An intuitive, robust locking mechanism, combined with protections against credit card fraud can deter theft in bike-share programs.



Proposed extents of a 10,500, 30,000 and 49,000 bicycle bike-share program.

02 The Case for Bike-Share

Image: NYCDCP

- **What is a Bike-Share?**
- **Potential Benefits of Bike-Share Programs**
  - **Transportation Benefits**
  - **Economic Benefits and Job Creation**
  - **Health Benefits**
  - **City Image Benefits and Connections to PlaNYC**

WHAT IS A BIKE-SHARE?

Bike-share programs are networks of public use bicycles distributed around a city for use at low cost. Bicycles can be picked up at any self-serve bike-station and returned to any other bike-station, which makes bike-shares ideal for Point A to Point B transportation. A New Yorker living on Avenue D in Manhattan could, for example, ride a bike-share bicycle to Union Square, leave the bicycle there and hop on the subway without worrying about bicycle theft. A New Yorker returning home to Elmhurst, Queens, could bicycle the last mile instead of waiting for the bus or transferring trains. Designed specifically to augment public transportation offerings, bike-share programs are defined by their low cost, the high concentration of their bike-stations over the program area, and their easy, 24 hour operations. Data from existing programs indicates that bike-share programs are popular. Velib', the Paris bike-share program, has an average of 75,000 rentals per day.[1]

Bike-shares differ from other forms of transportation infrastructure in the speed at which programs can be implemented. In Paris, Velib's initial 700 bike-stations and 10,000 bicycles were installed in less than 6 months; the program doubled in size six months later. In Montreal, Bixi's solar powered bike-station design, which is installed in pre-fabricated modular units, will reduce implementation times even further. Administrators estimate that Bixi installation time could be as short as 20 minutes per bike-station because excavation is not required.[2]

A Velib' user selects a bicycle from a bike-station. Image: Marty Jerome (www.blog.wired.com)

To use a bike-share bicycle, people sign up for daily, weekly or annual memberships. The memberships can be purchased online or at any bike-station. With their membership card in hand, users swipe their card or enter their password, select a bicycle from a bike-station, and go. Returning a bicycle is even easier. Users find a bike-station near their destination, roll the bicycle into an open docking station and are done. Most programs offer the first ½ hour free and provide a 15 minute grace period if there are no free docking stations at the users' destination. Bicycles not returned within 24 hours are considered stolen, and a set fee is automatically charged to the users' credit card.

The history and evolution of the bike-share concept is instructive. The first bike-share opened in Amsterdam in 1968 but was quickly overrun by theft. Many of Amsterdam's "White Bikes" were stolen and many others found wrecked or stripped for parts in the city's canals. The program closed shortly after its introduction. Subsequent efforts

1 Erlanger, Steven, "A Fashion Catches On in Paris: Cheap Bicycle Rentals," The New York Times, 13 July 08
2 Phone Interviews with Alain Ayott, Executive Vice President, Montreal Parking Authority/Stationnement de Montréal; 3 & 11 July, 2008

in other cities to improve bike-shares by using uniquely designed bicycles with specialized parts that had no resale value, by locating bicycles at bike-stations or by requiring a coin deposit to retrieve a bicycle similar to those used for airport luggage carts, all failed to substantially reduce bicycle theft because there was no way to track the bicycles once they left the bike terminal.[3]

Anti-theft mechanisms, such as requiring subscriptions, bike-stations and wireless technology, have largely limited theft in modern (also known as 3rd Generation) bike-share programs, allowing bike-shares to become viable options in the 21st century. Use of the bicycles is limited to subscribers, linking each bicycle hire to a user's credit card. Operators use networked self-serve bike-stations which communicate with a central computer system and Radio Frequency Identification (RFID) technology to monitor the location of bicycles in the system. In Barcelona, the use of these mechanisms has meant that the Bicing system has a theft rate of only 3% despite a high citywide general theft rate.[4]

A Velib' bike-station in Paris. Bike-stations are integrated into the streetscape. Image: xtof (www.flickr.com)

Bike-share programs differ substantially from recreational bicycle rentals. These differences underscore the transportation benefits of bike-shares. Bike-stations (where bicycles can be picked up or dropped off) are located in close proximity to one another, as well as to major transit hubs and are placed in both residential (origin) and commercial or manufacturing (destination) neighborhoods, which makes bike-shares ideal as a commuter transportation system. Velib' bike-stations, for example, are located approximately every 4 blocks (300m) which allows for easy access. In contrast, bicycle rental programs typically only have a few locations where bicycles can be rented, and to which they must be returned, and are mostly found in major tourist areas or in parks. Bike-stations are self-serve which allows users to access bicycles 24 hours a day, 7 days a week. Bicycle rentals are staffed which

Users select bicycles from a Bicing bike-station in Barcelona. All stations are self-serve. Image: euthman (www.flickr.com)

3 DeMaio, Paul and Jonathan Gifford, "Will Smart Bikes Succeed as Public Transportation in the United States?" *Journal of Public Transportation*, Vol.7, No.2, 2004, p.3

4 BikeOff Project: Design Against Crime, "Bicing Barcelona: ClearChannel Adshel Public Bicycle System," (http://www.bikeoff.org/design_resource/dr_PDF/schemes_public_bicing.pdf); Accessed 12/2/09 & Ajuntament de Barcelona Website, "Survey of Victimization in Barcelona 2006," (http://www.bcn.es/estadistica/angles/dades/anuari/cap08/C0803030.htm); Accessed 12/2/09

increases their operating costs and limits their operating hours and number of locations.

The pricing of bike-share programs also differentiate them from bicycle rentals. As bike-share programs are designed to enhance existing transit options, membership rates and use fees are kept low. Most bike-share programs offer the first ½ hour of use for free in order to encourage use and, set increasing prices ($1-$2) for each subsequent ½ hour in order to keep bicycles constantly circulating. Most recreational bicycle rentals in New York charge up to $20/hour or $95/day. The bicycle rental program on Governor's Island charged $5/half hour, well above public transportation prices and limited to a small, isolated area.

Lastly, bike-share programs differ from bicycle rentals in the characteristics of the bicycles. Bike-share bicycles are sturdy, heavy and designed to withstand considerable use and abuse. The average bike-share bicycle is used 10-15 times per day and has a life expectancy of 3-5 years.[5] RFID technology allows program operators to monitor bicycle location. The built in locking mechanism connects the bicycles directly to the bike-stations. Bike lights are automatically illuminated when the bicycle is in use.[6] Because they are meant for people who may not be wearing "bicycling attire," bike-share bicycles are designed so that the chain, gear shifts and brake mechanisms are completely enclosed and protected from dirt or tampering. Adjustable, but not removable, seats make the bicycles easy to use. Parts are specialized reducing the temptation for salvage or resale of parts. Bicycle rentals bicycles do not have this combination of features.

5 Grasso, Richard, Senior Vice President Business Development & Martina Schmidt, Director SmartBike US, ClearChannel Adshel, Phone Interview: 30 April, 2008
6 Velib' Website, "Velib Press Kit," (www.velib.fr); Accessed 8/26/08

POTENTIAL BENEFITS OF BIKE-SHARE PROGRAMS

Bike-share programs offer a number of real, tangible benefits to New York City. These benefits range from increased transportation options for New Yorkers, out-of-city commuters and visitors, to better health outcomes including a potential reduction or slowing of obesity rates. A New York bike-share program would help foster a positive, "green" image for the city which can in turn result in increased tourism and a strong business climate. The potential to replace some personal car or taxi trips with non-polluting bicycle trips can help the city reach its PlaNYC goals of reducing greenhouse gas emissions. Some reports from the European bike-share programs indicate a small, but significant, reduction in vehicular traffic and congestion which can be attributed to the presence of bike-share programs and increased cycling. Lyon saw a 44% increase in bicycle riding within the first year of their Velo'v program's.[7] Bicycle riding in Paris has increased 70% since Velib' was introduced in July 2007.[8]

Transportation Benefits:

Bike-share systems create new options for short trips, enhance mobility around the city and increase access to the city's existing transit services. In a survey of bike-share users in Paris, 89% said that Vélib' allowed them to move around Paris more easily and 54% said that they traveled more in Paris with advent of the Velib' program.[9] New York's compact geography and increasingly robust bicycle infrastructure make it ideally situated to reap significant transportation benefits from a bike-share program. Commuters in particular may benefit from bike-shares. In Paris, 61% of Velib' annual pass holders use the program regularly to get to work or school.[10] In Barcelona, 60% of the Bicing bike-share program subscribers used Bicing in their commute.[11] In New York, most New Yorkers live and work in the same borough, suggesting that many commuting trips could be within bicycling range.[12]

Bike-share systems encourage transit use by extending the distance that people will go to reach transit, by allowing them to avoid slow buses/connector services, and by providing links between subways stations that otherwise do not connect. For example, over 14,000 northwest Brooklyn residents (Greenpoint, Williamsburg, Fort Greene, etc) work in northwest Queens (Long Island City, Astoria, Sunnyside). While the distance between these areas is short, insufficient transit means that 42% of these commuters drive to work each day.[13] In addtion, for some households, the introduction of a bike-share program may help them avoid or postpone the purchase of a car, as trips to transit or other short trips could then be made by public bicycle.

7 Buhrmann, Sebastian; Rupprecht Consult Forschung & Beratung GmbH; "New Seamless Mobility Services: Public Bicycles." Niches Consortium & JCDecaux, "CycloCity: A Revolutionary Public Transit System Accessible to All." Philadelphia Presentation, 2008; (http://bikesharephiladelphia.org/PDF%20DOC/V%C3%A9lo'V_A_REVOLUTIONARY_PUBLIC_TRANSPORT_SYSTEM_ACCESSI.pdf); Accessed 9/02/08

8 Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps," *The London Times*, 8 July, 2008

9 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08

10 ibid.

11 Clear Channel Outdoor Website, "SmartBike™" (http://www.smartbike.com/); Accessed 3/24/08

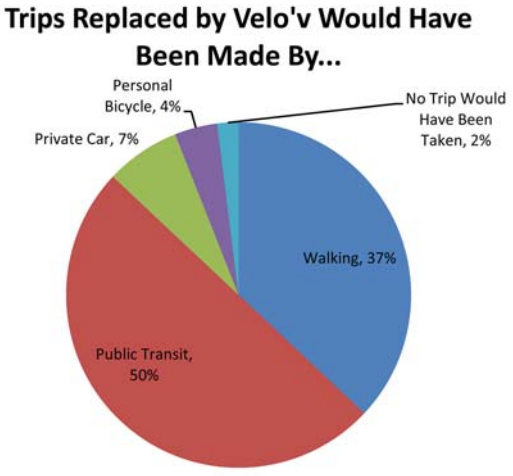
12 NYC Department of City Planning, Transportation Division. "NYC Peripheral Travel Study: Journey-to-Work Trips of NYC Workers Employed Outside Manhattan." October 2008, p.146

13 ibid.

At the same time, bike-share systems can relieve pressure on overburdened transit lines, by allowing subway riders to bicycle to less crowded and/or more direct routes or by replacing short transit trips altogether. A survey of Velo'v users in Lyon found that 50% of trips made with Velo'v would previously have been made on transit.[14] In New York, a subway commuter living on the Upper East Side and working in lower Manhattan or Midtown currently walks to the Lexington Avenue subway (4/5/6), one of the most congested subway lines in the city. With a bike-share program in place, that commuter might bicycle to an express stop or choose to bypass the 4/5/6 all together and bicycle to 63rd or 59th Streets where transfers are available for the F and N/R/W trains. Similarly a bike-share system would allow a Morrisania or Mott Haven resident working at Columbia-Presbyterian, City College or Columbia University, to bicycle to the D train instead of taking a bus or the crowded 2, 5 or 6 train into Manhattan and turning around to go back uptown into work.

"0€ at the Pump;" an advertisement promoting the benefits of bicycling. Image: Mairie de Toulouse

Bike-share programs, which typically can be introduced in a matter of months, can be especially valuable as New York faces increasing subway congestion and no clear, quick answers for relief. Massive construction costs limit development of additional new subway lines and restrict capacity expansion options such as platform extensions on existing lines. A recent MTA proposal to eliminate seats in rush hour trains indicates the seriousness of the problem. For anyone who has ever tried to take the cross-town bus at rush hour, a bike-share program would offer obvious advantages and could complement current NYCDOT efforts to speed up bus service.



The financial incentives to use a bike-share program grow as the cost of driving and transit increases. In Paris, 62% of Velib' users cited the program as way for them to reduce transportation costs.[15] Rising US gas prices in 2007-8 led to an increase in bicycle sales and bicycle commuting. According to the New York Sun, "many of these new cyclists are from areas not commonly associated with the "Bike Belt" — neighborhoods such as the Upper West Side and Williamsburg in Brooklyn — but are instead from Queens and other places where driving to work has long been common and affordable" and where public transportation is often limited.[16]

14 Buhrmann, Sebastian; Rupprecht Consult Forschung & Beratung GmbH; "New Seamless Mobility Services: Public Bicycles." Niches Consortium; p.5

15 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08

16 Phillips, Anna; "High Gas Prices Cause Bike Shortages in N.Y." *The New York Sun*, 30 May, 2008

While it is unlikely that all of New York City's drivers will suddenly step out of their cars and get onto a bicycle, evidence from European bike-share programs suggests bike-share programs may be linked to small, but significant, decreases in car use and traffic congestion. In Lyon, France, the 3,000 bicycle Velo'v bike-share system shifts 1,000 car trips to bicycle each day. 7% of Velo'v trips would have otherwise been made by car.[17] Within the first six months, 2 million Velo'v trips had been made, replacing an estimated 150,000 car trips.[18] In Paris, 20% of Velib' users said that they used their personal cars less since becoming members.[19] Assuming bike-share bicycles replaced just 1% of all non-commercial vehicle trips in Midtown and Lower Manhattan, the system could eliminate almost 9,000 car trips daily in New York City.[20] Rising gas prices may further stimulate this trend. By freeing up room on the city's subways and buses, especially for short trips, a bike-share program could encourage New Yorkers with longer commutes, who might otherwise drive, to take the train.

Economic and Job Creation Benefits:

Bike-share programs have proven to produce substantial revenues from fees and increased tourism and bicycle-related sales. The revenues and jobs generated by bike-share programs depend on program size. In Paris, Velib', which has 20,600 bicycles, earned over €30 million in its first year in membership and use fees.[21] Since the costs of the program are covered by the JCDecaux billboard contract, this money goes entirely to the city of Paris as revenue. Washington DC also receives all membership and use fees generated from SmartBike, although the small size of the program means that these revenues will be much lower. As advertising revenues in New York City are likely to be substantial, a bike-share franchise could generate significant revenue. The sale of one day "tourist" passes in particular could be a large revenue stream. In addition, sales of bicycle-related products such as helmets, reflective gear and personal bicycles also tend to rise with the advent of a bike-share program, stimulating economic growth and producing additional sales tax revenue.

A bike-share redistribution team in Barcelona. Image: ClearChannel Adshel

Bike-share programs are job creators and a number of programs have targeted that job creation toward youth and at-risk populations. Bike-share programs require staff to maintain the bicycles,

17 Buhrmann, Sebastian, Rupprecht Consult Forschung & Beratung GmbH, "New Seamless Mobility Services: Public Bicycles." Niches Consortium; p.5

18 ibid. p.2

19 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08

20 Trip estimate numbers are from the NYMTC Best Practices Model and from NYC & Co. estimates on leisure tourism

21 Nadal, Luc, "Bike Sharing Sweeps Paris Off Its Feet," *Sustainable Transport*, Institute for Transportation and Development Policy, Fall 2007, Number 19 & Erlanger, Steven, "A New Fashion Catches On in Paris: Cheap Bicycle Rentals," *The New York Times*, 13 July 2008

re-distribute them when necessary and administer and oversee the systems' central computer network. In Paris, JCDecaux employs more than 400 full-time and part-time staff, with a minimum guarantee of 20 hours/week. Job types are varied as the program requires everything from mechanics and warehouse staff, to call center technicians, service staff, sector managers and supervisors who interact with the public.[22] In addition, a large New York City bike-share program could create jobs elsewhere in New York State as facilities would need to be developed to manufacture the bicycles and bike-stations.

Health Benefits:

Bike-share programs, because they do not require users to own, store or maintain a personal bicycle, tend to introduce new people to bicycling and make bicycling a part of peoples' lives in new ways. 96% of Velo'v users in the first year had not ridden in Lyon before.[23] In addition, once they start, bike-share users tend to bicycle frequently. ClearChannel Adshel found that 45% of their membership used a bike-share bicycle more than five times per week.[24]

Thus, bike-share programs offer significant options for improvements in the health and quality of life of many New Yorkers. In New York, the majority of adults do not meet the levels of physical activity recommended to protect health and prevent disease.[25] For adults to maintain health, at least 30 minutes of moderate intensity physical activity is recommended a minimum of 5 days a week.[26] Such exercise can be broken down into short time spans, as small as 10 minutes, and can easily be encouraged by a bike-share program that allowed New Yorkers to bicycle to the subway station instead of taking the bus. Improved health outcomes can also come with cost savings for city and state health care providers. According to a study by the California Department of Health Services, a 5% improvement in the rates of physical inactivity and healthy weight over five years could save California more than $6 billion, while a 10% improvement could save nearly $13 billion.[27]

The public health benefits of increased bicycling are substantial. In one Danish study provided by the NYC Department of Health and Mental Hygiene's (NYCDHMH) Bureau of Chronic Disease Prevention and Control, those who did not cycle to work had a 39% higher mortality rate than those who did, even after adjusting for other relevant factors including leisure time physical activity.[28] Another source found that a fifteen minute bicycle ride to and from work five times a week can burn the equivalent of 11 pounds of fat in a year.[29]

22 Velib' Website, "Velib Press Kit," (www.velib.fr); Accessed 8/26/08
23 Holtzman, David, "Bike-Sharing," *Planning*, May 2008, p.21
24 Clear Channel Outdoor Website, "SmartBike™" (http://www.smartbike.com/); Accessed 3/24/08
25 NYC Department of Health and Mental Hygiene, 2007 Community Health Survey
26 New York City Department of Health and Mental Hygiene's Bureau of Chronic Disease Prevention and Control & Haskell, W.L., et al., *Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association.* Circulation, 2007. 116(9): p. 1081-93
27 Chenoweth, D., *The economic costs of physical inactivity, obesity and overweight in California adults: health care, worker's compensation, and lost productivity.* California Department of Health Services, Public Health Institute, 2005
28 Andersen, L.B., et al., *All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work.* Arch Intern Med, 2000. **160**(11): p. 1621-8
29 Bupa. *Cycling and health*. [cited 2008 August 8]; http://www.bupa.co.uk/health_information/html/healthy_living/lifestyle/exercise/cycling/cycling_health.html

The health benefits of small amounts of bicycle use are particularly important given rising obesity rates in the United States and the associated costs. According to one study, compared with their normal weight counterparts, obese or overweight Americans spend 36% more on health care services and 77% more on medications (the comparable numbers for current smokers are 21% and 28%, respectively).[30] If American obesity trends continue rising without additional behavioral or medical technology changes, by 2020, up to one-fifth of health care expenses could be devoted to treating obesity consequences. In New York State, Medicaid expenditures on long term care could rise to $5.7 billion by 2016 with per capita costs increasing from $280 to as much as $350.[31] Dutch studies also found correlations between level of activity and worker productivity. Workers who met recommended levels of vigorous physical activity (at least 20 minutes each time, three times a week) had fewer sick days than their counterparts who did not. These workers had four fewer sick days per year on average.[32]

City Image Benefits and Connections to PlaNYC:

While harder to quantify, a bike-share program could also help New York build on its image as a "green" leader set by the Mayor's PlaNYC 2030 and stimulate overall gains in quality of life in the city. PlaNYC 2030 is one of the most comprehensive proposals ever published for any city's future. In addition to the goals it set forth, many of which are currently in process of being implemented by the city, PlaNYC has helped to redefine New York City as an innovative, "green" city. A New York City bike-share program which could be implemented relatively quickly could positively contribute to these efforts, particularly in contrast to other much needed but capital intensive transportation investments such as subway expansion.

Bike-share programs around the world have meet with overwhelmingly positive national and international print, internet and televised media. Coverage has appeared throughout the European press (in tourism markets that the city is courting) and on innumerable transportation and travel blogs. Montreal's Bixi program was featured by Time Magazine as one of its 50 Best Inventions of 2008.[33] This approbation and attention has already had tangible positive image benefits in Paris. In 2007, Velib' won the British Guild of Tourism Writers' "Best Worldwide Tourism Project" award.[34] Similar publicity for a New York bike-share could help the city meet its goal of 50 million visitors by 2015.

Lastly, as evidenced by recent NYCDOT projects like Summer Streets, New Yorkers respond positively to increased opportunities for bicycling, which bodes well for a bike-share program. Velib' has a 94% satisfaction rate among users, many of whom credit the program with giving Paris a

30 RAND Health. *Obesity and Disability: The Shape of Things to Come*. 2007 [cited 2008 August 13]; Available from: http://www.rand.org/pubs/research_briefs/RB9043/

31 ibid.

32 Proper, K., et al., *Dose-response relation between physical activity and sick leave.* Br J Sports Med., 2006. **40**(2): p. 173-8.

33 Time Magazine Website, "Time's Best Inventions of 2008: #19 Montreal's Public Bike System," *Time Magazine*, (http://www.time.com/time/specials/packages/article/0,28804,1852747_1854195_1854146,00.html); Accessed 1/7/09

34 British Guild of Tourism Writers Website, "BGTW Tourism Awards – 2007: PARIS VÉLIB;" (http://www.bgtw.org/index.php?option=com_content&task=view&id=934&Itemid=77); Accessed 9/02/08

positive image and dramatically increasing their ability to move about the city.[35] As one review of Velib' noted, "when they speak of Vélibs, Parisians smile, even those like a waiter who admitted not having ridden one."[36]

35 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
36 Rayman, Eric; "Finding Liberté on Two Wheels;" *The New York Times*, 14 October, 2007

03 Case Studies

Image: Alexandre Genest, Biclycle Michel Dallaire and Cycle Devinci, All rights reserved 2008 (www.flickr.com)

- **Velib' (Paris)**
- **Bicing (Barcelona)**
- **SmartBike (Washington DC)**
- **Bixi (Montreal)**
- **Vélô (Toulouse)**

CASE STUDIES

Case studies of existing and proposed bike-share programs provide valuable lessons. Velib' in Paris is unprecedented in terms of its scale and program scope. Bicing, in Barcelona, and Vélô Toulouse in Toulouse, France demonstrate alternative funding options. SmartBike, in Washington DC, highlights the unique challenges posed by small programs. Bixi, scheduled to open in Montreal in 2009, suggests extremely important design modifications that may reduce capital costs. The following table provides a basic comparison of these programs in terms of city population and size, coverage area and number of bicycles and bike-stations.[1]

BIKE-SHARE CASE STUDIES					
PROGRAM:	VELIB'	BICING	SMARTBIKE	BIXI	VÉLÔ
OPERATOR:	JCDecaux	ClearChannel Adshel	ClearChannel Adshel	Stationnement de Montréal	JCDecaux
CITY:	Paris, France	Barcelona, Spain	Washington DC	Montreal, Canada	Toulouse, France
START DATE:	July 2007	March 2007	August 2007	Spring 2009	November 2007
CITY SIZE:	44 sq miles	39 sq miles	68 sq miles	141 sq miles	45 sq miles
PROGRAM COVERAGE:	Whole City	City Center	Select City Center Areas	City Center	City Center
CITY POPULATION:	2.2 million	1.6 million	588,000	1.8 million	435,000
CITY DENSITY:	53,000 people/ sq mile	41,000 people/ sq mile	9,000 people/sq mile	11,500 people/ sq mile	9,700 people/sq mile
BICYCLES:	20,600	6,000	120	5,000	1,400
BIKE-STATIONS:	1,451	400	10	Unknown	135

Throughout this report, Velib' is used most often for comparison. Paris and New York are both densely populated urban centers with a widely used public transit system. The workforces of both cities are augmented by commuters, mostly using regional rail services, coming in from nearby suburbs. Tourism plays a major role in the economies of both cities. In 2006 Paris welcomed 27 million visitors, 56% of whom came for leisure purposes.[2] New York received 43.8 million visitors in 2006 and 46 million in 2007; about 75% of all visitors came for leisure purposes.[3] While unique and distinctive, the Parisian streetscapes bear resemblance to large portions of New York; stores, small markets, restaurants and cafes rely on foot traffic and a strong pedestrian presence. Paris prior to Mayor Delanoë did not have a strong bike lane network, and, like New York, it did not have a significant bicycle mode split.

New York is the larger city with 8.2 million people spread over 304 square miles. The greater New York metropolitan (Tri-State) area has 19 million people over around 6,700 square miles. Paris, in contrast, has approximately 2.2 million people and covers 44 square miles. The greater Parisian metropolitan area (Île-de-France) has around 12 million people over around 4,600 square miles.

1 Expansion planned to Velib' for the winter of 2008 will add the Parisian suburbs to the coverage area and increase the program size to around 28,000 bicycles.

2 Velib' Website, "Velib Press Kit," (www.velib.fr); Accessed 8/26/08

3 NYC & Co. Website, "NYC Statistics," (http://nycvisit.com/content/index.cfm?pagePkey=57); Accessed 5/21/08

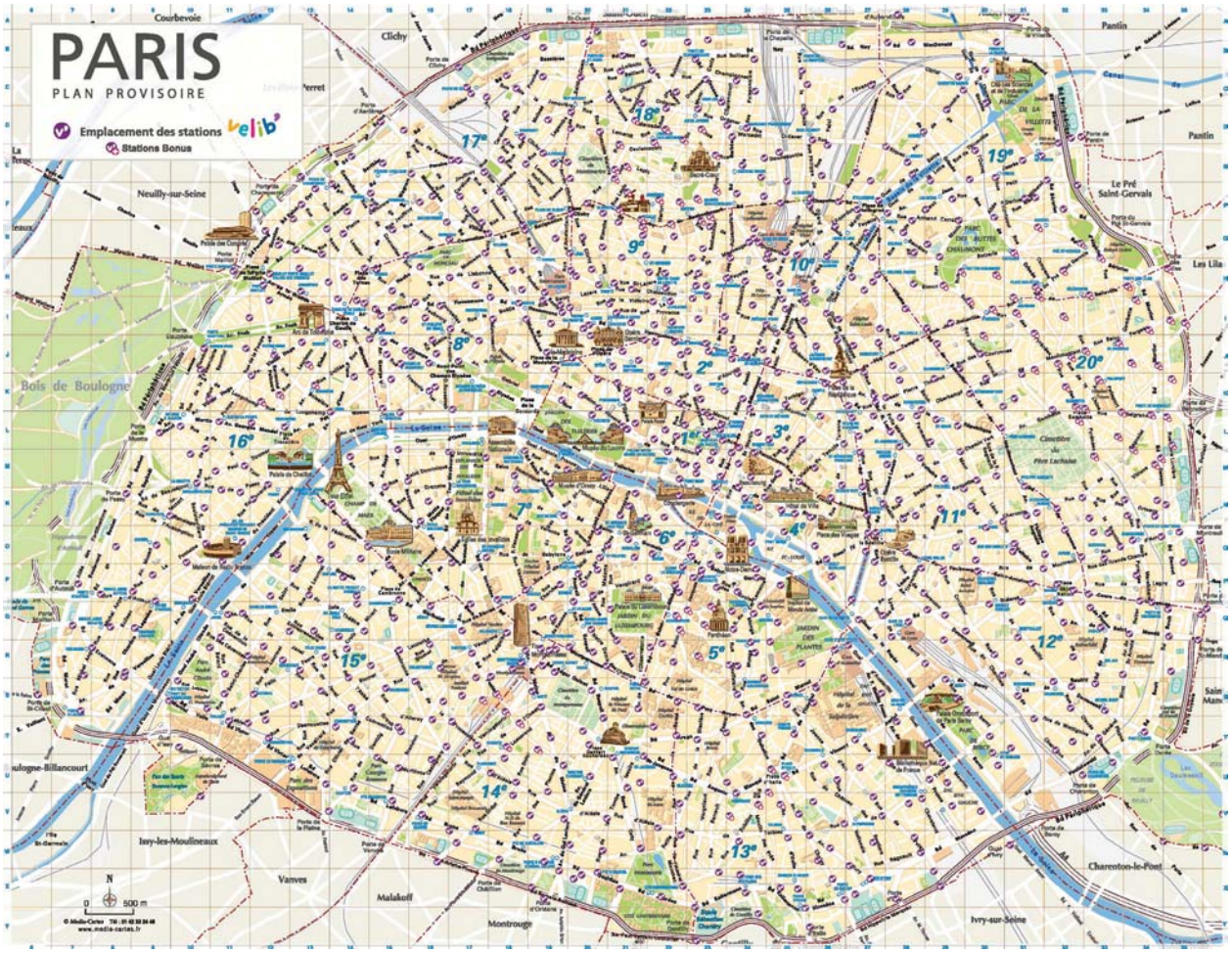
Paris has a higher overall average population density, about 53,000 people per square mile in contrast to New York's average 26,000 people per square mile. However, New York City's population density varies greatly. Manhattan's average population density is 85,000 people/square mile. The population density of New York's medium- and high-density areas (Manhattan, the south and southwestern Bronx, western Brooklyn and northwestern Queens) is virtually identical to Paris. These areas make up about a third of the city's land mass (around 113 square miles).

Weather in Paris is slightly milder than New York. Average January temperatures range from a high of 44°F to a low of 36°F and it snows on average 4 days per winter month.[4] New York in contrast has an average January high of 36°F and a low of 25°F.[5] Summers in Paris are hot, with temperatures mostly in the upper 80°'s and low 90°'s, similar to New York.

4 Carr, Kelby, "Paris and France Travel in January," (http://gofrance.about.com/od/francemonthlycalendar/a/franceinjan.htm); Accessed 09/09/08

5 Weatherbase Website, (http://www.weatherbase.com/weather/weatherall.php3?s=108503&refer=&units=us); Accessed 09/09/08

Paris France — VELIB' — JCDecaux

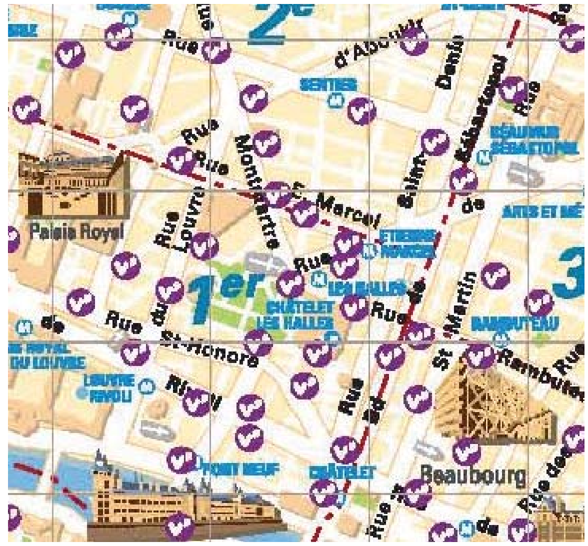


Velib' bike-stations cover the entire city of Paris. Each dot is a bike-station. Image: Mairie de Paris

With 20,600 bicycles and over 1,400 bike-stations, Velib' is the world's largest bike-share program. Unlike any other bike-share program currently in existence, Velib' covers the entire city of Paris, making it a comprehensive addition to the Parisian transportation network. Velib' was launched in July 2007 as a joint venture between the City of Paris and SOMUPI, a JCDecaux/Publicis partnership. The program was introduced in two phases: 10,000 bicycles in July 2007 and 10,600 more in December of the same year. This rapid and large scale roll-out allowed the program to build on its own internal momentum and draw in users living or working outside of initial coverage areas with the promise that they would soon be able to take Velib' all the way home. With the addition of the second phase, the Velib' program coverage extended to the entire city of Paris. A third phase (3,300 bicycles) which will extend Velib' to the inner Parisian suburbs has recently been announced.[6]

6 Velib' Website, "Le Vélib' en petite couronne : les travaux sont lancés!," (http://www.velib.paris.fr/index.php/actualites/decouvrez_velib/le_velib_en_petite_couronne_les_travaux_sont_lances); Accessed 1/20/09

Velib' is part of Paris's *Espaces Civilisés* ("Civilized Spaces") project, the overall greening and livability strategy introduced by Mayor Delanoë when he took office in 2001. The implementation of *Espaces Civilisés* has physically changed the Paris streets; reducing traffic congestion, prioritizing transit, pedestrians and bicycling, creating a robust bicycle network and introducing policies and programs to increase the presence of bicycles on Paris's streets.[7] Since Velib's introduction, Paris has seen a 70% increase in bicycle use and a 5% reduction in car use and congestion.[8]



Approximately 1 square mile of central Paris. Each purple dot is a bike-station. Image: Mairie de Paris

Following density standards developed and tested in Lyon with the Velo'v program, Velib' docking stations can be found every few blocks throughout the city (approximately 28 bike-stations/square mile).[9] Bike-stations range in size from around 12 docks/station in less highly trafficked areas to up to 70 docks/station around major tourist attractions. Bike-station density typically increases around commercial/transit hubs, although individual bike-stations are often smaller (~15-25 docks/station).


A Velib' commuter. Image: M. Fernandez

Like all bike-share programs, Velib' membership and use fees are designed to be affordable. The majority (86%) of users say that they are satisfied with the current pricing of the program.[10] Annual membership costs €29 (about $40), while daily and weekly memberships, designed mostly for tourists, cost €1 and €5 respectively. As is typical for bike-share programs, the first 30 minutes of use is free and users have a 15 minute grace period if docking stations are not available at their destination bike-station. Subsequent half-hour periods have escalating costs to encourage short trips, as opposed to longer recreational rides. The second ½ hour costs €1, the third €2. The maximum rental period is 4 hours. Velib' bicycles are the responsibility of the user once removed from a bike-station. JCDecaux charges €150 (about $225) to the user's credit card for bicycles not returned within 24 hours.[11]

7 Bennhold, Katrin. "A New French Revolution's Creed: Let Them Ride Bikes," The New York Times, 16 July 2007
8 Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps;" The London Times, 8 July, 2008
9 APUR, Etude de Localization des Stations de Velos en Libre Service, December 2006
10 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
11 Users who report their bicycles stolen are charged €45

Structure and Finances:
Paris's bike-share franchise contract is held by SOMUPI, a JCDecaux/Publicis partnership. The program is run and administered by JCDecaux. In exchange for rights to 1,628 advertising panels on billboards and other street furniture, JCDecaux maintains and operates Velib' and carried the full cost of the initial start-up capital, around €90 million.[12] Velib' operating expenses, for 20,600 bicycles, are estimated to be €35 million.[13] JCDecaux expects to generate around €50 million in revenue annually.[14] The city of Paris receives all of the Velib' subscription and use fees, estimated at €30 million annually.[15] Velib' is overseen by Atelier Parisien d'Urbanisme (APUR), a city of Paris planning agency.

Prior to Velib', Paris' street furniture franchise contract, set to expire in 2010, was held by SOMUPI. In 2006, the city of Paris broke that contract, and released a new RFP which included bike-share. Initially, Paris envisioned a smaller program (6,000 bicycles). However, RFP responses from JCDecaux and ClearChannel Adshel (20,000 and 14,000 bicycles respectively) encouraged the city to begin with a larger program.[16] Paris re-awarded the street furniture contract to JCDecaux in February 2007. Velib's first phase opened six months later in July 2007.

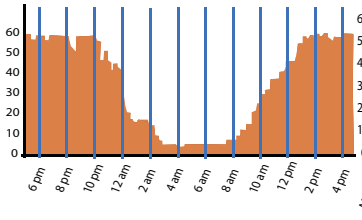
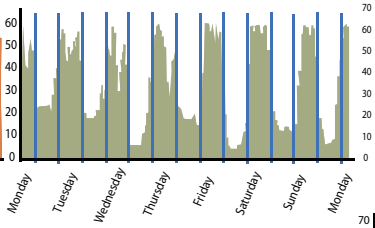
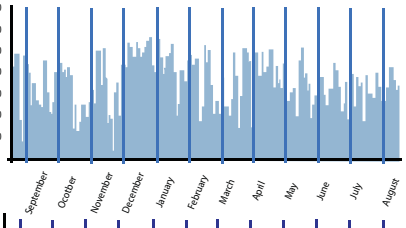
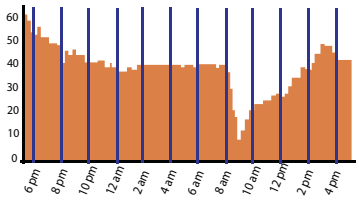
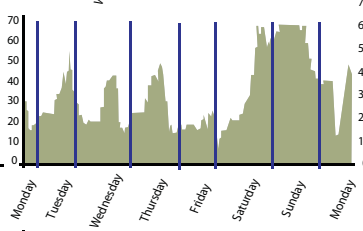
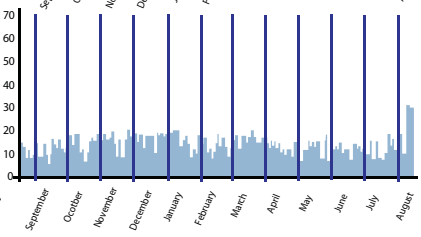
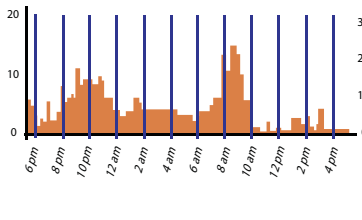
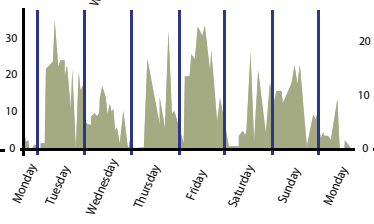
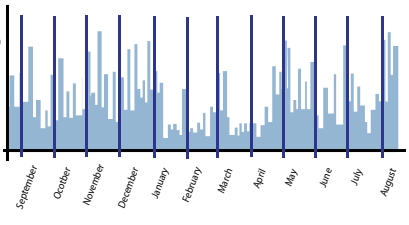
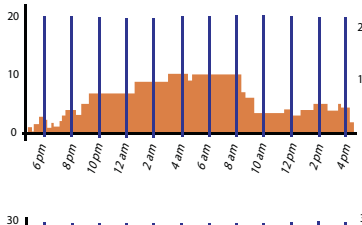
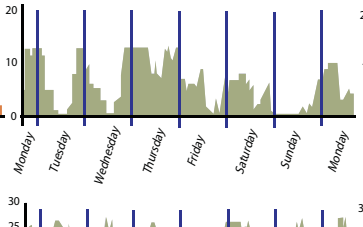
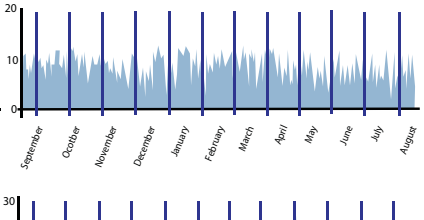
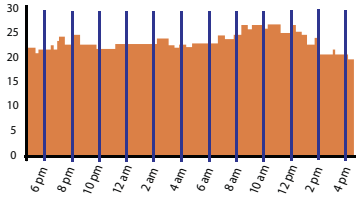
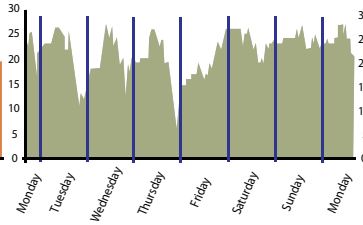
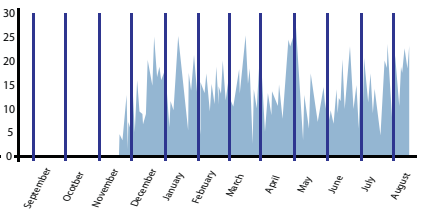
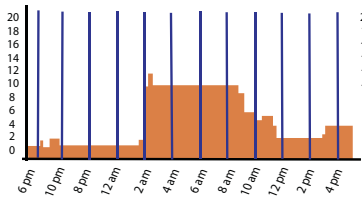
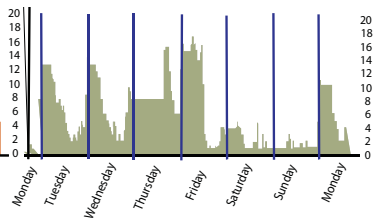
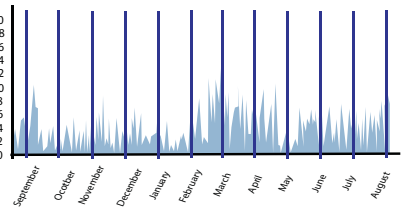
Ridership and Use:
First year ridership numbers highlight the immediate success of the Velib' program. Velib' opened its doors in July with 13,000 annual Velib' subscribers ready to ride.[17] By October 2007, there were 100,000 annual subscribers.[18] As of July 2008, a year after its introduction, Velib' had sold 200,000 annual memberships. 33% of all annual subscription holders (~63,000 people) live in the Parisian suburbs, testifying to Velib's power to draw commuters from outside of its coverage area.[19] JCDecaux reported 27.5 million Velib' trips in the first year; an average of 75,000 trips/day.[20] During the Paris transit strike in Velib's first winter, ridership rates reached 73,000 trips/day, more than twice the typical winter ridership.[21] Tourists and short term members have also flocked to the bike-share system. Within the first six months, Velib' sold 2.5 million one day passes.[22]

An analysis of the number of bicycles docked at bike-stations located around Paris shows that Velib' is constantly in use.[23] At an annual level, despite sporadic dips, most likely due to extreme

12 Nadal, Luc; "Bike Sharing Sweeps Paris Off Its Feet;" *Sustainable Transport*, Institute for Transportation and Development Policy; Fall 2007, Number 19
13 Spitz, Eric, City of Paris; Email Correspondence: Spring 2009
14 ibid.
15 Nadal, Luc; "Bike Sharing Sweeps Paris Off Its Feet;" *Sustainable Transport*, Institute for Transportation and Development Policy; Fall 2007, Number 19
16 ibid.
17 Bennhold, Katrin. "A New French Revolution's Creed: Let Them Ride Bikes," *The New York Times*, 16 July 2007
18 Hervieux, Linda. "Paris' rent-a-bike program perfect for city, says advocates," *New York Daily News*, 1 October 2007
19 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
20 Erlanger, Steven, "A Fashion Catches On in Paris: Cheap Bicycle Rentals," The New York Times, 13 July 08.
21 Velib' Website, "Strike: Velib' Figures," (http://www.velib.paris.fr/index.php/actualites/decouvrez_velib/greve_les_chiffres_de_velib); Accessed 2/2/09 & DeMaio, Paul; "Random Velib' Data," The Bike-Sharing Blog; (http://bike-sharing.blogspot.com/2008/02/random-velib-data.html); Accessed 6/25/08
22 DeMaio, Paul; "Random Velib' Data," The Bike-Sharing Blog; (http://bike-sharing.blogspot.com/2008/02/random-velib-data.html); Accessed 6/25/08
23 Velib' use data, which is a count of the number of bicycles at each bike-station in Paris, provides information

Daily, Weekly, and Annual Trends in Velib' Use

Number of Bicycles at Velib' Bike-Stations

	Daily (August 18, 2008)	Weekly (August 11-18, 2008)	Annual (September 2007 - August 2008)
City Center Station #4016 3 Rue Lobav			
Tourist Area Station #7022 3 Ave Bosquet			
Transit Hub Station #14005 2 Ave Rene Coty			
Residential Station #15062 87 Rue de la Convention			
Periphery Residential Station #17115 22 Ave de la Porte de Saint Oven			
Residential/Hill Station #19024 30 Rue Botzaris			

Different area-types have unique use patterns. Data gathered by Sebastien Gross, http://velib.chezwam.org/

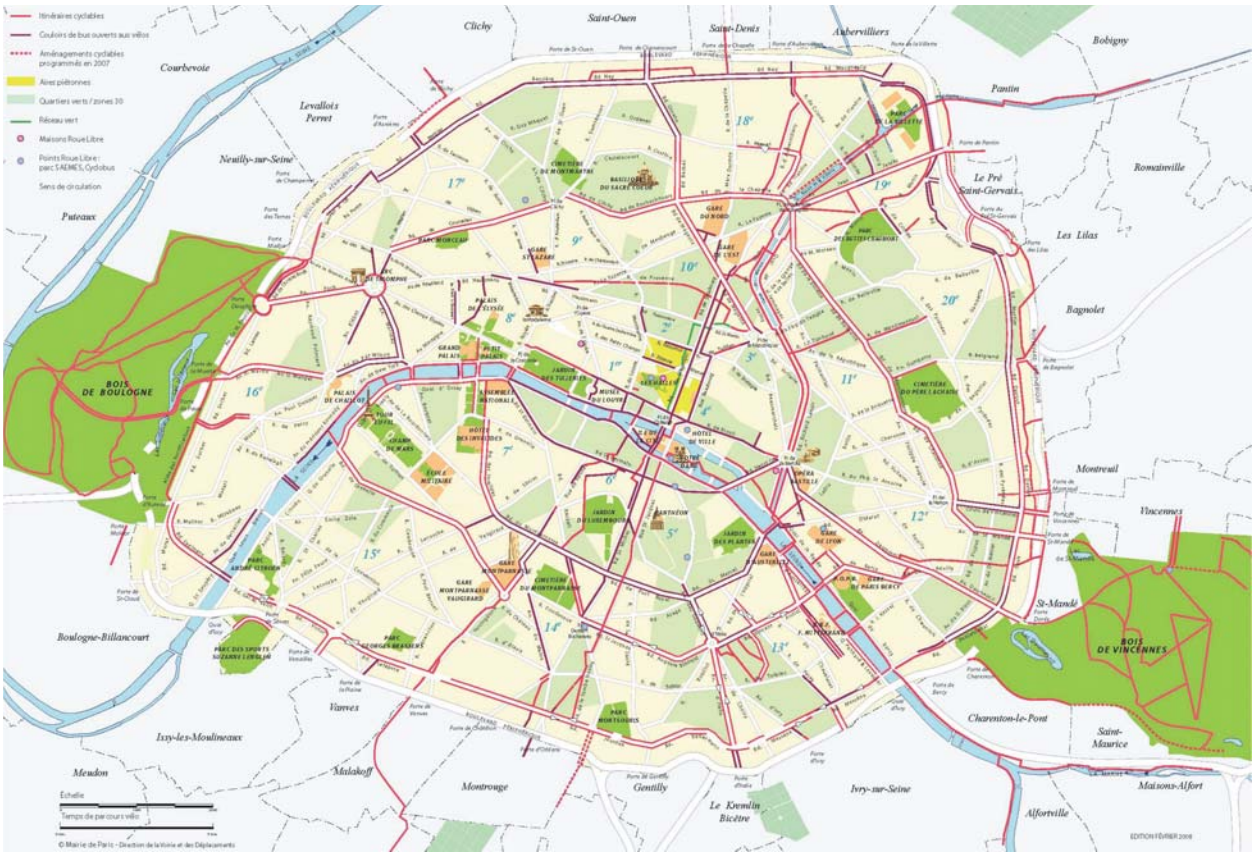
weather, Velib' bicycles are in use year round. Bike-stations located in tourist or residential areas show the least degree of seasonal change. On a weekly and daily level, explicit conclusions are hard to draw.[24] Bike-stations located in central business areas (for example bike-station #4016 near Hotel de Ville) show very regular use patterns. Commuters arrive on bicycles around 8am and the bike-station fills up steadily over the course of the morning. In contrast, at bike-station #14005 near Denfer-Rochereau, a major transit hub, bicycles are stocked in the early morning in anticipation of the morning rush and almost entirely gone by 10am. Bicycles return in the late afternoon and early evening to major transit hubs and residential bike-stations (#15062). At Hotel de Ville, also a major nightlife area and a central late night transfer point, many bicycles are rented late at night. Another study indicates that 25% of all Velib' trips take place between 9pm and 3am.[25] The Paris Metro closes at 1am.

In order to ensure the smooth running of the system, JCDecaux redistributes the bicycles throughout the day. Clustering, especially at major destination points or at the bottoms of hills is particularly an issue. Bike-stations located at the top of large hills (bike-station #19024 near the Butte Chaumont) seem to need constant restocking as users rent bicycles in the morning to ride down but do not seem to ride them back up at night. The JCDecaux redistribution fleet team uses 130 motorized bicycles, 20 CNG service vans and electric cars, and a floating maintenance barge.[26] The overall satisfaction level with JCDecaux's redistribution efforts is mixed. According to the London Times, JCDecaux has been "unable so far to ease the problem of saturation in Paris when commuters arrive in the morning."[27]

Parisian Bicycle Infrastructure:

While Velib' is perhaps the most well known element of *Espaces Civilisés*, the Parisian greening and livability strategy, it is not the only part. Starting in 2001, Paris began dramatically increasing the amount and quality of bicycle and pedestrian infrastructure, removing car parking spaces and redesigning many of the city's streets and boulevards. Paris invested €24 million to enhance the streetscape by widening sidewalks, planting trees and improving the bicycle network.[28] These efforts paid off. From 2001 to 2006, Paris saw a 48% increase in bicycle mode split, a 20% decrease in private car use, and an 11% decrease in trucks and tour buses.[29] Today in Paris, bicyclists have 230 miles (371 km) of bike lanes. Over 125 miles have been built since 2001.[30] Lane quality ranges from on street marked bike lanes to shared bus-bike lanes to fully separated bike lanes. Paris has also experimented with contraflow facilities which are a physically separated bike lanes with bicycle traffic that travels in the opposite direction of vehicular traffic. All total, bike lanes exist on about 17% of Paris' roads.

24 Data is collected at fixed intervals. While the total number of bicycles is known, which bicycles are at a given bike-station is unclear. A flat line can either mean that no bicycles were taken or returned (no users) or that one bicycle was rented at the same time another was returned (two users).
25 DeMaio, Paul, Director, MetroBike LLC; Phone Interview: 1 August 2008
26 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08, p.15
27 Bremner, Charles, "Paris offers drivers electric cars to beat pollution - for a small charge;" *The London Times*, 2 January, 2008
28 Nadal, Luc; "Bike Sharing Sweeps Paris Off Its Feet;" *Sustainable Transport*, Institute for Transportation and Development Policy; Fall 2007, Number 19
29 ibid.
30 Bennhold, Katrin. "A New French Revolution's Creed: Let Them Ride Bikes," *The New York Times*, 16 July 2007



The city of Paris has installed protected bike lanes on many major arteries throughout the city. Image: Mairie de Paris

While the average bike-station density is 28 stations/square mile, the number of bike-stations in any given area depends on density and the number of trips estimated to occur there. On the left, the density populated Gare Du Nord transit hub area. On the right, the lower density, primarily residential neighborhood surrounding Invalides. Maps are at the same scale.

Velib' bike-stations are typically found on side streets. Image: paspog (www.flickr.com)

Membership passes can be purchased at bike-stations. Image: Mike Grenville (www.flickr.com)

The locking mechanism is attached to the bicycle frame. Image: Richard Ying (www.flickr.com)

Bike-stations and Bicycles:

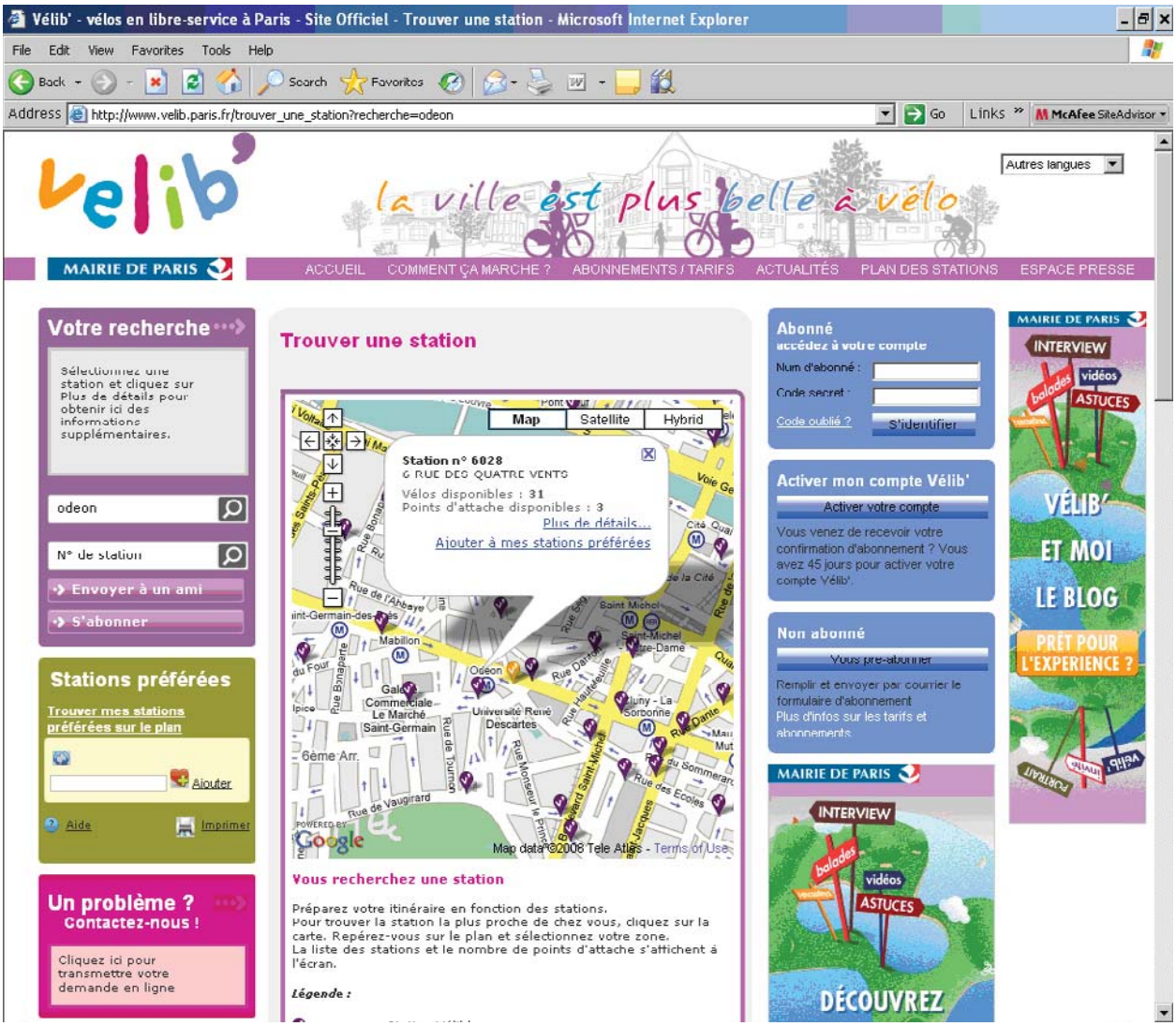
Velib' bicycles are easily distinguishable from other bicycles on the roadway because of their grey color and unique handlebars. Developed in-house by the JCDecaux design team, the bicycles have 3 speeds. In order to deter theft, they weigh about 50lb (22kg). Velib' bicycles, like other 3rd Generation bike-share bicycles, are specially designed without exposed cables or gears, both in order to reduce the chances of riders getting dirty or snagged on the chain and to reduce vandalism or wear and tear on the bicycles. The bicycles have an adjustable, but not removable, cushioned seat and a mesh basket on the front so that purchases or personal items can be easily transported. Safety features include automatic lights which remain on whenever the bicycle is in use and numerous reflectors.

Velib's bike-stations are designed to blend into the surrounding streetscape. Docking stations are free-standing and look like small bollards. Subterranean wiring allows passersby to walk in between individual docking stations. This design feature makes the bike-stations less imposing, reduces visual clutter and allows the bicycles to take up less space on the street or sidewalk. The lock on Velib' bicycles is a thin metal fin located on the side of the frame. To return a bicycle, users roll the bike into the docking station. A red light indicates that the bicycle is properly locked.

Most Velib' bike-stations are found on the sidewalks, in line with other forms of street furniture or trees. On street bike-stations are located in the parking lane and protected from cars with a low concrete block. Larger bike-stations are found under viaducts and elevated Metro lines. Bike-station sizes were determined by the number of trips (residential, business/school, shopping) estimated to be made in the surrounding area. Often, in highly trafficked areas, APUR placed multiple

smaller bike-stations close together, rather than just one large bike-station. For example, in the densely populated areas immediately adjacent to the Gare Du Nord and Gare de l'Est (two major transit hubs) there are twelve small stations. In contrast there are fewer, but larger bike-stations (~60 docks/station) around the less densely populated areas surrounding the Eifel Tower and Invalides.

Paris chose to prioritize sightlines to important monuments and so limited bike-stations on the city's historic boulevards such as the Avenue des Champs Elysees. As a result Velib' bike-stations are mostly found on side streets, just off main thoroughfares or along the edges of city parks. Special attention was also given to the pedestrian flow and access to the plazas around Paris' many monuments. Bike-stations were placed in proximity to the plazas and monuments but not directly in them. In addition, as Velib' was envisioned as an extension of Paris' transportation networks, bike-station placement rules ensured that bike-stations were located at each of Paris'



The Velib' website allows users to find a station ("Trouver une station") and learn how many bicycles are available ("Velos disponibles") and how many docking points are free ("Points d'attache disponibles.") The underlying map is a Google mash-up with the real-time bicycle and station information managed by the Velib' central computer.

Metro and RER (regional rail) stations.

Information Technology:
Like all other major bike-share programs, Velib' uses real-time technology to help users find bicycles and bike-stations. Velib' bicycles are equipped with radio frequency identification (RFID) tags which are read by the bike-stations, informing the computer which bicycles are there. As with other bike-share programs, the system is overseen by a computer system, which manages docking terminals, system activity, coordinates with the call center and generates reports and statistics. The "*Trouver une station*" ("find a station") link on the Velib' site takes the user to a Google map. Users can search for bike-stations using a location name, address or bike-station number or select a bike-station from the map. Information provided includes how many bicycles and how many docking stations are available.

Safety:
As the number of bicyclists has increased—Paris has seen a 48% rise in cyclists between 2001 and 2006—other road users have been forced to be more mindful and share the road.[31] The number of bicycle accidents has remained stable (around 500 accidents/year) despite the dramatic increase in bicyclists on the road. There were 3 Velib' deaths in the first year out of over 27.5 million rides. The city of Paris reported a 7% increase in bicycle accidents in 2007 but a 24% increase in bicycling in the city.[32]

In preparation for Velib', and in response to a rise in accidents in 2006 before Velib' was introduced, the city of Paris initiated a massive public safety campaign to educate drivers, pedestrians and cyclists about the rules of the road. The campaign focused on illegal actions of all road users—overly aggressive drivers, bicyclists ignoring red lights or stop signs, jaywalking, and moving vehicles encroaching on crosswalks, bus and bicycle lanes—in order to remind people that most accidents occurred as a result of disregarding existing traffic laws. Posters with provocative captions were placed on the sides of buses and ran in newspapers. Major streets were lined with named cut-outs of accident victims stating accident facts and figures. To complement these ef-

"Julien, 34 years old, leaving the movies. He jaywalked. Today Paris says "enough." In 2006, dangerous behavior caused 64 deaths and more than 7,000 injuries." Image: Mairie de Paris/ DGIC/ Bernard Pedretti (www.flickr.com)

"A license to drive is not a license to kill." Image: Mairie de Paris/ DGIC/ Arnaud Terrier (www.flickr.com)

31 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08, p21
32 Erlanger, Steven, "A New Fashion Catches On in Paris: Cheap Bicycle Rentals," *The New York Times*, 13 July 2008

forts, JCDecaux has distributed safety pamphlets to all Velib' annual subscribers and conducted safety demonstrations at Velib' stations.[33]

Paris police have also ramped up enforcement of traffic violations. The Paris police have begun a policy of issuing soccer-style "Yellow Cards" to bicyclists, pedestrians and drivers, who commit minor but dangerous traffic violations.[34] In 2007, police issued 7,000 moving violations to bicyclists, twice as many as in 2006.[35] Helmet use is also an ongoing challenge as most European bicyclists do not wear them.

Theft and Recent Challenges:

Velib' has seen higher than anticipated use, resulting in a number of operational challenges. Paris has received complaints that redistribution efforts are insufficient and that the 400 person maintenance staff may not be large enough to support the 20,600 bicycle program. In addition, high use rates (each bicycle is used 10-15 times per day) mean that bicycles must be repaired more often than initially expected. Recent reports indicate that the city of Paris may charge JCDecaux penalties for not maintaining the fleet in a state of good repair.[36] Bike-share programs still in development, like London, hope to limit such problems by using bicycle manufacturers who have proven track records for "service bicycles." CityByke, London's bike-share consultant and a potential operator for the London program proposes to use the bicycle manufacturer who builds bicycles for the Royal Mail.[37]

Velib' locking instructions. A green light signifies that the bicycle is available. An orange light indicates that lock is engaging. A green light accompanied by a beep indicates that the bicycle is properly locked. Image: Mairie de Paris

Theft is also a larger problem than expected. As of July, 2008, 3,000 Velib' bicycles (14% of the total fleet) had been stolen, about twice as many as JCDecaux initially estimated.[38] In February 2009, JCDecaux announced that 7,800 bicycles had been stolen, and suggested that the design of the locking mechanism, which may leave inexperienced users unsure of whether their bicycle is properly docked, could be at fault.[39] The city of Lyon, which uses an identical locking system as Paris, also saw higher than ex-

33 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08, p23
34 Staff, "Vandals don't spoil party as Paris bike scheme turns one;" *Sydney Morning Herald*, 16 July, 2008
35 Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps;" *The London Times*, 8 July, 2008
36 ibid.
37 Knight, Mark, Director, CityByke; Presentation: 4 August 2008
38 Erlanger, Steven, "A New Fashion Catches On in Paris: Cheap Bicycle Rentals," *The New York Times*, 13 July 2008
39 Bremner, Charles, "Paris self-service bicycles are vandalised, stolen and sold," *The London Times*, 10 February, 2009

pected theft rates.[40] In addition, both Lyon and Paris have high larceny rates, around 3,000 thefts/100,000 residents and 6,000 thefts/100,000 residents respectively in 2007.[41] In contrast, New York City's 2003 larceny rate was around 1,500 thefts/100,000 residents, and crime has decreased since then.[42] However, unlike previous generations of bike-share programs where stolen bicycles were often found, stripped for parts, in local trash heaps or canals, a significant number of stolen Velib' bicycles have been found intact in other cities around world, indicating that the publicity surrounding the Velib' program may be generating demand from collectors.[43] In addition to redesigning the locking mechanism, a higher theft penalty fee could help to minimize this issue, as the €150 security deposit is still far lower than the price of most new bicycles.[44]

Overall Program Analysis:

- Strengths:
  - High bike-station density and availability of bicycles makes Velib' a viable transportation mode.
  - Phased roll-out generated program "buzz" and increased potential subscriber pool.
  - Paris sponsored series of road safety campaigns aimed at vehicles, bicycles and pedestrians before launching Velib'.
  - Significant source of skilled jobs.
  - Bike-station design is discreet and blends into the streetscape.

- Areas Needing Attention:
  - Bicycle redistribution may be insufficient to meet demand.
  - Relatively low security deposit may be insufficient to deter theft.
  - Unintuitive and potentially insufficient locking mechanism may also increase bicycle theft.
  - 400 person staff may not be large enough to manage 20,600 bicycle system.
  - Operating and capital costs are higher than any other bike-share program.
  - Excavation and trenching required for installation.

40 The Design Council, "Bike Hire Schemes Made Secure: Designing Out Crime Case Study," (http://www.designcouncil.org.uk/en/Case-Studies/All-Case-Studies/Designing-Out-Crime-From-bike-hire-schemes/); Accessed 12/2/09

41 Institut National de la Statistiques et des Études Économiques Website, "Statistiques Locales," (http://www.statistiques-locales.insee.fr/esl/accueil.asp); Accessed 12/2/09

42 Federal Bureau of Investigations, "Report of Offenses Known to Law Enforcement," 2003

43 Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps;" *The London Times*, 8 July, 2008

44 Reports from other JCDecaux bike-share programs suggest that the replacement value of a bicycle is around $600.

Barcelona Spain	**BICING**	*ClearChannel Adshel*

Bicing bike-stations cover central Barcelona. Red icons indicate stations without bicycles. Green icons indicate stations where bicycles are available. The base map is a Google mash-up with realtime information provided by the Bicing Central Computer.

Program Background:

Bicing, run by ClearChannel Adshel, is Barcelona's bike-share program. It was launched in March 2007, with 1,500 bicycles. Like Velib', Bicing has been far more successful than anticipated. The city anticipated 40,000 subscribers in the first year. Instead, Bicing sold almost 100,000 annual memberships in just six months.[45] To accommodate this success, Bicing has expanded twice since its inception and now offers 6,000 bikes at 400 stations throughout the city.[46]

Bicing bike-stations and bicycles are located in the most densely populated areas of Barcelona. However, unlike other programs, like Velib' for example, Bicing is designed almost exclusively for Barcelona residents. The program only offers annual membership subscriptions; there is no daily or weekly pass available for visitors to purchase. Barcelona's many pre-existing recreational rental bicycle programs supply bicycles to the tourist market.

Program Financing & Political Climate:

Bicing is directly paid for by the city of Barcelona. The contract term is 10 years. Financing is generated from Barcelona's "Green Area" roadside parking program surplus and subscription revenue.[47] Advertising is not used, partially because JCDecaux currently holds the city's street furni-

45 Scholtus, Petz; "The TreeHugger Interview with Mayra Nieto, Barcelona Municipal Service: Bicing, Barcelona's Bike-Sharing System;" (http://www.treehugger.com/files/2008/01/the_th_intervie_28.php); Accessed 9/2/08
46 Grasso, Richard, Senior Vice President Business Development, & Martina Schmidt, Director SmartBike US; ClearChannel Adshel, Phone Interview: 30 April, 2008
47 ibid.

ture franchise contract. The amount of money Barcelona pays ClearChannel Adshel is negotiated each year, depending on estimated operating costs. This funding model has allowed Barcelona to expand the program in ways that other cities, like Washington DC, cannot. The initial 1,500 bicycle RFP offered €2.2 million for creation, operation and maintenance of the program.[48] In 2007, Barcelona paid Clear Channel approximately €4.5 million annually to operate and maintain 3,000 bicycles.[49] Figures are not available for the current 6,000 bicycles.

Bike-stations and Bicycles:

Bicing docking stations are connected by a long horizontal metal pole. Bicycles lock into the docking station via two 15mm stainless steel prongs located under the handle bars. Users lift the bicycle out of the docking station when returning or checking out a bicycle. Red and green lights on the bike-station inform the user if the bicycle is properly locked. Once the bicycle is docked, the bicycle RFID chip is read by the bike-station and the Central Computer is notified that the bicycle has been returned, ending the user's session. Bike-station and locking mechanism design may explain Bicing's low theft rate (180 bicycles or 3% of the total fleet in 2007).[50] This rate is substantially lower than Velib's despite the fact that Barcelona has a higher general theft rate than Paris, around 7,700 thefts/100,000 residents.[51]

The connected docking station design creates additional visual uniformity but can limit pedestrian flow. At the same time, Bicing bike-stations require less subterranean excavation and infrastructure than systems like Velib'; the initial Bicing bike-stations were installed within 3 months.[52] Like Velib', Bicing bike-stations are found both on

A user lifts a bicycle from a bike-station. Image: Raquel Morrison (www.flickr.com)

On-street bike-station. Image: Miuina (www.flickr.com)

48 Scholtus, Petz; "The TreeHugger Interview with Mayra Nieto, Barcelona Municipal Service: Bicing, Barcelona's Bike-Sharing System;" (http://www.treehugger.com/files/2008/01/the_th_intervie_28.php); Accessed 9/2/08

49 Nadal, Luc; "Bike Sharing Sweeps Paris Off Its Feet;" *Sustainable Transport*, Institute for Transportation and Development Policy; Fall 2007, Number 19, p. 11

50 BikeOff Project: Design Against Crime, "Bicing Barcelona: ClearChannel Adshel Public Bicycle System," (http://www.bikeoff.org/design_resource/dr_PDF/schemes_public_bicing.pdf); Accessed 12/2/09

51 Ajuntament de Barcelona Website, "Survey of Victimization in Barcelona 2006," (http://www.bcn.es/estadistica/angles/dades/anuari/cap08/C0803030.htm); Accessed 12/2/09

52 Clear Channel Outdoor Website, "SmartBike™;" (http://www.smartbike.com/); Accessed 3/24/08

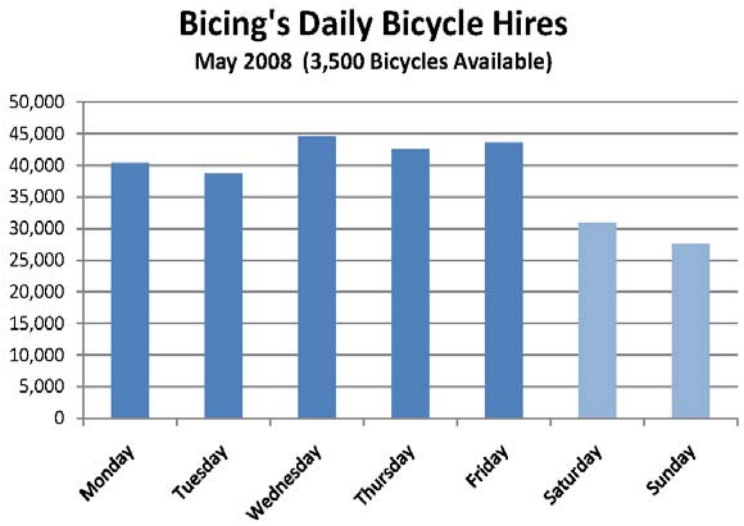
the street and sidewalk. On street bike-stations are marked by a thick red stripe and brightly colored protective bollards.

Bicing bicycles feature protected chain guards and tires to reduce wear and tear on the bicycles and protect users. Bicing bicycles also feature a smaller, 20", front wheel to increase maneuverability, however some users report that the smaller wheel may be more prone to get stuck in potholes and increases the risk of accidents.

***Customer Fee Structure**:*

- Free period: First 30 minutes
- Each additional 30 minutes: €0.30
- Max rental period: 2 hours
- Annual Subscription: €24 (Short term "tourist" passes are not available.)

The commuter focus of Bicing's fee structure is apparent in bicycle hire rates. About half of all subscribers (45%) use Bicing more than five times each week.[53] Bicing hires are significantly lower on the weekends as short term visitors to Barcelona cannot use the program.

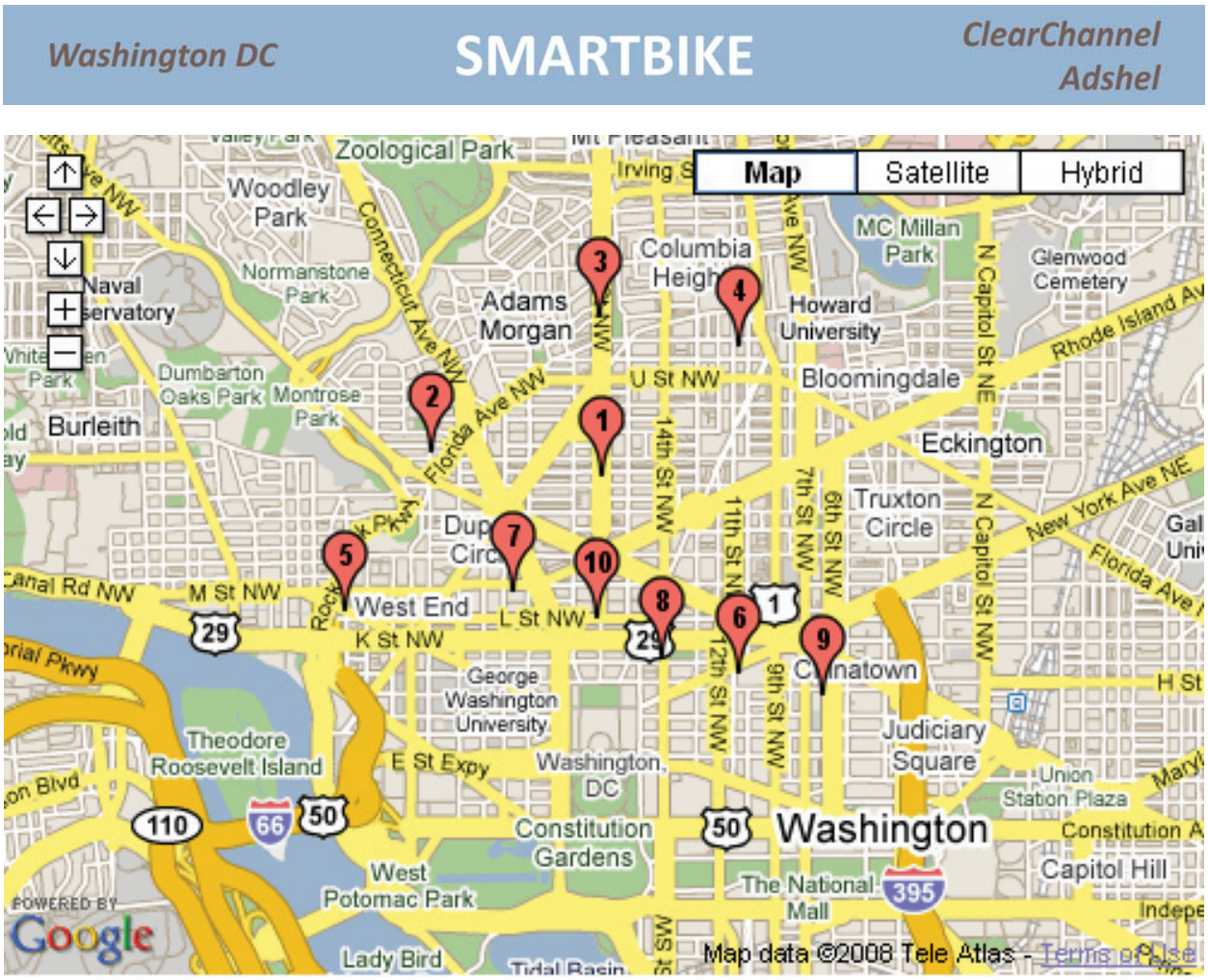


Overall Program Analysis:

- Strengths
  - Simple bike-station design allows for quick installation.
  - Contract includes options to expand program to meet demand.
  - ClearChannel Adshel programs are, on average, less expensive to build and operate than JCDecaux programs.
  - Bike-station design and locking mechanism are sufficient to deter theft.

- Areas Needing Attention
  - No weekly or daily pass available thus eliminating tourist use/revenue.
  - Users must physically lift the bicycle in order to lock or unlock.
  - Bike-station design may limit pedestrian flow.
  - Excavation and trenching required for installation.
  - Limited hours; Bicycles can only be rented between 5am and midnight on weeknights. 24-hour service is only available on weekends.

53 Clear Channel SmartBike document, provided by Richard Grasso, Senior Vice President Business Development, 10/01/07



SmartBike has 10 bike-stations to serve the city of Washington DC. The distance between bike-stations can be more than a mile. The basemap is a Google mash-up. Realtime information about bicycle and station availability is provided by the SmartBike Central Computer.

Program Overview:

Launched on August 13, 2008, SmartBike is the first 3rd Generation bike-share program in the United States and by far one of the smallest programs in operation. A small pilot program designed to target Washington's existing bicycle commuter population, SmartBike features 10 bike-stations and 120 bicycles and focuses on the NorthWest quadrant of the city. The small number of bike-stations over a sizable land area means that SmartBike users may be required to travel more than a half mile out of their way to find a bike-station with an open docking station if their intended destination bike-station is full. Unlike Paris or Barcelona, it is difficult to "stumble upon" a bike-station by accident. Despite its small size, SmartBike has had considerable success. As of January 2009, SmartBike had 1,050 subscribers.[54]

54 The Wash Cycle Website, "ClearChannel on SmartBike: Interview with Martina Schmidt," (http://www.thewashcycle.com/2009/03/smartbike.html); Accessed 3/20/09

A ClearChannel Adshel program, SmartBike uses the same bike-station and bicycle model as Bicing.

On-street SmartBike bike-station marked by Davidson bollards and striping. Image: Pedal Power Pete (www.flickr.com

Program Financing & Political Climate:

SmartBike is part of the Washington DC's 2004 bus shelter franchise contract with ClearChannel Adshel Outdoor.[55] The original bus shelter RFP called for a 50-bicycle pilot, which ClearChannel negotiated up to the current 120. The contract term is 20 years and is exclusive. Revenue is generated from advertising panels on bus shelters, street furniture and free-standing bike-stations. Washington DC receives 30%-35% of those revenues. In addition, the city collects all the membership fees associated with the program. However, SmartBike's small size means that it is unlikely to draw in subscribers at the scale of Velib' or Bicing. SmartBike had just over 250 subscribers when it opened.[56]

District DOT is currently considering plans for SmartBike expansion to 500 bicycles. The new program is expected to cost $1.8 million in capital and $800,000 annually.[57] However, while the contract includes the option of expanding the program it would require renegotiation of the existing advertising revenue share.[58] Revenues from use fees and subscriptions will be insufficient to cover the cost of the expansion. Recent reports suggest that Stimulus Funds may be used.

Bike-stations and Bicycles:

SmartBike bicycles and bike-stations are identical to Bicing bicycles. To date, SmartBike has reported one stolen bicycle out of its 120 bicycle fleet. Washington DC's theft rate is on par with Lyon, around 3,000 thefts/100,000 residents.[59] SmartBike bike-stations are almost exclusively located on Washington DC's notoriously wide sidewalks. On street bike-stations are protected with a ring of flexible, reflective Davidson bollards.

Customer Fee Structure:

55 Grasso, Richard, Senior Vice President Business Development, & Martina Schmidt, Director SmartBike US; ClearChannel Adshel, Phone Interview: 30 April, 2008
56 Alice Kelly, Program Manager, District DOT; Phone interview: 14 August 2008
57 ibid. 19 August, 2008
58 Grasso, Richard, Senior Vice President Business Development, & Martina Schmidt, Director SmartBike US; ClearChannel Adshel, Phone Interview: 30 April, 2008
59 Federal Bureau of Investigations, "Report of Offenses Known to Law Enforcement," 2003

- Annual subscription: $40
- Short term passes are not available
- Deposit/Bicycle Replacement Fee: $250[60]

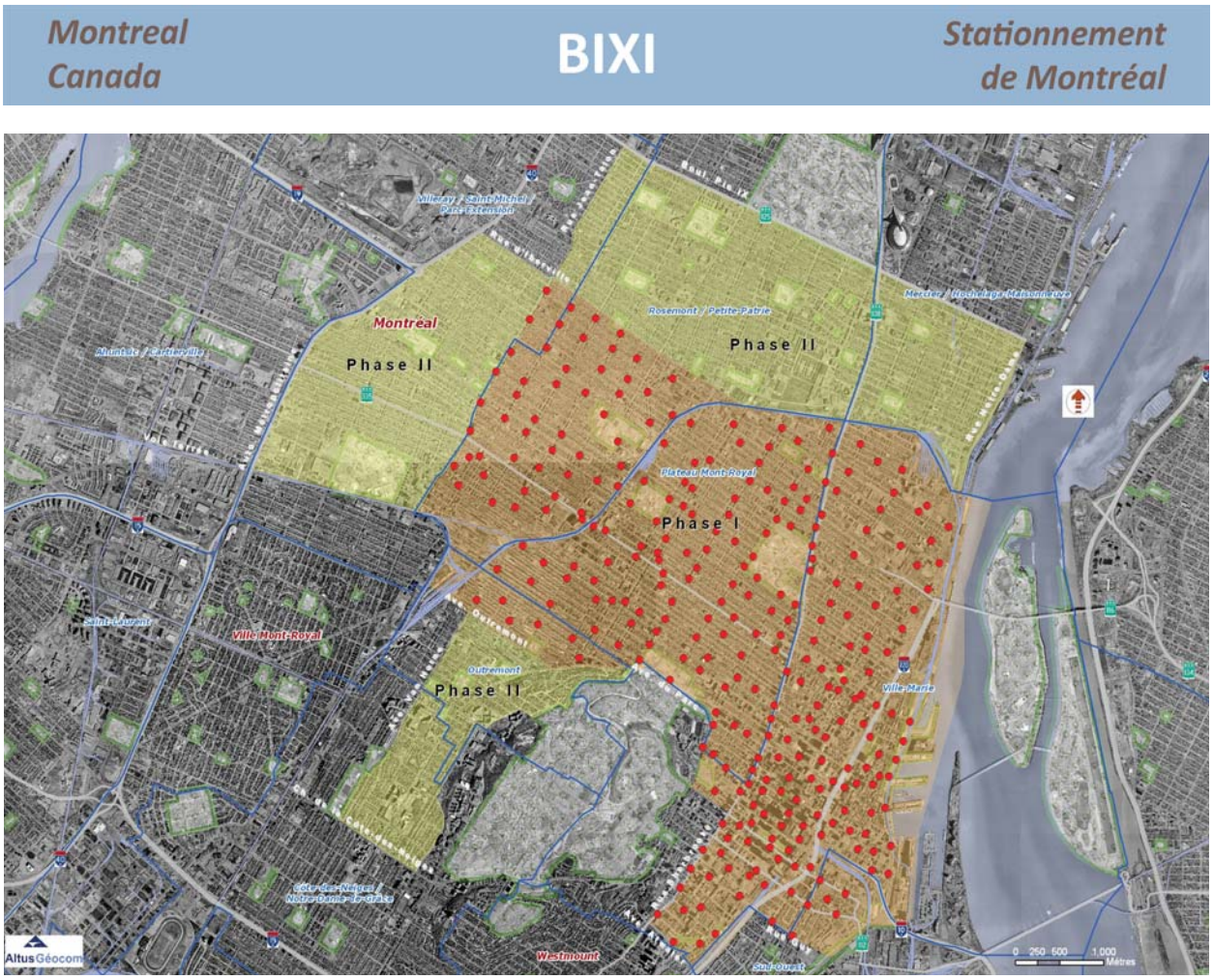
SmartBike combines the subscription options of a commuter program with the financial incentives of a recreational program. For example, SmartBike does not sell short term or daily passes, the passes typically used by recreational users or tourists. At the same time however, SmartBike also does not charge use fees, the small additional charges assessed by many operators after the first half hour which serve as incentives for users to return bicycles quickly and keep as many bicycles available as possible. Instead, SmartBike subscribers may check out a bicycle for up to three hours and can check out a second bicycle immediately thereafter if they want more time. This three hour free period is better suited for tourists than commuters for whom the majority of trips is around 30 minutes.

General Program Overview:

- Strengths
  - Located near high traffic areas and public transit.
  - ClearChannel Adshel programs are, on average, less expensive to build and operate than JCDecaux programs.
  - Bike-station design and locking mechanism seem to deter theft.

- Areas Needing Attention
  - A small pilot program with too few bikes to accurately judge impact.
  - Bike-stations are located sporadically and too far apart.
  - Bike-station design may limit pedestrian flow.
  - Misaligned fee and membership structure (rate structure favors tourists; membership options favor commuters).
  - Excavation and trenching required for installation.
  - Limited hours; Bicycles can only be rented between 6am and 10pm.

60 This could rise to $550 which would cover the full replacement value of the bicycle but potentially deter users. Dizikes, Cynthia; DC Rolls Out Bike-Sharing Plan to Thin Traffic; *LA Times*; 15 August, 2008



Bixi's proposed extent and phasing. Phase I covers the Montreal city center.

Program Overview:

Bixi, Montreal's bike-share program, is scheduled to open in the spring of 2009. Bixi's operator, the *Stationnement de Montréal*, plans to introduce 2,400 bicycles in the initial phase and add 2,600 more bicycles by the summer of that year for a total of 5,000 bicycles.[61] A 40 bike demonstration program debuted in September 2008 to generate a "buzz" for the program. At this scale, Bixi will be the largest bike-share program in North America and one of the largest in the world. Bixi is intended to augment Montreal's existing transit system and is geared toward the needs of commuter cyclists. Bixi bike-stations will be located every 250-300 meters throughout a 15 square km section of central Montreal.[62] The city of Montreal has an extensive bicycle lane network with bi-directional cycle tracks in commercial and residential areas.

The *Stationnement de Montréal* is Montreal's quasi-public parking authority which oversees the city's 20,000 parking spaces and municipal garages. The *Stationnement de Montréal* will incorporate bike-station options into its existing real-time wireless parking meters, as well as building

61 Bixi Website, (http://bixi.ca/index.php?page_id=1&lang=en); Accessed 11/12/08
62 Alain Ayott, Executive Vice-President, Montreal Parking Authority; Phone Interviews: 3 & 11 July, 2008

new payment bike-stations.[63] At present, Montreal's parking spaces are all numbered. Drivers enter the number of their parking space at a parking meter and can pay with a credit card. Parking enforcement is done via a wireless handheld device which tells parking police which parking spaces are paid for.

Bike-stations and Bicycles:

Montreal's harsh winter and extreme snowfall (up to 12 feet on average) mean that Bixi will only be in service from April to November. As a result, Bixi was developed with a modular "drop and go" bike-station design.[64] Docking and pay stations are attached to a metal plate which is in turn bolted to the ground; no underground excavation or installation work is necessary. Bike-stations will installed with a boom truck each spring and will be removed each winter or in case of roadwork or to adjust bike-station locations throughout the system. Bixi bike-stations can be erected or disassembled in 20 minutes, significantly decreasing capital costs.[65] Bike-stations can be moved easily to respond to demand or to provide "mega" bike-stations for special events.

Testing out bicycles at a Bixi demo bike-station. Image: ApollineR (www.flickr.com)

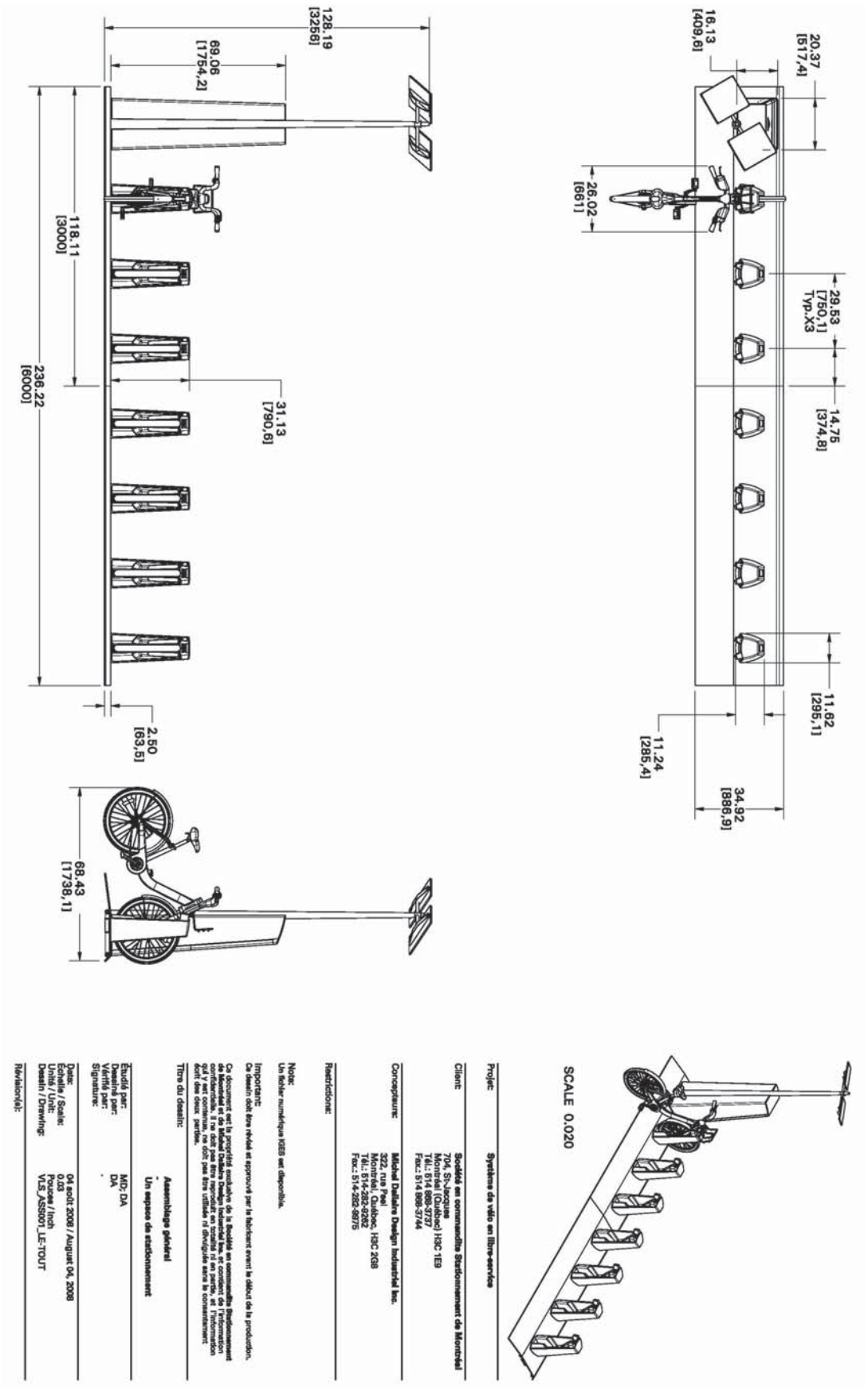
Electricity is supplied to the docking stations and pay station via two 8 ½" x 11" solar panels attached to the pay station. No subterranean wiring is required. A number of energy saving techniques, such as having the pay station "sleep" when not in use and using a black and white pay screen, will ensure that the electricity supplied by the solar panel will be sufficient.[66]

In contrast to JCDecaux and Clear Channel Adshel bike-station designs, the front wheel of Montreal's bikes roll right into the docking station instead of requiring the user to lift up the bike or match up a locking device.

Program Financing & Political Climate:

The *Stationnement de Montréal* will fund Bixi from user fees and possibly sponsorships. Operating costs for the full 5,000 bicycle program are expected to be approximately $1,200/bike/year for the duration of the ten year contract. In the first year, capital costs will account for 60% of the initial budget.[67]

63 ibid.
64 ibid.
65 ibid.
66 ibid.
67 ibid.



Bixi bike-station technical drawing. Image used with permission of Montreal Public Bike System.

Because trenching and excavation are not required, the capital costs for Montreal's modular system "drop and go" system are projected to be lower than other bike-share systems. Bixi estimates capital costs around $3,000/bicycle.[68] Velib's capital costs are estimated at $4,400/bicycle.[69]

Customer Fee Structure:

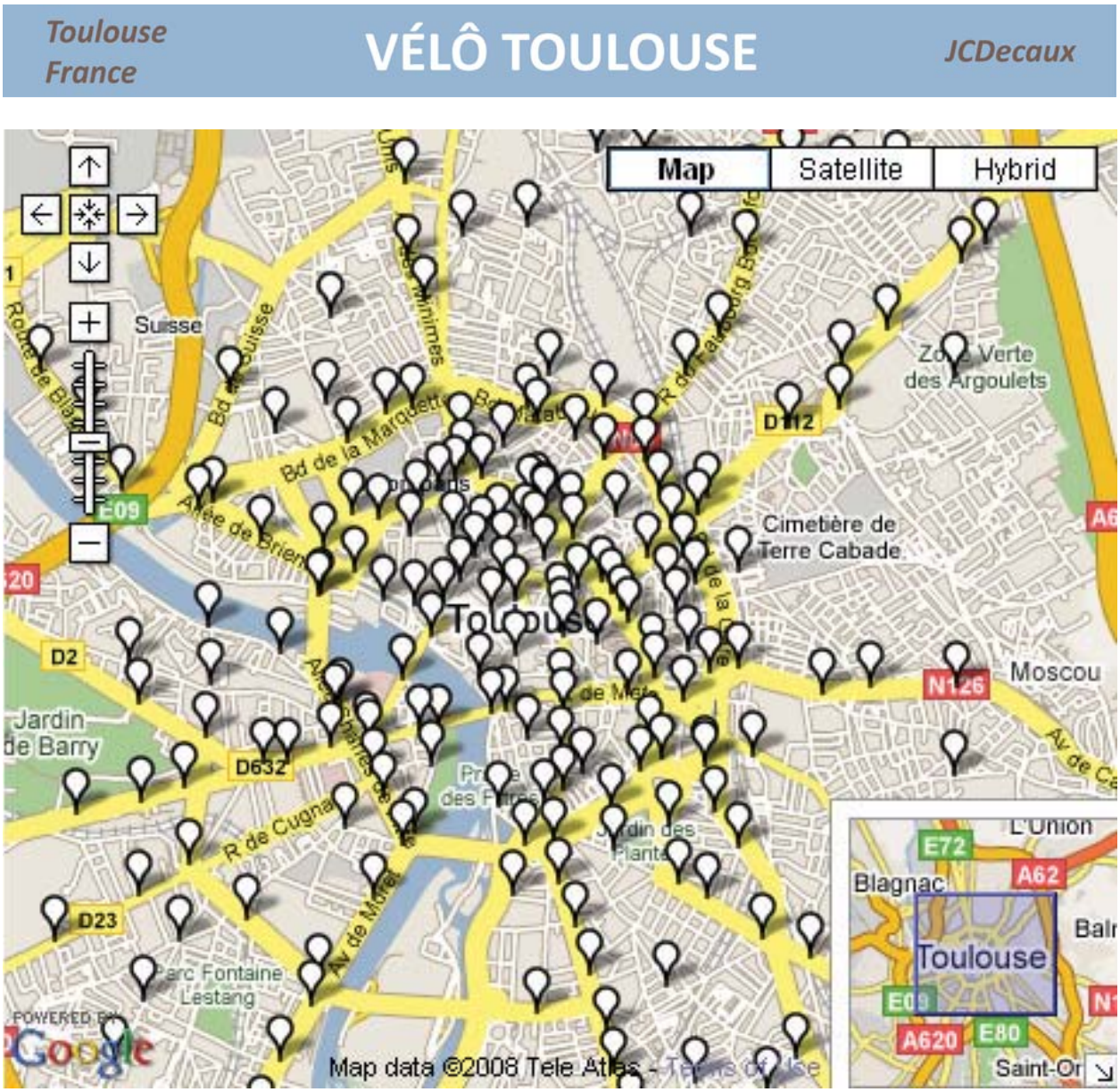
- Annual membership: $78
- Monthly membership: $28
- Daily membership: $5
- Free Period: First 30 minutes. Second 20 minutes is $1.50. Fourth 30 minutes is $6, and prices increase by $6/30 minutes subsequently.[70]

General Program Assessment:

- Strengths:
  - Modular bike-station design (bicycle docks are mounted on metal plate) allows for a highly flexible program. Sidewalk or street excavation is not necessary and bike-stations can easily be relocated.
  - Bike-stations are powered by solar panels. Trenching to power sources is not required.
  - "Drop and Go" bike-station design allows for the creation of short-term mega-bike-stations for major events and allows program administrators to change the locations of bike-stations depending on demand.

- Areas Needing Attention:
  - Modular and solar bike-station design has not yet been tested.

68 Alain Ayott, Executive Vice-President, Montreal Parking Authority; Phone Interview: 14 October, 2008
69 Spitz, Eric, City of Paris; Email Correspondence: Spring 2009
70 Bixi Website, "Fees and Membership;" (http://bixi.ca/index.php?page_id=3&lang=en); Accessed 11/6/08



Vélô Toulouse extent. The underlying map is a Google mash-up with the real-time bicycle and bike-station information managed by the Vélô Toulouse central computer.

Program Background:

Vélô Toulouse, which opened in November 2007, provides 1,400 bicycles at 135 stations. Operated by JCDecaux, the program is scheduled to expand to 2,400 bicycles at 253 bike-stations by the end of 2008.[71] Like Velib', Vélô Toulouse was an immediate success. Within its first year, Vélô Toulouse reported 2 million trips; an average of 12,000 trips/day.[72] Within the first six months, more than 268,000 day passes and 7,000 annual subscriptions had been sold.[73]

71 Emin, Patrick. "JC Decaux wins street furniture contract for Toulouse," (http://www.mavilleavelo.com/index.php?option=com_content&task=view&id=279&Itemid=1); Accessed 8/26/08

72 Vélô Toulouse Website, "2 millions de locations, 2 millions d'occasions d'être heureux!;" (http://www.velo.toulouse.fr/actualites/actualites/2_millions_de_locations_2_millions_d_occasions_d_etre_heureux); Accessed 10/8/08

73 Vélô Toulouse Website, "VélôToulouse franchit le cap du million de locations!;" (http://www.velo.toulouse.fr/

Vélô Toulouse uses the same bicycle and bike-station model as Velib'. Current coverage is focused on the center of the city, with bike-stations radiating out from the core on main roads. Future expansion will extend the coverage out into the rest of the city.

Program Financing & Political Climate:
Financing for Vélô Toulouse comes from membership fees, city funds and advertising. However, unlike other advertising based programs, advertising revenue for Vélô Toulouse is generated from advertising panels located on the rear tire mudguards of each bicycle. In first year, the HSBC bank logo was featured on 1,000 bicycles, providing around $1M in revenue.[74] JCDecaux also hold the street furniture contract in Toulouse but this is separate from the city's bike-share program contract.

Bike-stations and Bicycles:
A JCDecaux program, Vélô Toulouse uses the same bicycle and bike-station model as Velib'.

Customer Fee Structure:

- Annual Membership: €25
- Monthly: 10€
- 7 day Pass: €5
- Daily Pass: €1
- Free Period: First 30 minutes

General Program Assessment:

- Strengths:
  - On-bicycle advertisements offer an additional funding source and provide extra incentives for bicycle maintenance and upkeep

- Areas Needing Attention:
  - On-bicycle advertisements could seem overly commercial
  - Excavation and trenching required for installation.

Woman consults bike-map on a Vélô Toulouse bike-station. Image: thomascornardeau (www.flickr.com)


A Vélô Toulouse bike-station. Image: Noodlepie (www.flickr.com)

actualites/actualites/velotoulouse_franchit_le_cap_du_million_de_locations); Accessed 6/16/08
74 JCDecaux & HSBC; "PRESS RELEASE: HSBC Wraps Velo Toulouse;" (http://www.hsbc.fr/1/PA_1_3_S5/content/france/about-HSBC/press-releases/pdf/19-11-07_cp_velos_toulouse_GB.pdf); Accessed 06/25/08 & Squire, Josh, Bicycle System Manager, JCDecaux; Phone Interviews: Spring/Summer 2008

04 NYC Bicycling Conditions

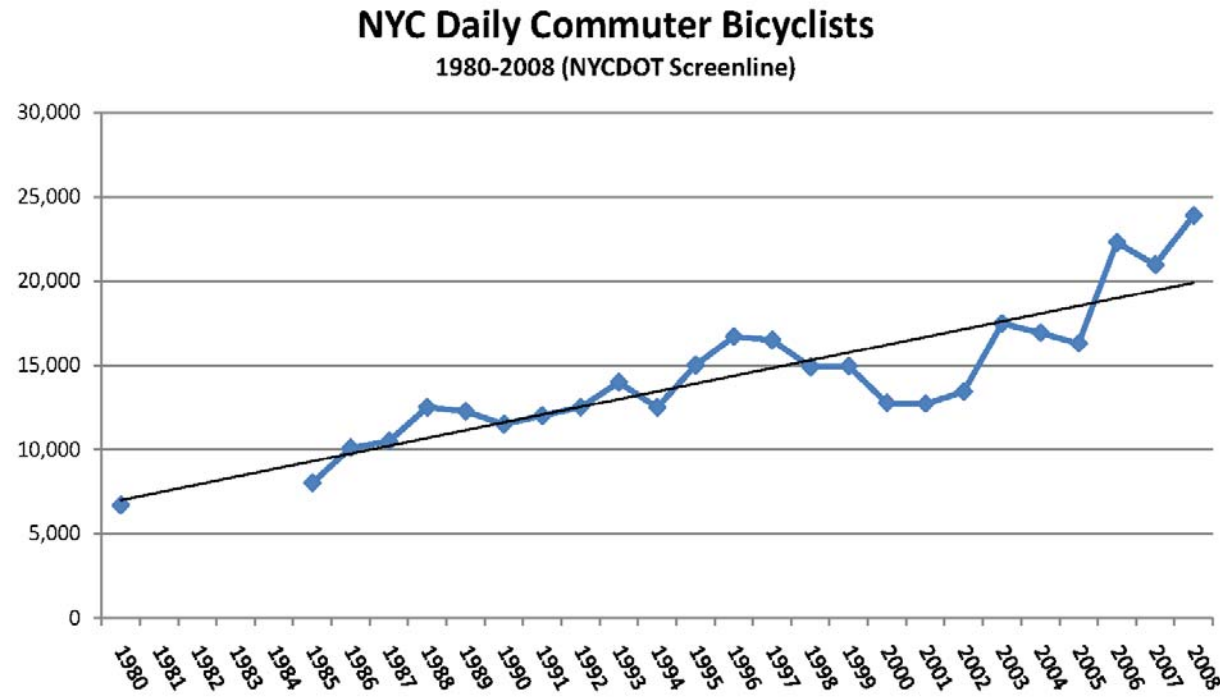
Image: NYCDCP

- **Current Conditions**
- **Safety**
- **Other Bicyclist Concerns**

CURRENT BICYCLING CONDITIONS IN NYC

Bicycle riding in New York City is at its highest recorded level. Spurred by the construction of bicycle facilities citywide, increased attention from residents, political leaders and city officials, rising fuel and gas costs, as well as greater awareness on the part of the public of the costs of traffic and transit congestion, bicycles are increasingly part of New York's pantheon of transportation modes.

Assessing the exact number of bicyclists in New York is difficult. However, data shows that bicycle ridership has been steadily increasing in New York City for the past 3 decades. The 2000 US Census indicated that over 15,000 New Yorkers bicycle to work each day, more than any other city in the nation. The 2006 American Community Survey, conducted six years later, reported almost 20,000 bicycle commuters in New York City daily, a 33% increase. NYC Dept. Transportation's (NYCDOT) Screenline Counts (now called the Commuter Cycling Indicator), which count all bicyclists coming into Manhattan below 50th Street on a given day in the summer or early fall, recorded 22,700 bicyclists in 2008. Based partially on the Screenline Counts, Transportation Alternatives, an advocacy group, puts the number of daily bicyclists in New York in 2007 at 131,000.[1] The 2007 Community Health Survey found that about 9% of adult New Yorkers (543,000 people) are regular cyclists, meaning they rode a bicycle in New York City several times a month in the last 12 months.[2]



1 Transportation Alternatives, (http://transportationalternatives.org/); Accessed 9/8/08

2 NYC Department of Health & Mental Hygiene, Community Health Survey (CHS).
The CHS is a cross-sectional telephone survey that samples approximately 10,000 adults aged 18 and older from NYC neighborhoods.

NYCDOT's protected on street bike lane on 9th Avenue in Manhattan. Image: NYCDOT

Since they have been conducted since the early 1980's NYCDOT's Screenline Counts provide an excellent look at the rate of increase in commuter bicycling over the past two decades.[3] The Screenline suggests a 3.43% average annual increase in bicyclists since the count began. Over the same period, New York City's total population grew by about 0.7%. Commuter bicycling has especially accelerated in recent years. NYCDOT estimates that commuter cycling has grown by 77% between 2000 and 2007 and 35% between 2007 and 2008.[4] Part of the discrepancy between Census/American Community Survey numbers and the Screenline Count comes presumably because the Screenline includes people who use bicycles for non-work trips, bike-messengers and delivery-people and multi-modal commuters who bicycle for only part of their commute.[5]

With the new citywide focus on green initiatives and sustainability as outlined in the Mayor's 2030 PlaNYC, bicycling in New York has received increased attention. The 2030 plan calls for "pursu[ing] strategies to encourage the growth of cycling across the city," and the completion of the 900 mile Bicycle Master Plan.[6] NYCDOT Commissioner Janette Sadik-Kahn has prioritized pedestrian and bicycle safety and her agency is working to increase New York's bicycle mode split to 3% by 2020, up from less than 1% today.[7] To further these goals, NYCDOT installed 60 miles of bike lane in 2007 alone, higher than the PlaNYC target, and another 80 miles, including protected on street bike lanes, in 2008. NYCDOT is also increasing outdoor public bicycle parking and is working with community boards and agencies including NYC Department of City Planning (NYCDCP) and the MTA to identify locations.

The NYCDCP is also initiating policies and implementing projects to encourage bicycle use. In November, 2007, a NYCDCP zoning text amendment was passed by the City Council requiring one bicycle parking space for every car parking space up to 200 spaces in all commercial and community facilities zones.[8] Additional zoning text amendments to encourage the provision of bicycle facilities are currently in progress. NYCDCP is also developing a comprehensive internet application that will allow users to search and create bicycle routes, find bicycle parking and find bicycle tours throughout the city.

3 NYC DOT Website, "Bicycle Counts;" (http://www.nyc.gov/html/dot/html/bicyclists/nycbicyclescrct.shtml); Accessed 11/7/08

4 NYCDOT, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation 2008 and Beyond." 2008, p.15 & NYCDOT Website, "Bicyclists: Bicycle Counts," (http://www.nyc.gov/html/dot/html/bicyclists/nycbicyclescrct.shtml); Accessed 2/3/09

5 NYCDOT, "2008 Commuter Cycling Indicator," (http://www.nyc.gov/html/dot/downloads/pdf/commuter_cycling_indicator_and_data_2008.pdf); Accessed 2/3/09

6 PlaNYC, Transportation Initiatives, "9: Promote Cycling;" p. 87, (http://www.nyc.gov/html/planyc2030/html/plan/transportation_promote-cycling.shtml); Accessed 9/8/08

7 New York City Department of Transportation, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation, 2008 and Beyond," April 2008

8 NYC Department of City Planning, "Commercial and Community Facility Parking Lot Text Amendment," (http://www.nyc.gov/html/dcp/html/parking_lots/index.shtml); Accessed 9/8/08

Thousands of bicyclists, runners, rollerbladers and walkers shared the streets during NYCDOT's 2008 Summer Streets pilot program. Image: NYCDCP

The prevalence of policies aimed at increasing bicycling is not unique to New York. Indeed, programs to increase urban space for bicyclists and pedestrians are taking off around the globe. In addition to the bike-share programs, bicycle and pedestrian events, such as Ciclovia in Bogota or ParisPlage in Paris which close major car thoroughfares for specific days during the summer months, are now being tested around the US in cities like Portland, El Paso, and most recently, New York. New York's "Ciclovia" pilot, proposed by NYCDOT, debuted in August, 2008, with renowned success. Called "Summer Streets," it created a car-free bicycle and pedestrian network in Manhattan from the Brooklyn Bridge to Central Park over the course of three consecutive Saturdays. Throughout New York, civic organizations such as the Forum for Urban Design, Lower Manhattan Development Corp. and Friends of Governor's Island have proposed small, area specific, bicycle rental programs at reduced rates in order to encourage bicycling around the city.

SAFETY

Despite this growth in cycling in the city over the past 3 decades and the increased attention to bicycles and pedestrians on a policy level, safety while riding on New York City's streets is one of the main concerns of New York's current cyclists. Perceptions about bicycle safety are likely to be the major deterrent to cycling for many "would be" cyclists. NYCDCP's 2006 Survey of Bicycle Needs found that traffic and poor driver behavior were the 2nd most important issues for 48% of potential bicycle commuters.[9] Bicyclists face inattentive or aggressive drivers and high traffic flows. Double parking and using marked bike lanes as driving lanes are commonplace in all of the city's on street bike lanes, forcing bicyclists out into traffic. As in Paris, bicyclists themselves often fail to heed the rules of the road, increasing the risk to themselves and others.

Increasing the number of separated bike lanes—like the one recently installed on 9th Avenue in Manhattan that provides a physical barrier between the bike lane and moving traffic—is one way to address these issues. But even protected greenways can be insufficient without adequate adherence to and enforcement of basic traffic laws. In 2006, two bicyclists were killed on the Hudson River Park protected bicycle greenway, one by a drunk driver mistaking the greenway path for a road and the second by an NYPD tow-truck failing to yield while making a turn across the bike lane.[10]

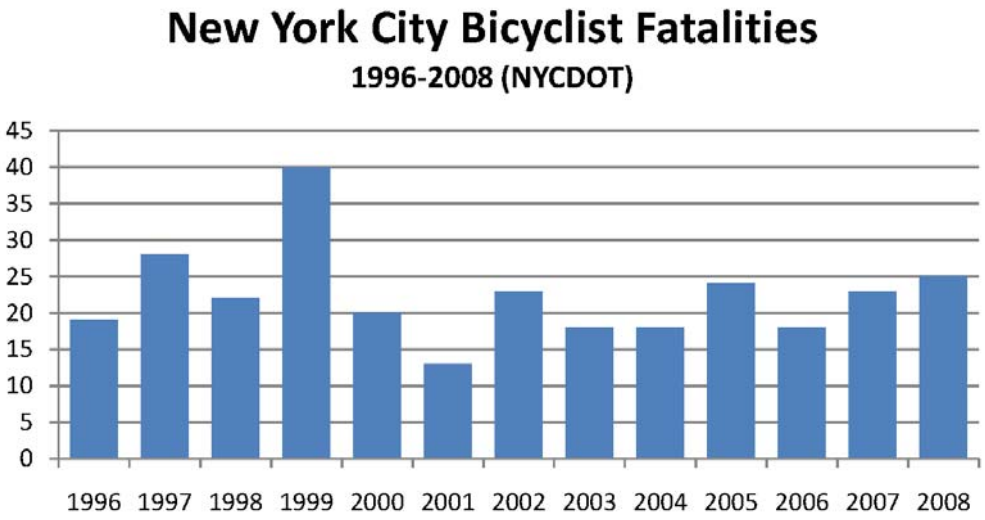
Bicyclist safety may be increasing. Data collected and released by NYC Dept. Health and Mental Hygiene (NYCDHMH) and NYCDOT indicate the number of serious bicyclist injuries (defined as injuries that require the bicyclist to be taken to the hospital) declined 46% from 1996 to 2003.[11] While the NYCDOT/NYCDHMH report did not speculate on reasons for this decline, some possibilities present themselves including improvements in bicycle lanes and bicycle signage around the city.

Despite increased awareness, blocked bicycle lanes are common throughout the city as motorists use them for additional driving and parking lanes. Image: NYCDCP

Data on bicyclist fatalities also points to increasing bicyclist safety although conclusions about the causes are harder to draw. Bicyclist fatalities made up 6% (255) of the total number of traffic fatalities in New York City between 1996 and 2005, indicating that bicyclists, when compared to other road users, are disproportionately affected by fatal transportation-related crashes.[12] The overwhelming majority of bicy-

9 NYC Department of City Planning, Transportation Division, "The New York City Bicycle Survey," May 2007; p.13
10 Confessore, Nicholas & Kate Hammer, "Drunken Driver Kills Rider on Bicycle Path, Police Say;" *The New York Times*, 3 December 2006
11 New York City Depts. Of Health and Mental Hygiene, Parks and Recreation, Transportation, and the New York City Police Department. "Bicycle Fatalities and Serious Injuries in New York City, 1996-2005"; p. 22
12 New York City Depts. Of Health and Mental Hygiene, Parks and Recreation, Transportation, and the New York City Police Department. "Bicycle Fatalities and Serious Injuries in New York City, 1996-2005"; p. 12; Data comes from the NYCDOT Fatality Database and is cross-referenced with the NYPD Accident and Investigations Squad

clist fatalities involve interactions with cars. However, there does not seem to be a general trend in deaths from year to year. Instead, bicyclist deaths reached a high in 1999 with 40 deaths and have fluctuated between the low-teens and low-20's each year since then. As seen in the NYCDOT Screenline Counts, the number of bicyclists increased overall over the same time period. Findings from the NYCDOT/NYCDHMH report cannot confirm the correlation among bicyclist fatalities, number of bicycle lanes and the number of bicyclists.



Importantly, public health data and evidence from Paris collected over Velib's first year, suggests that increased bicycle use and the presence of bike-share programs, which may bring in more inexperienced bicyclists, did not increase bicycle accidents and, in fact, may lower bicycle accident rates per cyclist. NYCDHMH's Bureau of Chronic Disease Prevention and Control found numerous public health studies that correlated increased numbers of bicyclists and pedestrians and reduced numbers of bicyclist fatalities. Data shows that heavier bike and pedestrian traffic is linked to lower collision rates with automobiles, and that policies which increase the numbers of people who walk and bike appear to be effective for improving the safety of walkers and cyclists.[13] Underscoring this data, in 2007, the city of Paris reported 24% increase in bicycling in the city but only a 7% increase in bicycle accidents. To date, there have been 3 Velib' deaths out of over 30 million Velib' trips.[14] This relative increase in bicyclist safety can be partially attributed to increased attention and awareness of bicyclists in Paris; drivers see more bicycles on a daily basis and thus are more aware of their presence on the street.

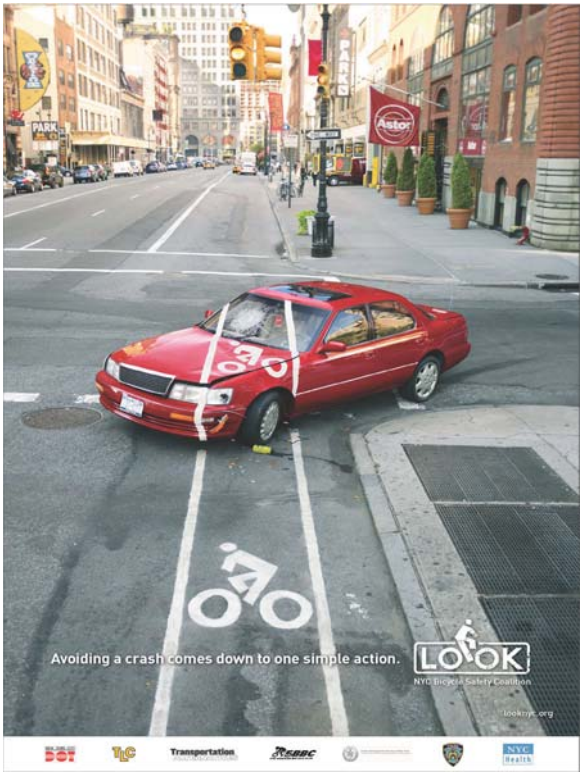
To address these safety issues, NYCDOT and other city agencies have worked aggressively to improve street conditions for bicyclists. In 1997, the New York City Bicycling Map, a joint project by NYCDCP, NYCDOT and NYC Dept. Parks and Recreation (NYCParks), was released indicating

Database.

13 Jacobsen, P.L., *Safety in numbers: more walkers and bicyclists, safer walking and bicycling.* Inj Prev, 2003. **9**(3): p. 205-9 & Freudenberg, N., S. Galea, and D. Vlahov, eds. *Cities and the Health of the Public.* 1 ed. 2006, Vanderbilt University Press: Nashville

14 Erlanger, Steven, "A New Fashion Catches On in Paris: Cheap Bicycle Rentals," *The New York Times*, 13 July 2008 & Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps;" *The London Times*, 8 July, 2008

safe bicycle routes around the city. That map is updated yearly and over 1 million maps have been distributed. In 2007, after findings were released that showed that 94% of bicycle fatalities were due to human error, drivers unaware of bicyclists or failing to yield and bicyclists ignoring traffic lights, the NYC Bicycle Safety Coalition, a partnership between NYCDOT, NYCDHMH, NYPD, Taxi and Limousine Commission (TLC), Transportation Alternatives and civic and bicycle advocacy groups, introduced the "LOOK" campaign educate bicyclists and drivers and address rider safety issues.[15] LOOK campaign posters are featured on bus shelters, buses, phone kiosks, and taxis and distributed as postcards. Magazines and local radio stations will feature the campaign as well. NYCDOT has also initiated its GET FIT-TED campaign which distributes bicycle helmets for free around the city. The helmets, designated as the "Official New York City Bicycle Helmet," are sponsored by Target and designed by NYC and Co., New York City's official tourism organization. To date, thousands of helmets have been distributed.[16]



New York City's "LOOK" Campaign posters encourage bicyclists and drivers to pay attention. Image: LOOK Campaign

The city has also worked to increase the amount and quality of bicycle infrastructure throughout the city. In 1997, NYCDOT and NYCDCP released the New York City Bicycle Master Plan which called for a 900 mile comprehensive network of bike-routes throughout the city. Since then, NYCDOT has added 216 miles of bicycle lanes and on street bicycle lanes and signed routes.[17] With the mandate from PlaNYC, NYCDOT plans to add 200 additional miles of on street bicycle paths and 15 miles of protected on street bicycle lanes by July 2009.[18] As of January 1st, 2009, over 150 miles had been completed. A protected on street bicycle lane is in place on 8th and 9th Avenues in Manhattan and has received much positive attention.

Bicyclists in particular are encouraged to wear light colored or reflective clothing and to use lights to increase their visibility on the road. Image: LOOK Campaign

15 New York City Depts. Of Health and Mental Hygiene, Parks and Recreation, Transportation, and the New York City Police Department, "PRESS RELEASE: City Announces Unprecedented City-Wide Bicycle Safety Improvements," (http://home2.nyc.gov/html/dot/downloads/pdf/pr06_50.pdf); Accessed 9/8/08

16 NYCDOT Website, "Bicyclists," (http://home2.nyc.gov/html/dot/html/bicyclists/officialhelmet.shtml); Accessed 9/8/08

17 New York City Depts. Of Health and Mental Hygiene, Parks and Recreation, Transportation, and the New York City Police Department. "Bicycle Fatalities and Serious Injuries in New York City, 1996-2005" p. 6

18 New York City Department of Transportation, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation, 2008 and Beyond," April 2008, p. 53

Bicycle riders themselves also share in the responsibility for safer riding conditions. While many bicyclists remain alert and obey the rules of the road as laid out in the New York State Drivers Manual, other bicyclists create unsafe conditions for pedestrians, other bicyclists and drivers by riding on sidewalks, riding against traffic and failing to obey traffic signals.

OTHER BICYCLIST CONCERNS

The lack of secure bicycle parking at work was the most common reason why New York's "would be" bicycle commuters in the NYCDCP Bike Survey said that they did not commute via bicycle.[19] While the city provides over 4,700 CITYRACKS, these are outdoor, unmonitored parking spaces, and theft is often an issue. Indoor, monitored facilities are few and far between.

While bicycles are allowed on New York's subways, getting them there is a challenge; cyclists must navigate stairs and a turnstile just to reach the platform. New York's subways do not have designated spaces for bicycles or bicycle hooks. MetroNorth and LIRR require bicycle permits and do not allow bicycles at peak times. Bicycles are not allowed on any of New York City's buses.

Enhancing bicycle access over the city's major bridges may also lead to an overall increase in bicycling in New York. While there are multiple, bicycle-friendly connections between lower Manhattan and Brooklyn or upper Manhattan and the Bronx, there are fewer options between Queens and Manhattan and only one connection, the TriBorough Bridge, which is inhospitable to bicycles or pedestrians, between Queens and the Bronx. It is impossible to bicycle to Staten Island from New York, although bicycles are allowed on the Staten Island Ferry. Even the most bicycle-friendly bridges often have long on- and off-ramps that require bicyclists to travel potentially significant distances out of their way. In Queens, in particular, numerous highways and high-speed boulevards can also pose safety hazards to bicyclists.

19 NYC Department of City Planning, Transportation Division, "The New York City Bicycle Survey," May 2007

05 NYC Bicycling Demand

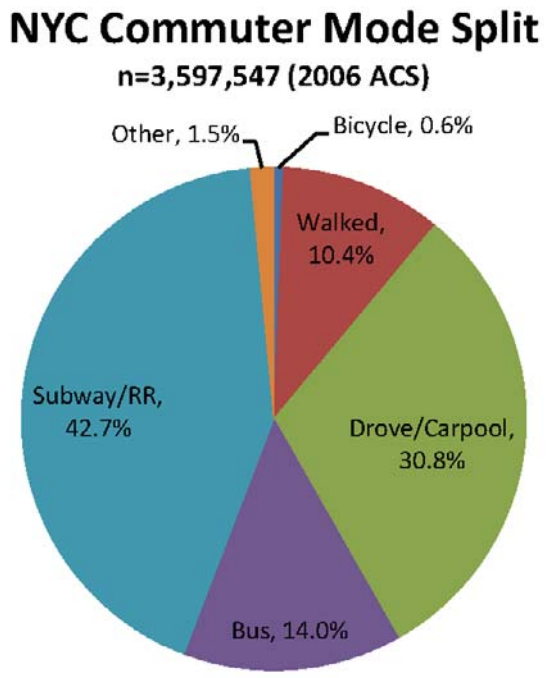
Image (L/R): BicyclesOnly (www.flickr.com)

- NYC Bicycling Trends
- Who Rides in New York?
- Who Uses Bike-Shares?
- Potential Demand Estimates

NYC BICYCLING TRENDS

This section analyzes New York City's current bicyclist trends and estimates the potential demand for a bike-share program. In addition to a general trend analysis of current New York City bicycle ridership, the gender, age and location breakdown of New York bicyclists are considered. Based on these analyses, this section also attempts to provide rough estimates for the number of people, New Yorkers, out-of-city commuters and tourists, who might use a bike-share program. Three uptake rates for bike-share use (3%, 6% and 9%) are considered in this section. The numbers generated through these assumptions cannot be used to specifically determine who will use a bike-share program, rather they are indications of the potential demand New York City could see if such a program were introduced.

Data from the 2006 American Community Survey (ACS) indicates that bicyclists currently make up 0.6% of all New York City commuters.[1] This mode-split is higher than the national average of 0.38% of the total national work force, but lower than the mode-split reported in other major American cities such as San Francisco, Washington DC, Minneapolis-St. Paul, Philadelphia, Portland and Seattle. A number of these cities, namely Minneapolis, Philadelphia and Portland, have recently released plans to introduce bike-share programs. NYCDOT's current bicycle infrastructure enhancements are designed to help increase New York City's bicycling mode split to 3% by 2020, a goal set in NYCDOT's 2008 Strategic Plan.[2]



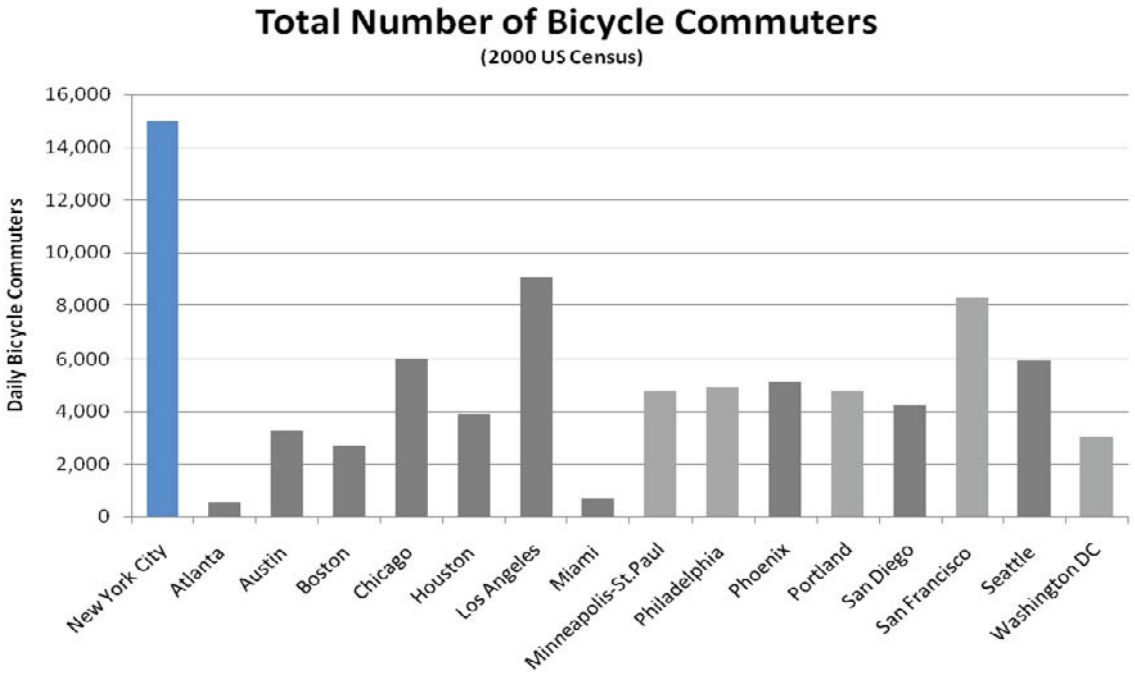
However, by virtue of its size, New York City leads the nation in the number of bicycle commuters. The 2000 US Census indicates that approximately 15,000 New York City residents commute to work by bicycle; this is one third again as many bicycle commuters as Los Angeles and almost twice as many as San Francisco, the cities with the next largest bicycle commuter populations. While cities like Minneapolis, Portland and San Francisco have higher bicycling mode-splits, in New York City, bicycling is used as commuter mode by significantly more people.

The perception of bicycling as "not a real option" for commuting in New York may play a large part in New York's low mode split. As discussed in Chapter 4, this perception is created by concerns about safety, driver behavior, difficulties bringing bicycles on subways

1 2006 American Community Survey. In New York City where multi-modal commuting is the norm, the US Census and ACS tend to undercount bicycle trips. Respondents are only allowed to select one "primary" mode of transportation to work, thereby excluding bicyclists who might ride to the nearest bus or subway station or who commute by bicycle only a few days a week.

2 New York City Department of Transportation, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation, 2008 and Beyond," April 2008

and trains, and bicycle theft. NYCDCP data suggests that the lack of secure bicycle parking facilities at workplaces is the primary deterrent to bicycle commuting.[3] City-backed public service campaigns to encourage better driver and bicyclist behavior may improve the image of cycling citywide. Recently proposed additions to the city's Zoning Resolution to encourage bicycle parking in the workplace may, if passed by the City Council, also increase bicycle commuting.



In addition, as other cities have seen, building bike lanes tends to encourage cycling. The city of Paris, not known for bicycling prior to Mayor Delanoë, saw a 48% increase in cycling between 2001 and 2006 as the city built more bike lanes.[4] NYCDOT's current efforts to increase the number of bicycle lanes and bicycle parking facilities around the city may also spur bicycle use. Between 2000 and 2007, NYCDOT built over 200 miles of bike lanes and saw commuter cycling grow by 77%.[5]

Lastly, as New York's population increases, congestion on existing transportation modes worsens, and the price of transit rises, bicycling within the city has the potential to grow and gain credence as a viable commuter option. Recent economic reports suggest that higher fuel costs have demonstrable effects on American travel patterns and commuter behavior, including increasing bicycle use across the country. Higher gas prices may also be causing public transit use to increase. In June 2008, the American Public Transportation Association reported that public transit ridership for the first quarter of 2008 had increased 3.3%, at the same time as a 2.3% decrease in vehicle

3 Moynihan, Colin, "For City Commuters, Same Old Story for Another Vehicle: Parking Is Scarce;" *The New York Times*, 1 July 2008

4 Velib' Website, "PRESS RELEASE: Thousands of self-service bicycles real freedom! Bicycles everywhere for everybody!," p.2

5 New York City Department of Transportation, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation, 2008 and Beyond," April 2008, p.15

miles traveled nationally reported by the Federal Highway Administration.[6] In New York City, the Comptroller's Office reported that January-October. 2007 subway, MetroNorth and LIRR ridership had increased by 4.5%, 4.2% and 5.3% respectively, over the same time period in 2006.[7]

A 2008 report by David Rosenberg, Chief North American economist for Merrill Lynch, indicated that rising fuel costs have caused bicycle sales in the United States to rise 5% in 2008 in contrast to an 11% decrease in car sales over the same time period.[8] On Long Island, bike shop owners have reported a 10-20% increase in bicycle sales as compared to the year before.[9] Sales of Long Island Railroad bicycle passes are also increasing. In May 2006, LIRR sold 1,451 bike passes. In May 2008, LIRR sold 1,725, an 8.5% increase.[10]

6 American Public Transportation Association (APTA), "Public Transit Ridership Continues To Grow In First Quarter 2008," (http://www.apta.com/media/releases/080602_ridership_report.cfm); Accessed 9/8/08
7 Thompson, William, NYC Comptroller, "Economic Notes;" Office of the New York City Comptroller, Vol. XVI, No. 1, February 2008
8 Wilcox, Daniel; "Driving Out, Bicycling to Work is In," *New York Daily News*, 17 June, 2008
9 Teigman, Danny, "Concern over gas prices sees more LIers turn to bikes," *Newsday.com* (newsday.com/business/local/gasprices/ny-bzcov075755208jul07,0,7134350.story); 7 July, 2008
10 ibid.

WHO RIDES IN NEW YORK?

Data from the 2000 US Census, the 2006 ACS, bicycle feasibility assessments conducted by other cities and usage data from the Paris and Barcelona bike-share programs indicate that bicycle ridership and potential bike-share use may be impacted by demographics such as:

- Gender
- Age
- Location

Other demographic information, such as race/ethnicity, income and educational status may also impact bicycle use but the data available does not allow this report to explore these factors in a meaningful fashion.

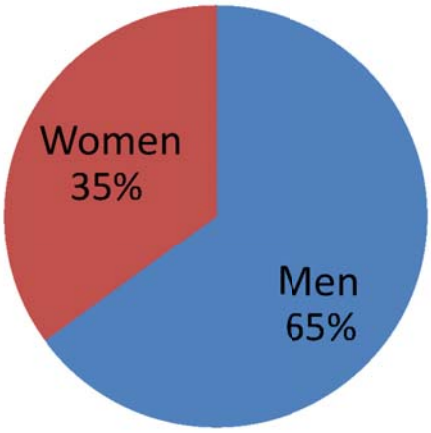
Gender:
Bicycling is typically a male dominated activity and in New York City this is especially the case. Men made up 65% of the total cyclists counted in NYCDCP's 2007 fall bicycle counts, conducted at 14 locations throughout Manhattan. This gender disparity is higher than gender disparities found in bicyclist surveys conducted in other cities like Toronto and Paris. In 2000, men made up 56% of all Toronto cyclists.[11] In 2005, men made up 59% of all Parisian cyclists.[12]

The gender disparity among New York City cyclists is even more pronounced when the type of bike lane is considered. In 2007, men made up 85% of bicycle riders on on street bikelanes. The number of women in on street lanes has been slowly increasing since 2000 (in 2000, women made up 12% of the riders counted on street vs. 15% in 2007). Counts conducted on Manhattan's greenways, which are used mostly by commuters and recreational riders, instead of messengers or delivery people, may reflect the gender split more accurately.

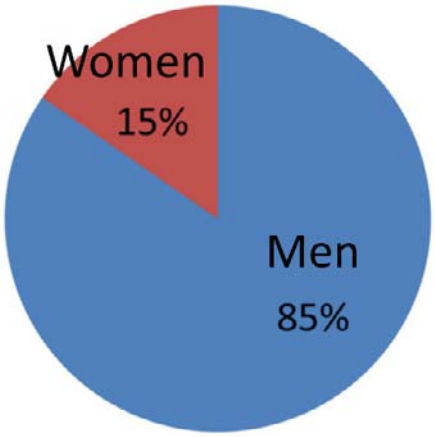
Weekend ridership along Manhattan's greenways, which is probably most applicable to recreational bicycling, shows much less of a disparity between men and women riders. In 2007, women made up 42% of weekend greenway ridership. In general, the gender disparities in bicycle ridership may underscore the need for more protected on street bike lanes similar to the greenways or the 9th Avenue protected lane recently built by NYCDOT.

11 Decima Research, Inc., "City of Toronto 1999 Cycling Study," February 2000
12 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08

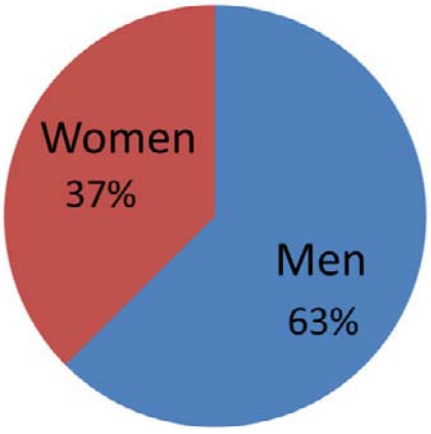
Bicyclists by Gender
All NYC Cyclists
n=39,629 (DCP 2007)



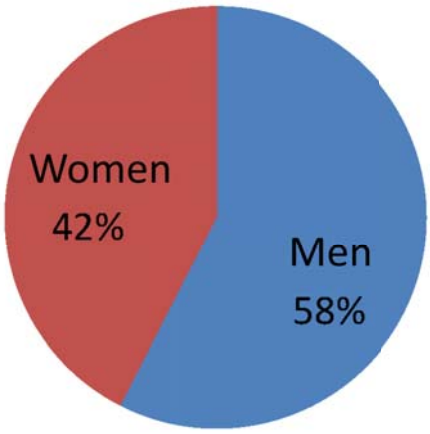
Bicycle Use by Gender
On-Street Bike Paths
n=8,814 bicyclists (DCP2007)



Bicycle Use by Gender
Greenways
n=10,964 (DCP 2007)



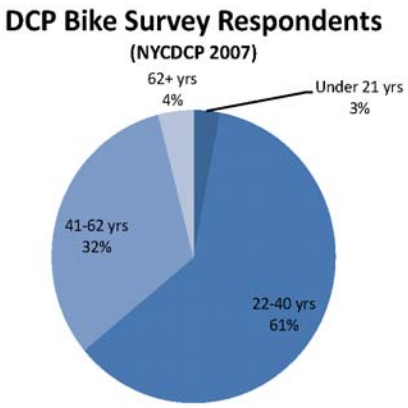
Bicycle Use by Gender
Weekend/Greenway
n=19,851 (DCP2007)

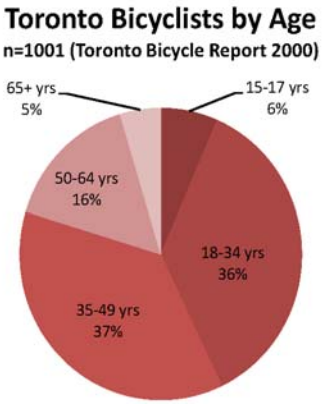


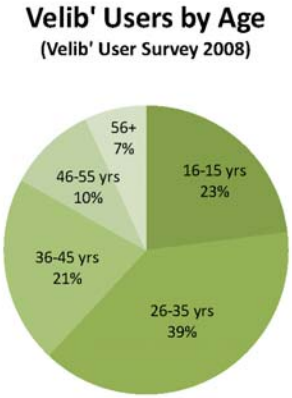
Age:

Survey data collected in New York, Toronto, Paris and other cities indicates that bicycling is not only for the 20-somethings. The 2006 Bicycle Needs Poll conducted online by the NYCDCP found that while the majority (61%) of New York bicyclists were in their 20's and 30's, people in their 40's and 50's still made up almost one third (32%) of the respondents. These numbers are similar to more rigorously conducted bicyclist surveys in places like Toronto which found that 58% of all Toronto bicyclists are over the age of 35.[13] Data collected on Velib' users in Paris shows similar trends. More than one third (38%) of Velib' users are over the age of 36.[14] Half (51%) of Parisian bicyclists before Velib' were between the ages of 30 and 50.[15]

Both the Toronto and New York City bicycling surveys found a limited number of younger bicyclists. In New York, bicyclists under the age of 21 made up 3% of the total survey respondents but approximately 30% of the total population. In 2007, only about 2% of public high school students in New York City biked to school or biked to public transportation to get to school.[16] The majority of student trips are short enough to be completed by bicycle; 73% of students walk to school or walk to public transportation to get to school.[17] In Paris, riders between the ages of 16 and 25 make up a little less than one quarter (23%) of Velib' users.[18] At the other end of the spectrum, both studies also found a small number of older bicyclists. In New York City, bicyclists ages 62 and older made up 4% of the total survey respondents but 14% of the total population.





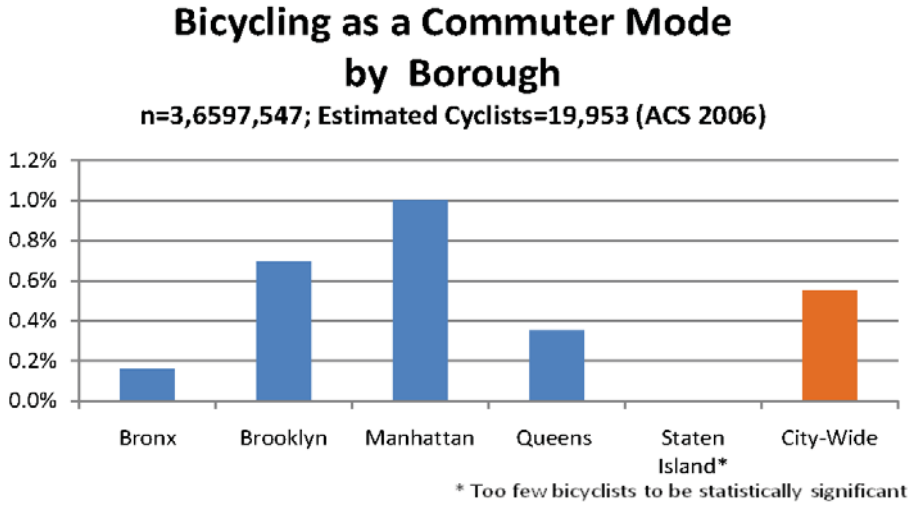


13 Decima Research, Inc., "City of Toronto 1999 Cycling Study," February 2000
14 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
15 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08; p.27
16 New York City Departments of Health and Mental Hygiene (DOHMH) and Education (DOE): New York City Youth Risk Behavior Survey, 2007; data requested from DOHMH Bureau of Epidemiology Services, August 2008
17 ibid.
18 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08

Location:

According to the 2006 ACS, the number of bicycle commuters in New York varies by location, with the highest bicycle commuter mode-splits concentrated in Manhattan and Brooklyn. Other data sources, such as NYCDHMH's Community Health Survey (CHS), which consider all bicyclists, not just commuters, suggest however that bicycle use is consistent across the boroughs, except Staten Island, and significantly higher than commuter counts depict.

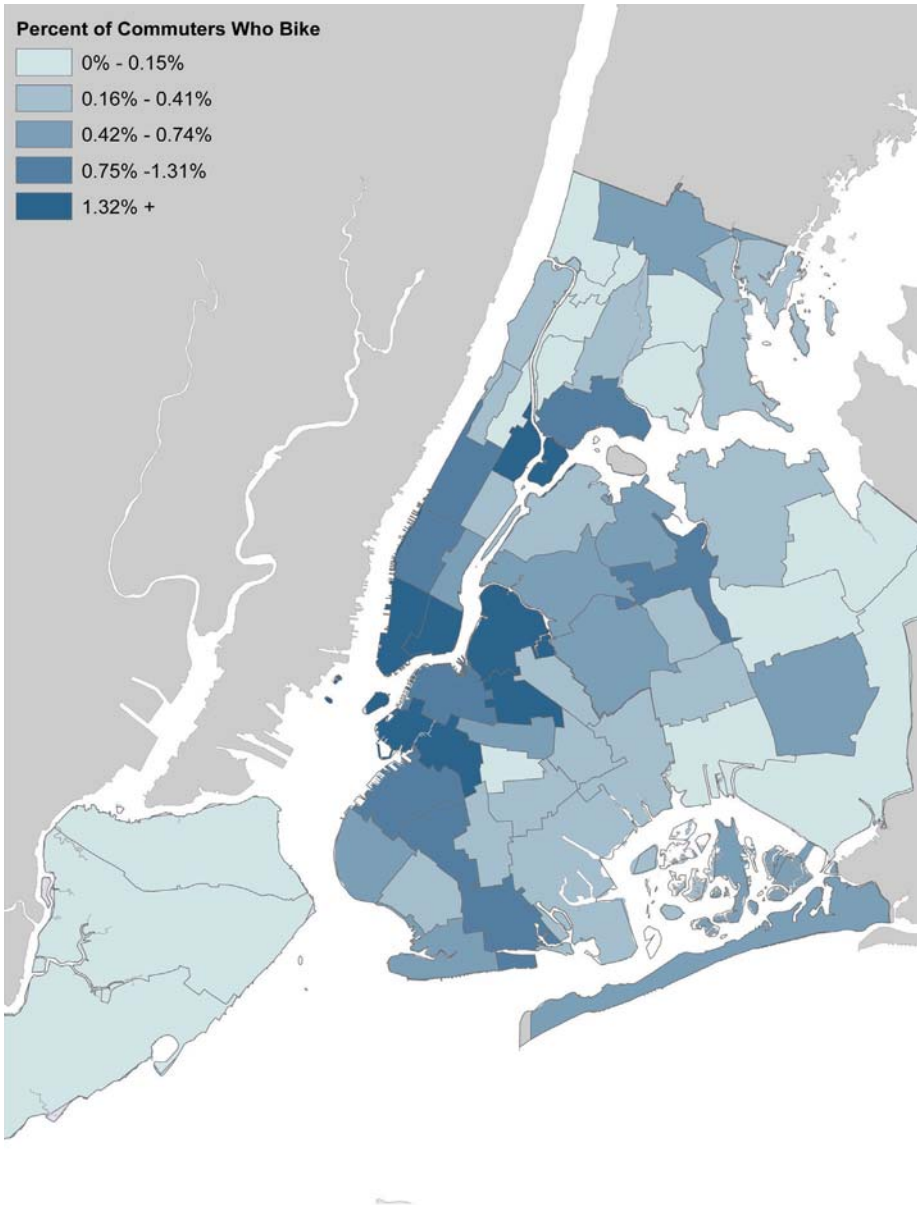
2006 ACS data indicates that 0.6% of all New York workers currently commute to work by bicycle and that that the number of bicycle commuters in Manhattan and Brooklyn is higher than the citywide average, 1% and 0.65% respectively. Bicycle commuting rates are lower than the average in the Bronx (0.16%) and Queens (0.35%). The total number of Staten Island bicycle commuters (97) reported in the 2006 ACS is smaller than the margin of error and thus not included. When analyzed geographically at the Public Use Microdata Area (PUMA) level, the 2006 ACS shows that current bicycle commuting in New York City is concentrated on the west side of Manhattan south of 110th street, East Harlem, the Lower East Side, parts of Brooklyn (Greenpoint, Williamsburg, Bedford-Stuyvesant, Downtown Brooklyn, Park Slope, Carroll Gardens, Red Hook), Sunset and Borough Parks, Gravesend, and select portions of the Bronx (Woodlawn/Eastchester) and Queens (Corona, Elmhurst). All of these areas currently have bicycle commuting rates that are above the citywide average. Most of the Manhattan and Brooklyn rates are approaching NYCDOT's goal of 3% bicycling mode split by 2020.[19]



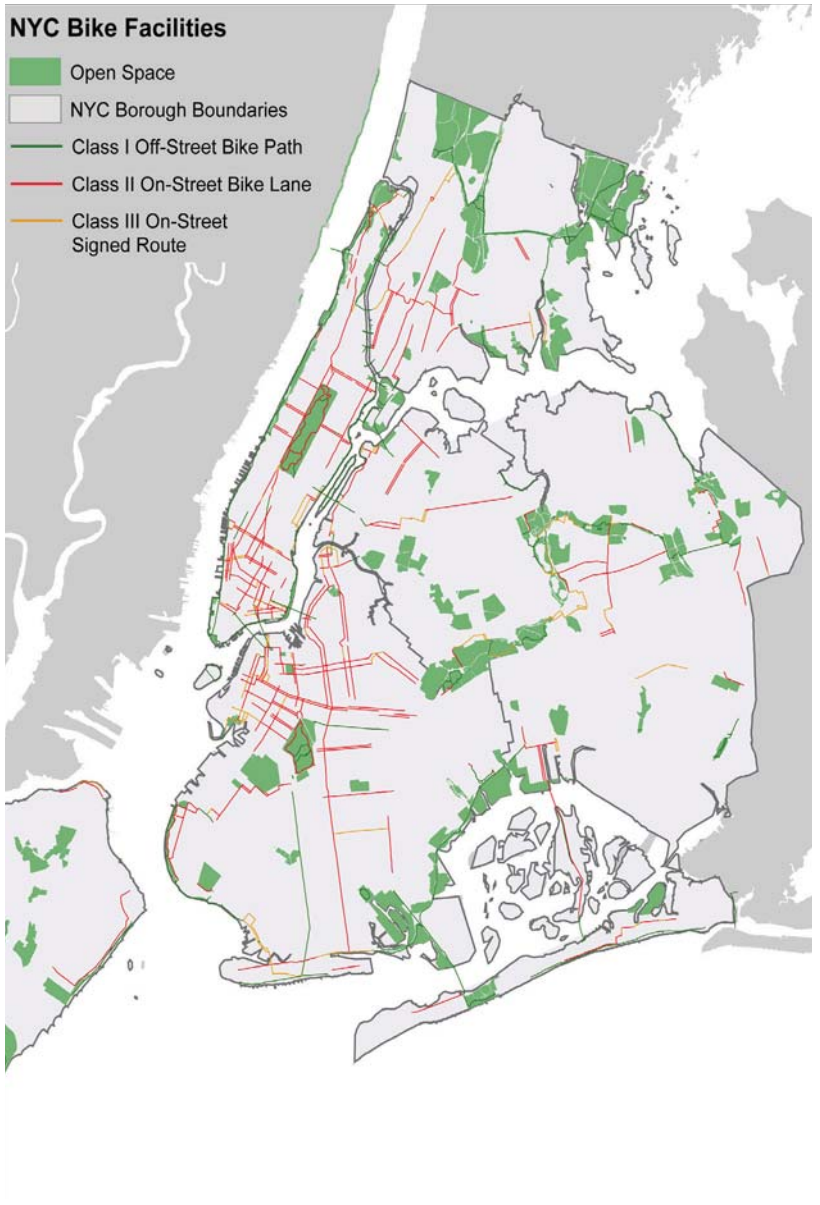
With some exceptions, areas indicated by the ACS as having high rates of bicycle commuting correspond to areas with a highly connective bike lane network (i.e. prominent greenways and bike lanes that go both east/west and north/south). These factors are probably mutually reinforcing. For a bike-share program, the presence of connective bike lanes may be important as potential bike-share users who do not currently bicycle may feel more comfortable riding on bike lanes.

The inclusion of non-commuter bicyclist data suggests that bicycling in New York City is far more common than otherwise thought and that there are significant bicycling populations in at least

19 New York City Department of Transportation, "Sustainable Streets: Strategic Plan for the New York City Department of Transportation, 2008 and Beyond," April 2008

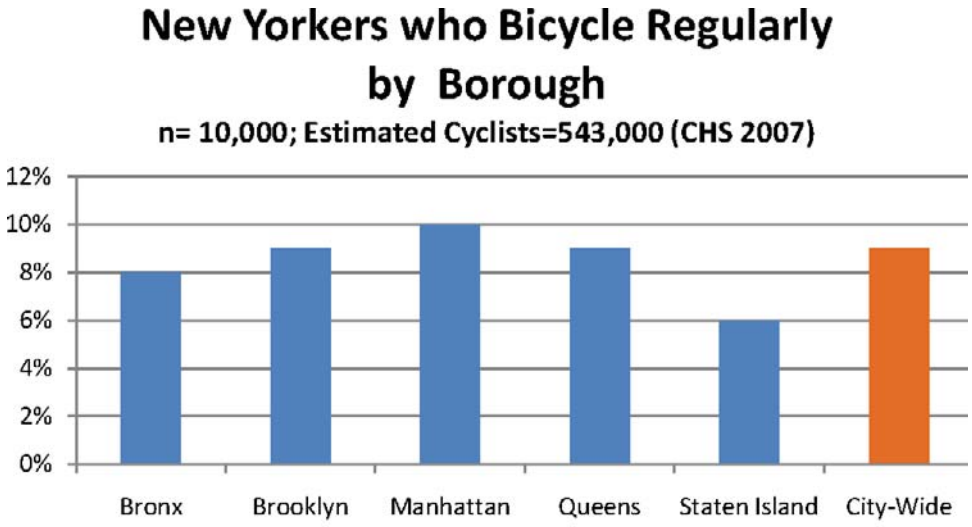


Rates of bicycle commuting vary throughout the city, with the most bicycle commuters living in Manhattan and northwest Brooklyn. Data from the 2000 US Census.



New York's bike lane network also extends throughout the city and is the most robust in Manhattan and Brooklyn.

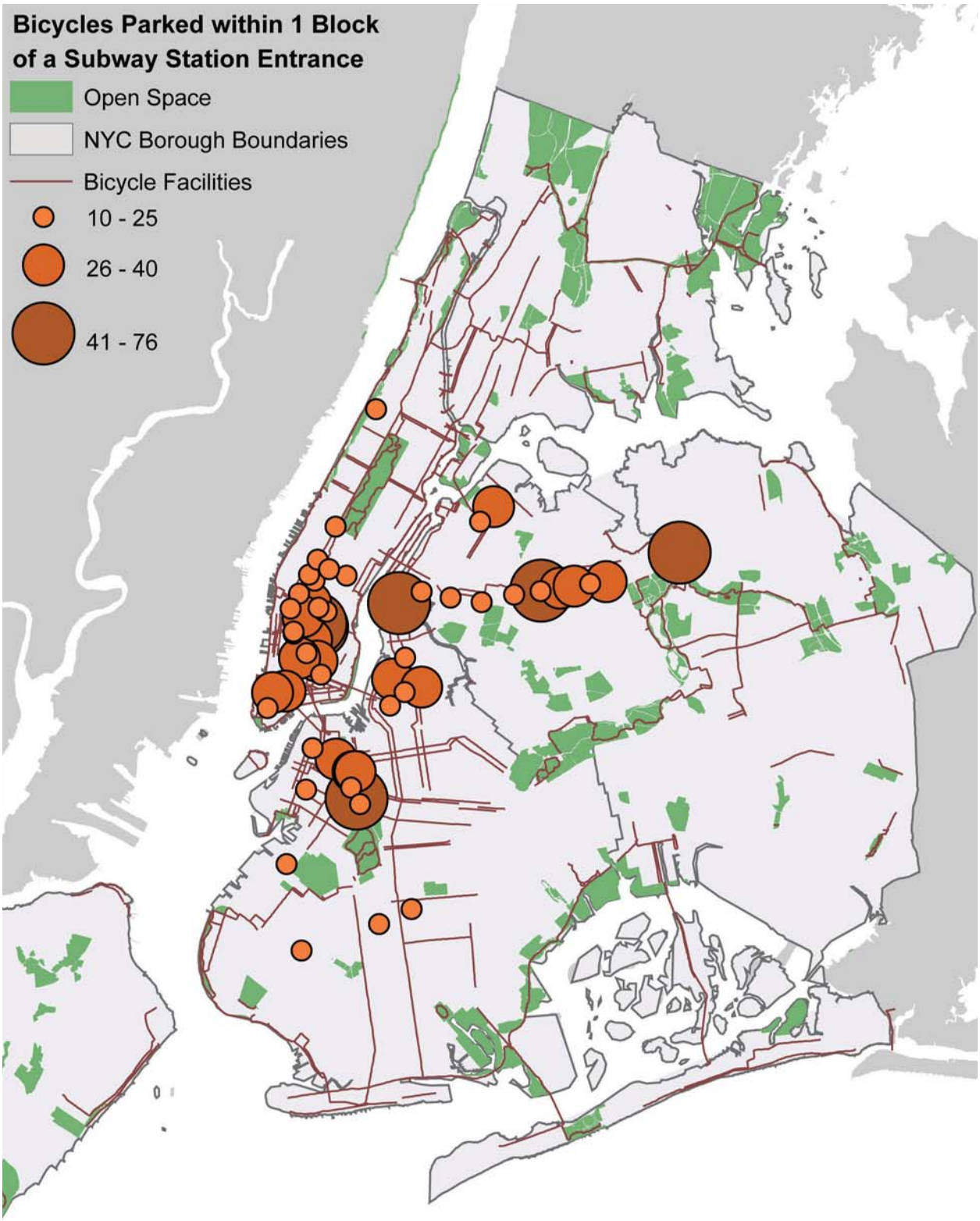
four of the five boroughs. NYCDHMH's 2007 CHS, found that about 9% of adult New Yorkers (543,000 people) are regular cyclists, meaning they rode a bicycle in New York City several times a month in the last 12 months.[20]



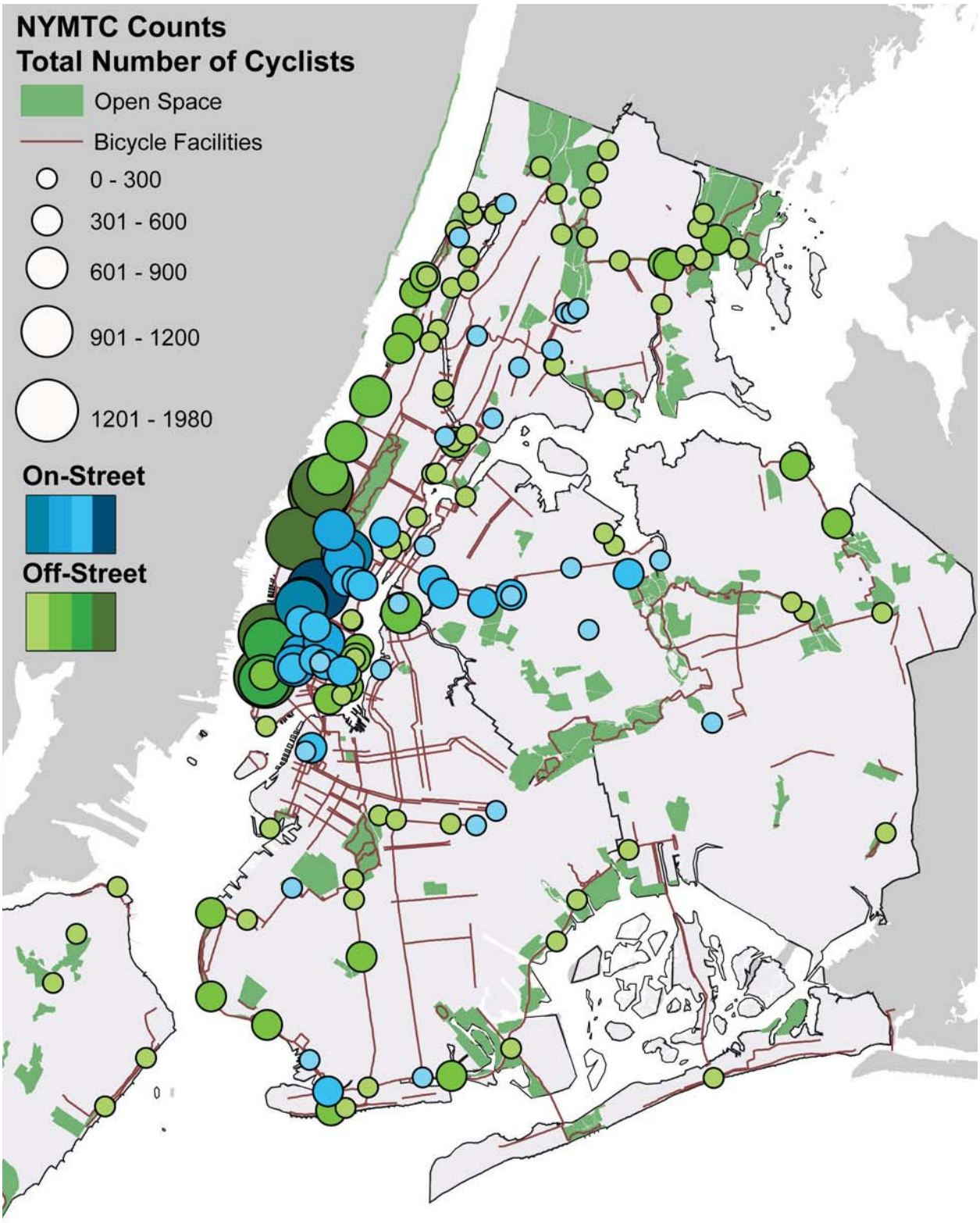
CHS data is underscored by other locally conducted bicycle counts and analyses. The Census and ACS surveys do not count multi-modal commutes; this may result in significant undercounting of bicycle commuters in New York. For example, a 2008 NYCDCP study of bicycle parking options at New York City subway stations found significant numbers of bicycles parked around subway stations in Queens, especially around Astoria, Queens Plaza, Jackson Heights and Flushing. These are areas that do not show up as "bicycling hot spots" in the Census or ACS.

New York Metropolitan Transportation Council (NYMTC) Bicycle Data Collection Program counts, conducted from 2002 to 2005, also provide interesting data on bicycle usage in the city. Unlike NYCDOT and NYCDCP annual counts, the NYMTC counts are conducted in all five boroughs. These counts found significant numbers of bicyclists at all 226 counting locations throughout the city. Manhattan and greenway counting locations recorded up to 2,000 bicyclists daily per location. Counting locations on street and in the other four boroughs typically recorded 300-600 bicyclists daily per location.[21] Unclear criteria for selecting counting locations and the fact that most locations were only surveyed once over the course of the project makes these counts difficult to use for anything more than anecdotal evidence.

20 NYC Department of Health & Mental Hygiene, 2007 Community Health Survey (CHS). The CHS is a cross-sectional telephone survey that samples approximately 10,000 adults aged 18 and older from NYC neighborhoods.
21 NYMTC, "NYMTC Bicycle Data Collection Program," (http://www.nymtc.org/project/NYMTC_Bicycle_Data_Collection_Program/www_html/intro_sum.htm); Accessed 09/09/08



Data collected by NYCDCP Transportation Division suggests a high degree of bicycle use in areas not indicated by the Census. These may be multi-modal bicycle commuters who bicycle to the subway or bus.



NYMTC one-day bicycle counts also find higher than expected numbers of bicyclists in areas where the Census shows little bicycle commuting activity.

WHO USES BIKE-SHARES?

Data from the major European bike-share programs (Velib', Bicing, Velo'v), indicate that bike-share programs typically have three main user groups:

- Commuters
- Recreational/Errand Riders
- Tourists

In Paris, 61% of the 190,000 people who have purchased Velib's annual membership are commuters who use Velib' in order to get to work or school. About 84% of these users typically use Velib' in conjunction with other modes of transportation.[22] Commuter ridership is not confined to the cities alone. In Paris, 33% of all annual subscription holders (62,700 people) live in the Parisian suburbs.[23] By and large, these riders use commuter rail services to get into Paris and then complete their journeys by bicycle.

Tourist and short term demand is also significant. In Lyon, approximately 40% of all trips are made by weekly pass holders.[24] Within the first six months of operation, Velib' sold 2.5 million one day passes.[25]

Bike-share user groups each have their own distinct bicycle use patterns. For example, commuters and recreational/errand users are most likely to want monthly or annual membership structures, whereas tourists will mostly want daily or weekly options. Commuters are more likely to use bicycles in the morning or evening, during typical rush hour peaks, whereas recreational/errand users and tourists make up the bulk of the users during the rest of the day. User groups are not mutually exclusive. A person who uses Velib' to get to work may also use Velib' at lunch time to run an errand. Night trips, presumably made mostly by recreational users, are also very common. In Paris where the Metro stops running at 1am, 25% of all trips take place between the hours of 9pm and 3am.[26] New York City might also see significant numbers of trips during "off hours" when subway and bus service is reduced.

The type of user also affects the rate of bicycle turnover. For example, data gathered from Velib' thus far shows that majority of annual members are commuters and that the average trip is 20 minutes.[27] This indicates rapid bicycle turnover as commuters reach their place of work or transfer point. In contrast, tourists are more likely to rent bicycles for longer time spans in order to see

22 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
23 ibid.
24 JCDecaux, "CycloCity: A Revolutionary Public Transit System Accessible to All;" Philadelphia Presentation, 2008; (http://bikesharephiladelphia.org/PDF%20DOC/V%C3%A9lo'V_A_REVOLUTIONARY_PUBLIC_TRANSPORT_SYSTEM_ACCESSI.pdf); Accessed 9/02/08
25 DeMaio, Paul; "Random Velib' Data," The Bike-Sharing Blog; (http://bike-sharing.blogspot.com/2008/02/random-velib-data.html); Accessed 6/25/08 & Bremner, Charles, "Paris offers drivers electric cars to beat pollution - for a small charge;" *The London Times*, 2 January, 2008
26 DeMaio, Paul; "Random Velib' Data," The Bike-Sharing Blog; (http://bike-sharing.blogspot.com/2008/02/random-velib-data.html); Accessed 6/25/08
27 ibid.

multiple sites. It is likely that a bike-share program in New York would see similar patterns since 2000 US Census data shows that most New York City bicycle commuters (85%) currently travel less than 30 minutes in order to get to work.

Price sensitivity may also be influenced by user group. For commuters and other habitual users, the financial draw of a bike-share program is that it costs the same or less than other transportation modes while allowing them to get closer to their final destinations without delays or transfers. Thus, for commuters and errand users, pricing structures, such as the free initial 30 minutes system that the European programs use, may be significant incentives to bicycle use. In contrast, recreational users and tourists, who currently pay up to $99/day for bicycle rentals in New York may be less price sensitive, and may keep a given bike-share bicycle for multiple hours regardless of price.

POTENTIAL DEMAND ESTIMATES

Using the user group patterns of successful bike-share programs around the globe as a guide, this report estimates the number of people in each potential user category—commuter, recreational/errand and tourist—in New York City. A range of "uptake" rates (the proportion of any given population who can be expected to use a bike-share program) is employed to develop demand estimates for a New York City bike-share program. For more nuanced analysis, these estimates should refined by considering current "profiles" of typical New York City cyclists.

Uptake Rates* (3%, 6% & 9%)*:
Uptake rates vary by user group and by city. It may be difficult to assume the uptake rate for New York as is seen in cities elsewhere. Cultural or city character differences such as prevalence of cars or willingness to bicycle, and financial differences such as the price elasticity for bicycle use or the percent of income typically consumed by transportation must be accounted for. This report presents a range of uptake options (3%, 6% and 9%) in order to best reflect the possible demand and financial outcomes of a bike-share program. The uptake range, from 3%-9%, was developed from the following analysis of predicted and actual uptake rates for other programs.

In London, TfL has conducted market analyses and surveys and estimates that approximately 9% of the residents in the phase one bike-share area (a roughly 13 square mile area centered on Westminster) will purchase annual memberships.[28] This estimate is slightly higher than subscription data collected in Paris. In the first year, 6% of Parisians (127,300 Paris residents) purchased annual subscriptions.[29] An additional 60,000 annual passes were sold to commuters living in the Parisian suburbs just outside of Velib's range.

TfL's survey data predicts a 9% as the average uptake rate for tourists as well.[30] However, data gathered in Paris on the number of one day Velib' passes sold suggest that this estimate may be low. In 2007, Paris, one of the world's most popular international tourist destinations, received 28 million overnight visitors.[31] Also in 2007, Velib' sold 2.5 million one day tourist passes in its first six months. Assuming that short term visitors to Paris were the primary buyers of short term one day Velib' passes, these numbers suggest a tourist uptake rate of 18%.[32] 9% is the highest uptake rate used in this report.

Despite low rates of commuter bicycling as recorded by the US Census and ACS, data collected by NYCDOHMH in 2007 indicates that 543,000 (9% of adults) New Yorkers rode a bicycle several times per month over the course of the past year. These existing bicycle rates suggest that, despite negative perceptions surrounding bicycling in the city, a significant number of New Yorkers bicycle regularly.

The pricing of the program is likely to play a large role in the final achieved uptake rate. A program with higher membership and user fees is predicted to have a lower uptake rate. Conversely, a program which relies less on membership and use fees to cover operating costs and thus has low-

28 Dector-Vega, German, Traffic & Highways Manager, Transit for London; Email Correspondence: 30 July 2008
29 67% of 190,00 annual passes sold
30 Dector-Vega, German, Traffic & Highways Manager, Transit for London; Email Correspondence: 30 July 2008
31 "Le Tourisme A Paris En 2007;" Office du Tourisme et des Congres de Paris, p.2
32 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08

er rates should see a higher uptake. Paris charges approximated $40/year and achieves around 6% uptake. While further market analyses should be conducted, this report assumes that a bike-share uptake rate for commuter and recreational/errand riders combined could reasonably range between 3% and 9% of the population.

Commuters:

An analysis of where New Yorkers live in relationship to their jobs offers a more nuanced portrait of how many New Yorkers could be expected to commute via a bike-share program. As outlined in Appendix B, this study assumes that 5 miles is the maximum reasonable bicycling distance for commuters in New York. Using this assumption, analysis was conducted with data from the 2000 US Census (Journey to Work) to determine the total number of New Yorkers in the workforce who live within a 5 mile and 2.5 mile radius of their place of work. This analysis, summarized below indicates that between approximately 369,000 and 1.45 million New Yorkers live close enough to their place of work that bicycling could be a feasible option. This represents between 11% and 45% of the total New York City resident workforce.

As discussed in Appendix B, these figures only represent the number of New York City residents who live within cycling distance of their work. In addition, due to the restrictions of the Census, multi-modal commuters are excluded from this estimate.

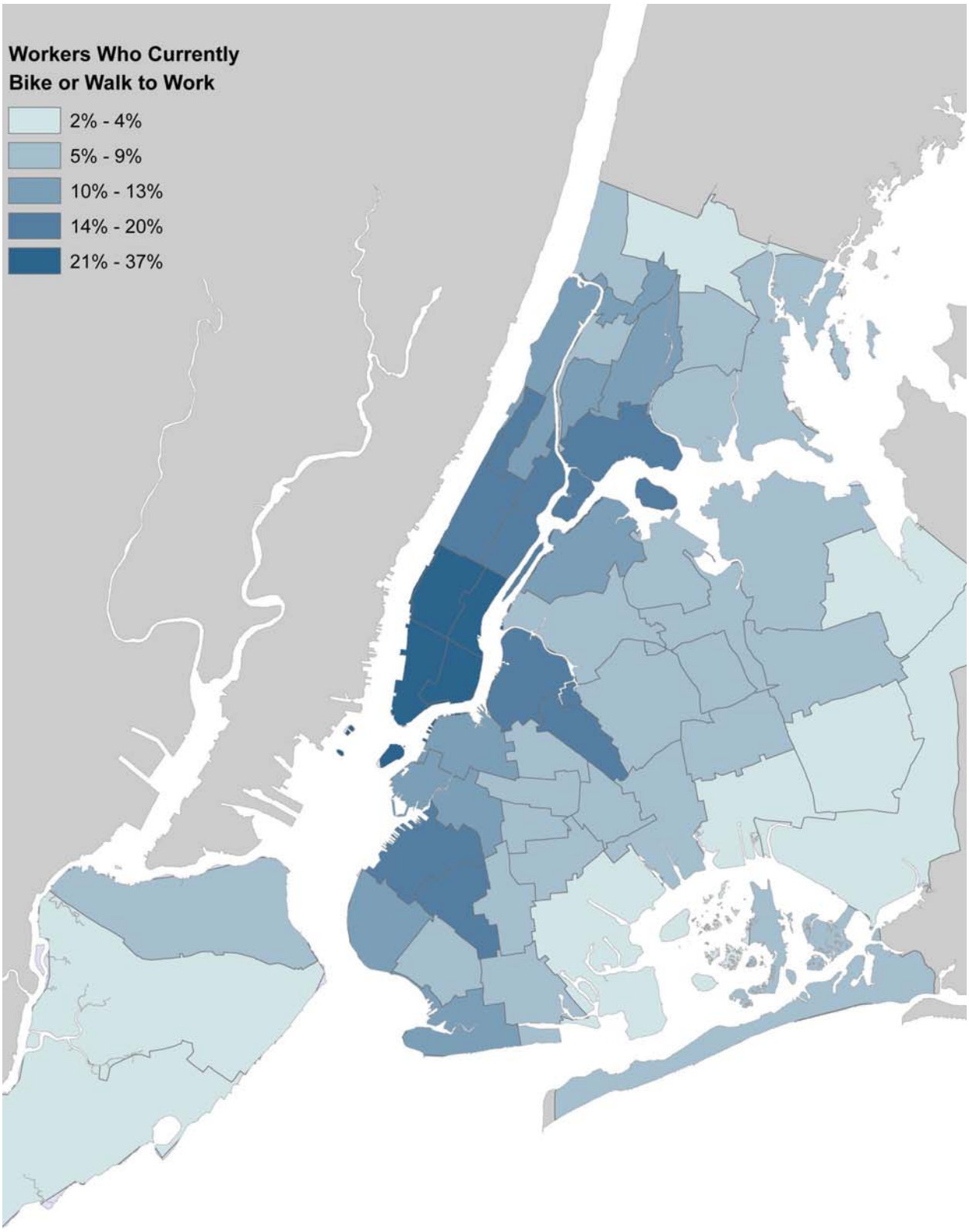
New Yorkers Who Live Within Biking Distance of Work

	Currently Bike or Walk	Live Within 2.5 Miles of Work	Live Within 5 Miles of Work
Total Number of New Yorkers	368,800	831,400	1,446,400
As Percentage of Total NYC Population	4.61%	10.38%	18.06%
As Percentage of New Yorkers in the Workforce	11.55%	26.05%	45.31%

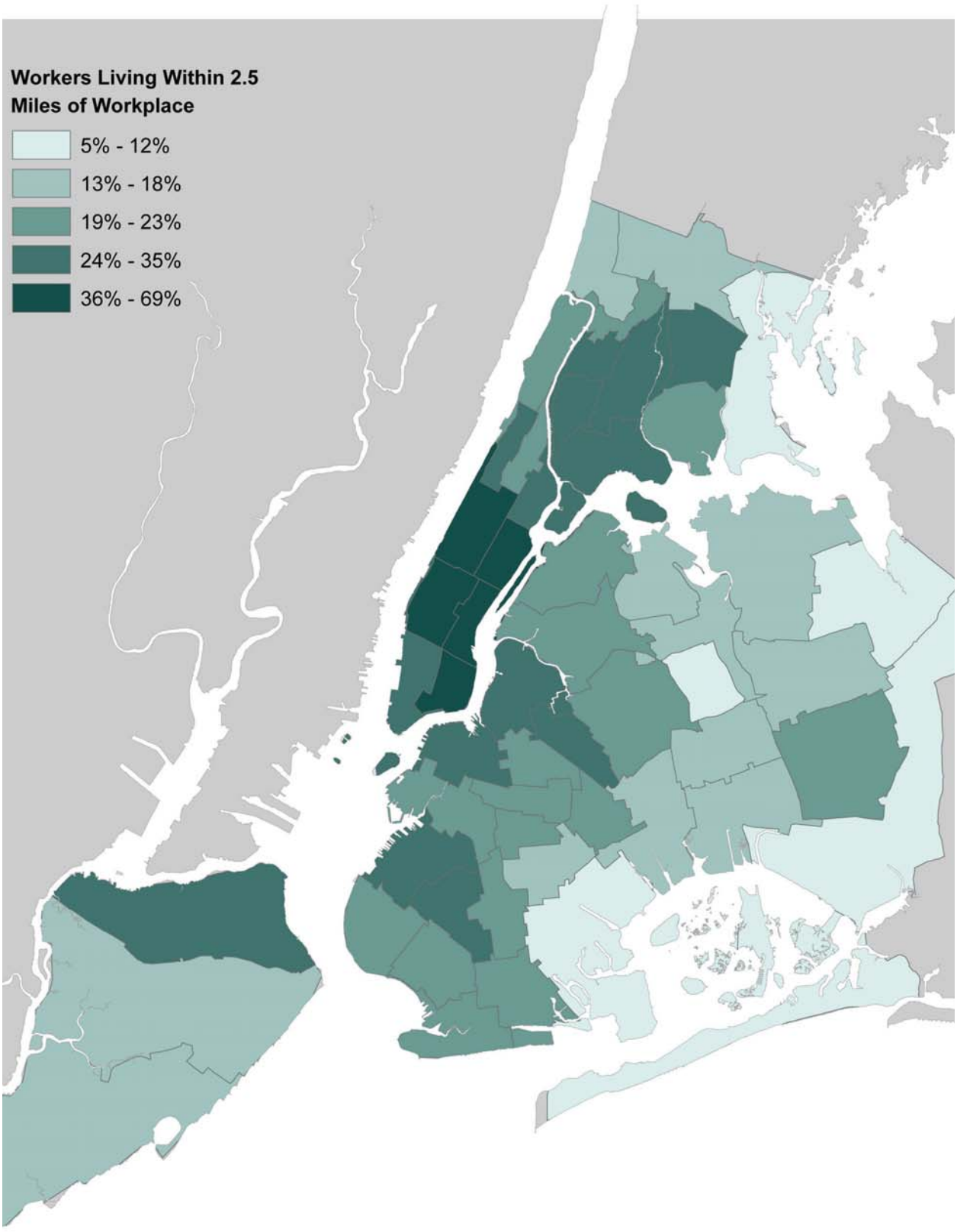
At a 3% uptake rate, this would translate into 11,000-43,000 New Yorkers commuting using a citywide bike-share program. At a 6% uptake rate, 22,000-87,000 New Yorkers would commute using a citywide bike-share program. At a 9% uptake rate, 33,000-130,000 New Yorkers would commute via bike-share. Neither the Paris data nor TfL uptake model is adjusted for commuting distance (the uptake model is a percent of total population) or price elasticity.

Potential Commuter Demand

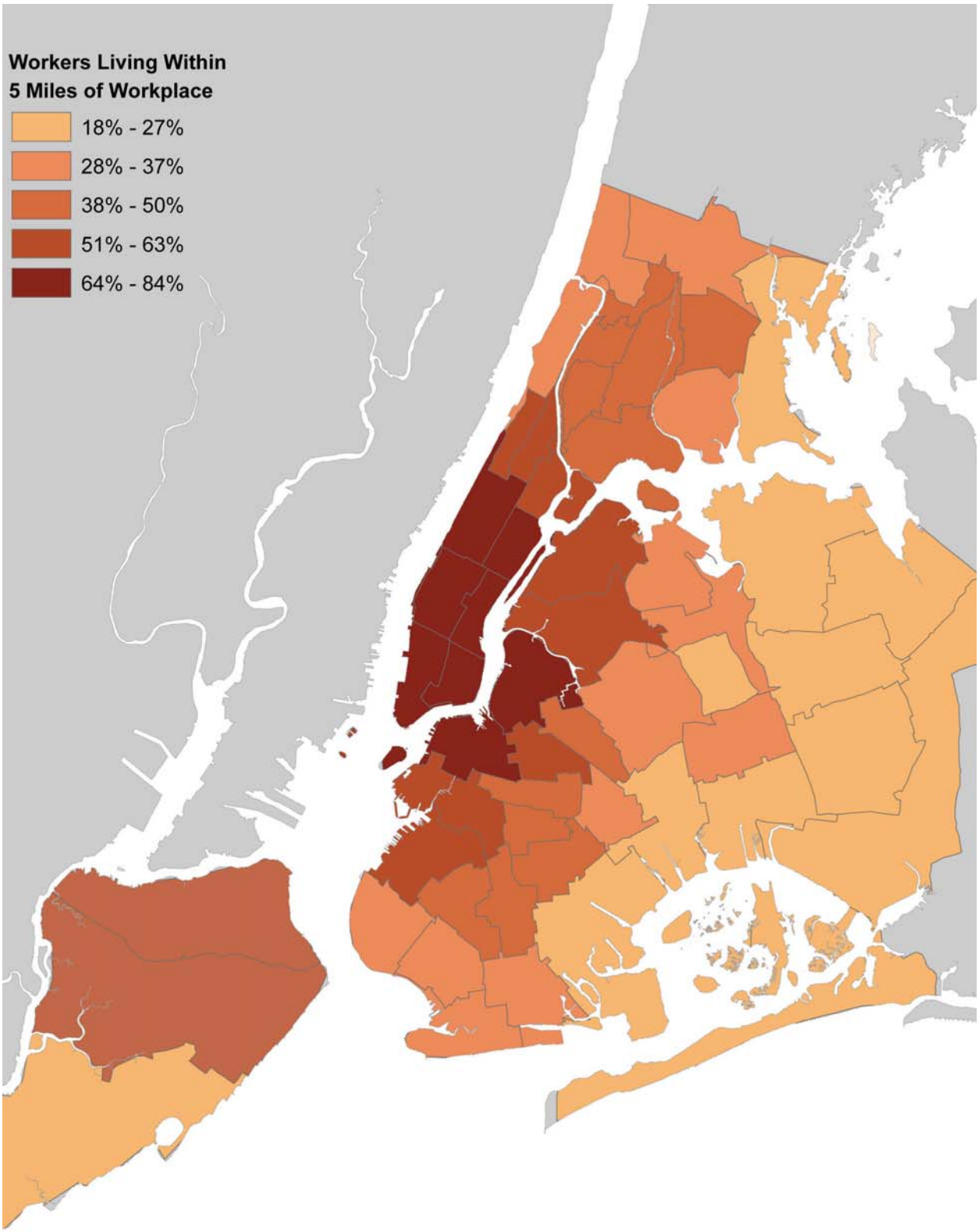
	Currently Bike or Walk	Live Within 2.5 Miles of Work	Live Within 5 Miles of Work
Total Number of New Yorkers	368,800	831,400	1,446,400
3% Uptake	11,064	24,942	43,392
6% Uptake	22,128	49,884	86,784
9% Uptake	33,192	74,826	130,176



Many Manhattan and NW Brooklyn residents currently walk or bike to work. Data from the 2000 US Census.



The majority of New Yorkers live and work in the same borough. In Manhattan, more than 25% of residents south of 110th Street live within a 2.5 mile radius of their place of work. Data from the 2000 US Census.



More than 1/2 of Manhattan residents south of 168th Street, Astoria, LIC and Northwest Brooklyn residents live within a 5 mile radius of their place of work. Data from the 2000 US Census.

In addition, out-of-city commuters may also be potential bike-share users. In Paris, 33% of the Velib' commuter population lives in the Parisian suburbs.[33] In New York City, such commuter ridership could also be substantial. Over 552,000 commuters come into New York City daily on MetroNorth, LIRR, NJTransit, and the PATH trains or through the Port Authority Bus Terminal.[34] Many of these commuters enter the city at major hubs and then take the subway to their final destinations. At a 3-9% uptake rate from New York's out-of-city commuters, 17,000 to 50,000 additional people would subscribe to a citywide New York bike-share program.

Potential Commuter Demand (Including Out-of-City Commuters)

	Current bikers/walkers + Out-of-City	Within 2.5 Miles + Out-of-City	Within 5 Miles + Out-of-City
Total Commuters w/in Biking Distance	368,800	831,400	1,446,400
3% Uptake	11,064	24,942	43,392
6% Uptake	22,128	49,884	86,784
9% Uptake	33,192	74,826	130,176

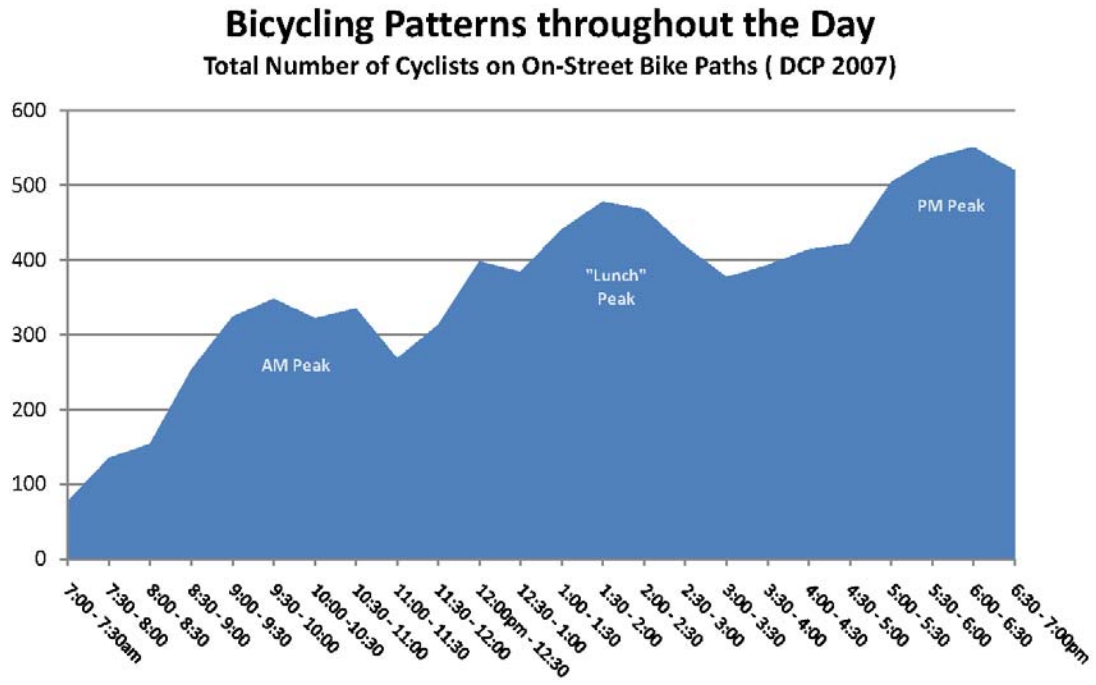
33 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08

34 Daily Ridership: MetroNorth: 132,000 people; LIRR: 100,000 people; NJTransit: 70,000 people; PATH: 50,000+; PA Bus Terminal: 200,000 people

Recreational/Errand Users:

The uptake rate for recreational or errand users is difficult to estimate from existing data since there is little information about how many such trips are currently undertaken by bicycle in New York. In Paris, recreational or errand users make up 39% (74,000 people) of the total number of annual pass holders or 3% of total population of Paris. In New York City, almost one million people commute into Manhattan south of 59th Street daily from other places in the five boroughs. Of those people, commuters who live further than a reasonable bicycling distance from work might still purchase annual bike-share membership to run errands during the day or after work, expand the range of their lunch options, or reduce travel time between meetings held in different locations. In New York City, at a 3% uptake rate of the total population, 250,000 people would use a citywide bike-share program. At 6%, 492,000 people would subscribe; at 9%, a New York City bike-share program could expect 738,000 recreational/errand subscribers.

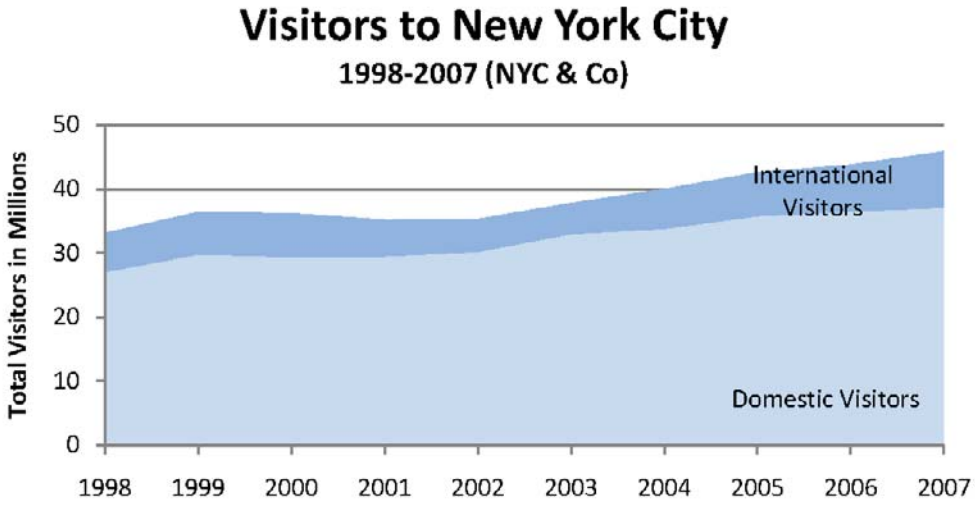
As can be seen from bicycle counts conducted by DCP, DOT and NYMTC throughout the year, bicycles in New York are used throughout the day. DCP's annual Fall bicycle counts, shows three bicycling peaks, AM, "Lunch" and PM. The AM and PM peaks resemble transportation ridership peaks associated with other modes of transit and seem to correspond to the typical 9-5 work day. Atypical is the "Lunch" peak which begins at noon and goes until 3pm. Interestingly, bicycle use overall increases over the course of the day, with substantially more bicyclists counted in the evening than in the mornings.



Tourists:

Visitors to New York represent another large population of potential bike-share users. Within the first six months, the Velib' program sold 2.5 million one day (essentially "visitor") passes. In 2006, over 27 million visitors came to Paris, slightly more than half for tourism or leisure purposes.[35] In contrast, New York received 43.8 million visitors in 2006 and 47 million visitors in 2008, about 75% of whom came for leisure purposes.[36] Of those coming for leisure, 25% are visiting friends and/or family. The remaining 75%, 24.6 million visitors in 2006, came either as tourists or for errands. Bike-share programs, which provide an active, above ground way to see the city as well as access to out of the way areas, could be a valuable amenity for such visitors.

The number of tourists to New York has been steadily growing over the past decade and the city is well on its way to meeting its goal of 50 million visitors by 2010 set by Mayor Bloomberg. At 3% uptake rate of visitors coming for tourism purposes, a New York City bike-share program could anticipate 1.4 million tourist users annually. At a 6%, a New York City bike-share program could anticipate 2.6 million tourist users annually, at the 2006 tourism level. At 9%, a New York City bike-share program could expect almost 4 million users in the first year.



International tourists are an important part of New York City's tourism market, making up about 16% of the total visitors in 2006. Unlike domestic visitors, who tend to come to the city for short periods (86% stay for less than 4 days) and may only be in town for an afternoon to run errands, international visitors tend stay in New York longer (73% stay for more than 4 days).[37] The international tourists also tend to travel into the boroughs and seem to be more willing to use the city's public transit system.[38]

35 Velib' Website, "Velib Press Kit;" (www.velib.fr); Accessed 8/26/08, p.11
36 NYC & Company Website, "NYC Statistics;" (http://nycvisit.com/content/index.cfm?pagePkey=57); Accessed 9/8/08
37 NYC & Company, "Leisure Travel to New York City in 2007," NYC & Company, 17 September, 2008
38 Keren, Donna, Senior Vice President, Research & Analysis, NYC & Co.; Phone Interview: 23 June, 2008

Western Europeans make up the majority of New York's international visitors, followed closely by tourists from Canada and Japan.[39] These countries, as well as New York's emerging international markets like Brazil (+66%), Australia (+51%), India and Argentina (+47% each), and Russia (+28%), often have bicycling cultures that could translate into ridership for a bike-share program.[40] With the U.S. dollar declining against the Euro (as of Sept. 29th, 2008, $1 = 0.7€), overseas tourists, especially from Europe have increasingly been making New York City one of their top vacation destinations.

Other Estimate Models: Population Density

The potential demand for a bike-share program could also be assessed by looking at medium and high density areas (32,000 people or more/square mile) in New York. Since roughly ¾ of the city's population (just over 6 million people) lives on about 1/3 of the total land mass (116 square miles), targeting a bike-share program in high density areas would be an effective way to provide access to the most people at the least cost.

At a 3% uptake rate for New York's high density areas, a bike-share program could expect 185,000 New York City residents to subscribe. At a 6% uptake rate for New York's high density areas, a bike-share program could expect 369,000 New York City residents to subscribe. Using a 9% uptake rate, 554,000 New Yorkers could be expected to subscribe. As outlined above, a New York City bike-share program could also anticipate subscription by 11,000-33,000 out-of-city commuters who come into the city by rail and 1.4-4 million tourists annually.

In addition, a bike-share program that covered Manhattan's business core could potentially see use from New York City residents who live, but do not work, in the coverage area. Such users could use the bike-share to complete their journey to and from work (especially workers on the far east or west sides), or to make trips and run errands during lunch hour or after work. Potential ridership could be significant. Almost 1 million New York City residents work in Manhattan south of 59th Street but do not live in the area.

In all cases, the uptake rate for a New York City bike-share program will likely be dependent on pricing.

Estimated Users vs. City Population

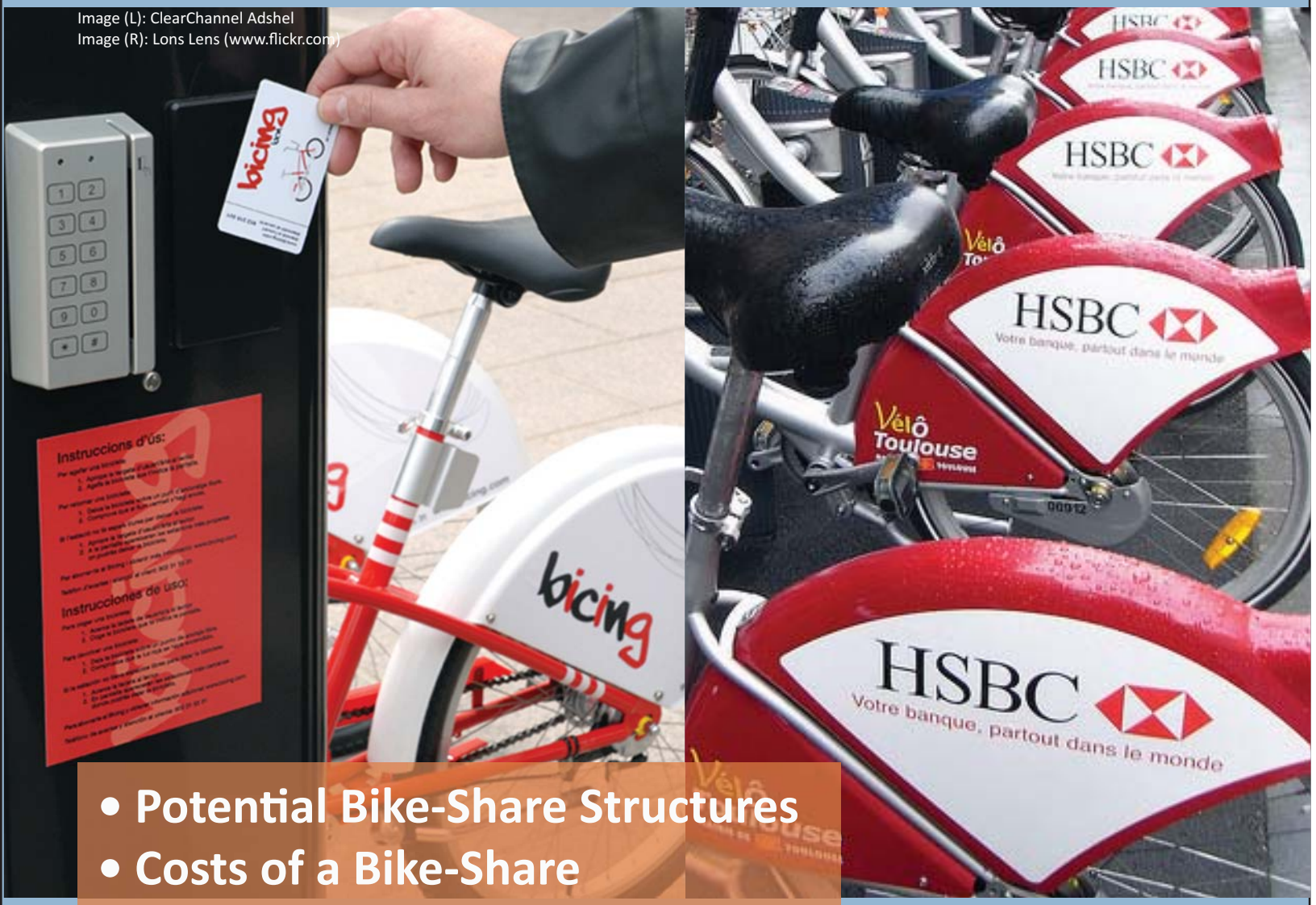
Estimated Number of Users	% of High-Density Areas	% of City Population
185,000	3%	2.2%
369,000	6%	4.4%
554,000	9%	6.7%

39 NYC & Company Website, "NYC Statistics," (http://nycvisit.com/content/index.cfm?pagePkey=57); Accessed 5/21/08

40 NYC & Company, "FYI: Preliminary Forecast-Visitor Volume 2007&2008 New York City Briefing Sheet," NYC & Company, 29 May, 2008

06 Paying for a NYC Bike-Share

Image (L): ClearChannel Adshel
Image (R): Lons Lens (www.flickr.com)



- **Potential Bike-Share Structures**
- **Costs of a Bike-Share**
- **Potential Revenue Sources**

POTENTIAL FINANCIAL STRUCTURES

This section outlines the regulatory environments associated with both city-built and franchise bike-share programs. Within the confines of those environments, this section also provides "back of the envelope" estimates for the cost and revenues for a New York City bike-share program at a variety of scales. Membership and use fees are considered the primary operating revenue source in all estimates; potential advertising revenues are discussed where appropriate. Capital funding sources—such as the New York City Investment Fund and other private grants—are covered in brief.

Bike-share programs are strong candidates for the public-private partnership model of provision of public services. Despite their obvious public transportation and health benefits, few cities have the capacity, money or desire to run bike-share programs on their own. As a result, most bike-shares are built, run and maintained by private companies who make a profit off the program or, more commonly, off the advertising in the bike-share contract. Because bike-stations are placed on public land—city streets and sidewalks—bike-share programs cannot be provided by the private sector alone.

Worldwide, bike-share programs are structured in two major ways, albeit with numerous permutations. Bike-share programs can be developed:

- As part of an advertising franchise authorized by the city and operated by the franchisee
- With city funds and operated by the city or by a service operator

Franchises are the dominant, but not the only, model for most of the world's bike-share programs. Paris and Washington DC, for example, have connected their bike-share programs to larger street furniture franchise contracts, allowing advertisers to earn revenues from advertising in exchange for building and operating bike-share programs. Toulouse has created a bike-share specific franchise which generates advertising revenues from the bicycles themselves. In contrast, the Barcelona and Montreal systems do not use advertising revenue. In Barcelona, the bike-share is separated from advertising and the city pays the operator (ClearChannel Adshel) to build and run programs out of other city revenue streams. In Montreal, the Montreal Parking Authority, a quasi-public authority, proposes to fund Montreal's Bixi program entirely off of membership/use fees and sponsorships.[1]

A city-built bike-share program could also later be combined with a franchise. A franchise model would allow for wider bike-share coverage, since the advertising revenues could help to offset both capital and operation costs. The process for franchise authorization is, however, lengthy and New York's current street furniture franchises limit options for bike-share. A city-built program could be implemented faster but coverage would be restricted to areas where membership and use fees could cover costs. A New York City bike-share program could begin as a city-built program in select high volume locations while NYCDOT begins franchise authorization proceedings.

1 The Call-A-Bike bike-share program in Germany is paid for by the German national railroad as part of their complement of services.

Potential revenue streams for a New York bike-share program depend on the program structure and related regulatory environment. However, certain revenue streams, like membership and user fees, will likely play a part in any structure as New York City and State face significant budget issues and as much of the city's street furniture is already consolidated under a franchise agreement. Advertising revenue is also important, although the use of advertising is only allowed within the confines of a franchise agreement.

Within the broad categories of Franchise and City-Built program, the following options exist:

	FRANCHISE			CITY-BUILT PROGRAM	
Option #	**Option 1a:**	**Option 1b:**	**Option 1c:**	**Option 2:**	**Option 3:**
Description	Renegotiate Existing Street Furniture Franchise	New Bike-Share Franchise	New Street Furniture Franchise + Bike-Share	City Build and Operate	City Build and Contract Out Operations
Contract Type	Franchise Contract			N/A	Service Contract
Capital Costs Assumed by…	Franchisee			City	City
Operating Costs Assumed by…	Franchisee			City	Operator
Primary Revenue Sources	• Advertising • Membership/User Fees			• City Funds • Membership/ User Fees	• City Funds • Membership/ User Fees
Other Revenue Options	• Federal/State Grants • Private Loans/Grants • City Funds			• Federal/State Grants • Private Loans/ Grants	• Federal/State Grants • Private Loans/ Grants

Franchise Options

In general, franchise contracts are used because they allow cities to implement bike-share programs without taking money directly from city coffers. Instead costs are borne by the franchisee/operator in exchange for revenue from advertisements placed on city property. Franchise based bike-share programs are not "free" however, because money the city could have earned from the advertising space in the franchise is now split between the city and the franchisee/operator.

Key to the development of a successful franchise based bike-share program is acknowledgement of the fact that municipal governments and private-sector companies have different bottom lines. Importantly, as New York City has found in other franchise contracts, locations that are the most lucrative in terms of advertising revenue do not always match the locations that a calculation of public needs, such as provision of public telephones or bike-stations, might dictate. The 2006 CEMUSA contract stipulated that NYCDOT select the locations for CEMUSA bus shelters, rather than leaving placement decisions up to the franchisee; similar terms would be necessary for a bike-share franchise.

In New York, franchises are defined in the City Charter as "grants by an agency of a right to occupy or use the inalienable property of the city to provide a public service" and typically are used for the private provision of public amenities such as private bus lines or bus stop shelters.[2] Franchises are proposed by the mayor and authorized by the City Council. The process for franchise authorization tends to be lengthy. The Authorizing Resolution and Uniform Land Use Review Process (ULURP) application for the 2006 CEMUSA Coordinated Street Furniture Franchise was initially submitted by the Giuliani administration in the late 1990's.[3]

Franchise Option 1a: Added into an Existing Street Furniture Franchise

Velib' in Paris and SmartBike in Washington D.C. are funded as part of larger street furniture contracts. In Washington, for example, ClearChannel operates DC's 120 bicycle program and gives the District 35% of the total advertising revenues.[4] In Paris, the 20,600 bicycle Velib' program is tied into the city's billboard contract with SOMUPI, a JCDecaux joint venture. The city of Paris broke its original JCDecaux franchise contract to create a new one that included bike-share.

New York's ability to add a bike-share program into one of its existing franchise is limited by the terms of those contracts. The 2006 Coordinated Street Furniture Franchise gives CEMUSA control over advertising on city bus shelters. In exchange, CEMUSA must replace and maintain the City's 3,169 existing bus shelters, 330 newsstands, and an unspecified number of public service structures, and build and maintain 20 automatic public toilets, for 20 years. In addition to being relieved of the responsibility for provision and maintenance of these structures, the City is guaranteed a minimum of $1 billion in revenue and close to $500 million in free advertising over the next 20 years.

Modifications to the CEMUSA contract to include a bike-share program may be difficult because they would require significant renegotiation between DOT and CEMUSA. Importantly, the current financial payout of the CEMUSA contract would be difficult to replicate if a bike-share pro-

2 New York City Charter, Section 362-b

3 McKenna, Brooke, NYCDOT, Coordinated Street Furniture Franchise; Interviews: August 2008

4 Grasso, Richard, Senior Vice President Business Development, & Martina Schmidt, Director SmartBike US; ClearChannel Adshel, Phone Interview: 30 April, 2008

gram were included, since the contract already covers most of what is traditionally thought of as "advertiseable" street furniture. Renegotiation of the CEMUSA contract would require a lengthy authorization process (as would any franchise).

It should be noted that, of the outdoor street furniture advertising companies the currently include bike-share programs in their repertoires, CEMUSA only has two programs currently in operation (nibici in Pamplona and Roma'n in Rome). Both programs are small—nibici has 350 bicycles and Roma'n has 200—and may not provide CEMUSA with sufficient expertise for running a New York sized program.

New York's phone booth contracts are another major existing city franchise. The city's 35 phone booth advertising contracts are handled by NYCDoITT and are set to expire in 2010.[5] As with other forms of street furniture, the revenues from phone booth advertising panels can be substantial. In the 2nd Quarter 2008, advertisements on the city's phone booths netted $340/month/ad panel or $4.2 million/month in total. The city currently receives 26% of the advertising revenues.[6]

Phone booth contracts are non-exclusive under the Federal Telecom statutes which mandate equal access. However, the declining use of pay phones has raised questions, and lawsuits, about the placement of phone booths as community boards and neighborhood groups have charged that street furniture advertisement companies are using phone booths to sneak ads into areas where ads are not permitted or not desirable.[7] As a result, phone booths are likely a poor funding option for a bike-share program.

Franchise Option 1b: A New Bike-Share Specific Franchise

Toulouse has used its bike-share program to create entirely new franchise options by advertising on the bike-share bicycles themselves. In Norway, ClearChannel Adshel's franchise includes advertisement located on the bike-stations. Such bike-share specific franchises are appealing because of the direct relationship between the advertisement and the program. Attaching the advertisement panel to the bike-stations or bicycles gives advertiser/operators an additional incentive to ensure that the program is well maintained and that the bicycles are constant use around the city. The revenue streams from on-bicycle advertisements are largely untested but have the potential to be substantial.

Franchise Option 1c: A New Street Furniture Franchise Which Includes Bike-Share

Unlike many street furniture contracts elsewhere, the CEMUSA contract is not exclusive. In theory this means that the city could issue a new street furniture franchise contract for additional bus shelters, newsstands, public service structures or automatic public toilets that could be used to fund a bike-share program. However, in practice, this option would be difficult as the City is required to allow CEMUSA to build their full allotment of street furniture before granting a new franchise contract for additional street furniture covered under the contract, which severely restricts this option. Other forms of street furniture—such as muni-meters—are not part of the CEMUSA contract, and these could be tied into a new bike-share/street furniture contract.

5 Schorr, Stanley, NYC DoITT, Finance Division, Phone Interview: 24 July, 2008
6 Kaylish, Wayne, NYC DoITT, Finance Division, Phone Interview: 4 August 2008
7 McGinty, Jo Craven, "As Billboards, Public Phones Always Work;" *The New York Times*, 17 August, 2007

City-Built Program Options

A city-built bike-share places the financial burden of the program on the city. A city-built bike-share program could be run by NYCDOT itself or contracted out to an independent operator using a service contract. Authorizations for the acquisition of bicycles and the placement of bike-stations would come from the NYCDOT Commissioner with approval of the Mayor. The Design Commission review is required. If the city were to choose to contract out the operations of the bike-share, it would follow the service contract rules as laid out in the City Administrative Code. Advertising is not an option, except under the auspices of a franchise contract.

Option 2: City Built/City Operated
A city-built/city-operated program would be developed under the auspices of NYCDOT. There is no set structure for operations.

Option 3: City Built/Contractor Operated
Bicing, in Barcelona, is paid for out of city revenues. The program cost is negotiated annually. In New York, a city-build/contractor operated program would be developed and overseen by NYCDOT. There is no set structure for operations.

BIKE-SHARE PROGRAM COSTS

The costs of a bike-share program vary depending on the number of bicycles and bike-stations, the size and density of the coverage area, and the bicycle and bike-station type and operator selected. Depending on the model of bike-station used, New York City's high installation and electrification costs could also contribute to the overall price tag of a program. For example, current estimates place the cost of manufacturing, installing and "trenching" (digging to the closest power source) for the new CEMUSA bus shelters at $15,000-$20,000 per shelter. These high costs are due partially to the complex subterranean environment below the city's sidewalks where water, sewer, and power lines, subway and building vaults and foundations all must be accommodated.

Capital costs for a bike-share program include provision of bicycles, manufacture and installation of bike-stations, purchase of service and distribution vehicles, development of a website, and purchase and installation of necessary hardware and software. ClearChannel Adshel estimates that each bicycle costs $550-600. District DOT in Washington DC estimates the capital cost for a ClearChannel Adshel model bike-share program at around $3,600/bicycle.[8] Velib's capital costs are estimated at $4,400/bicycle.[9]

Montreal's Bixi program suggests a valuable design innovation to reduce capital costs. The bicycle docking stations are mounted onto a metal plate which is in turn bolted to the ground. Excavation and trenching are not required, a significant capital cost reduction. The Stationnement de Montréal estimates its capital costs around $3,000/bicycle.[10]

Operating costs include salaries for maintenance and administrative staff, insurance, replacement costs for broken or stolen equipment, debt-service, gasoline and upkeep costs for redistribution vehicles, website hosting and maintenance, electricity charges for the bike-stations, membership cards and warehouse/storage fees. When averaged across programs, the average operating cost for a bike-share program is around $1,600/bicycle. Again, Stationnement de Montréal predicts the lowest operating costs; around $1,200/bicycle. Bixi's use of solar power (the Bixi bike-station is powered entirely by solar panels) may contribute to the lower cost. Operating costs may also rise with the uptake rate. This report assumes a conservative 20% increase in operating costs for every 3% uptake increase.

Economies of scale may be possible for larger programs. For both capital and operating costs, some costs, such as purchase and upkeep of maintenance and distribution vehicles, website hosting and wireless connectivity charges, are relatively constant regardless of the size of the program. In addition, unit prices may decrease as purchase order sizes increase.

8 Kelly, Alice, Program Manager, District DOT; Phone and email correspondence: 14 August 2008
9 Spitz, Eric, City of Paris; Email Correspondence: Spring 2009
10 Alain Ayott, Executive Vice President, Montreal Parking Authority/Stationnement de Montréal; Phone Interviews: 3 & 11 July & 14 October, 2008

POTENTIAL REVENUE SOURCES

For New York City, membership and use fees represent the primary revenue source for a bike-share program. Advertising, the major revenue stream for most bike-share programs worldwide, is limited in New York by existing franchise contracts. Advertising on bike-share bike-stations or the bicycles themselves remains a potentially lucrative but largely untested source of revenue. Other sources of capital, such as private loans from the New York City Investment Fund or federal grants are also available.

Membership and Use Fees:

Since bicycling is not the default choice for most commuters, bike-share programs that charge users more than they would pay to drive or take public transit have slim chances of success. As a result, membership and use fees for bike-share programs are typically kept low in order to encourage use. The European programs charge roughly $40/year. Montreal's Bixi program, the only program to attempt to cover costs with fees alone, will charge approximately $80/year.[11]

Even at low rates, membership and use fees can be significant sources of revenue, especially when the program is concentrated in densely populated, highly trafficked areas. Just over 500,000 people live in Manhattan south of 59th Street and just under a million more commute into that area each day from the rest of the city. 552,000 more commute into Manhattan south of 59th Street daily from New Jersey, Long Island, Westchester and upstate New York and Connecticut. A bike-share program could be used by such New Yorkers in their commute or to run errands at lunch or after work. In Paris (total population just under 2.2 million), the city of Paris earned $31.5 million from membership and use fees in Velib's first year.[12] As in Paris, the volume of visitors coming to New York also make one day passes a potentially valuable revenue stream. Visitors to Paris purchased 2.5 million one day (1€) Velib' passes in the first 6 months of the program alone.[13] In New York City, where a one day subway pass costs $7.50 and tourist bicycle rentals range between $35-99/day, higher rates may be possible. Price elasticity is unknown.

Assumed Rates	
Annual Pass	$60
Weekly Pass	$19
Day Pass	$5
1st Half Hour	Free
Subsequent Half Hour(s)	$2 each

A rough estimate for projected revenues from membership and use fees was developed for this report. Fees were tested over the four program size scenarios at 3%, 6% and 9% uptake rates. A projected "Net Operating Income" was developed for each scenario by assuming different uptake rates for different populations. For example, people who both live and work within the coverage area were assumed to be more likely to subscribe to the program (6%) than commuters coming in from Westchester, New Jersey or Long Island or elsewhere outside the coverage area (3%). Day passes were assumed to be more popular (9% of leisure tourists staying less than 4 days) than week passes (6% of leisure tourists staying longer than 4 days). Using data from other programs, 5% of all trips were assumed to go over 30 minutes. The demand assumptions for each scenario are included in Appendix D: Financial Assumptions.

11 Alain Ayott, Executive Vice-President, Montreal Parking Authority; Phone Interviews: 3 & 11 July, 2008
12 Erlanger, Steven, "A New Fashion Catches On in Paris: Cheap Bicycle Rentals," *The New York Times*, 13 July 2008
13 Bike-Share Blog Website, posted by Paul DeMaio, "Random Velib' Data," (http://bike-sharing.blogspot.com/2008/02/random-velib-data.html); Accessed 6/25/08

As scenario sizes expand to cover larger, less trafficked portions of the city (Queens, the Bronx and southern Brooklyn), other funding sources, such as advertising, would become necessary in order to maintain reasonable membership rates. In the scenarios that focus exclusively on New York's most densely populated, highly trafficked areas (Manhattan and parts of Brooklyn), the $60/year pricing produces net revenues after accounting for operations costs.

In conversations with NYC Department of Health and Mental Hygiene (NYCDHMH), concerns were raised that some of the health benefits of the bike-share could be lost if the program was priced out of the reach of New Yorkers in lower-income neighborhoods where obesity levels are highest. For people who would use bike-share to supplement their Monthly or Weekly MetroCards, currently priced at $81 and $25 respectively, with the bike-share program, the $60 annual fee could be a deterrent. In contrast, for commuters who use fixed value pay-as-you-go MetroCards, use of a bike-share program, which would allow bicycles to take the place of short subway trips, could result in a net savings.

Among DOHMH's recommendations to address the issue of affordability is a cost subsidy program for low-income populations.[14] NYCDHMH has introduced "Health Bucks" coupons for fruit and vegetable purchases at farmers' markets. Health Bucks are distributed in two ways—via community organizations and sites to community residents, and as an incentive for using Food Stamps at Farmers Markets. Health Buck redemption is most successful when they are distributed at point of purchase as an incentive for Food Stamp use (over 90%). Distribution via community groups and sites reaches additional populations such as potential first time farmers market visitors and non Food Stamp residents, but is less successful (redemption rates of approx 50%) and raises issues such as accountability and concerns about use by targeted groups. A similar system utilizing a cost subsidy system, via coupons or purchase codes eligible to those with an Electronic Benefit Transfer (EBT) card or number at points of purchase in low-income neighborhoods, could similarly be adapted to bike-share, to help decrease cost barriers for participation among low-income populations. These payment mechanisms would need to be evaluated to ensure that they provide adequate protections against credit card fraud and identity theft.

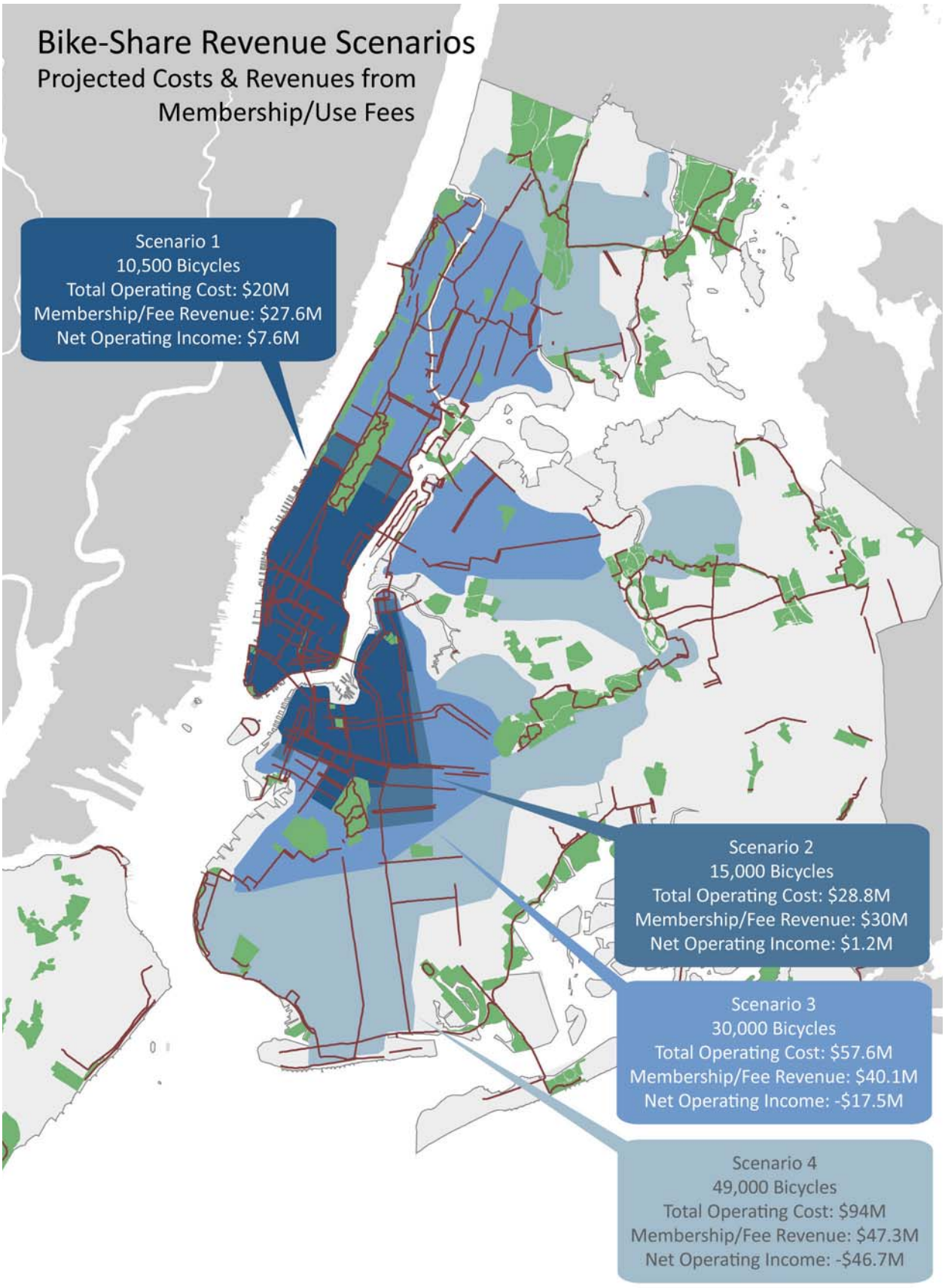
The credit card requirement, used to reduce theft, could pose some problems for lower income New Yorkers as they are less likely to have credit cards. In 2001 Casey/ Urban Institute Making Connections (MC) Survey found that, of the respondents, only 10% of households with incomes of $5,000 or less had a credit card in contrast to 78% of households with of $30,000 or more.[15] To further assess the magnitude of this issue in New York, NYCDHMH recommends further research into the availability of credit cards in lower-income areas, perhaps using MTA MetroCard purchase data and comparing the percent of credit card purchases (out of the total MetroCard purchases) in low-income areas with the percent of credit card purchases elsewhere in the city. Data could be collected either using the zip code associated with the credit cards or by looking at the total percent of purchases in stations in low-income areas made via credit card.[16] NYCDHMH also suggest that MTA data could be used to determine if there are correlations between income and types of MetroCard (Monthly or Weekly vs. Pay-As-You-Go) purchased.[17]

14 Communications with Bureau of Chronic Disease Prevention and Control, NYC Department of Health and Mental Hygiene

15 Casey/Urban Institute Making Connections (MC) Survey as provided by the NYC Department of Health and Mental Hygiene

16 Karen Lee, Deputy Director, & Victoria Grimshaw, Chronic Disease Prevention and Control, NYCDHMH; In-Person and Email Interviews: Summer 2008

17 Communications with NYC Department of Health and Mental Hygiene


Bike-Share Revenue Scenarios
Projected Costs & Revenues from Membership/Use Fees
Scenario 1
10,500 Bicycles
Total Operating Cost: $20M
Membership/Fee Revenue: $27.6M
Net Operating Income: $7.6M
Scenario 2
15,000 Bicycles
Total Operating Cost: $28.8M
Membership/Fee Revenue: $30M
Net Operating Income: $1.2M
Scenario 3
30,000 Bicycles
Total Operating Cost: $57.6M
Membership/Fee Revenue: $40.1M
Net Operating Income: -$17.5M
Scenario 4
49,000 Bicycles
Total Operating Cost: $94M
Membership/Fee Revenue: $47.3M
Net Operating Income: -$46.7M

Advertising:

On-bicycle or on-station advertising could be used to fund a New York bike-share program. The inclusion of advertising revenues could allow the bike-share operator to reduce membership rates and/or expand service over a larger portion of the city.

In the long term, the size of the bike-share program and determinations regarding the appropriateness of advertising are the limiting factors on the success of a bike-share franchise. Larger programs, which provide more advertising space, would generate higher revenues. In Midtown, bus shelter sized advertising panels earn $3,500-$5,000/month.[18]

In Norway, advertising panels are installed as part of the bike-station. Image: ClearChannel Adshel

However, advertising panels will not be possible or desirable on every bike-station. For example, for bike-stations that are placed on the sidewalk, in parks or on roadway medians advertising panels would block important sightlines or access paths. In Paris the Velib' bike-stations were designed to have a low profile and create minimal physical or visual intrusion into the streetscape. As result, none have advertising panels. Assuming a density of 28 stations/square mile and assuming that advertising panels were only attached to bike-stations in the city's commercial core (i.e. Manhattan below 60th Street), there would be 170-200 bike-stations with advertising in a New York City bike-share program.[19] This report estimates that those panels could earn $7-$8.5M per year in advertising revenues.

Advertising on bike-share bicycles is also an option. Revenues might be lower since there is limited advertising room on a bicycle and because it is a new and untested form of advertising. Velo Toulouse will be the first bike-share program to use on-bicycle ads. HSBC Bank has already purchased one year's worth of on-bicycle ads (1,000 bicycles) for $1M.[20]

On-bicycle ads provide revenue for the Vélô Toulouse program. Image: Mike Smiths flickr (www.flickr.com)

18 Outside of the city's core, revenues from bus-shelter sized advertising panels can drop to as little as $800/month.

19 Atelier Parisien d'Urbanisme (APUR), "Etude de Localization des Stations de Velos en Libre Service;" December 2006. P. 48

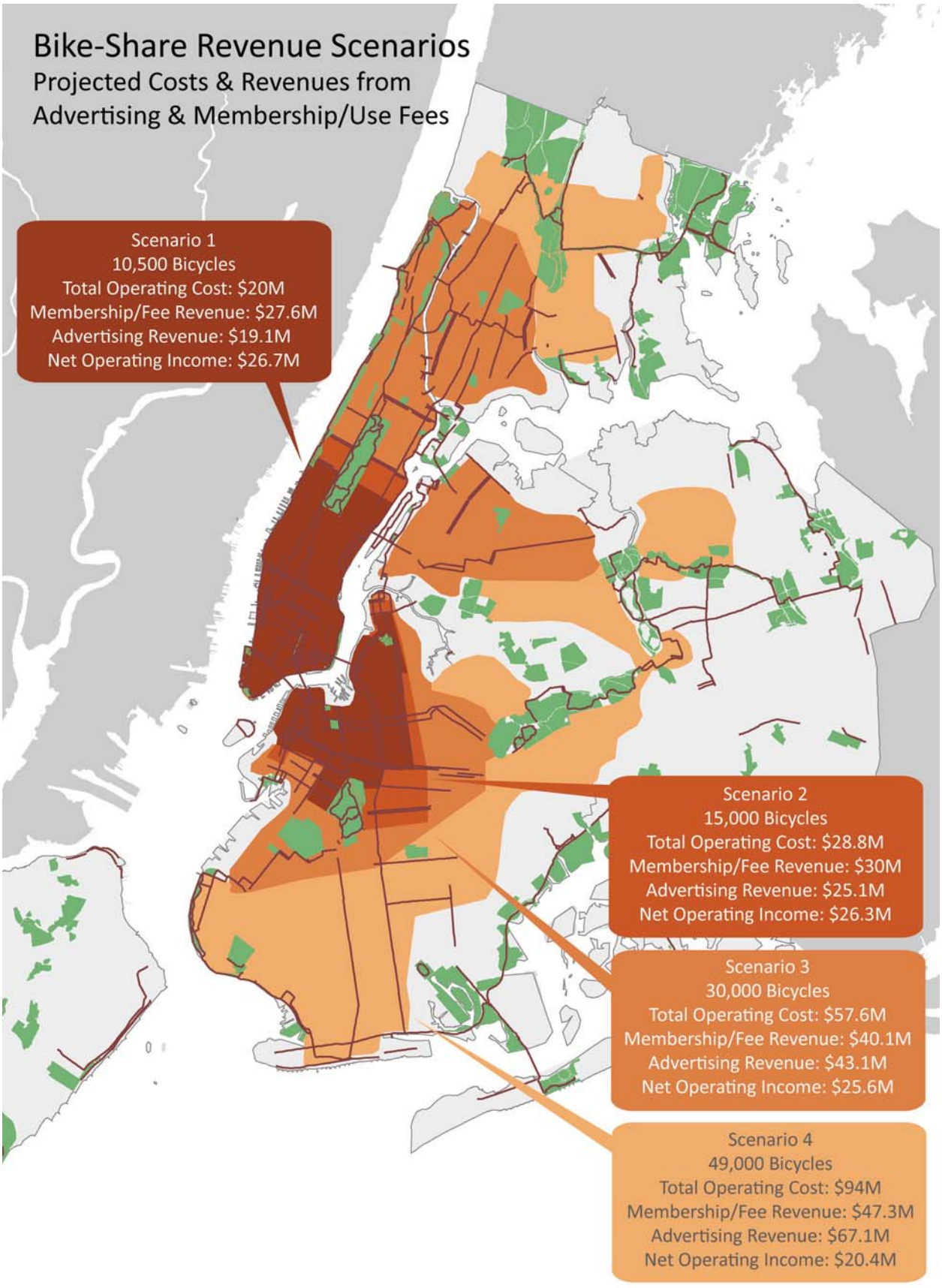
20 JCDecaux & HSBC; "PRESS RELEASE: HSBC Wraps Velo Toulouse;" (http://www.hsbc.fr/1/PA_1_3_S5/content/france/about-HSBC/press-releases/pdf/19-11-07_cp_velos_toulouse_GB.pdf); Accessed 06/25/08 & Squire, Josh, Bicycle System Manager, JCDecaux; Phone Interviews: Spring/Summer 2008

Estimates for the value of on-bicycle advertisements can be extrapolated from the value of other "in motion" advertisements: taxicabs. In New York, taxicab advertisements are worth $200-$350/taxi/month. ClearChannel Adshel estimates that an advertisement run on 200 taxicabs is seen by 25% of the adult population of the city of the course of a month.[21] Because on-bicycle advertising space is smaller than taxi advertising space, this report estimates that on-bicycle advertisements would generate less, around $100/bicycle/month. At this rate, the value of a logo on 15,000 bicycles would be worth around $18M per year to a sponsoring company. On-bicycle advertisements could be changed when bicycles were brought in for routine maintenance, approximately every 3 months. A high profile of a New York City bike-share program could mean that on-bicycle ads would sell well.

Bike-Share Franchise: Projected Advertising Revenue

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Bicycles	10,500	15,000	30,000	49,000
Bike-Station Ads	$7,140,000	$7,140,000	$7,140,000	$7,140,000
On-Bike Ads	$12,000,000	$18,000,000	$36,000,000	$60,000,000
Total Ad Revenue	$19,140,000	$25,140,000	$43,140,000	$67,140,000

21 Collings, Kevin, ClearChannel Adshel, ClearChannel Taxi Media, Phone Interview: 4 August 2008


Bike-Share Revenue Scenarios
Projected Costs & Revenues from
Advertising & Membership/Use Fees
Scenario 1
10,500 Bicycles
Total Operating Cost: $20M
Membership/Fee Revenue: $27.6M
Advertising Revenue: $19.1M
Net Operating Income: $26.7M
Scenario 2
15,000 Bicycles
Total Operating Cost: $28.8M
Membership/Fee Revenue: $30M
Advertising Revenue: $25.1M
Net Operating Income: $26.3M
Scenario 3
30,000 Bicycles
Total Operating Cost: $57.6M
Membership/Fee Revenue: $40.1M
Advertising Revenue: $43.1M
Net Operating Income: $25.6M
Scenario 4
49,000 Bicycles
Total Operating Cost: $94M
Membership/Fee Revenue: $47.3M
Advertising Revenue: $67.1M
Net Operating Income: $20.4M

City Funds and Bonds:

City funds and bonds could be used to fund a bike-share program built by the city. The capital costs of a bike-share program can be addressed either with Municipal Bonds, from the city's Capital Budget, or with Pay-As-You-Go (PAYGO) funding, from the city's Expense Budget. The operating costs of a program could be addressed with membership and use fees as well as monies from the city's General Fund which are distributed through the annual Expense Budget. While money in the General Fund can theoretically be earmarked—for example, some portion of the $535M the city earned in parking violations in 2007 could be set aside for bike-share—they typically are not. Both the Capital Budget and Expense Budgets are proposed yearly by the Mayor and must be approved by the City Council. Differences between capital and operating costs are important as the City Charter has specific rules about what types of projects can be funded from its various revenue streams.

Operating funds come from the city's revenues from user fees, penalties, taxes, etc. Revenues generated from the bike-share program itself (membership and use fees) would cover the operating costs of a program focused on Manhattan and parts of Brooklyn. In addition, other funding sources such as Federal or private foundation grants could also be used.

Capital funds could come from Municipal Bonds (Capital Budget) and/or PAYGO funding (Expense Budget). In New York City, projects that are eligible for Capital Budget funding must have a dollar value of more than $35,000 and a "period of probable usefulness" of at least five years.[22]

Issuing municipal bonds is a traditional form of transportation financing meant to provide significant amounts of money for capital projects. For example, in Portland, Oregon floated $88.7 million in bonds, backed by a $.20/hour parking rate increase in city garages to fund the first phase of the Portland Streetcar project.[23] Bond financing means that the cost of an asset that lasts for many years is spread out over its lifespan instead of being the financial responsibility only of the first generation of users. Municipal bonds in particular are attractive to investors because the interest income is tax-exempt. Bonds can be problematic however, because the debt-service payments associated with bonds consume valuable city revenue resources. Rising interest rates, declining property values and concerns about state and local budget shortfalls in the near future mean that the city may be wary of issuing new debt.

Revenue bonds, where the debt issued to pay for the capital costs of a program are backed by revenues generated by that program (in the case of a bike-share program, membership or user fees) are also an option. However, as with any revenue bond, concerns from investors that the program would not be used widely enough to generate necessary revenues could lead to higher interest rates. In addition, bonds cannot be used to fund operations costs. Revenue from a bike-share program might be better used to pay for operating the program. The current financial crisis may limit the availability of bonds as a revenue source.

Legal issues may arise when projects funded through municipal bonds are mixed with franchise operating agreements as such arrangements can render interest income from the municipal bond

22 NYC Independent Budget Office, "Understanding New York City's Budget: A Guide," NYC Independent Budget Office 2006, p.5

23 Portland Streetcar Website, "History," (http://www.portlandstreetcar.org/history.php); Accessed 11/09/07 & Vicky Diede, Portland Streetcar Project Manager, City of Portland Office of Transportation, Email correspondence: 11/27/2007

ineligible for tax exemptions.[24] In such cases, the financing costs may become higher since investors must pay taxes on the interest earned requiring higher interest rates to earn the same profits. The legality of such a combination of municipal bonds and advertising would need to be confirmed with the city's Corporation Counsel and the Office of Management and Budget.

PAYGO funding is the second option for raising the capital funds for a city-built bike-share program. PAYGO allows the city to fund capital projects without contributing to the city's overall debt obligations. PAYGO money is taken from the city's annual Expense Budget. In years past, the PAYGO allotment in the city budget has been around $200M. However, in the most recent budget, PAYGO money was eliminated entirely, in response to the city's worsening financial health. PAYGO money could be returned to the budget by the Mayor.

Private, State and Federal Loans and Grants:
Grants may also be an option in bike-share funding, although they should not be counted on as a consistent stream of revenue since most must be applied for each year and are not guaranteed. Grants come from the Federal and State government or from private foundations. Loans may be available from private investors. In some cases, the use of Federal grants could limit the city's ability to pursue franchise or advertising options.

New York City Investment Fund:
The New York City Investment Fund is private fund that distributes low-interest loans for projects located within the five boroughs that will advance the good of New York City. While typical loans range from $500,000 to a few million dollars, the reputation of NYCIF, which includes on its board members of major New York City financial institutions and businesses, can help to leverage additional private capital for unusual projects like a bike-share program. NYCIF prefers to work with private sector or non-profit partners, making NYCIF funding an ideal combination with a franchise or in the case of a city-built program that was operated by an outside contractor. NYCIF money is not grant money and must be repaid since the fund is self-replenishing; however, a wide range of return options are available and each loan is specifically tailored to each project. NYCIF has job creation among its specifically stated goals. In preliminary, fact finding conversations, Maria Gotsch, NYCIF President and CEO, expressed interest in a New York bike-share program.[25]

Federal & State Grants:
Bicycle related projects can receive funding from the federal government through federal transportation legislation such as ISTEA, TEA-21 and most recently, SAFETEA-LU which set aside monies for pedestrian or bicycle related planning. While some funds are available directly from the federal government, most of the funding is available through specific programs and then funneled through state transportation departments and metropolitan planning organizations. In New York City, federal money for a bike-share program would be distributed to the New York State Department of Transportation and NYMTC, the New York City metropolitan planning organization, which in turn would distribute the funds to City DOT. The following programs could provide funding to a New York City bike-share program via the current federal transportation bill, SAFETEA-LU. SAFETEA-LU expires in 2009. A new federal transportation bill will be the responsibility of the new administration and Congress.

24 Olson, Jay, NYCOMB, Assistant Director; Phone Interview: 4 August 2008
25 Gotsch, Maria; President & CEO, NYCIF, Phone Interview: 26 August 2008

- Congestion Mitigation And Air Quality Improvement Program (CMAQ)
  ISTEA, passed in 1991, authorized the CMAQ program to fund surface transportation projects and other projects related to improving air quality. Both the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) distribute monies to State DOTs, MPOs and other transit agencies. CMAQ funds are meant to provide seed money for a project, not to be a permanent funding mechanism for new projects.[26]

- Surface Transportation Enhancement Program
  The Surface Transportation Program (STP) requires state DOTs and MPOs to set aside 10% of their funds toward transportation enhancements that are not traditionally included in typical transportation funding.[27] Examples of projects include providing funding for bicycle lanes and contributing to capital costs of a bicycle transit center.

- Transit Enhancements
  Funds from this program can be used toward projects designed to enhance bicycle and pedestrian facilities. In addition, transit agencies are eligible to use these funds towards adding bicycle storage and parking to trains and busses.

- Transportation and Community and System Preservation (TSCP)
  The FHWA, FTA and EPA developed the TSCP program to study offer grants for projects that are intended to integrate improve community's by enhancing the transportation system. TSCP is "designed to support exemplary or innovative projects" for transportation and improving the quality of life of communities.[28]

The programs mentioned above are not an exhaustive list of federal and state funding mechanisms designed for bicycle infrastructure. Federal public health grants in particular have not been explored as preliminary research indicates that most health grants are only available for research, not capital cost or program operation.

Private Foundation Grants:
Foundations often award grants to municipal governments, universities, not-for-profit organizations and advocacy groups for bicycle related projects. Award amounts vary. Over the past few years, foundations like Bristol-Myers Squibb Foundation, Robert Wood Johnson Foundation, Lilly Endowment, Richard King Mellon Foundation and the Ruth Mott Foundation awarded grants of $100,000 or more for bicycle projects. Other groups, such as the REI Bicycle Friendly Communities Grants Program, award grants that are less than $50,000 dollars for bicycle planning. Grants could be used towards initial start-up costs but should not be used as a consistent stream of revenue.

26 Federal Highway Administration (FHWA), "Congestion Mitigation and Air Quality (CMAQ) Improvement Program," (http://www.fhwa.dot.gov/environment/cmaqpgs/); Accessed 07/21/08
27 Federal Highway Administration Website, "Bicycle and Pedestrian Provisions of Federal Transportation Legislation;" (http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4); Accessed 9/8/08
28 ibid.

07 Implementation


Image: Muddy LaBou (www.flickr.com)

Image: Muddy LaBoue (www.flickr.com)

- **Bike-Station Placement and Size**
- **Bike-Station Installation and Design**
- **Program Size and Extent**
- **Pilot Programs**
- **Phasing and Funding**
- **Fees**
- **Safety and Helmet options**
- **Theft Reduction**

BIKE-STATION PLACEMENT AND SIZE

The placement of bike-stations reflects a tension between program visibility and aesthetic clarity of the streetscape and traffic and pedestrian traffic 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 highly trafficked sidewalks may mean that there is limited room for bike-stations. In New York, the dense array of infrastructure beneath the city's streets can also complicate bike-station installation.

Paris's bike-station placement was guided by a series of rules developed by *Atelier Parisien d'Urbanisme* (APUR) in conjunction with the *Architectes de Batiments de France* (French Architectural Association) and the *Sections Territoriales de Voirie* (Transportation Department); in New York bike-station placement would be decided primarily by NYCDOT. Paris' general implementation rules include: placement of bike-stations near Metro stations and adherence to the average bike-station density guidelines tested in the Lyon bike-share of an about of 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.[1]

Bike-station sizes in New York 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 such as museums, theatres, and concert halls, and proximity to retail shopping opportunities. Importantly, bike-share programs need have more docking stations than bicycles (typically 40-50% more) to ensure that users can always find a place to leave their bicycle. Assuming 1 bicycle/110 residents, the average New York City bike-station would hold 24 bicycles, although bike-station sizes would differ by borough. Alternatively, smaller bike-stations, placed at a higher frequency (i.e. more stations/square mile) could also be pursued. In general, 10 bicycles, parked at a bike-station, can fit into one car parking space.

Proposed general guidelines for the placement of New York bike-stations are as follows. Bike-stations should be placed:

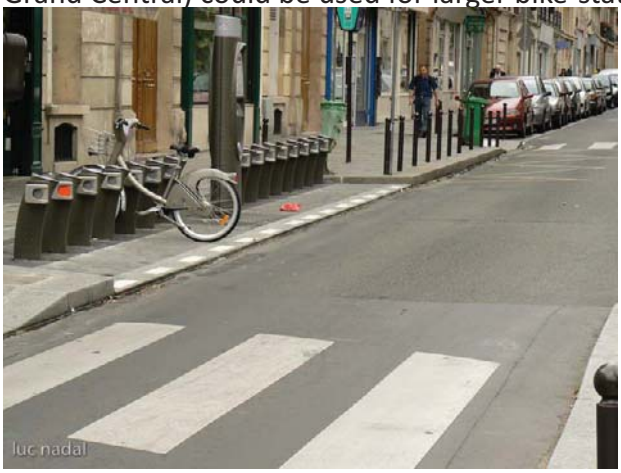
- On wide sidewalks or in the roadbed. Bike-stations should not impede pedestrian or vehicular traffic.
- With enough frequency to ensure program visibility and use (approx. 28-30 stations/square mile)
- Along existing or proposed bike lanes whenever possible
- Near subway stations, major bus stops, the Staten Island Ferry Terminal and other ferry landings
- Near major cultural and tourist attractions
- Adjacent to major public spaces and parks

Sidewalk Bike-stations:

Bike-stations placed on the sidewalk should be placed in line with other forms of street furniture and trees. Where possible, curb bulb-outs should be used to limit the intrusion of the bike-stations into pedestrian pathways. Wide sidewalks (Lenox Ave. for example), and wide roadway me-

1 Atelier Parisien d'Urbanisme (APUR), "Etude de Localization des Stations de Velos en Libre Service," December 2006; p.48

dians in particular, provide options for smaller bike-stations. Bike-stations could also be placed along the frontage of open air municipal parking lots and city property, and on private property (for example on university campuses) in partnership with landowners. As with Paris, underutilized space under viaducts and elevated railroads and highways (for example under the FDR in the Financial District, under the MetroNorth tracks at 125th Street, or under the Park Ave. Viaduct at Grand Central) could be used for larger bike-stations.



As in Paris, sidewalk bike-stations in New York City should be placed inline with other streetscape elements. Image (L): Luc Nadal (www.flickr.com)

Roadbed Bike-stations:

Roadbed bike-stations should be placed primarily just off major avenues to provide additional protection for riders and the bicycles themselves. In some places, advertising panels on the bike-stations could serve a double purpose, protecting on street bike-stations from damage from cars while simultaneously drawing attention to the bike-share program. On street bike-stations in particular should be placed near to bike lanes. On street bike-stations 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

In Paris, on-street bike-stations are buffered by parked cars. Parked cars could serve a similar role in New York.

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 Grand Army Plaza, Bryant Park or Columbus Circle. To ensure 24 hour access, bike-stations should not be placed inside the city's major recreational parks (e.g. Central Park, Prospect Park, Van Cortland Park, Flushing Meadow Park) but rather along the periphery where late night foot traffic is higher. Bike-stations should be a priority in or alongside parks and plazas near transit (e.g. Union Square, Herald Square or Foley Square). Smaller "plaza" parks (e.g. the plaza at the intersection of Madison and St. James in Manhattan, or Winfield Plaza in Woodside, Queens) may benefit from increased use stemming from bike-stations along their edges.

Spaces under viaducts are reclaimed by Velib' bike-stations (L). In New York, space is available under infrastructure like the FDR or the MetroNorth tracks pictured above (RT). Image (L): Image: TCY (http://commons.wikimedia.org/)

The peripheries of parks also offer options for bike-station placement. In New York, underutilized urban plazas could benefit from the traffic and activity that a bike-station could bring. Image (L): Image: austinevan (www.flickr.com)

BIKE-STATION DESIGN AND INSTALLATION

Effective bike-station design must consider a wide variety of issues including the physical space used by the bike-station and interactions with pedestrians, drivers and other bicyclists, docking mechanisms and installation and power sources.

Overall Design:

Bike-station designs that use individual docking stations are preferable in New York City where sidewalk space is scarce and pedestrian mobility is of the utmost importance. JCDecaux and the Montreal Parking Authority both use this mode, locking their bicycles to discrete docking stations connected, in JCDecaux's case, by underground wiring, and in Montreal's case, by a metal plate affixed to the street. The small low scale of JCDecaux's or the Montreal Parking Authority's docking stations makes them unobtrusive and discreet; important benefits in a busy, crowded city like New York. In contrast, the long docking bar, used in Barcelona and Washington DC, could be disruptive to pedestrian flow.

Locking Mechanism:

This report recommends an intuitive locking system that clearly tells users when the bicycle has been fully and properly locked. The locking mechanism should be fully incorporated into the bicycle design; it should be impossible to remove the lock without breaking the bicycle. Since bike-share bicycles are heavy, "roll in" systems may be superior to "lift in" systems, in terms of ease of use. However, the overall durability of the locking mechanism should be the deciding factor.

Installation and Power Sources:

Bike-stations that require excavation or rely on the city's power grid are infeasible in New York. Excavation and trenching to power sources would be costly and time consuming. In addition,

Bixi stations are lifted into place with a boom truck and are bolted to the ground. No excavation is required. Image: Yvonne Bambrick/ysuchislife (www.flickr.com)

Excavation and trenching is required for JCDecaux (above) and ClearChannel Adshel bike-share kiosks. Image: Ladybadtiming (www.flickr.com)

New York's subterranean infrastructure would significantly limit the placement of such bike-stations. The constant roadwork as utility companies and city agencies rip up the street to access and repair infrastructure below and even routine road resurfacing would also be an issue, possibly requiring periodic shutdowns and potentially costly relocations.

This report recommends pre-fabricated and/or modular bike-station designs that can be bolted into a variety of roadway surfaces (e.g. concrete or asphalt). Quick installation and de-installation times (minutes or hours as opposed to days) are necessary. Solar power, which is currently used to power the city's MuniMeters, is suggested.

PILOT PROGRAMS

This report finds that a small "pilot" bike-share program would be unsuccessful in New York. Evidence from bike-share programs around the world suggests that small programs do not provide meaningful transportation, health or economic development gains nor do they provide a significant basis from which the city could evaluate the effectiveness of the program. In a city as densely populated of New York, small pilots in particular pose problems because the program coverage area would be insufficient to warrant bicycle use.

SmartBike in Washington DC provides valuable lessons about the difficulties posed by small pilots. With 120 bicycles spread out over 10 bike-stations, the bike-stations are hard to find unless one knows where to look. Washington has not seen transportation benefits from the program. In contrast, Velib' opened its doors with 10,000 bicycles and then six months later doubled the number of bicycles to cover the whole city, allowing the program to see immediate transportation gains (5% reduction in automobile traffic in the first year).[2] Six months after Velib' opened it was credited with helping Paris weather the multi-day transit strike in the winter of 2007.[3]

Because SmartBike is too small to generate large revenues from membership or use fees, expansion options for the program are also limited. Velib' opened with 13,000 annual subscribers, €377,000 in starting revenue.[4] In contrast, SmartBike opened with 250 annual subscriptions for initial revenue of $10,000.[5] The small number of bicycles makes one day passes infeasible and has led program operators to consider limiting the number of annual passes. Thus tourists or potential riders who are unwilling to commit immediately to an annual pass cannot use SmartBike. In contrast, Paris sold 2.5 million one day passes in the first 6 months alone, dramatically changing how many tourists explore Paris and generating significant revenues. In New York, the city's ability to develop a bike-share program is dependent on starting at the right scale. With much of the city's street furniture already under contract, other funding mechanisms, such as membership and user fees, which depend on volume, will be needed to pick up the slack.

Changing perceptions about bicycles, driven to some extent by increasing energy costs and growing awareness of climate change issues, may also point cities in the direction of larger initial programs. As Kelly says of Washington DC's SmartBike program:

> "Knowing what we know now, of course, we would have launched it bigger. But when we were initially thinking about this we really weren't sure how popular it would be. The rising cost of gas and the ever-increasing green attitude of everybody is now showing us that yes, the city will support a broader program."[6]

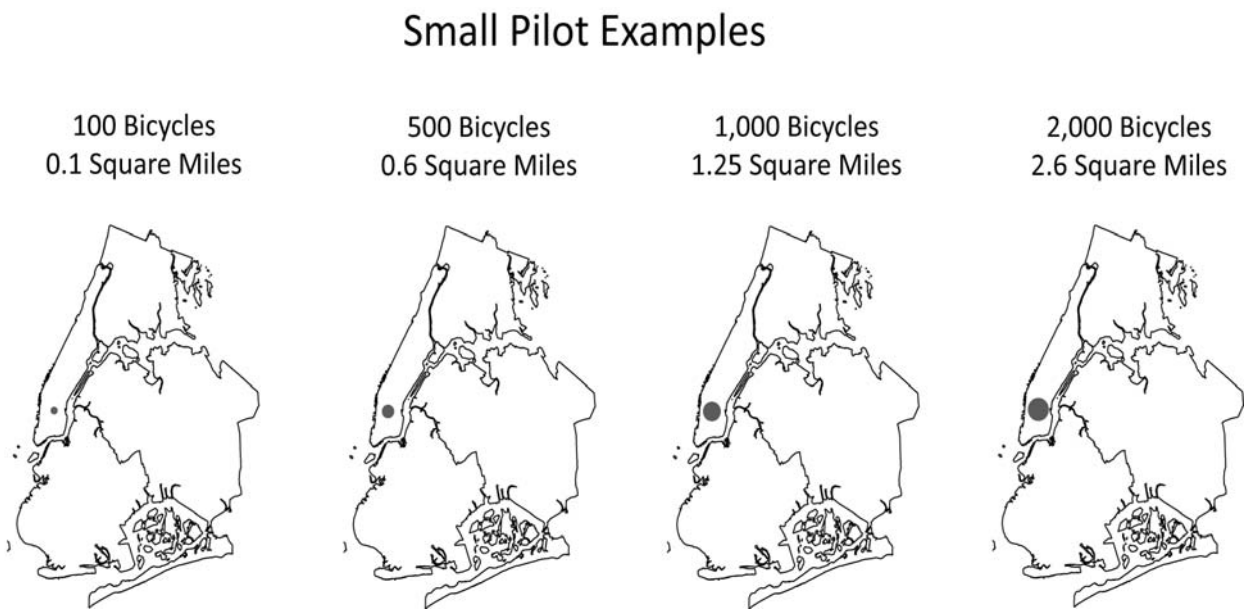
2 Bremner, Charles & Marie Tourres, "A year on, the cycle experiment has hit some bumps," *The London Times*, 8 July, 2008 & Dell, Kristina, "Bike-Sharing Gets Smart," *Time Magazine*, 12 June 2008 (http://www.time.com/time/magazine/article/0,9171,1813972,00.html); Accessed 9/02/08

3 Mulholland, Tara, "Paris's bicycle rental system gets a baptism by fire," *International Herald Tribune*, (http://www.iht.com/articles/2007/11/22/europe/velib.php); Accessed 08/13/08

4 Bennhold, Katrin. "A New French Revolution's Creed: Let Them Ride Bikes," *The New York Times*, 16 July 07.

5 Alice Kelly, Program Manager, District DOT; Phone interview: 14 August 2008

6 Aaron, Brad, "Streetfilms: DC Bike-Share Hits the Ground Rolling," (http://www.streetsblog.org/2008/08/22/streetfilms-dc-bike-share-hits-the-ground-rolling/); Accessed 09/08/08



Small bike-share programs or pilots are insufficient for New York's size and density.

A large bike-share program may also be important to New York City for the publicity it could bring. However, with a number of other American cities, such as Minneapolis, Boston, and Philadelphia, looking to introduce bike-share programs, a small program is unlikely to generate significant attention.

PROGRAM SIZE AND EXTENT

Bike-share programs that are financially self-sufficient tend to be larger programs that can take advantage of volume-based funding mechanisms such as advertising or membership fees, and focused around densely populated or highly trafficked area where bicycles and bike-stations can be used by the maximum number of people. In many cases, this combination of attributes also creates programs which see significant transportation and health benefits. In contrast, small programs, and programs that are placed in low density/less trafficked areas, do not typically produce the revenues required to be financially self-sustaining. These programs provide few, if any, transportation or health benefits. Purely recreational programs, similar to bike rentals currently offered by private companies such as Bike-And-Roll, likewise fail to provide needed positive transportation or health impacts.

This report recommends that a New York City bike-share focus on the medium and high density areas of the city, defined as areas with 32,000 people/square mile or more. About two-thirds of the city's population (5.2 million people) live in these areas (about 81 square miles). These areas, which encompass portions of four of the five boroughs, can be served by a bike-share program of approximately 49,000 bicycles, spread over 2,600 bike-stations at an average density of 28-30 stations/square mile. New York's bike-share program should start in Manhattan south of 60th Street and in portions of Brooklyn and Downtown Brooklyn where there are bridge connections to Manhattan. These areas are the most highly trafficked portions of the city by residents, commuters and tourists, making the program self-sufficient from the start with membership and use fees alone. Program expansion, to include the rest of the city's medium and high density areas could be achieved with the addition of advertising revenues as the large number of bicycles could generate sufficient revenues.

New York City's size—304 square miles spread over four distinct land masses—and range of population densities—85,000 people/square mile in Manhattan vs. 9,000 people/square mile in Staten Island—means that the city will have to think strategically about program expansion. A high bike-station density (28-30 stations/square mile) is necessary for bike-share programs because it allows users to find and return bicycles easily. In lower density areas this bike-station density may be financially infeasible. Staten Island, for example, is excluded from the citywide bike-share program recommended in this report because of its small potential user base. In some lower density areas, it may be more cost effective to encourage bicycling by increasing the quantity and quality of personal bicycle parking facilities rather than by introducing a bike-share program.

PHASING AND FUNDING

This report recommends introducing bike-share to New York City in a series of large, swift phases, culminating in a total of 49,000 bicycles. Paris provides a valuable model for effective program phasing. Velib's phasing allowed the program to build on its own momentum and reach subscribers from outside the coverage area in anticipation of future coverage. In addition, the large starting size allowed the program to open its doors to tourists and one day users, which generated substantial revenues from the outset.

Membership/use fees and advertising are the two largest sources of revenue for a New York City bike-share program and both should be used. While a Manhattan/Downtown Brooklyn focused program could be funded with membership and use fees alone, this report recommends that the city pursue at bike-share franchise, using on-bicycle advertisements, to further expand bike-share coverage to the rest of the city.

The following phasing is recommended:

- Phase 1: The initial phase (10,500 bicycles), should be located in the highest density, highest trafficked areas, and funded through membership and use fees generated by the program itself.

- Phases 2 & 3: Subsequent phases (10,500-49,000 bicycles) should be funded partially through membership and use fees and partially through a bike-share franchise using on-bicycle advertisements. Authorizing legislation, CEQR/ULURP and FCRC approvals for the bike-share franchise should be pursued concurrent to the introduction of the first phase. The franchise "expansion" phases would extend bike-share coverage into areas that are densely populated (32,000+ people/square mile) but do not have sufficient commuter or tourist traffic to support a program on their own. These phases should be introduced as soon as possible, within the confines of the franchise authorization.

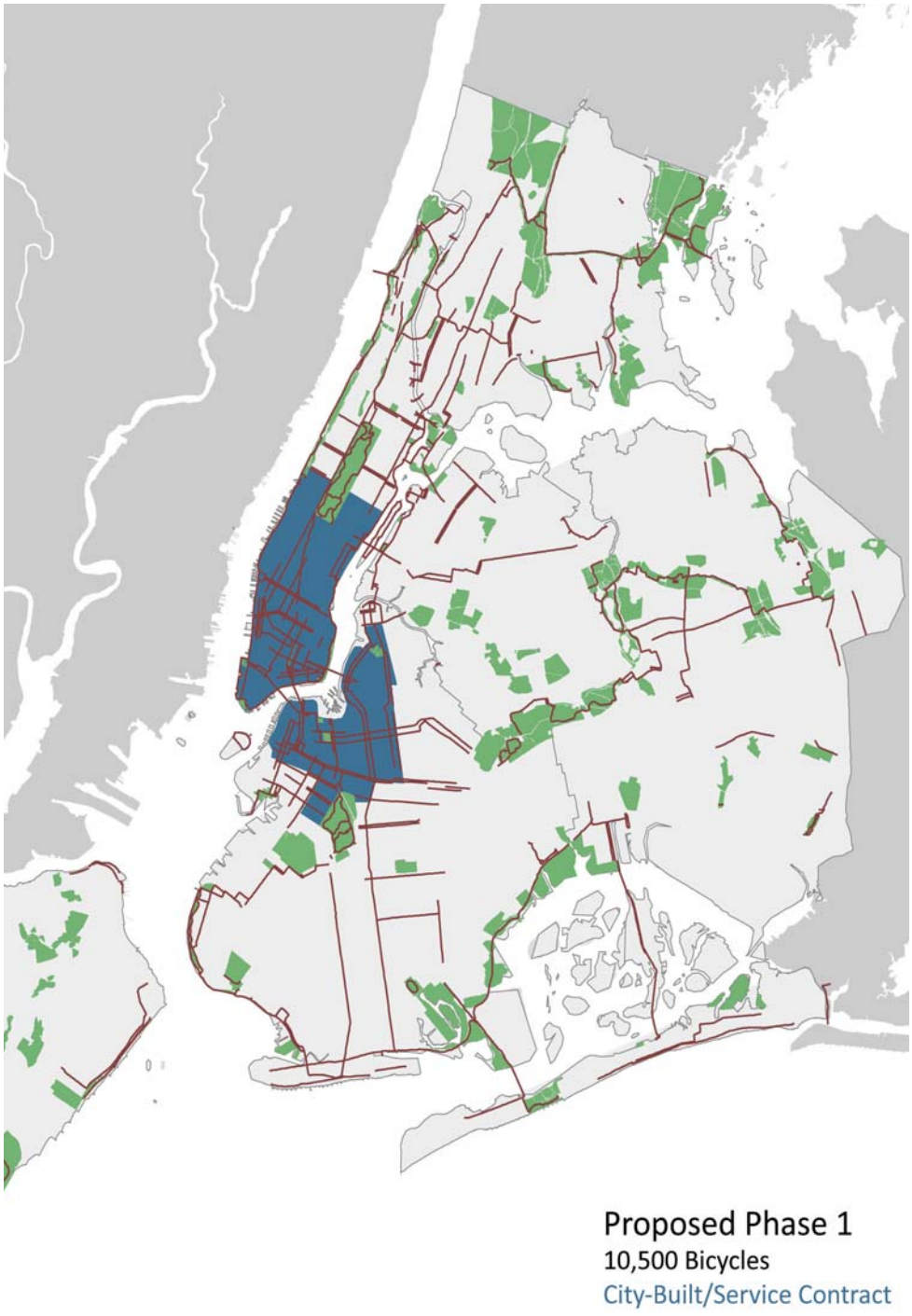
For Phase 1 in particular, this report looked to ensure that initial program coverage included highly trafficked areas, major origin and destination points for commuters, and covered neighborhoods in multiple boroughs that are currently characterized by large numbers of existing bicyclists and a high degree of bike lane coverage. Phases 2 & 3 followed the same guidelines with additional focus on increasing program continuity and citywide representation. Further discussion of the phasing analysis is included in Appendix C: Phasing Methodology.

The following financial models estimate potential costs and revenues for each phase.[7] 3% annual inflation was assumed for all costs and a 20% increase in operating costs was assumed for each 3% increase in uptake. Advertising revenue is assumed for Phases 2 & 3. Further assumptions about costs, revenues, ridership numbers and uptake can be found in Appendix D: Financial Assumptions.

7 The financial estimate for 15,000 bicycles/Scenario 2 (which is not recommended as a phase) is included in Appendix D: Financial Assumptions

PHASE 1: 10,500 Bicycles

- Phase 1 is built by the city and operated under a service contract.
- Operations costs are covered by membership/use fees
- This phase covers Manhattan south of 60th Street and substantial portions of Northwestern Brooklyn, including Greenpoint-Williamsburg, Fort Greene, Prospect Heights and Park Slope.

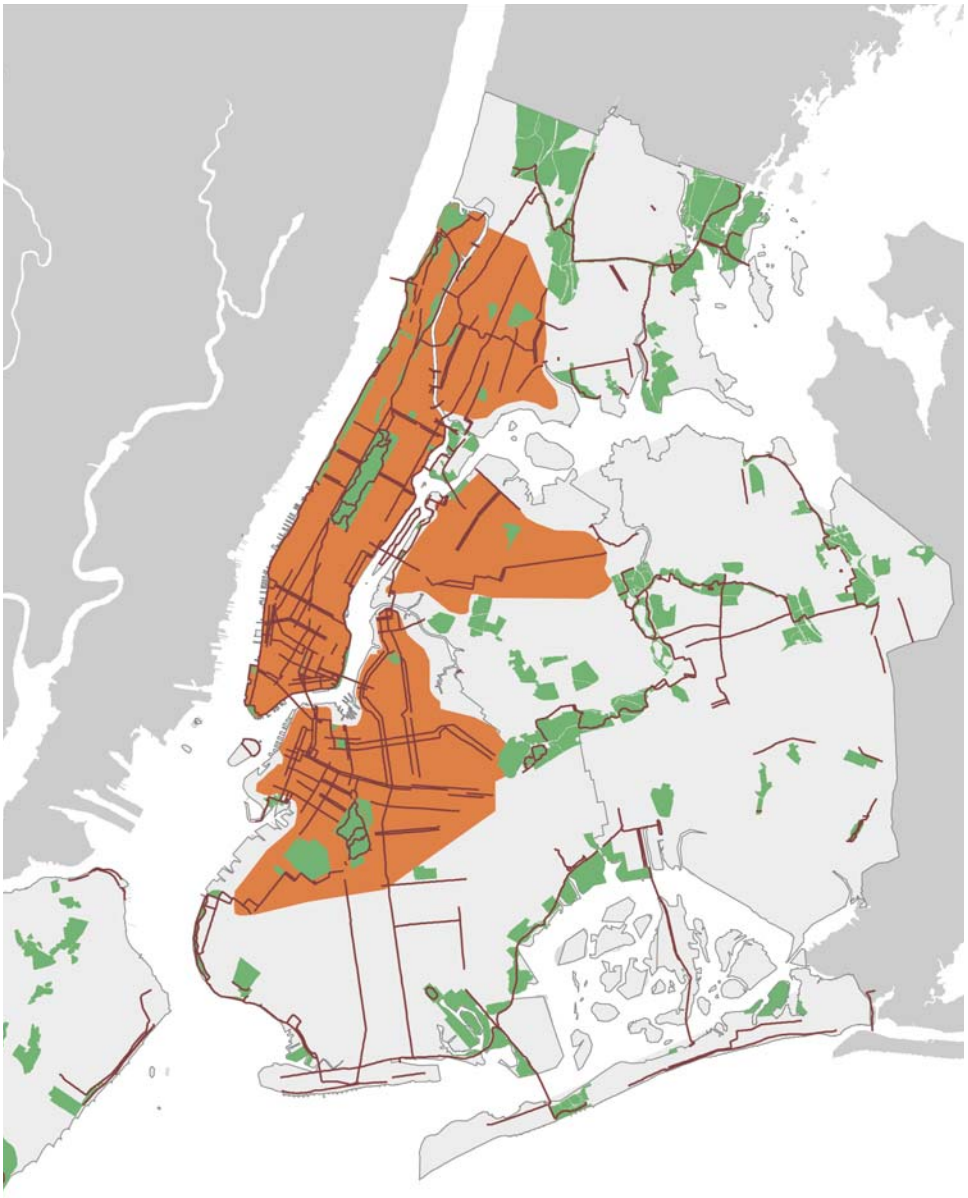


PHASE 1/SCENARIO 1 (10,500 Bicycles)

Demand Assumptions	Total Possible	3%	6%	9%	Projected
Residents in Catchment Area	947,070	28,412	56,824	85,236	6%
NYC Workers in Catchment Area	1,067,000	32,010	64,020	96,030	3%
Out-of-City Workers in Catchment Area	552,000	16,560	33,120	49,680	3%
Leisure Tourists staying less than 4 days	29,197,500	875,925	1,751,850	2,627,775	9%
Leisure Tourists staying more than 4 days	5,152,500	154,575	309,150	463,725	6%
Trips/Year		14,362,562	28,725,124	43,087,685	23,260,729
Trips Longer Than 30 Min (5%)		718,128	1,436,256	2,154,384	1,163,036
Cost Assumptions	Rates	3%	6%	9%	Projected
Total Capital Costs	$3,600	$37,800,000	$37,800,000	$37,800,000	$37,800,000
Total Operations Costs	$1,600	$16,800,000	$20,160,000	$24,192,000	$20,160,000
Annual Membership & Use Fee Revenues	Rates	3%	6%	9%	Projected
Annual Pass (residents)	$60	$1,704,726	$3,409,452	$5,114,178	$3,409,452
Annual Pass (non-residents)	$60	$1,920,600	$3,841,200	$5,761,800	$1,920,600
Commuter Annual Pass	$60	$993,600	$1,987,200	$2,980,800	$993,600
Week Pass	$19	$2,936,925	$5,873,850	$8,810,775	$5,873,850
Day Pass	$5	$4,379,625	$8,759,250	$13,138,875	$13,138,875
Use Fees (1/2hr)	$2	$1,436,256	$2,872,512	$4,308,769	$2,326,073
Total Membership & Use Revenue					$27,662,450
Net Operating Revenue					$7,502,450

PHASE 2: 30,000 Bicycles (+29,500)

- Phase 2 is the first expansion of the New York City bike-share under a franchise agreement.
- Operations costs are covered by a combination of membership/use fees and on-bicycle advertisements.
- This phase continues coverage into upper Manhattan and Northwestern Brookly, including Bedford-Stuyversant, Crown Heights, Ditmas Park and Sunset Park. Bike-share coverage is introduced in Queens (Astoria, Jackson Heights, LIC) and the Bronx (Melrose, Grand Concourse, Fordham, East Tremont).

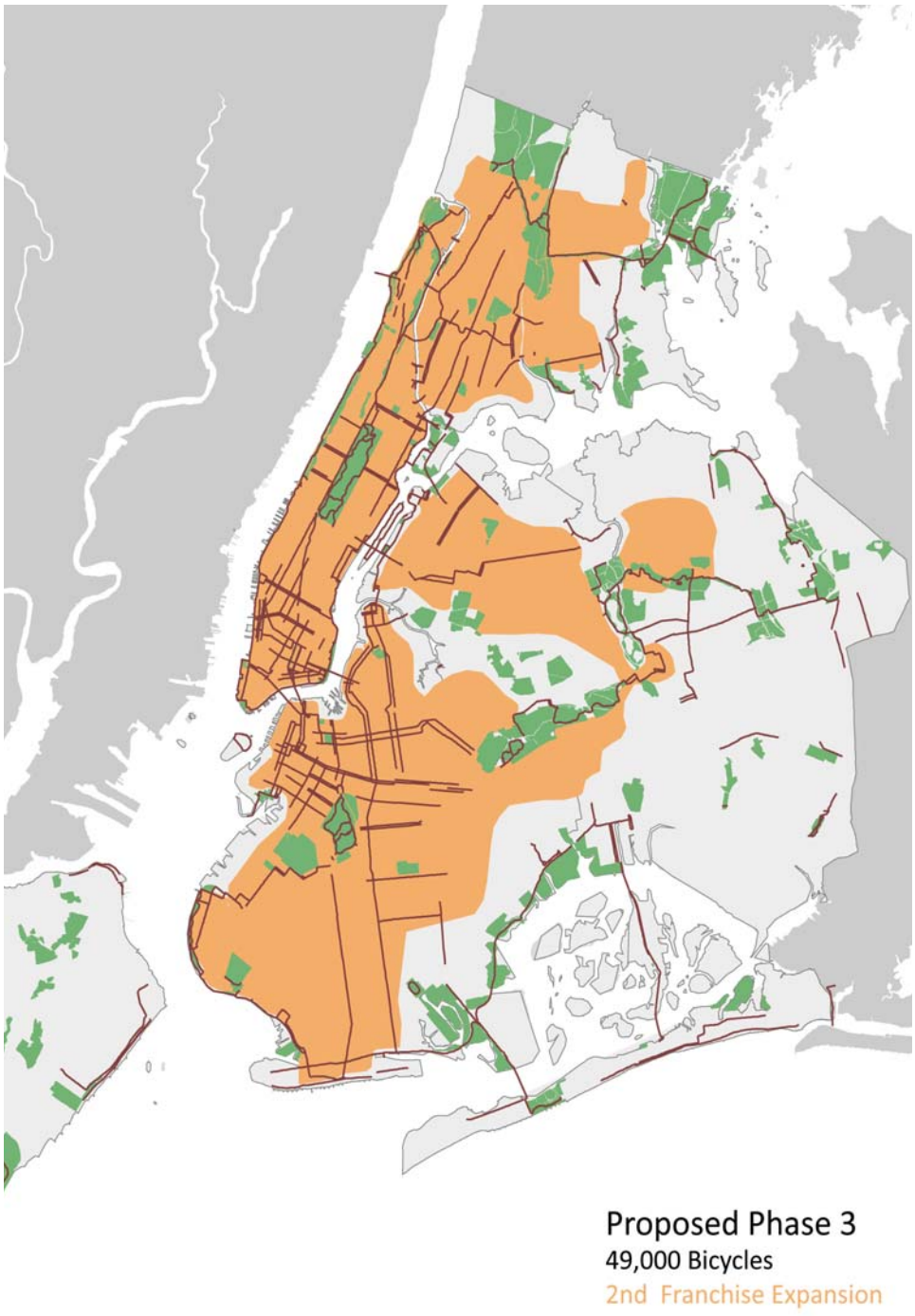


PHASE 2/SCENARIO 3 (30,000 Bicycles)

Demand Assumptions	Total Possible	3%	6%	9%	Projected
Residents in Catchment Area	3,627,590	108,828	217,655	326,483	6%
NYC Workers in Catchment Area	829,000	24,870	49,740	74,610	3%
Out-of-City Workers in Catchment Area	552,000	16,560	33,120	49,680	3%
Leisure Tourists staying less than 4 days	29,197,500	875,925	1,751,850	2,627,775	9%
Leisure Tourists staying more than 4 days	5,152,500	154,575	309,150	463,725	6%
Trips/Year		29,975,167	59,950,333	89,925,500	55,599,778
Trips Longer Than 30 Min (5%)		1,498,758	2,997,517	4,496,275	2,779,989
Cost Assumptions	Rates	3%	6%	9%	Projected
Total Capital Costs	$3,600	$108,000,000	$108,000,000	$108,000,000	$108,000,000
Total Operations Costs	$1,600	$48,000,000	$57,600,000	$69,120,000	$57,600,000
Annual Membership & Use Fee Revenues	Rates	3%	6%	9%	Projected
Annual Pass (residents)	$60	$6,529,662	$13,059,324	$19,588,986	$13,059,324
Annual Pass (non-residents)	$60	$1,492,200	$2,984,400	$4,476,600	$1,492,200
Commuter Annual Pass	$60	$993,600	$1,987,200	$2,980,800	$993,600
Week Pass	$19	$2,936,925	$5,873,850	$8,810,775	$5,873,850
Day Pass	$5	$4,379,625	$8,759,250	$13,138,875	$13,138,875
Use Fees (1/2hr)	$2	$2,997,517	$5,995,033	$8,992,550	$5,559,978
Total Membership & Use Revenue					$40,117,827
Net Operating Revenue (Membership Only)					-$17,482,173
Advertising Revenue					$43,140,000
Net Operating Revenue (With Advertising)					$25,657,827

PHASE 3: 49,000 Bicycles (+15,000)

- Phase 3 is the second expansion of the New York City bike-share under a franchise agreement.
- Operations costs are covered by a combination of membership/use fees and on-bicycle advertisements.
- This phase further extends coverage in Brooklyn, Queens and the Bronx, including Bay Ridge, Flatbush, Coney Island, Elmhurst, Flushing, Pelham Parkway, Woodlawn and Kingsbridge.



PHASE 3/SCENARIO 4 (49,000 Bicycles)

Demand Assumptions	Total Possible	3%	6%	9%	Projected
Residents in Catchment Area	5,255,188	157,656	315,311	472,967	6%
NYC Workers in Catchment Area	516,000	15,480	30,960	46,440	3%
Out-of-City Workers in Catchment Area	552,000	16,560	33,120	49,680	3%
Leisure Tourists staying less than 4 days	29,197,500	875,925	1,751,850	2,627,775	9%
Leisure Tourists staying more than 4 days	5,152,500	154,575	309,150	463,725	6%
Trips/Year		38,666,538	77,333,076	115,999,614	74,447,361
Trips Longer Than 30 Min (5%)		1,933,327	3,866,654	5,799,981	3,722,368
Cost Assumptions	Rates	3%	6%	9%	Projected
Total Capital Costs	$3,600	$176,400,000	$176,400,000	$176,400,000	$176,400,000
Total Operations Costs	$1,600	$78,400,000	$94,080,000	$112,896,000	$94,080,000
Annual Membership & Use Fee Revenues	Rates	3%	6%	9%	Projected
Annual Pass (residents)	$60	$9,459,338	$18,918,677	$28,378,015	$18,918,677
Annual Pass (non-residents)	$60	$928,800	$1,857,600	$2,786,400	$928,800
Commuter Annual Pass	$60	$993,600	$1,987,200	$2,980,800	$993,600
Week Pass	$19	$2,936,925	$5,873,850	$8,810,775	$5,873,850
Day Pass	$5	$4,379,625	$8,759,250	$13,138,875	$13,138,875
Use Fees (1/2hr)	$2	$3,866,654	$7,733,308	$11,599,961	$7,444,736
Total Membership & Use Revenue					$47,298,538
Net Operating Revenue (Membership Only)					-$46,781,462
Advertising Revenue					$67,140,000
Net Operating Revenue (With Advertising)					$20,358,538

FEES

As bicycles are not the default mode choice for most New Yorkers, bike-share membership and user fees must stay low in order to attract users. Offering the first ½ hour for free, and providing a 15 minute grace period to riders who arrive at their destinations only to find the bike-station full, are necessary elements of a successful bike-share program and should be included in New York. In addition, the policy of charging small ($1-2) escalating fees for additional ½ hours should also be retained in order to keep bicycles in circulation.

Price elasticity is an unknown in bike-share programs. New York should continue to monitor uptake rates of other programs such to see if there is a discernable impact on uptake. Bixi, in particular, which will charge $78/year, as opposed to $40/year charged by Velib' should be watched closely. Cost of living factors should also be considered.

The financial estimates in this report are based on the assumption that a New York City bike-share program could charge more than is currently charged in Paris for Velib' use, without negatively impacting use. This report recommends that the membership and user fees charged by the Velib' program in Paris serve as minimums for a New York program. The price of a MetroCard should be used as a comparison point by which to judge bike-share fees. Bike-share prices should remain well below MTA prices.

- ***Annual Membership:***
  The financial analysis for this report assumed an annual membership fee of $60. The introduction of advertising to the revenue streams available to a bike-share program may help to make this possible at larger scales.

- **Monthly Membership:**
  A monthly membership option is not recommended because it could result in ridership decreases in the winter months.

- ***Daily and Weekly Membership:***
  As daily passes are likely to be used most by visitors or for recreation uses, this report recommends daily membership rates that are comparable to the 24 hour "Fun Pass" offered by the MTA. The financial analysis used for this report assumed a daily membership rate of $5.

  This report assumed that weekly passes would be purchased by people staying in New York City for longer than 4 days. As such, the financial analysis used for this report assumed a weekly membership rate of $19 (4 days x $5 =$20).

Credit Card Alternatives:

The credit card requirement, inherent in Third Generation bike-share programs could pose some problems for lower income New Yorkers who might otherwise use the program. In consultation with the NYCDHMH, this study suggests that prepaid cards used exclusively for the bike-share system could be an alternative option for those who do not have a credit card. While these are often associated with transaction or maintenance fees, the city or operator may be able to negotiate with the card provider to keep the fees low.

SAFETY OPTIONS

Ensuring safety, for bike-share users and others, is a crucial part of any bike-share program. Especially in New York where many negative perceptions surround bicyclist safety, introducing measures to encourage bike helmet use, promoting good bicyclist and driver behavior and increasing the city's protected bicycle facilities is doubly important. As discussed in Chapter 5, bicycling in New York is safer than it used to be. The increased use of bicycle helmets and increased bicyclist presence and awareness may play a role here.

Helmets:

The self-serve nature of bike-share programs limits their ability to provide helmets. JCDecaux's investigation of imbedding membership cards into personal bike helmets is the closest that any program to date has come to providing helmets, and should be explored for New York. Short of legislation mandating helmet use, there is no way to make bike-share use contingent on wearing a helmet. In addition to being difficult legislation to pass, such legislation could also reduce the number of bike-share riders by eliminating the spontaneity of bike-share use. In the absence of program-provided helmets, the city could encourage helmet use by:

- Giving Out Free Helmets with Annual Bike-Share Membership
  Through NYCDOT's "GET FIT-TED" helmet distribution and safety awareness campaign, the city already distributes free bicycle helmets. Free helmet distribution could be extended to include people who purchase annual bike-share memberships. Official New York City bicycle helmets, which are specially designed by NYC and Co., the city's official marketing and tourism, and sponsored by Target, could be sent to subscribers. Alternatively, helmet vouchers, redeemable at New York City bicycle shops could be distributed. While such a system could not enforce the wearing of helmets, it could eliminate price as an obstacle to use.

NYCDOT's GET FIT-ED program teaches helmet safety and gives away free Official NYC bicycle helmets.

- Exploring "Chip in Helmet" Programs like that Developed by JCDecaux
  JCDecaux's proposed "Chip in Helmet" Program will allow annual subscribers to imbed their membership card in a personal bike helmet. Further discussion of this option should occur as program details emerge. However, as with all other helmet options this program cannot make people wear helmets.

- Continuing Public Service Campaigns Encouraging Helmet Use
  Helmet use can also be encouraged through public service campaigns. The LOOK campaign's "Helmet Hair is Beautiful" postcard series is one such effort which attempts to erase the stigma around helmet use. Such campaigns should be continued. Private sector efforts, such as the "Safety is Sexy" campaign (http://safetyissexy.blogspot.com/) which

highlights fashionable bicycle helmets, helmets that look like hats, and other safety accessories, should also be explored further.

Promoting Good Bicyclist and Driver Behavior:

As discussed in Chapter 3, the combined efforts of the NYCDOT, NYCDHMH, the NYPD and public advocacy organizations like Transportation Alternatives have produced valuable public service campaigns (e.g. the LOOK Campaign) aimed at increasing bicycle awareness. The city can further encourage safety by further increasing the presence and scope of these programs. In addition, the city can encourage better bicyclist and driver behavior by:

- Clarifying and Publicizing Bicycle Rules of the Road

  Many bicyclists are unsure of the rules of the road which increases the dangers they face and the dangers they pose to other bicyclists, pedestrians and drivers. While bicycle rules are mentioned in the New York State Drivers Manual, the mention is cursory and easy to miss in a document otherwise entirely devoted to cars. In the absence of clear, widely publicized official bicycling rules that deal with bicycle-specific situations (like yield responsibilities between bicycles and buses for example), bicyclists make up their own rules or follow the (sometimes poor) examples of other riders. Well publicized, bicycle specific road rules could help to increase bicyclist safety and overall predictability in bicyclist behavior.

Bicycling road rules are posted on each Velib' bicycle. "I don't ride on the sidewalk. I respect traffic lights and stop signs. I don't carry passengers. I don't ride against traffic (except on counterflow bikelanes)." Image: oric1 (www.flickr.com)

- Using Bike-Stations and Bicycles to Publicize Bicycle Safety Information

  Bike-station and bicycles present a perfect opportunity to distribute bicycle safety information to bicyclists. Space should be provided to provide information such as basic traffic laws, the importance of helmet use, and the location of bike lanes.

- Publicizing Existing Bicycling Safety Courses

  Private and non-profit organizations such as Bike New York offer free and/or low cost bicycling safety courses. Such classes could be publicized in bike-share or other bicycling materials.

Increasing New York City's Bicycle Infrastructure:

NYCDOT should continue striping and building new bike lanes and protected greenways throughout the city. Special attention should be paid to increasing network connectivity (more east/west lanes in Manhattan and the South Bronx for example). In addition, protected lanes should be built wherever possible.

THEFT REDUCTION

The bike-station structure, subscription service and credit card deposit/penalty features, unique to 3rd generation bike-share programs have dramatically reduced theft and have made bike-share programs viable in a way that their predecessors were not. However, some problems still remain. While New York City's theft rate is significantly lower than that of Paris, Barcelona or Washington DC, a number of design and behavioral incentives should be considered to further limit theft.

- Complicated or unintuitive bike-station locking mechanisms make it difficult for users, especially short term users, to know when their bicycle is properly returned. Bicycle thieves use such opportunities to take bike-share bicycles without providing traceable credit card information. Simple, intuitive systems that clearly indicate when bicycles are locked, such as flashing green/red lights, are recommended.

- Most bicycle thieves want working bicycles (the creation of a resale market for parts is avoided by using specialized parts that do not fit other bicycles). Bike-station designs in which it is possible to break the lock without rendering bicycle inoperable should be avoided in New York.

- Credit card fraud and identity theft could be an issue. Payment systems that require the purchaser to physically have their card with them at the time of purchase, or employ other anti-fraud measures, should be used.

- Low penalty fees can make it cheaper to steal a bike-share bicycle than to buy a new one. The going price of a basic new bicycle can range as high as $500 in New York City, the deposit fee for the New York bike-share should be assessed accordingly. Bike-share administrators should watch results from SmartBike in Washington DC which charges $250 for bicycles that are not returned, to determine an appropriate fee for New York.

- A New York City bike-share program would likely, like Paris, generate significant publicity. To reduce incentives for theft, New York could also consider making replica bike-share bicycles available for purchase.

08 Appendices

- A: Summary of Data Sources
- B: Commuter Demand Methodology
- C: Phasing Methodology
- D: Financial Assumptions
- E: Bike-Share Programs Worldwide
- F: Works Cited

APPENDIX A: SUMMARY OF DATA SOURCES

Assessing the total number of bicyclists in New York and potential market demand for bicycling is particularly difficult as typical transportation counting methods such as registration are not available for bicycles. Further complicating matters, bicycles do not require specific facilities or land set-asides for parking, and are not counted in many transportation surveys. This report relies on the following data sources for its estimates about bicycle use in New York City.

US Census Journey to Work Data (2000):
The 2000 US Census supplies the majority of demand data used in this report. "Journey to Work" data is gathered as part of the Decennial Census sample characteristics or "long form" which surveys approximately 1 in every 6 households. It is conducted by the US Census Bureau. US Census data on bicycling is limited because data is collected on trips taken for commuting purposes only. Trips undertaken for errands, social visits, recreation or other activities are not recorded. In addition, the Census only allows respondents to indicate one mode of transportation. As a result, a commuter who bicycles to a subway station and then takes a subway to work, or commuters who bicycle to work only a few days a week are not counted. In New York, the issue of undercounting is particularly true for the "walk to work" category as most New Yorkers walk some distance each day to reach their subway or bus station but do not consider walking as their primary means of commuting.

Journey to Work data only looks at people in the workforce, ages 16 and older. As a result, this dataset automatically excludes children (under 15) who are too young to use bike-share programs. Journey to Work data does not have an upper age limit.

American Community Survey Journey to Work Data (2006):
The American Community Survey (ACS) is an annual population and characteristics survey conducted by the US Census Bureau. Approximately 3 million households nationwide are surveyed. As with the US Census, ACS data on bicycling trends can be misleading because data is only collected on trips made for commuting purposes and because respondents are only able to indicated one primary mode of commuting, thus eliminating multi-modal commuters. However, as it is an annual survey, the ACS provides data that is more current than the US Census.

NYCDOT Screenline/Commuter Cicycling Indicator Counts:
NYCDOT's Screenline counts are a 12- and 18-hour summer bicycle count conducted yearly at intersections along 50th Street in Manhattan and on major bridge crossings. Because it only counts bicycles entering and exiting Manhattan's central business district, and does not count non-Manhattan inter- or intra-borough travel, this study does not use the Screenline Count to estimate the total number of bicyclists in New York. Rather, due to its long duration—counts began in the 1980's and continue today—the Screenline Count provides valuable trend information about the growth of bicycling in New York.

NYCDOHMH Community Health Survey and Youth Risk Behavior Survey (2007):
The NYC Department of Health & Mental Hygiene's Community Health Survey (CHS) is an annual cross-sectional telephone survey that samples approximately 10,000 adults aged 18 and older from NYC neighborhoods. Estimates are weighted to the NYC population per Census 2000 and are age-adjusted to the US 2000 Standard Population.

The New York City Youth Risk Behavior Survey (2007) is a joint effort of the NYC Departments of Health and Mental Hygiene (DOHMH) and Education (DOE). The survey looks at New York City public high school students. The data used in this report was requested from DOHMH Bureau of Epidemiology Services in August 2008. Estimates are weighted to the NYC public high school population.

NYMTC Bicycle Data Collection Program Counts:

The New York Metropolitan Transportation Council (NYMTC) has conducted a bicycle ridership count over three phases, fall 2002 and spring/summer 2003, spring /summer 2004, and spring/summer 2005. The counts were conducted throughout the five boroughs of NYC and the five suburban counties in the NYMTC region. Counts were conducted at both on street locations and off street multi-use lanes. The data is meant to represent a "typical day when the weather was conducive to bicycling and pedestrian activity" The counts were conducted at 226 New York City locations over the course of the three phases. The NYMTC counts are useful in that they include areas outside of Manhattan. However, it is unclear how the counting locations were selected. In addition, not every location was observed every year of the counts, making it difficult to get a true comparison across the different locations. The results do indicate that there is significant bicycle use in geographically different areas of the city, something the other bicycle use counts do not address. The inclusion of on street locations without bike lanes does indicate that bicycle use does not depend on bicycle infrastructure.

Department of City Planning (NYCDCP) Counts:

The Transportation Division of the New York City Department of City Planning has conducted bicycle ridership counts since 1999. Data related to the usage of the city's bicycle lanes and greenway paths are collected each year during the fall season. This data collection effort is intended to assist planners in addressing issues related to cycling in New York City and to support ongoing and future bicycle planning studies. Manhattan has been the only focus of the bicycle counts since 2001, due to limited resources. The NYCDCP counts are useful in that they include the same locations every year, and provide information on bicycle ridership in Manhattan beyond the CBD. However, the Manhattan focus limits their ability to account for bicycle ridership in different areas throughout the City.

Department of City Planning (NYCDCP) Bike and Ride Data (2008):

In 2008, the Department of City Planning Transportation Division began collecting data for a "Bicycle Access and Parking for Subway and Commuter Rail User" study designed to examine current multimodal bicycle-subway/commuter rail patterns and make recommendations to create secure bicycle parking at transit stations. As part of the study, a citywide survey of subway and commuter rail stations was conducted to assess existing bike to transit use and to make site-specific recommendations. Counts were taken on weekdays throughout the summer. Unlike other data collection efforts, this study specifically addressed cyclists using a bicycle for only a portion of their trip. While this study has not examined every transit station in the City, it does account for a large portion of them; in total 239 stations were surveyed. The study revealed very high numbers in areas not typically associated with bicycle ridership (as well as those that are associated with bicycle use).

Department of City Planning (NYCDCP) Bicycle Survey (2007):

The 2007 NYCDCP Bicycle User Survey was a voluntary, online bicyclist needs assessment conducted during New York Bike Month, in May 2006. The survey was made available on the Department of City Planning website and publicized by a variety of bicycle and transportation advocacy groups. Over the course of the month, 1,086 people completed the survey. As with other voluntary surveys, selection bias may be a prominent issue in the Bicycle Survey, as bicyclists or people with strong feelings about bicycling in New York were most likely to respond. In addition, low response rates from places like the Bronx may indicate that outreach was insufficient or that the online format made the survey unavailable to some populations. The data in this report is used to illustrate habits of current New York bicyclists, rather than as an indication of prospective rider populations.

APPENDIX B: COMMUTER DEMAND METHODOLOGY

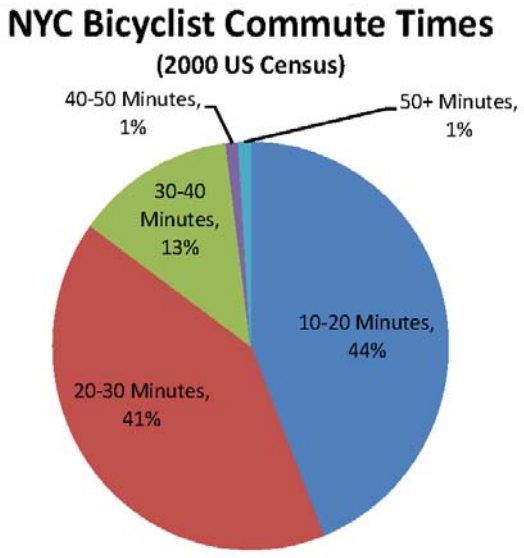
In Europe, commuters make up a substantial portion of the total bike-share users. In Paris, respondents to a JCDecaux survey indicated that 74% of bicycle trips were made for work purposes.[1] ClearChannel Adshel's data from Spain and Scandinavia shows that 60% of bike-share users used the bicycles as part of their commute.[2]

The data set for this analysis was built from 2000 US Census Journey to Work data analyzed at the Public Use Microdata Area (PUMA) level. PUMAs are geographic areas with more than 100,000 residents and less than 400,000 residents. In New York City, PUMAs roughly follow Community Board boundaries and were treated synonymously in this report.

In order to address the limitations of the Census data, explained below, this report provides a low-, mid-, and high-end estimate for the number of potential bicycle commuters. As elsewhere in this report, this is not a prediction of who would or will use a New York City bike-share program; rather it is an estimate of the number of people who live within a "reasonable bicycling distance" of their place of work.

For the purposes of this analysis, a "reasonable bicycling distance" for commuters is defined as less than 5 miles. This distance was determined based off 2000 US Census (Journey to Work) data which indicates that 85% of New York City's bicycle commuters bicycle to work in less than 30 minutes and that only 2% of current bicycle commuters ride for more than 40 minutes. The average bicycle commute time is 27 minutes. This study treats current ridership patterns as an indication of New Yorkers' "willingness to ride" and will assume that the average New Yorker who could commute by bicycle would be willing to ride for up to 30 minutes.

The connection between time and distance is made with the assumption that the average bicycle commuter will ride at a speed of approximately 10-15mph. Given this assumption, we assume that New Yorkers who would bike would be willing to bike between 5 and 7.5 miles for commuting purposes. This study focuses on the conservative 5 mile distance limit for further assumptions.



1 Velib' Website, "Press Release: Appendices Opinion Poll;"
2 Clear Channel Outdoor Website, "SmartBike™;" (http://www.smartbike.com/); Accessed 3/24/08

Low-End Estimate Assumptions:

The "Low End" estimate is comprised of:

- *New Yorkers in the workforce (age 16+) who currently walk to work*
- *New Yorkers in the workforce (age 16+) who currently bicycle to work*
- *New Yorkers in the workforce (age 16+) who currently use "other means" to get to work*

NYC commuters who currently walk to work:

- This study assumes that people who currently walk to work could use a bike-share program as they are traveling short, "bike-able" distances. The 2000 US Census shows that the average New Yorker who currently walks to work has a commute of 16 minutes. New Yorkers who live in PUMA 03802 (Morningside Heights) have the shortest walking commute: 11 minutes. New Yorkers who live in PUMA 03707 (University Heights/Morris Heights) have the longest walking commute: 21 minutes. At an average walking speed of 3mph, this means that the average walking commuter travels 0.8 miles to get to work; residents of PUMA 03707 travel just over 1 mile. These are distances that can easily be undertaken by bicycle. In addition, since walkers are typically the most sensitive to street conditions, this study assumes that environments that are "friendly" to walkers will be hospitable to bicyclists.

New Yorkers in the workforce (age 16+) who currently bicycle to work:

- This study assumes that people who already commute to work by bicycle would also use a bike-share program. While these commuters already own and use personal bicycles we assume that such commuters would augment their current bicycle use with public-use bicycles if such bicycles were spontaneously available since concerns like secure bicycle parking were would be alleviated. The number of New Yorkers in the workforce (age 16+), as counted by the 2000 Census, may be low. NYCDOT's "Screenline Counts" conducted annually since the early 1980's show a 3.43% annual increase in bicycling since then.

Mid- and High-End Assumptions:

This study assumes that people who currently live within a short, "reasonable bicycling distance" from their place of work could use a bike-share program if one were available. Using the US Census designation PUMA as the measurement tool, this study draws radius rings from the midpoint of each PUMA to ascertain the number of people who live in the PUMA and work in census tracts within a certain distance of that midpoint.

The "Mid End" estimate is comprised of:

- New Yorkers in the workforce (age 16+) who live within 2.5 miles (a "bikeable" distance) of their work. The radius ring is 2.5 miles. The maximum possible cycling distance is 5 miles, however, most commuters included in this count would have a much shorter commute.

The "High End" estimate is comprised of:

- New Yorkers in the workforce (age 16+) who live within 5 miles (a "bikeable" distance) of their work. The radius ring is 5 miles. The maximum possible cycling distance is 10 miles, however, most commuters included in this count would have a much shorter commute.

In all cases, census tracts that would require a bicyclist to cross rivers where bicycle-accessible bridges are unavailable were excluded. This exclusion pertained mostly to Staten Island and

western Brooklyn commuters and to northeastern Queens and southeastern Bronx commuters. In the case of the TriBorough Bridge and cyclists commuting between the Bronx, Manhattan and Queens, the distance from the midpoint of each relevant PUMA to the middle of Randall's Island was calculated and then a second ring (with a radius equal to 5 miles less the distance from the PUMA midpoint to the middle of Randall's Island for the "high" estimate or 2.5 miles less the distance from the PUMA midpoint to the middle of Randall's Island for the "middle" estimate) was drawn and other census tracts added or subtracted as necessary. A similar process was used for Cross-Bay Boulevard and Queens cyclists.

Members of the workforce who reported working from home in the 2000 US Census (Journey to Work data) are excluded from the total number of people who could use bike-share programs. It is possible that people working from home might subscribe to a bike-share program for reasons other than commuting, such as errands.

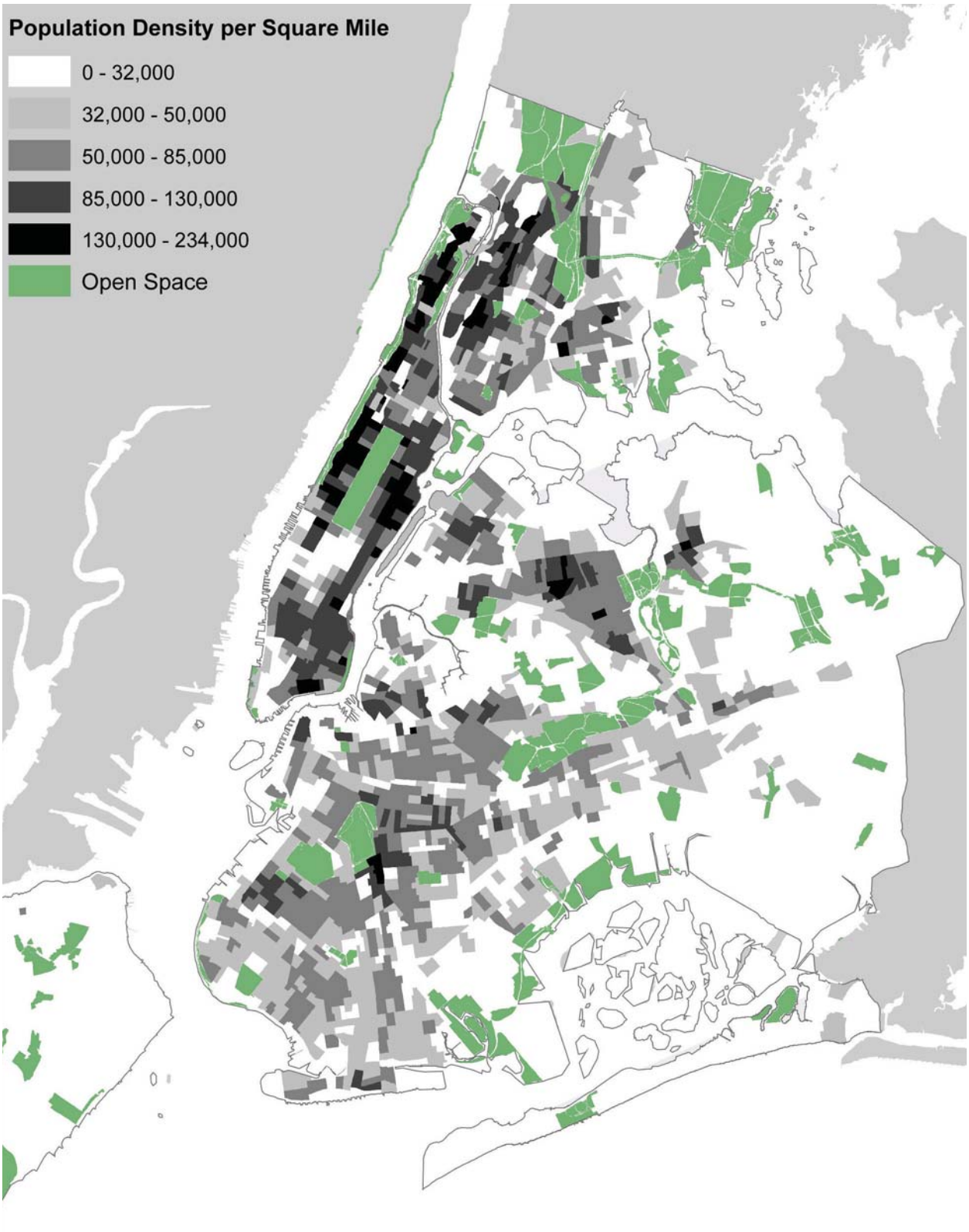
Excluded Populations:
The methodology outlined above excludes two commuter populations who could potentially use a New York City bike-share program. These populations are:

- Commuters who do not live in NYC but commute by train or bus to Grand Central Terminal, 34th Street-Pennsylvania Station, Port Authority Bus Terminal, Atlantic Avenue, Harlem-125th Street or other stations on the MetroNorth, PATH or Long Island Railroads, and work within cycling distance of those stations. Data from Europe predicts that these populations may be substantial. In Paris, people who live in the Parisian suburbs make up 33% of all Velib' users.[3]

    - MetroNorth: 132,300 people daily into Manhattan.[4]
    - LIRR: 100,000 people daily into Manhattan[5]
    - NJ Transit: ~70,000 people daily into Manhattan[6]
    - PATH: 48,000 people daily into Manhattan between 7-10am[7]
    - PA Bus Terminal: 200,000 people daily into Manhattan[8]

- Multi-Modal Commuters who live in NYC and currently take the bus or walk less than 5 miles to connect to a subway, bus or other form of transportation. Data from the Velib' program in Paris indicate that 61% of Velib' annual pass holders use their Velib' bicycles as part of their commute and transfer to other forms of public transportation.[9] DCP's 2006 bicycle survey also indicates a high population of multi-modal bicycle commuters. 29% of respondents said that they transferred from their bicycle to another means of transportation in the course of their commute.

3 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08
4 MTA Website, "About MetroNorth Railroad," (http://www.mta.info/mnr/html/aboutmnr.htm); Accessed 5/15/08
5 MTA Customer Service (5/23/08)
6 New York Metropolitan Transit Council (NYMTC), "2006 Hub-Bound Report," (http://www.nymtc.org/files/hub_bound/2006_Hub_Bound.pdf); Accessed 9/8/08. p.15
7 Ed Sasportis, PATH (email dated 6/5/08)
8 Young, Bill, Tunnels, Bridges & Terminals, Port Authority of New York/New Jersey; Phone Interview: 16 October, 2008
9 Velib' Website, "Now We Know You Better;" (http://www.velib.paris.fr/les_newsletters/10_aujourd_hui_nous_vous_connaissons_mieux); Accessed 8/26/08



New York City has a wide range of population densities, from 85,000/square mile average in Manhattan to 9,000 people/square mile average in Staten Island. Two-thirds of the city's population (5.2 million people) live on a little over one-third of the city's land mass, in neighborhoods with 32,000 people+/square mile. Data from the 2000 US Census.

APPENDIX C: PHASING METHODOLOGY

The selection of areas for inclusion in a New York City bike-share program was based on a variety of considerations including:

- Population Density and High Trip Volume
- Presence of Major Origin/Destination Points
- Significant Bike lane Coverage
- Significant Presence of Bicyclists
- Program Continuity/Contiguous Areas
- Citywide Representation
- Publicity Presence

The number of bike-stations required was determined using the 28 stations/square mile ratio developed in Lyon and Paris. The average bike-station size was determined on a borough level, based primarily on population density (assuming 110 bicycles/resident).[10] Manhattan, with an average of 85,000 people/square mile, will need the largest bike-stations, on average 28 bicycles/station. The number of bicycles/station is not the same as the size of the bike-station. In order to ensure that users can return bicycle easily, most programs assume around 40% more docks than bicycles.

Average Bike-Station Sizes by Borough

	Bronx	Brooklyn	Manhattan	Queens	CityWide
Population/Square Mile	42,000	39,000	85,000	23,000	31,000
Average Bicycles/Station	16	15	28	14	17
Average Station Size (40% Larger)	22	21	39	20	24

Where possible, key indicators, such as population or workforce densities, retail density, or the presence of colleges and universities or cultural attractions, were mapped. Maps were normalized over a 300m grid, which produces the desired 28 stations/square mile density.

Population Density and High Trip Volume:
High population density and high trip volumes are the strongest predictors of the success of a bike-share program. Bike-stations must be located in close proximity to one another in order to ensure program visibility and ease of use. Low density areas which would have many bike-stations for few people and few trips would place unduly high financial and operational stresses on the program. This report focuses on New York's medium and high density areas, defined as having 32,000 people/square mile or more. The average population density of these areas is around 53,000 people/square mile, which is identical to Paris.

Manhattan is the densest borough, with an average population density of 85,000 people/ square mile, excluding open space. It is a uniformly high density borough, which makes it ideal for a bike-share program. Brooklyn has uniformly medium densities between 32,000 and 85,000 people/ square mile. The Bronx and Queens have certain areas with high population densities, notably

10 Paris has approximately 100 bicycles/resident.

the Southwestern Bronx along the 4 and D train corridor and the Queens "Triangle," the area between Northern Blvd, Queens Blvd, and the Flushing Meadows Corona Park. However population density elsewhere in those boroughs drops off precipitously. Staten Island is the lowest density borough, with only 9,000 people/square mile. Only select portions of the St. George area have population densities that could support a bike-share program.

Presence of Major Origin/Destination Points:
Successful bike-share program include major origin (home and hotels) and destination (work, school, commercial centers, cultural or tourist attractions) points within their coverage areas. This allows users to make entire trips via bike-share as well as increasing opportunities for multi-modal commuting. Bike-share programs that only include destination points are of limited use to commuters, although they may be highly used during the day for short trips at lunch hour or by tourists. Bike-share programs that only include origin points would likely see heavy use at the rush hours by users hoping to connect to other modes but daytime use would be limited. In either scenario, bicycles would be underused during a significant portion of the day, limiting program effectiveness and revenues.

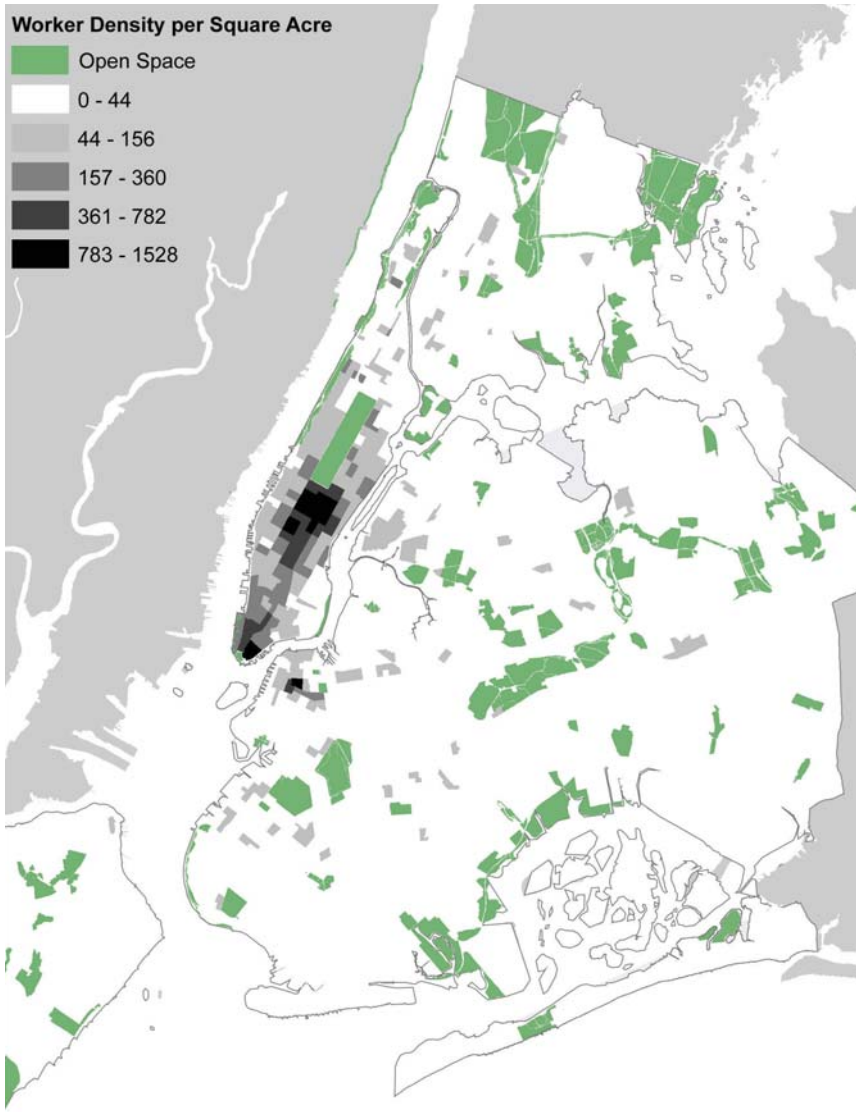
Destinations:
Midtown and Lower Manhattan have the highest workforce densities of anywhere in the city, making these areas prime destination points. In addition, most of the city's major commuter hubs—Grand Central Terminal, Port Authority Bus Terminal, 34th Street-Pennsylvania Station, World Financial Center and South Ferry—are located in Midtown and Lower Manhattan.

Cultural and recreational attractions (such as theaters, movie theaters, concert halls, museums, swimming pools, YMCA/YWCA facilities and libraries) are also important as such facilities are associated with a high volume of trips many of which could be completed by bicycle. While such destinations exist throughout the city, they are found in Midtown and Lower Manhattan at higher densities.

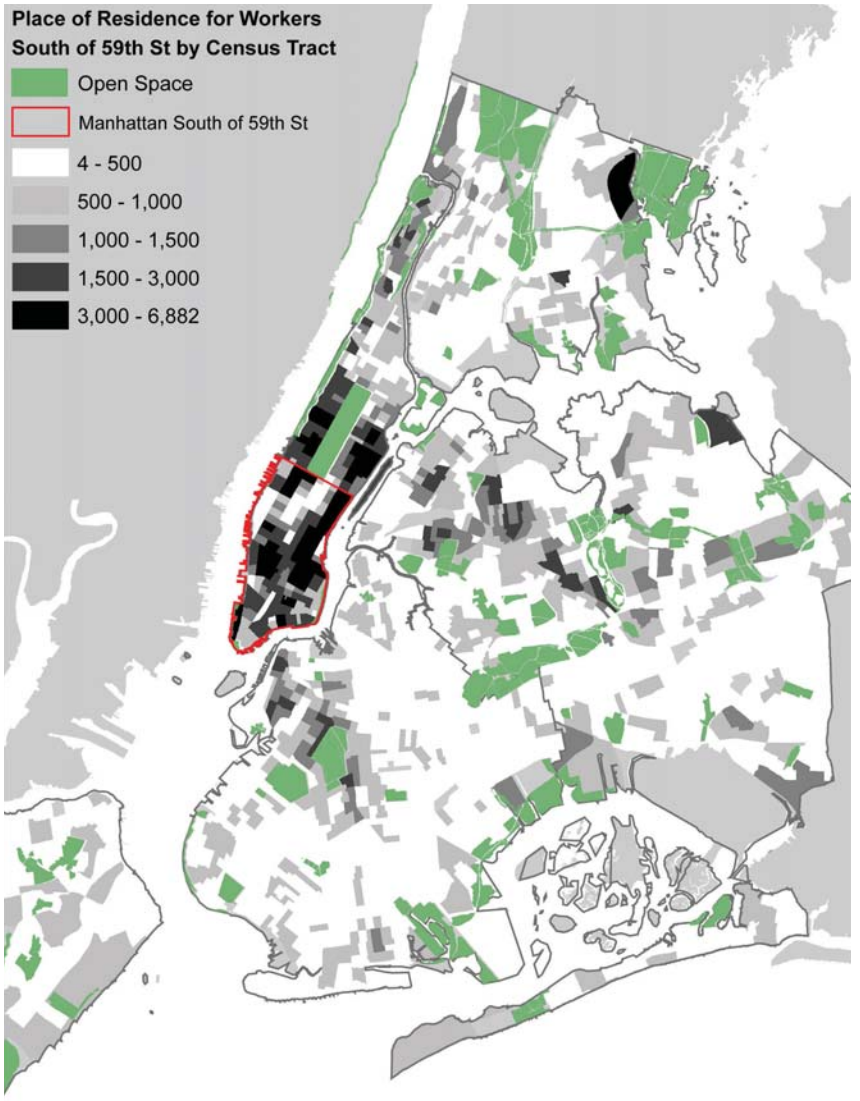
Areas with high retail coverage (measured here as total retail square footage) are also areas where high trip volumes are expected. In particular, Manhattan below 60th Street shows consistent retail coverage, as opposed to other parts of the city where retail coverage is limited to commercial corridors. Hotels and colleges/universities, also overwhelming located in Manhattan, are also high trip volume generators because tourists and students are two strong bike-share demographics.

Origins:
Isolating origin points is more complicated because New York is big and people live almost everywhere. For certain business areas, however, like Midtown, some patterns emerge. For example, a significant number of people who work below 59th Street live on the Upper East and Upper West Sides.

Significant Bike lane Coverage & Presence of Bicyclists:
Bike-share programs bring substantial numbers of new people into bicycling. While many have experience in urban riding, others do not. A high degree of existing bike lane coverage and the presence of other bicyclists are important to increase the safety of these new riders. In addition, the existence of connected networks of bike lanes, which would allow users to make their entire trip on marked routes, may be an incentive for otherwise hesitant new riders.



The highest worker densities are concentrated in Manhattan south of 60th Street. Data from the 2000 US Census.



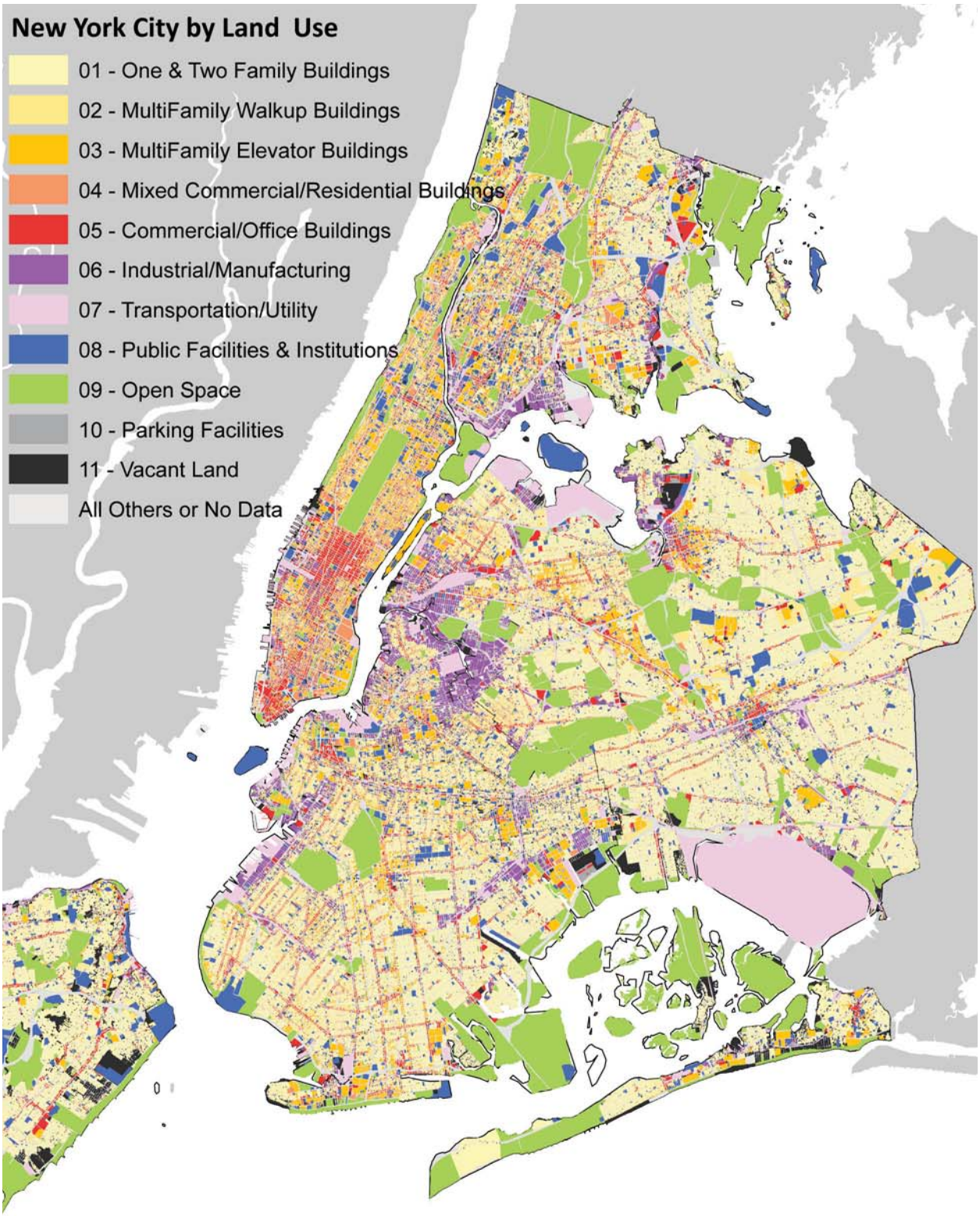
A significant number of these workers live in Manhattan.

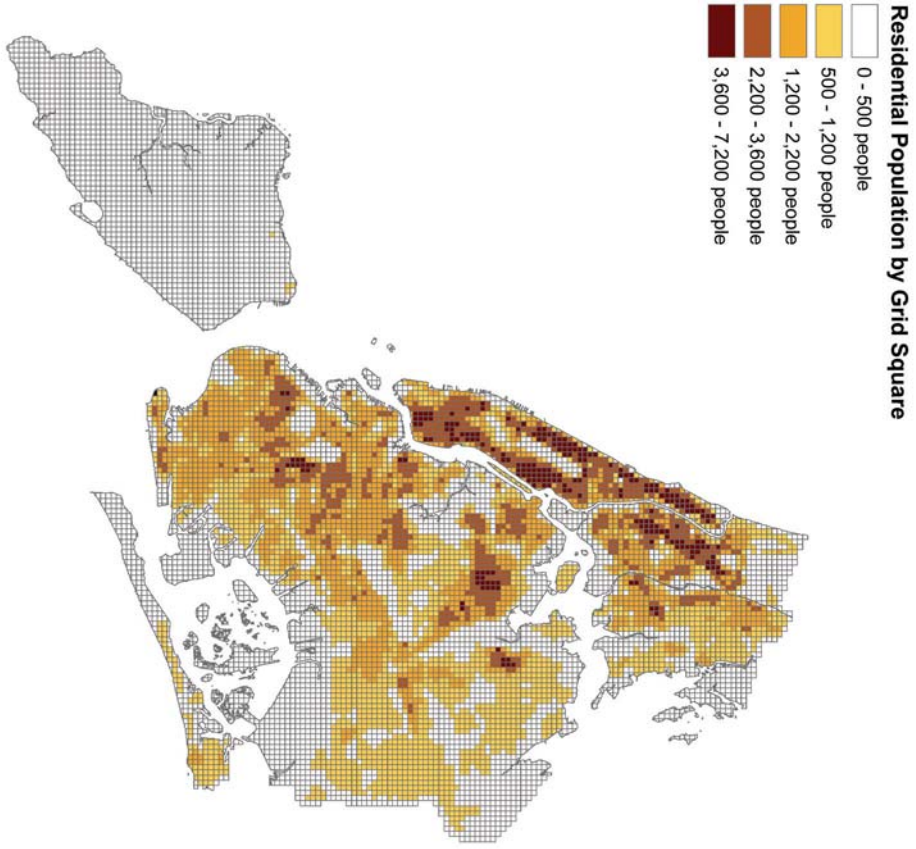
In New York the bike lanes are concentrated in Manhattan and Brooklyn, which are also the areas with the highest numbers of current bicycle riders. These areas are strong candidates for the initial phases of a bike-share program. Other areas of the city, notably in Queens, seem to have large populations of bicyclists and could also support bike-share programs.

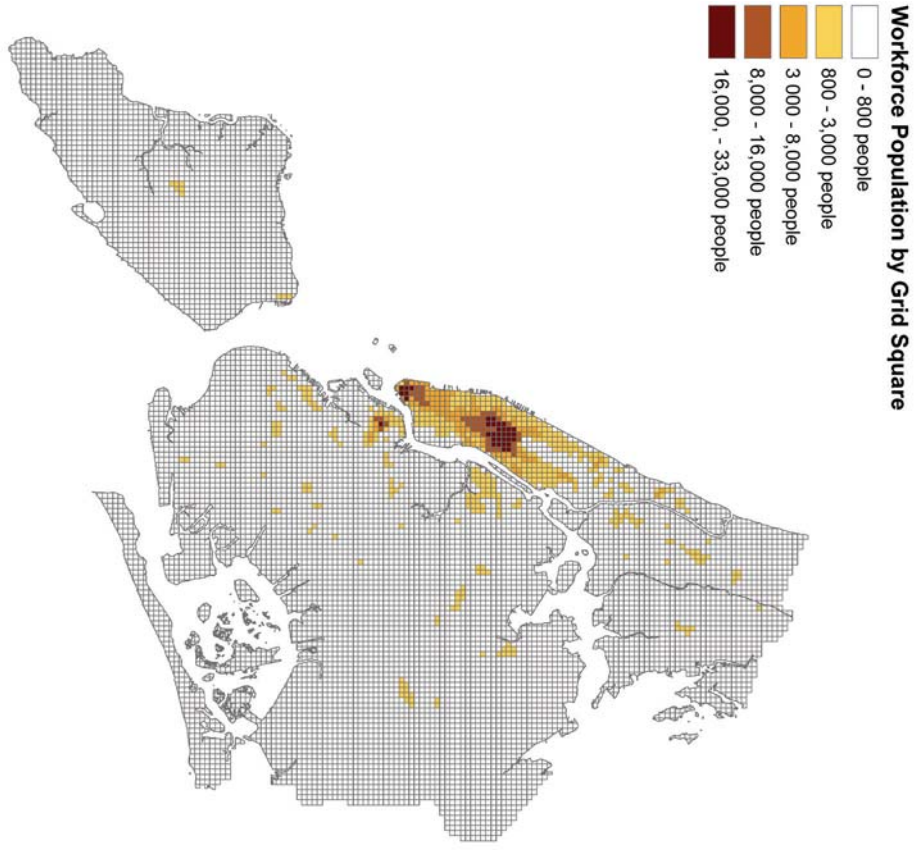
Program Continuity/Contiguous Areas & Citywide Representation:
Bike-share programs require coverage area continuity in order to function efficiently. Placing bike-stations in isolated target areas, for example in Flushing, Williamsburg and Midtown, dramatically decreases the number of potential users, as such a configuration only allows for specific types of trips. In addition, citywide representation is important in order to achieve transportation goals. For Staten Island, whose low population density and small number of bike lanes make bike-share programs less tenable, representation can be achieved by placing bike-stations at the Staten Island Ferry Terminal at South Ferry.

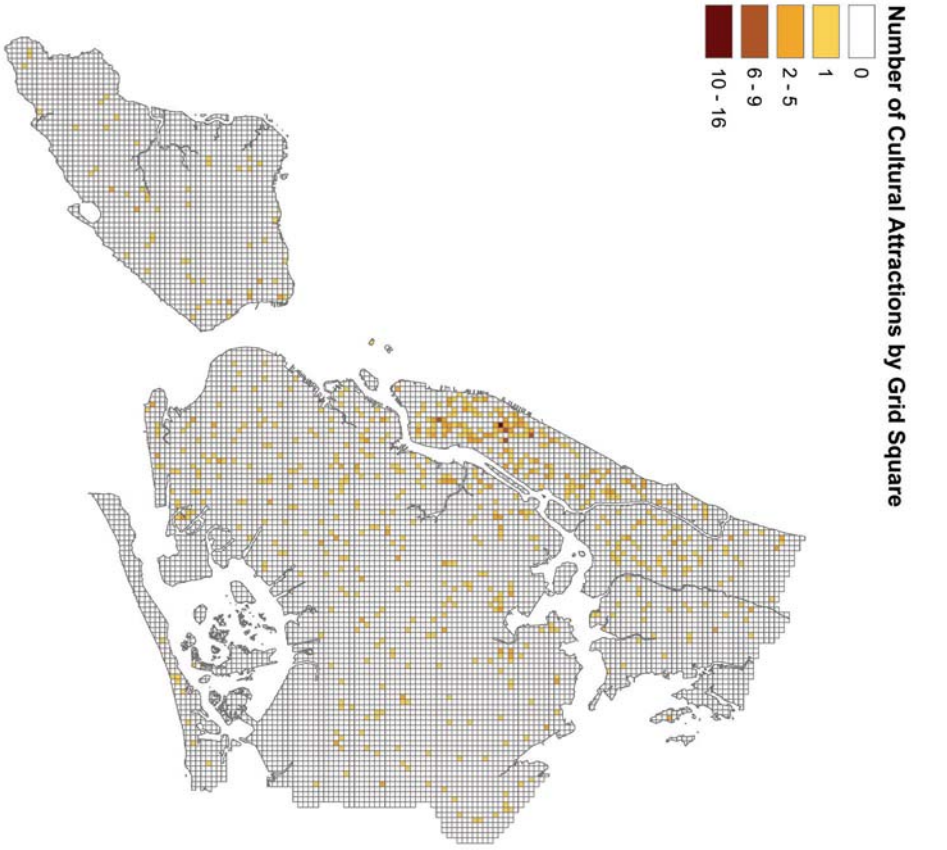
Publicity Presence:
Bike-share programs depend on strong publicity and a "presence" in the streets. These two factors build a "buzz" around the program that can draw in potential users and increase revenues from membership and use fees. While bike-share bicycles would be seen in all parts of New York, programs with high visibility in New York's major commercial, cultural and tourist areas—Midtown and Lower Manhattan, Downtown Brooklyn, etc.—will receive more attention and faster. These areas should be considered for the first phases of the program because they can help to build the momentum needed for program expansion.

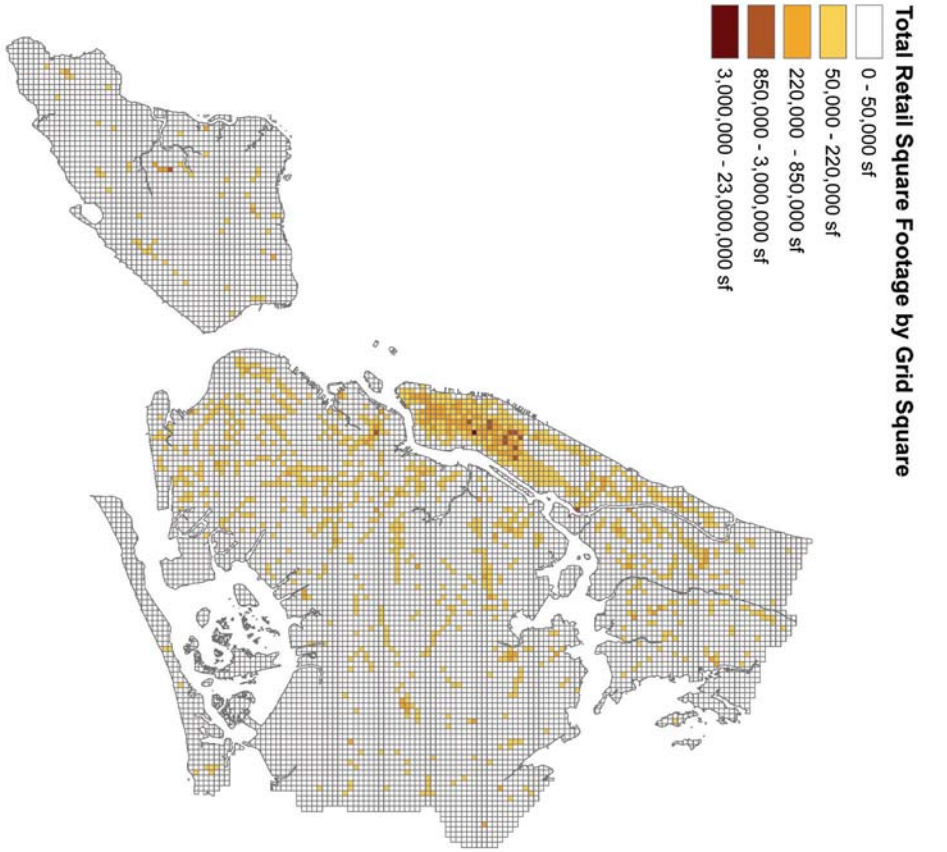
In addition, if a franchise model that relies on on-bicycle advertisements is used, then placing the initial phases of bicycles in areas that tend to generate higher revenues for advertising is desirable. Initial placement in such areas would increase the program's financial viability, but program coverage should not be isolated to these areas.

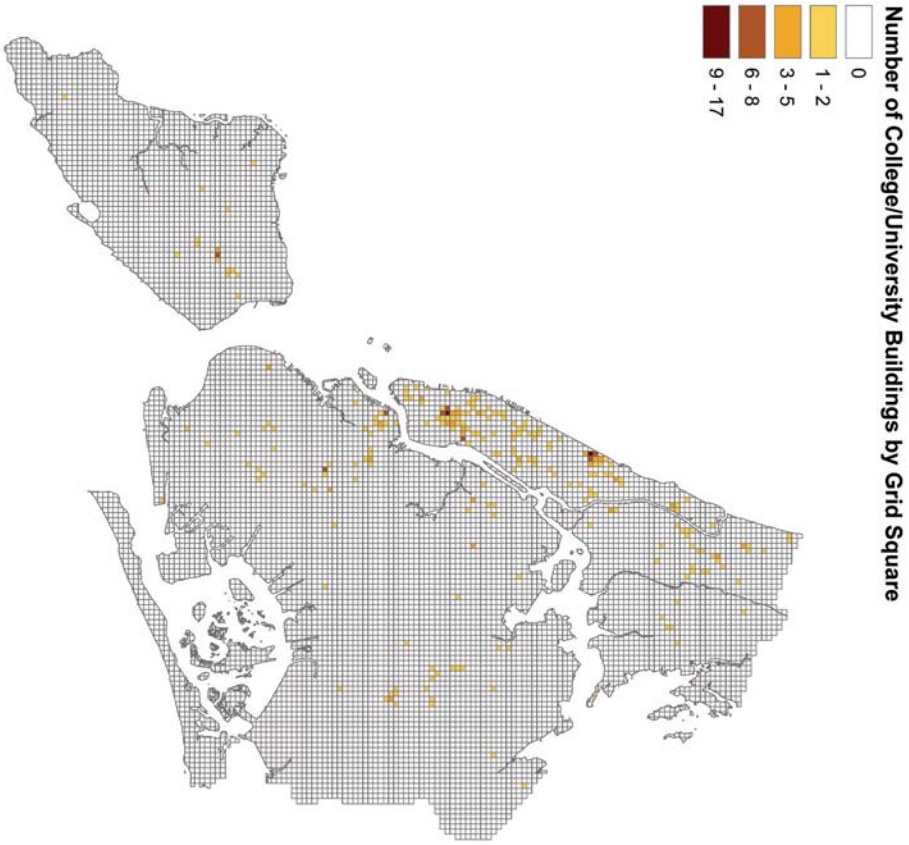

New York City by Land Use
01 - One & Two Family Buildings
02 - MultiFamily Walkup Buildings
03 - MultiFamily Elevator Buildings
04 - Mixed Commercial/Residential Buildings
05 - Commercial/Office Buildings
06 - Industrial/Manufacturing
07 - Transportation/Utility
08 - Public Facilities & Institutions
09 - Open Space
10 - Parking Facilities
11 - Vacant Land
All Others or No Data

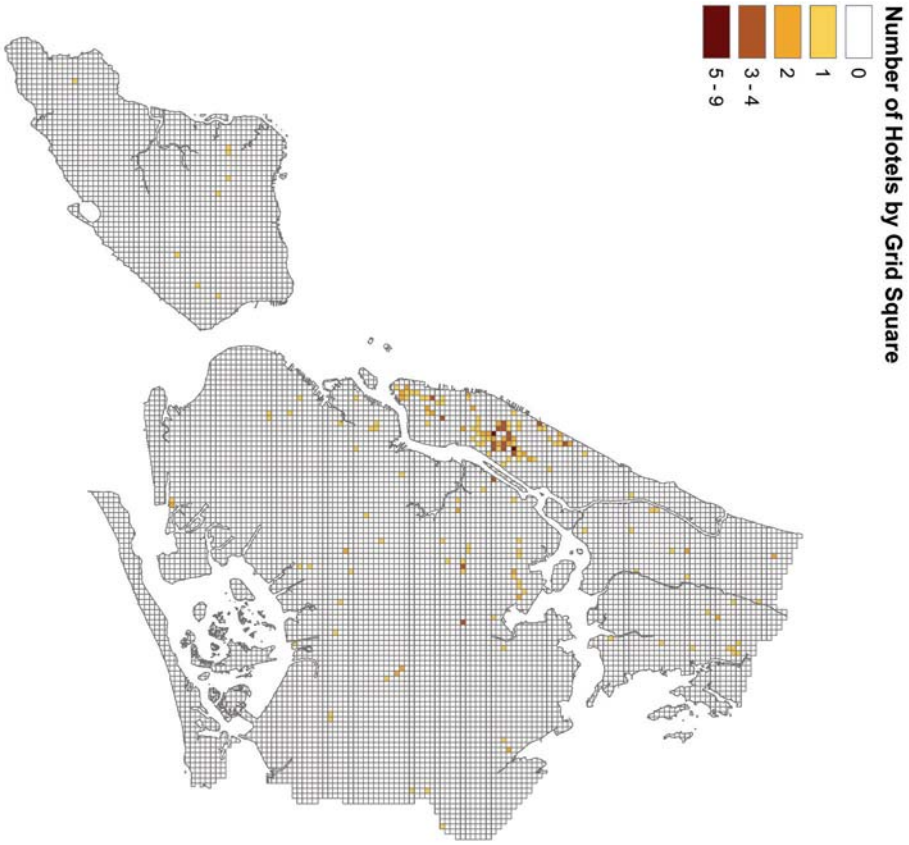

Residential Population by Grid Square
0 - 500 people
500 - 1,200 people
1,200 - 2,200 people
2,200 - 3,600 people
3,600 - 7,200 people


Workforce Population by Grid Square
0 - 800 people
800 - 3,000 people
3 000 - 8,000 people
8,000 - 16,000 people
16,000, - 33,000 people


Number of Cultural Attractions by Grid Square
0
1
2 - 5
6 - 9
10 - 16


Total Retail Square Footage by Grid Square
0 - 50,000 sf
50,000 - 220,000 sf
220,000 - 850,000 sf
850,000 - 3,000,000 sf
3,000,000 - 23,000,000 sf


Number of College/University Buildings by Grid Square
0
1 - 2
3 - 5
6 - 8
9 - 17


Number of Hotels by Grid Square
0
1
2
3 - 4
5 - 9

APPENDIX D: FINANCIAL ASSUMPTIONS

Bike-Share Program Costs:

Bike-Share Capital Costs

City	Montreal	New York	Washington DC	Lyon	Paris
Program	Bixi	2007 Estimate	SmartBike Expansion	Velov'	Velib'
Operator	Stationnement de Montréal	ClearChannel Adshel	ClearChannel Adshel	JCDecaux	JCDecaux
Number of Bicycles	2,400	500	500	1,000	20,600
Capital Cost	No Data	$1,800,000	$1,800,000	No Data	$90,000,000
Capital Cost/Bicycle	$3,000	$3,600	$3,600	$4,500*	$4,400

All data provided by the operators or providers unless otherwise noted.

* This figure is cited to European programs in general in Becker, Bernie, "Bicycle-Sharing Program to Be First of Kind in U.S.," The New York Times, 27 April, 2008

Bike-Share Operations Cost

City	Montreal	Lyon	Barcelona	Washington DC	Paris	New York
Program	Bixi	Velov'	Bicing	SmartBike Expansion	Velib'	2007 Estimate
Operator	Stationnement de Montréal	JCDecaux	ClearChannel Adshel	ClearChannel Adshel	JCDecaux	ClearChannel Adshel
Number of Bicycle	2,400	1,000	3,000	500	20,600	500
Operations Cost	No Data	$1,550,000	$4,500,000	$800,000	$35,000,000	$972,000
Operations Cost/ Bicycle	$1,200	$1,500*	$1,500**	$1,600	$1,700	$1,944

All data provided by the operators/providers or the city unless otherwise noted.

* Buhrmann, Sebastian, Rupprecht Consult Forschung & Beratung GmbH, "New Seamless Mobility Services: Public Bicycles;" Niches Consortium

** Nadal, Luc, "Bike Sharing Sweeps Paris Off Its Feet," Sustainable Transport, Institute for Transportation and Development Policy, Fall 2007, Number 19

Bike-Share Scenario Demand Assumptions:

Phase and Scenario Demand Assumptions

TOTAL SUBSCRIBERS	Assumptions	Projected Uptake	Phase 1	NA (Scenario 2)	Phase 2	Phase 3
Residents in Catchment Area	Variable	6%	947,070	1,434,710	3,627,590	5,255,188
NYC Workers in Catchment Area	Variable	3%	1,067,000	1,023,000	829,000	516,000
Out-of-City Workers in Catchment Area	552,000	3%	552,000	552,000	552,000	552,000
Leisure Tourists staying less than 4 days	85% of Leisure Tourists	9%	29,197,500	29,197,500	29,197,500	29,197,500
Leisure Tourists staying more than 4 days	15% of Leisure Tourists	6%	5,152,500	5,152,500	5,152,500	5,152,500

TOTAL TRIPS	Assumptions	Projected Uptake	Phase 1	NA (Scenario 2)	Phase 2	Phase 3
Residents in Catchment Area	4x/week	6%	11,819,434	17,905,181	45,272,323	65,584,746
NYC Workers in Catchment Area	3/week	3%	4,993,560	4,787,640	3,879,720	2,414,880
Out-of-City Workers in Catchment Area	3/week	3%	2,583,360	2,583,360	2,583,360	2,583,360
Leisure Tourists staying less than 4 days	1x	9%	2,627,775	2,627,775	2,627,775	2,627,775
Leisure Tourists staying more than 4 days	4x	6%	1,236,600	1,236,600	1,236,600	1,236,600
Projected Total Trips			23,260,729	29,140,556	55,599,778	74,447,361

Membership/Use Fee Revenues for Scenario 2 (15,000 Bicycles):

Scenario 2 was not recommended as a phase due to the relatively small Net Operating Income which was deemed to be insufficient if operating costs were higher than expected.

NO PHASE/SCENARIO 2 (15,000 Bicycles)

Demand Assumptions	Total Possible	3%	6%	9%	Projected
Residents in Catchment Area	1,434,710	43,041	86,083	129,124	6%
NYC Workers in Catchment Area	1,023,000	30,690	61,380	92,070	3%
Out-of-City Workers in Catchment Area	552,000	16,560	33,120	49,680	3%
Leisure Tourists staying less than 4 days	29,197,500	875,925	1,751,850	2,627,775	9%
Leisure Tourists staying more than 4 days	5,152,500	154,575	309,150	463,725	6%
Trips/Year		17,199,515	34,399,031	51,598,546	29,140,556
Trips Longer Than 30 Min (5%)		859,976	1,719,952	2,579,927	1,457,028
Cost Assumptions	Rates	3%	6%	9%	Projected
Total Capital Costs	$3,600	$54,000,000	$54,000,000	$54,000,000	$54,000,000
Total Operations Costs	$1,600	$24,000,000	$28,800,000	$34,560,000	$28,800,000
Annual Membership & Use Fee Revenues	Rates	3%	6%	9%	Projected
Annual Pass (residents)	$60	$2,582,478	$5,164,956	$7,747,434	$5,164,956
Annual Pass (non-residents)	$60	$1,841,400	$3,682,800	$5,524,200	$1,841,400
Commuter Annual Pass	$60	$993,600	$1,987,200	$2,980,800	$993,600
Week Pass	$19	$2,936,925	$5,873,850	$8,810,775	$5,873,850
Day Pass	$5	$4,379,625	$8,759,250	$13,138,875	$13,138,875
Use Fees (1/2hr)	$2	$1,719,952	$3,439,903	$5,159,855	$2,914,056
Total Membership & Use Revenue					$29,926,737
Net Operating Revenue					$1,126,737

APPENDIX E: 3RD GENERATION BIKE-SHARE PROGRAMS WORLDWIDE

City	Country	Program Name	Operator	Website
Aix-en-Provence	France	V'Hello	JCDecaux	http://www.vhello.fr/
Barcelona	Spain	Bicing	Clear Channel Adshel	http://www.bicing.com/
Beijing	China	Beijing Bicycle Rental Company	Owner Operated	http://www.bjbr.cn/wd/wd.htm
Berlin and Others	Germany	Call-A-Bike	Deutsche Bahn	http://www.callabike-interaktiv.de
Brussels	Belgium	Cyclocity	JCDecaux	http://www.cyclocity.be/
Burgos	Spain	BiciBur	ITCL	http://www.bicibur.es
Drammen and Others	Norway	Bysykkel	Clear Channel Adshel	http://www.adshel.no/index2.html
Dublin and Others	Ireland	Hourbike	Hourbike	http://www.hourbike.com/hourbike/home.do
Gigón	Spain	Cyclocity	JCDecaux	http://www.gijon.es/Contenido.aspx?id=19315&leng=en&zona=0
Central London	England	TBA	TBA	TBA
Greater London	England	OYbike	OYBike Systems	http://www.oybike.com/
Hangzhou	China	Hangzhou Public Bicycle System	unknown	http://www.hzzxc.com.cn/
Kaohsiung City	Taiwan	C-Bike	unknown	http://www.c-bike.com.tw/eng/map.html
Lyon	France	Vélo'v	JCDecaux	http://www.velov.grandlyon.com/
Marseille	France	Le Vélo	JCDecaux	http://www.levelo-mpm.fr/
Montreal	Canada	Bixi	Montreal Parking Authority	http://bixi.ca/index.php?page_id=1&lang=en
Pamplona	Spain	nbici	CEMUSA	http://www.c-cycles.com/
Paris	France	Vélib'	JCDecaux	http://www.velib.paris.fr/
Parma and Others	Italy	Bicincittà	Communicare	http://bicincitta.com
Rennes	France	Vélo à la Carte	Clear Channel Adshel	http://veloalacarte.free.fr/index2.html
Rome	Italy	Roma'n'Bike	CEMUSA/Bicincittà	http://www.roma-n-bike.it/
Salzburg	Austria	Citybike	Gewista Urban Media	http://www.citybikesalzburg.at/
Sevilla	Spain	sevici	JCDecaux	http://www.sevici.es/
Stockholm	Sweden	City Bikes	Clear Channel Adshel	http://www.stockholmcitybikes.se/en/Home/
Taipei	Taiwan	YouBike	unknown	http://www.youbike.com.tw/upage/
Toulouse	France	Vélô	JCDecaux	http://www.velo.toulouse.fr/
Various	The Netherlands	OV-Fiets		http://www.ov-fiets.nl/
Viennna	Austria	Citybike	Gewista Urban Media	http://www.citybikewien.at/
Washington D.C.	USA	Smark Bike DC	Clear Channel Adshel	https://www.smartbikedc.com/default.asp

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