

Bike Sharing in the United States: State of the Practice and Guide to Implementation

September 2012

Prepared by Toole Design Group
and the Pedestrian and Bicycle Information Center
for USDOT Federal Highway Administration



U.S. Department of Transportation
**Federal Highway
Administration**



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ADVISORY COMMITTEE MEMBERS

Parry W. Burnap
Executive Director
Denver Bike Sharing

Julia Diana
Manager, San Antonio Bikes
City of San Antonio

Bill Dosset
Executive Director
Nice Ride, MN

Chris Eatough
Program Manager
BikeArlington

Nate Evans
Bicycle & Pedestrian Planner
Baltimore Department
of Transportation

Nicole Freedman
Director of Bicycle Programs
City of Boston

Lynn Harris
Senior Administrative Analyst
University of California – Irvine

Chris Holben
Project Manager
District Department of Transportation

Anne Hudak
Active Lifestyles Coordinator
Partners for Active Living

Scott Kubly
Managing Deputy Commissioner
Chicago Department of Transportation

Joshuah Mello
Assistant Director for
Transportation Planning
City of Atlanta

Josh Moskowitz
Project Manager
District Department of Transportation

Colby Reese
Vice President
Deco Bike

Cate Ryba
Media and Communications Officer
Mary Black Foundation

Jim Sebastian
Supervisory Transportation Planner
District Department of Transportation

Rebecca Serna
Executive Director
Atlanta Bicycle Coalition

Cindi Snell
Executive Director
San Antonio Bikeshare

Elizabeth Train
Executive Director
Boulder B-Cycle

Mitch Vars
I.T. Director
Nice Ride Minnesota

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Figure 1: Nice Ride
Credit: Nice Ride (Minneapolis/St. Paul, MN)

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GLOSSARY OF TERMS

BIKE SHARING

Bike sharing is a nonmotorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (0.5 to 3 miles). It provides users the ability to pick up a bicycle at any self-serve bike sharing station in the network and return it to any other bike sharing station (including the origin).

BIKE SHARING STATION

A bike sharing station is the structure that holds the automated customer kiosk, and the docks that dispense the bicycles. A station can hold a minimum of one bicycle and up to a maximum number of bicycles by adding more dock platforms.

DOCK

The dock is the most basic component within a bike sharing station. The dock is a mechanism that retains a bicycle in an upright, locked position until released by the user.

CUSTOMER KIOSK

An electronic terminal which provides bicycle rental instructions, payment equipment (i.e. credit card device), and all other means necessary for the rental of bicycles.

'LAST MILE' TRIP

A bicycle trip associated with the connection between a transit hub (i.e. bus, rail) and the final destination.

MEMBER

A daily, weekly, monthly or annual user of a bike share program. Some bike share programs refer to daily, weekly or monthly users as 'casual users'.

MEMBERSHIP DUES

Membership dues are the amount charged to each bike share customer which allows access to the bike sharing program.

RIDERSHIP FEES/USAGE FEES

The terms are used interchangeably to refer to any additional charges incurred by users of bike share systems after the first 30 to 60 minutes of usage. NOTE: some programs have begun to modify their fee structure by eliminating the free period.

REBALANCING/REDISTRIBUTION

The terms are used interchangeably to refer to the process in which bicycles are redistributed throughout the service area to ensure that each bike share station has an appropriate proportion of available docks and bicycles at all times (ideally around 50% bikes to 50% open docks) to ensure optimum service.

SERVICE AREA

The geographical area within a jurisdiction where a bike sharing program offers service for its users. For the purposes of this guide, the service area includes a 1 mile radius around each bike sharing station.

CHAPTER 1. EXECUTIVE SUMMARY

1.1 PURPOSE AND BACKGROUND OF THE GUIDE

With the introduction of new and more advanced bike sharing programs, and the continued interest and political support for them throughout many U.S. cities, it is important to provide an objective analysis of bike share programs, and to document early lessons learned. This guide is intended to serve as a resource for transportation planning professionals, as well as public officials considering implementation of a bike sharing program. The guide presents a snapshot of current municipal bike share systems where local jurisdictions (including cities, counties, etc.) are engaged in the funding, managing, administering and/or permitting of bike share implementing practices.¹

The objectives of this guide are to:

- Define bike sharing and provide an overview of the concept.
- Describe the steps a jurisdiction should take to plan, implement, and sustain a bike share program.
- Document existing models of provision, infrastructure considerations, and funding options for successfully implementing a bike sharing program.
- Describe metrics for monitoring and evaluating program success.
- Provide a baseline documentation of existing bike share programs in the United States in 2012.

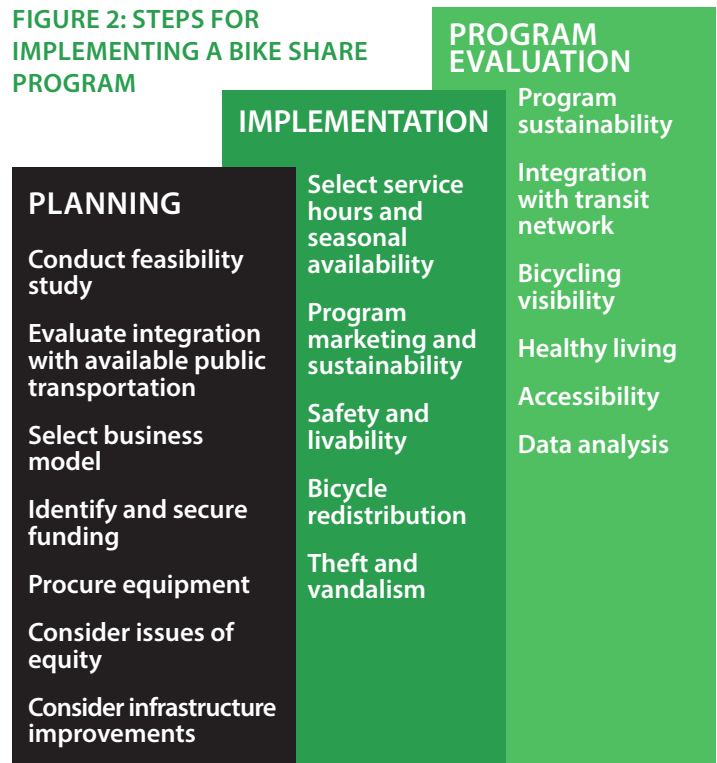
1.2 WHAT IS BIKE SHARING?

Bike sharing is an innovative transportation program, ideal for short distance point-to-point trips providing users the ability to pick up a bicycle at any self-serve bike station and return it to any bike station located within the system's service area.

While still very young, modern American bike share programs build on lessons learned from their European and Canadian counterparts, with some differences in technology and operations. In the context of this study, bike sharing differs from traditional bicycle rental

services in that it is typically used for short distance and duration trips that are often combined with public transit. Figure 2 delineates the steps jurisdictions should take for implementing a bike share program.

FIGURE 2: STEPS FOR IMPLEMENTING A BIKE SHARE PROGRAM



With increasing political and financial support for bike share programs in many major U.S. cities,² it has become important to document the early lessons learned by pioneering programs, and to provide an initial set of best practices for the next generation of bike share programs. Interest in bike share has been fueled by success in several cities, including Washington, DC, Denver and Minneapolis, where bike share has quickly become an accepted and popular transportation option. It will be important to track the progress of bike sharing implementation as new and more advanced programs are implemented in the next few years.

This guide has been organized in four sections to match with the program development process: Planning, Implementation, Program Evaluation and Additional Considerations. The following is a summary of the findings and recommendations in each of these areas.

1.3 SUMMARY OF RECOMMENDATIONS

BIKE SHARE PLANNING RECOMMENDATIONS

The planning stage determines the ultimate form of the bike share program. At this stage, a determination is made as to the optimal business model, related capital and operational costs, and potential funding sources. To effectively plan a bike share program, jurisdictions should consider the following:

i. **From their outset, jurisdictions should define the goals of implementing bike share programs in order to document their impact.** Although the primary goal communities set for bike share may vary, most seek a wide range of benefits (e.g. increase bicycling visibility, promote healthy and active living, provide transit connections).

EXISTING COMMUNITY GOALS FOR BIKE SHARE PROGRAMS

- Promotion of healthy living
- Increasing bicycling visibility
- Integration with transit network
- Promote financial sustainability
- Increased access for underserved communities

ii. **Jurisdictions should select a business model that best fits their local political and financial context.** There are currently three general business models being utilized in existing programs. The appropriate business model will depend on the institutional capacity of the lead agency and regulatory framework within a jurisdiction.

iii. **Jurisdictions should consider all the costs attached to the planning, implementation and management of a bike sharing program.** The costs of starting a bike share program can be significant. As of March 2012, the capital costs for implementing a jurisdiction-wide bike sharing system ranged from an average of \$4,200 to \$5,400 per bicycle, including all system components, staff and administrative support. Operating costs ranged from an average of \$150 to \$200 monthly per bicycle.³

iv. **Jurisdictions should evaluate the feasibility and determine the optimal structure of a program**

before committing to implementation. In addition to gauging if the bike share program is feasible, the study should determine the optimal implementation model. It is important that this feasibility study take an impartial approach to the various models that are possible.

v. **Jurisdictions should consider initial capital investment needs as well as long term operating costs when pursuing different funding sources.** A wide variety of funding sources are being used to support bike share programs. A combination of Federal, State and local government funding, in addition to private sources, and membership and usage fees are currently being used by existing programs.

vi. **The general public and various stakeholders should be engaged throughout all phases of the program implementation.** To ensure success, jurisdictions should include all stakeholders in the planning, implementation and evaluation process.

ADDITIONAL CONSIDERATIONS

An extensive network of bicycle facilities is of great benefit, but may not be necessary prior to program roll out. While fully formed bike networks are not a prerequisite for success, there need to be bikeable areas and other visible signs that bicycling is encouraged within the jurisdiction.

Weather and topography can have an effect on service provision and ridership. Despite seasonal weather changes, bike share programs can be used throughout the year. Jurisdictions should however be mindful of how extreme weather conditions can affect ridership patterns, quality of service and life-cycle of the bicycles and stations.⁴ With regard to topography, slopes of more than 4% can be a major barrier for bicyclists and can have an effect on ridership and bicycle redistribution patterns throughout the service area.⁵

Additional information can be found on Chapter 3 of this guide.

BIKE SHARE IMPLEMENTATION RECOMMENDATIONS

The implementation stage includes the deployment and day-to-day activities of a bike sharing program. To



Figure 3: Deco Bike user getting to work.
Credit: Deco Bike (Miami Beach, FL)

ensure successful implementation, jurisdictions should consider the following:

- i. **Jurisdictions should consider deployment of stations in areas where increased population and job densities positively impact ridership.** Experience has shown that stations with close proximity to high population and job density locations receive the most ridership. Additionally, in communities with strong public transportation systems, deployment of stations should facilitate connectivity between transit and bike share.
- ii. **Jurisdictions should consider locating their stations no more than ½ mile apart to minimize the distance users must walk to access the service.** Station density is a determinant of ridership levels. The density of stations within a service area plays an important role in determining the relative level of ridership across the system.
- iii. **Stations should be placed in locations that are clearly visible from multiple approaches, in full consideration of the necessary space requirements**

and circulation to and around the station. Station location must balance the need to be in a highly visible location with the spatial requirements for the station. For example, it is important that bike share stations be located in close proximity and within view of transit station entrance/exits, if they are intended to serve those users.

- iv. **Affordable and strategic pricing scale should be determined to promote ridership and demand.** Jurisdictions implementing a bike share program should consider how pricing scales can encourage high turnover of bicycles and increased usage of the system for short-term trips.⁶
- v. **Service hours should be tailored to the system and the context.** Jurisdictions considering the implementation of a bike share system should adjust the hours of operation to the needs of the local community and the size/density of the system. Jurisdictions should note that it can be cost prohibitive to provide staffing to support a 24-hour bike share system if there are very few or no users at late hours.



Figure 4: Boulder B-Cycle
Credit: Robert D. Jones, Boulder B-Cycle (Boulder, CO)

ADDITIONAL CONSIDERATIONS

Theft and vandalism have not been a major issue in any of the programs studied. Existing U.S. systems studied reported very low rates of theft and vandalism. Most current systems include secure locking mechanisms which only allow users to unlock a bike with the use of a specialized key or code. Additionally, some equipment suppliers have included built-in cable locks on their bicycles for bicycle security at intermediate stops.⁷

Early evidence suggests that crash rates in existing bike sharing programs are low. Programs interviewed reported very low number of reported crashes.⁸ It is important to note that as bike sharing is still a relatively new transportation option in the U.S., there is limited experience with liability exposure and the topic has not been tested in courts. Further analysis will be needed as the number of programs grows and existing programs mature.

Refer to Chapter 4 of this guide for additional information.

BIKE SHARE EVALUATION RECOMMENDATIONS

Jurisdictions should evaluate system performance to gauge success and identify improvements that are needed. When evaluating programs, jurisdictions should consider the following:

- i. **Small bike sharing programs can be successful.** While higher concentration of jobs and population can enhance the ridership of a bike share system,⁹ early reports from existing small system managers indicate that bike share programs can be successfully implemented in jurisdictions with relatively modest density compared to their more urban counterparts. However, the long term prognosis for the success for small and suburban bike share programs will require additional assessment as these programs mature.
- ii. **Evaluating customer information and feedback is important for system improvement.** New programs should request customer feedback to improve system performance. Additionally, by taking into consideration public opinion, new bike sharing programs will be able to target new areas for potential expansion.
- iii. **Mobile and web applications enhance system functionality.** New programs should consider how sharing real-time ridership data with customers can boost system functionality and enhance user experience.
- iv. **Data analysis is important to help increase public support for the program.** New programs should consider the promotion of open data to help increase public support for implementation and potential future expansions of the program.

See Chapter 5 of this guide for more information.

ADDITIONAL CONSIDERATIONS FOR SUCCESS

As a relatively new phenomenon, there is limited availability of data on the implementation of bike sharing programs in the U.S. The following is a list of additional considerations:

- i. **Bike share programs should work hand-in-hand with other efforts to accommodate and encourage bicycling.** Bike share programs can increase the visibility of bicycling within a jurisdiction, helping to achieve larger mode-shift and climate change goals. Additionally, based on the experience of existing programs, bike share systems can give additional impetus to efforts to improve bicycle infrastructure.
- ii. **Bike share programs should promote helmet use.** Helmet use should be strongly promoted, and mechanisms should be used to increase access to helmets (i.e. making them available for discount purchase when applying for membership). Jurisdictions with mandatory helmet laws for adult bicyclists have additional implementation considerations to address. In general, it should be the responsibility of the individual to provide their

own helmet in order to participate in bike share.

- iii. **Bike share programs should strive for participation among low income and minority populations.** Bike share programs continue to face challenges reaching these populations, despite a number of innovative approaches. Long term success will depend in part on being able to show that bike share can serve everyone.
- iv. **Bike share programs should be integrated with other alternative transportation options to provide multiple choices depending on the direction and purpose of each trip.** Jurisdictions implementing bike share should integrate the system with other transportation options, such as car sharing and transit connections, so that users can go from rail, to bus, to bike, to car with relative ease. Recent reports indicate that bike share systems can have a positive impact on local bicycle retail business. San Antonio and Washington, D.C. are jurisdictions that have seen an increase in retail bicycle sales since deploying bike share systems.¹⁰

Additional information can be found on Chapter 6 of this guide.



Figure 5: Nice Ride users
Credit: Nice Ride (Minneapolis/St. Paul, MN)

CHAPTER 2. EVOLUTION OF BIKE SHARING IN THE U.S.

2.1 BACKGROUND

In 2008, Washington, DC became the first major city in the United States to implement a modern bike share program. Smartbike DC included ten stations and 120 bicycles and was implemented through a cooperative agreement with Clear Channel Outdoor, an advertising company.¹¹ In the spring of 2010, Denver became the second jurisdiction to implement a major bike share program through a successful public-private partnership. As of March 2012, nearly 20 bike share systems exist in small and large cities across the U.S., and over 20 are in active planning stages. With interest in bike share spreading over many jurisdictions throughout the U.S., it is increasingly important to document the lessons learned by the pioneering programs and to identify lessons learned for the next wave of communities that will implement bike share.

Specifically, the guide contains the following information:

- **Provides an overview of the concept of bike sharing.** The guide seeks to provide a common understanding of what a bike sharing program is, present a brief history and evolution, and describe current trends.
- **Identifies the steps for establishing a bike sharing program.** This document provides a “How-to-Guide” for moving a bike share program from an idea to reality. In particular, the guide provides insight into the existing implementation models, selection of service area, equipment selection, service hours, sustainability planning and liability considerations.
- **Explores the different funding mechanisms that are currently being used.** This guide identifies the innovative ways in which different systems have combined funding sources to finance the roll out and on-going operation of a bike share program.
- **Discusses additional considerations for implementing a bike share system.** This



Figure 6: Capital Bikeshare bicycle
Credit: Capital Bikeshare (Washington, DC Area)

includes a look at the potential challenges rising from mandatory helmet laws, how to address environmental justice concerns and the potential synergy resulting from integration with other modal options.

The following information gathering and analysis methods were employed to complete this guide:

- **A bike sharing advisory group was convened to provide oversight and guidance.** The group consisted of managers and planners from twelve different jurisdictions implementing or planning for the implementation of bike sharing programs in the U.S.
- **A literature review of previous U.S. and international bike sharing research was performed.** Additionally, several publically accessible bike share program feasibility analyses implementing bike sharing systems were evaluated.
- **Twelve existing and planned U.S. bike share programs were analyzed.** Telephone interviews were conducted with selected bike share program managers. Demographic and employment data from each of the cities identified for this study was reviewed. A cursory investigation of additional existing U.S. bike share programs was conducted.

To ensure the guide's applicability to the broadest possible audience, the bike share programs selected for the in-depth analysis varied in size of program, jurisdiction size, geographic representation, stage of implementation, and types of technology used. The following programs were selected:

East Coast

- Hubway (Boston, MA)
- Capital Bikeshare (Washington, DC/Arlington, VA)

Southeast

- Deco Bike (Miami, FL)
- Spartanburg B-cycle (Spartanburg, SC)

Midwest

- Nice Ride (Minneapolis, MN)

Mountain West

- Denver B-cycle (Denver, CO)
- Boulder B-cycle (Boulder, CO)

Southwest

- San Antonio B-cycle (San Antonio, TX)

West

- Zotwheels (University of California, Irvine)*

**Zotwheels was included to provide insights into university owned and managed programs. While this guide shares lessons learned from the Zotwheels program, the findings are focused on urban bike sharing programs.*

In addition to investigating nine operating bike share programs, three cities in the preliminary stages of implementation were included in the analysis to provide perspective of jurisdictions engaged in system planning. These jurisdictions included Atlanta, Georgia; Baltimore, Maryland; and Chicago, Illinois.¹²

In addition to domestic research, this Guide builds upon lessons learned by European and Canadian bike share programs. This guide builds on existing international research into bike share implementation including the *Optimizing Bike Sharing in European Cities – A Handbook* which documents the implementation of programs in Europe.

Appendix E of this guide provides a complete profile of each of the jurisdictions studied, and is organized to allow quick analysis and comparisons.

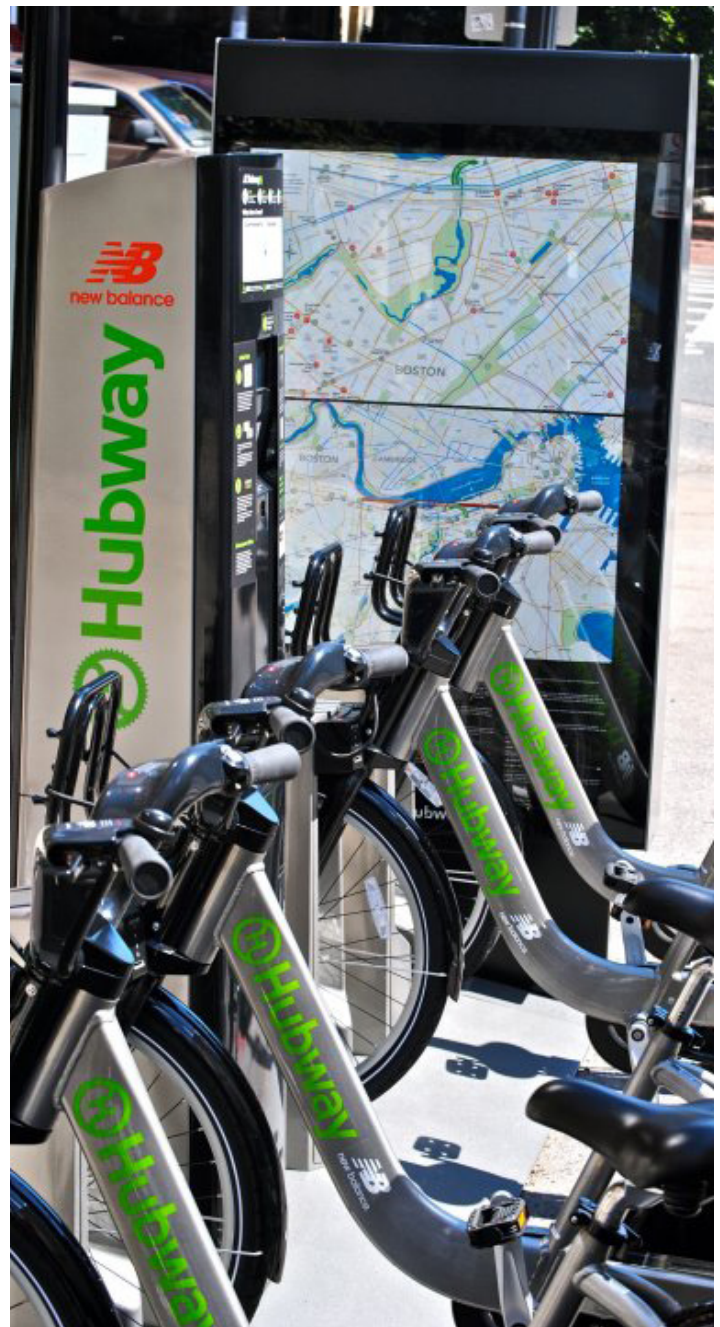


Figure 7: Hubway station
Credit: Hubway (Boston, MA)

2.2 WHAT IS BIKE SHARING?

Bike sharing is a nonmotorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (0.5 to 3 miles). It provides users the ability to pick up a bicycle at any self-serve bike station in the network and return it to any bike station located near their destination. Bike sharing differs from traditional bicycle rental services in a number of ways:

- It is oriented to short-term, one-way use: 30 to 60 minutes rather than daily or weekly rental periods.
- The bicycle can be returned to any number of unstaffed bike sharing stations, as well as the original rental location.
- Generally, only one style of bicycle is available.¹³
- The rental transaction is fully automated and there is no need for on-site staff. Additionally, the hours of operation can be programmed or adjusted based upon a jurisdiction's unique needs.
- Because the bicycle is parked at a special docking station, the user is no longer responsible for the bicycle when the trip is finished, minimizing user liability and the responsibility for providing sufficient security.

To date, bike share systems in the U.S. have been implemented primarily in core urban areas.¹⁴ As of March 2012, approximately 40 systems in the U.S. are either operational or in the planning stages.¹⁵ For most existing U.S. bike share systems, the local government (i.e. town, city, county, etc.) has played a leading role either by initiating, funding, administering, operating or permitting the program.

2.3 WHY BIKE SHARING?

Bike sharing systems have evolved primarily as a means to make bicycle travel in urban areas available to a wider range of people. A shared bike service makes both spontaneous and planned urban trips possible by bike and can be an ideal complement to transit trips as it provides first mile and last mile connections. Moreover, bike sharing programs can contribute to reduced traffic congestion, reduced use of fossil fuels, reduced pressures on motor vehicle parking supply, and increased use of transit and other single occupant vehicle alternatives (e.g., rail, bus, car-sharing).¹⁶

Bike sharing can reduce the personal cost of urban transportation by offering an affordable public transport option.¹⁷ To this end, bike sharing pricing schemes typically offer the first 30-to-60 minutes of every ride for free, which encourages high turnover of the bikes and increases the probability that stations will have sufficient bicycles available to meet market demand.



Figure 8: Automated bike share station
Credit: San Antonio B-cycle

Bike sharing programs offer environmental, social, economic and public health benefits. Some cities are implementing a bike share program to reduce their car-related carbon emissions for “last mile” trips.¹⁸ Several existing bike share programs are providing detailed tracking of health benefits of trips taken via bike share, such as calories burned.¹⁹ Bike share programs can also support a variety of economic development initiatives including tourism and urban redevelopment. For example, Capital Bikeshare has responded to system demands by deploying stations around the National Mall and with proximity to local hotels to help provide additional transportation options for tourists and residents alike.

Finally, jurisdictions can benefit from the relatively lower implementation and operational costs, and flexibility as bike share programs can be installed and open for business in months rather than years.²⁰

2.4 BIKE SHARING IMPLEMENTATION IN THE U.S.

The history of bike sharing implementation in the U.S. has followed the evolution of bike sharing in European cities and can be traced through three generations:

- 1. Free Bike Programs:** The free bikes generation started in Amsterdam (Netherlands) with the implementation of the white bikes program which offered free unlocked bikes throughout the city core for free public use. The first documented similar program in the U.S. was established in Portland, Oregon in 1994 by the United Community Action Network, a local nonprofit organization focusing on environmental issues.²¹ Unfortunately, due to a variety of issues, including theft and damages to the bicycles, the bike plan failed soon after its launch.
- 2. Coin Deposit Systems:** Coin deposit systems started in the 1970-80's and offered bikes for hire throughout designated docking stations containing coin slots and small deposit boxes which reimbursed the coins when the bicycles were returned. The first coin-deposit system in North America was established in the Twin Cities in 1996. This Yellow Bike Project used 150 bicycles placed throughout a network of designated locations.²² While these improvements increased the chances for success of the programs, the bicycles were still vulnerable to theft because the system did not require any user registration prior to checkout. Furthermore, the coin deposits were small and did not guarantee that the bikes would be returned.²³
- 3. Automated self-serve kiosks:** Modern bike sharing systems include automated self service kiosks at every station.²⁴ These “third generation” bike sharing systems also include a more comprehensive set-up for user registration, deposit, and route tracking as well as operations and bicycle re-distribution that respond to user patterns and demand. Most existing systems include physically distinct bicycles (design and color) and automated kiosks/docking stations with secure docking mechanisms and an electronic user interface for bike checkout. Advanced radio frequency identification (RFID) technology (i.e. Smartcards, magnetic fobs, etc.) and specialized wireless technology give users the ability to check out



Figure 9: Spartanburg B-cycle
Credit: Carroll Foster (hoteyephoto.com)

a bike whenever and wherever they find a stocked bike station. The introduction of RFID technology has also allowed existing programs to track bicycle usage and user information, helping curb bicycle theft which was a major drawback for prior system generations. Some third generation systems include GPS technology which allows them to follow ridership patterns in real time, and in turn, drive daily redistribution efforts and provide useful data for planning system expansion.²⁵

As expressed before, Washington DC was the first jurisdiction to implement a third generation bike sharing system in the U.S. in 2008. The system was called SmartBike and was replaced in 2010 by Capital Bikeshare. Denver, Colorado and Minneapolis, Minnesota later followed with their introduction of Denver B-cycle and Nice Ride programs respectively. All systems analyzed in this guide are in this third generation group.

2.5 EMERGING TECHNOLOGIES

- a. Integration with transit:** In recent years, various jurisdictions have started investigating the use of a single integrated payment system to allow for the use of both transit and the bike sharing system. By integrating RFID technologies transportation planners hope to make it easier for users to access rail or bus services for longer distance trips and switch to a bicycle for the “last mile” trip. This integration can be extremely valuable as it has the potential to enlarge the “catchment” area of a transit station and help curb congestion and pollution rates by connecting more people to transit alternatives.



Figure 10: Electric bike
Credit: giel.com



Figure 11: ViaCycle station-less bicycle (Atlanta, GA)
Credit: ViaCycle.com



Figure 12: Hubway bicycle specialized shape
Credit: Hubway (Boston, MA)

- b. E-bikes:** Electric bikes or “E-Bikes” have gained popularity in some communities. E-bikes use an electric motor to provide pedal assistance when and where a small boost is needed (i.e. up hills or when carrying a heavier load). Most E-bikes include a rechargeable battery that lasts approximately 20 hours, depending on the usage patterns.²⁶ As of March 2012, the San Francisco Bay Area is in the planning stages for the implementation of a pilot program of regional bike share. This program intends to offer a combination of traditional and e-bikes, and will open up additional parts of the city that can be served by bike share and a larger potential customer market.²⁷ The program is being funded by a grant from FHWA’s Value Pricing Pilot Program, and will be administered by a local car sharing co-operative.²⁸ Finally, the University of Tennessee—Knoxville has been testing an electric bicycle sharing system.²⁹ Information on the success of the program was not available for inclusion in this report.
- c. Station-less bike sharing:** An additional emerging technology is the station-less bike sharing system. In this system, all that is needed are bicycles with an electronic locking system which uses GPS and

wireless communications (i.e. cell phone). All necessary security and checkout infrastructure is located on each bicycle, eliminating the need for kiosks, or specialized bike docking racks. The electronic lock, which is usually located at the rear of the bike, handles all check-in and check-out functions, transmitting the usage and location of each bicycle when needed, and monitoring maintenance needs and unauthorized use.³⁰ Current models require users to pre-register online, then walk to any bike share bicycle and quickly check it out by using a mobile phone to send a text message with their user PIN and the clearly labeled bicycle ID number.

Two factors have led to the growing level of interest as well as political and financial support for bike share throughout the U.S.: the rising popularity of bicycling as an urban travel mode, and technological innovations that have made it possible to nearly eliminate the problem of theft and vandalism in modern bike share programs. As technology continues to evolve, it is quite possible that the methods of implementing bike sharing programs throughout the world will evolve in new and interesting ways that make bike sharing a feasible and affordable option for a wide spectrum of users and trip types.

CHAPTER 3. PLANNING

As with any new transportation service, bike sharing requires an up-front planning phase prior to launching service. The characteristics of this planning phase have greatly varied among the communities throughout the U.S. that have implemented bike sharing programs. Some have conducted formal feasibility studies, while others have proceeded with various aspects of the planning process in a less formal structure.

The information-gathering phase should be conducted in an unbiased manner. While it is important to understand bike share vendors' perspective on implementation, it is also important to maintain a healthy separation between the jurisdiction's goals and objectives for the program, versus the vendor's preferences.

There are a several questions that should be considered prior to embarking on bike share implementation:

- 1. Is a bike share program appropriate for my jurisdiction?** In many cases, the answer to this question is assumed to be “yes,” particularly if the program is being planned within a jurisdiction where there is strong political and financial support. However if political support is tepid and no clear champion for bike share exists within the community, a bike sharing program may be less feasible. To this end, public participation and support is of vital importance to the implementation of a bike share program. It is also important to point out that implementation of bike sharing in the U.S. has primarily been in core urban areas. There has been far less experience implementing bike sharing in suburban areas. Thus the best way to implement a bike share program in these communities has yet to be established.
- 2. What will the goals of this bike sharing program be?** It can be helpful to establish metrics for success early in the program, to ensure stakeholders are in agreement, and to structure the program to achieve the objectives. Some communities have set goals that are focused on economic sustainability. Other jurisdictions have set goals that relate back to additional transportation goals established through other planning processes (ex. goals to increase bicycling, and reduce carbon emissions).

Proposed Seattle Bike-Share Implementation Phases

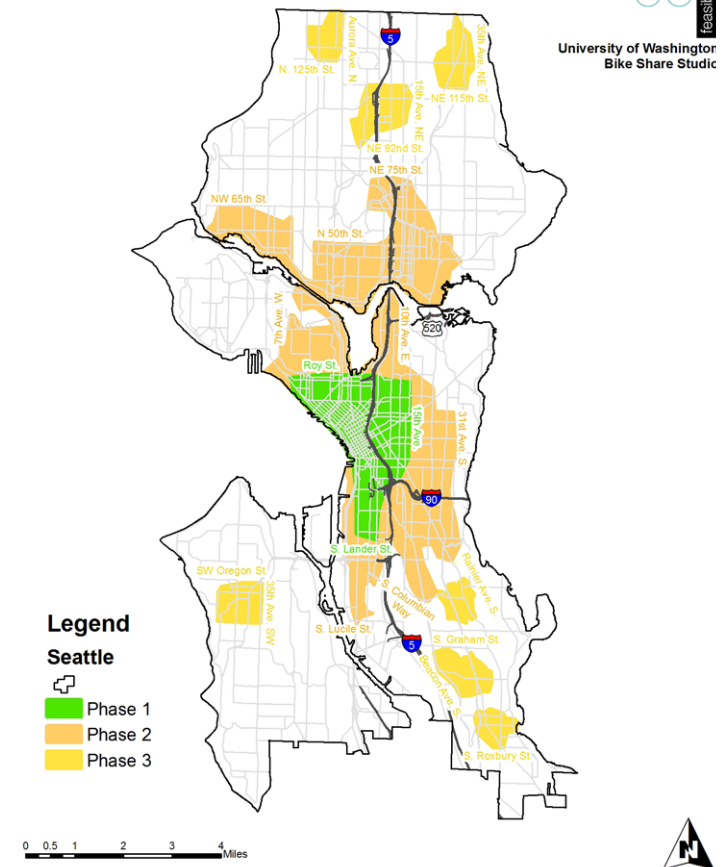


Figure 13: Heat map analysis of feasibility study conducted for the City of Seattle
Source: Feasibility Study for a potential bike share program in the City of Seattle

In communities where funding for the program has come from health foundations or other similar sources, the goals of the program have been oriented to health outcomes. Finally, the goals of the program should be revisited periodically throughout implementation, as experience is gained, and new realities emerge.

- 3. What will the initial service area for the program be, and where will the stations be placed?** A critical task for bike share implementation is to determine the best area for deployment of a network of stations. Bike sharing programs are most successful in areas that have a mixture of land uses which tend to help generate a variety of trip

types throughout the day.³¹ Connections to other modes of transportation are also important – this gives users the ability to use bike share to increase the efficiency of transit trips, for example.³² More guidance on this aspect of bike share is provided below.

4. How will the program be paid for, and how will it be operated? These are two fundamental questions that have a great impact on the way bike sharing programs are implemented. To date, there has been a variety of funding and operating models in the U.S., and no clear consensus on what the “best” model is. This report describes the general spectrum of funding and operating models as of early 2012. Finally, an early review of local regulations can help

determine if the use advertising and/or sponsorship is allowed to help provide additional funding sources. More information is provided in Sections 3.3 and 3.4 below.

5. Can the program be integrated with other transportation services, and if so, how? Bike share is more convenient to its customers when it is seamlessly integrated with other modes of transportation, particularly transit and pedestrian trips. It is therefore important to place stations where they are accessible to people arriving or departing from transit stations and on foot. Future innovations in bike share are likely to improve the connection between transit, bike sharing and car sharing, so the user can easily choose the most efficient and effective mode of transportation given the particular set of circumstances.

6. What is the timeframe for roll out, and what are options for future phases? Establishing a schedule for roll out is a fundamental aspect of the planning process. This schedule should account for time constraints of various funding sources, as well as the time of the year and need to maintain momentum. Many systems envision a phased roll out that includes a core service area that will be expanded over time to include additional areas of the community.

7. What are other local transportation issues, services and policies that could support or hinder success of the program? Each community is unique, with its own set of transportation issues that must be taken into consideration when planning a new bike share system. This report explores various issues that have been a factor in existing programs (see Sections 3.6 and 3.7).



Figure 14: San Antonio B-cycle staff
Credit: San Antonio Bikes

3.1 SELECTING A SERVICE AREA

Higher use bike share stations tend to be located in higher density areas (i.e. those areas with higher population and job rates, and with higher levels of commercial activity), and with high levels of pedestrian activity. Topography is also an important consideration related to service area siting. Implementation of a system may be more complicated in jurisdictions with steep (or even rolling) terrain.³³ Jurisdictions with steep slopes may want to consider, to the degree that this is possible, initial implementation in parts of the community that are relatively flat. Finally, the size of the service area will be dependent on the size of the jurisdiction. Existing bike share programs in the U.S. that were part of this analysis include a service area coverage of 1.5 square miles (Spartanburg, SC) to 36 square miles (Washington DC area).³⁴

Many bike share programs have developed “heat maps” that help to define the initial service areas for the system. The following are typical factors in the development of these maps:

- **Population Density:** Higher population densities tend to support higher bike share demand by providing a pool of regular users. Higher population densities tend to correlate with reduced rates of auto ownership as well.³⁵
- **Employment Density:** Higher employment density yields greater access to potential bike share users. Employment density and location can also help determine how the pattern of morning commute may affect the distribution of bike share rides throughout the service area.
- **Proximity to Colleges and Universities:** Student populations can be a likely market for bike sharing programs because of their lower rates of automobile ownership. Universities located in urban settings tend to be surrounded by mixed-use development which further supports bike share usage.³⁶
- **Retail/Commercial Activity Density:** Commercial activity is usually included in the analysis because of its function as a trip attractor and its potential to have an effect on ridership and distribution of bicycles.

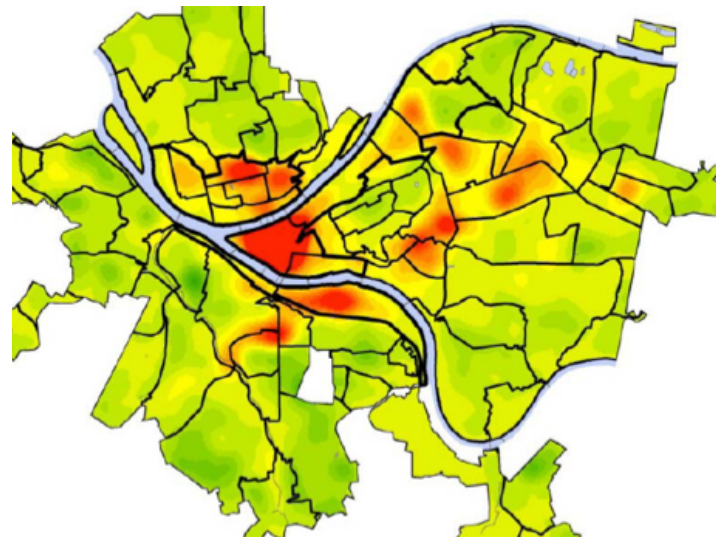


Figure 15: Heat map analysis (City of Pittsburgh)
Source: Feasibility Study for a potential bike share program in the city of Pittsburgh

- **Available bicycle infrastructure:** Bicycle lanes, bike boulevards, cycle tracks and shared use paths provide supporting infrastructure for bike share users and should be included in the analysis.³⁷
- **Proximity to tourist attractions and recreation areas:** Bike share rides generated by tourists have the potential of becoming a considerable source of revenue for a bike share system.³⁸ Some tourist areas are congested, putting pressures on existing transportation infrastructure. A bike share program increases mode share choices and providing quicker access to recreational areas.
- **Available Transit:** In large cities, bike sharing programs are often organized to provide better service for the first and/or last mile of a trip taken on public transit. The goal is to create a connected transportation experience with less time used for transfers and access to and from the transit service.
- **Topography:** Steep inclines can be a deterrent to bicycling. Slopes at a grade of 4% or higher are considered a major barrier for bicyclists.³⁹ Existing systems reported lower usage to stations that are located in higher elevations within the system, which creates challenges for redistribution.⁴⁰

In most instances, a phased approach to implementation may be the best way to ensure jurisdiction-wide access and buy-in necessary to get the program launched.

3.2 STATION DENSITY/SITING

Most existing U.S. systems include a range of 3.5 to 5 bike share stations per square mile of service area, although Deco Bike in Miami Beach has a station density of almost 14 stations per square mile.⁴¹ As a general rule in urban areas, bike share stations should be placed at approximately ½ mile from each other. This range is directly related to the distance a person would have to walk to a station.⁴² This may be problematic for permitting and spacing requirements. The ideal location in terms of demand does not always coincide with the ideal location in terms of physical space.⁴³ Lastly, financial considerations (i.e. capital and operational costs) have a direct impact on the number and separation between stations feasible for a jurisdiction.

Bike share stations should be placed in safe, convenient, and highly visible locations. If stations are intended to serve a transit stations or hubs, they should be visible from the entrance/exit of the station, and should not interfere with the normal use of the public space in which they are located, such as pedestrian travel along sidewalks and vehicular movements along roads. Bike share stations should not interfere with bicycle movements along trails or in nearby bicycle lanes or cycle tracks. Ideally, stations should be placed in close proximity to bicycling infrastructure (ex. bike lanes, shared use paths, etc) to increase connectivity to the jurisdiction’s bike network.⁴⁴

While most bike share stations are modular, there are certain minimum siting requirements. Figure 17 provides an overview of the appropriate dimensions

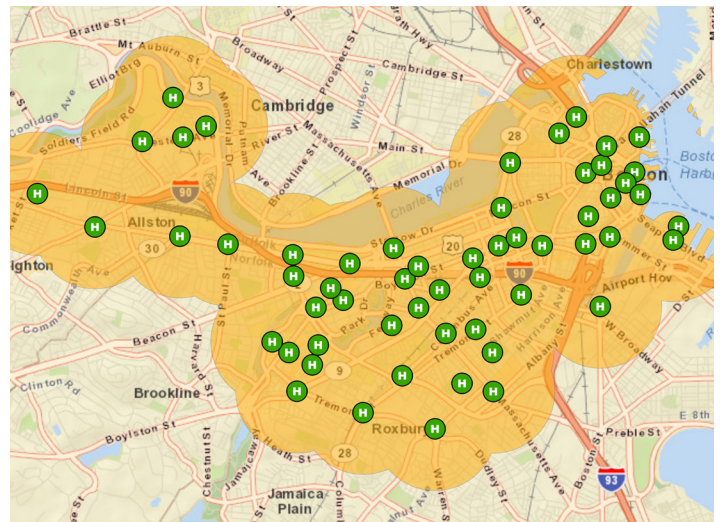


Figure 16: Hubway stations (Boston, MA)

for an 11 dock bike share station which requires an approximate space of 32 feet wide and 12 feet deep (these figures accommodate the station infrastructure as well as access space) depending on the type of technology employed. Additionally, stations with solar power require access to sunlight for a minimum portion of the day (around 4 hours), and a vertical clearance of at least 11 feet.⁴⁵ Table 1 summarizes typical spacing requirements and typical weight of each station.

There are also two-side stations available from some bike share equipment providers. These stations can almost double the bicycles that can be stored in the footprint of a single sided station’s footprint. These two-sided stations will require access space on both sides to check out and return bicycles (See Figure 18).

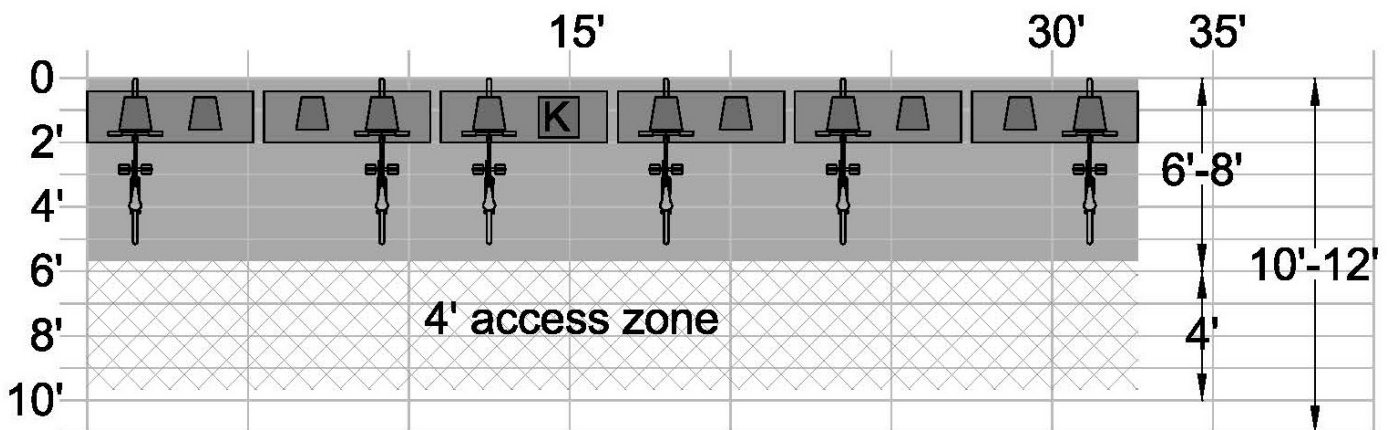


Figure 17: Station Dimensions for an 11 dock station. (NOTE: 'K' indicates the location of the automated customer kiosk)

TABLE 1 – STATION DIMENSIONS AND WEIGHT⁴⁶

Docks	Width	Station Depth	Access Depth	Total Depth	Weight
11	31' to 32'	6' to 8'	4 feet	10' to 12'	3000 to 5000 lbs
15	40' to 42'	6' to 8'	4 feet	10' to 12'	4500 to 5500 lbs
19	50' to 52'	6' to 8'	4 feet </td <td>10' to 12'</td> <td>5500 to 6500 lbs</td>	10' to 12'	5500 to 6500 lbs

3.3 SELECTING A BUSINESS MODEL

As of early 2012, three types of business models have generally been used for bike share programs in the U.S.: jurisdiction owned and managed, nonprofit owned and managed, and for profit owned and managed. The characteristics of each particular model determine how the program will be financed, who will undertake day-to-day operations, and what type of bicycle and kiosk hardware will be deployed.

In addition to programs that align closely with the business models described in this Guide, there are some bike share programs that are hybrids between the models. Bike sharing is a new and dynamic transportation service, therefore new combinations and strategies are emerging with each new implementation project.

The following is a description of the three business models. They are also summarized in Table 2 on page 23.

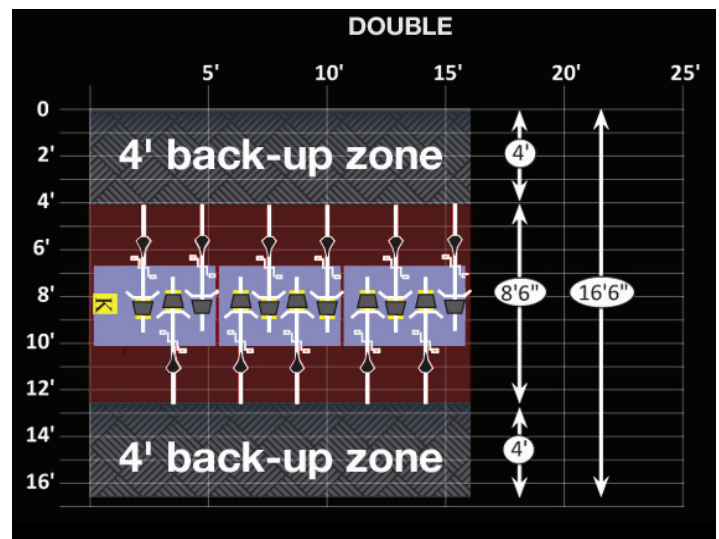


Figure 18: B-cycle double sided stations
Source: B-cycle

JURISDICTION OWNED AND MANAGED

In this model, the jurisdiction pays the up-front capital costs, and owns the infrastructure and equipment (i.e. bicycles and bike stations). The jurisdiction works with a private contractor which handles membership management, customer service, marketing, bicycle redistribution, data management, and maintenance of stations and bicycles. In this model, the government accepts financial responsibility for the program, while the private contractor accepts liability exposure.



Figure 19: Deco Bike
Credit: Deco Bike (Miami Beach, FL)

An identified variation of this model has allowed for advertising and sponsorship concessions. In this approach, the jurisdiction owns the equipment and shares the capital as well as the operation and management costs with a private contractor. This allows the operator to include advertising and sponsorship opportunities to fund the program and generate additional revenue which can be shared between the jurisdiction and the private contractor.⁴⁷

Funding: Systems subscribed to this model tend to include a mix of Federal, State and local grants, as well as private contributions in the form of sponsorships. Jurisdictions using this model have used Congestion Mitigation and Air Quality Improvement (CMAQ), and other Federal transportation program funding. Additional funding comes from revenues generated from membership and usage fees.⁴⁸

Benefits and shortcomings: Local government ownership can allow for greater control over the bike share station permitting process, station locations, definition of the service area and overall deployment. Additionally, systems using this model have been able to use profits to fund program improvements and expansion of service to additional areas.⁴⁹ The independent contractor accepts liability, thereby limiting the jurisdiction's exposure.⁵⁰

Since a portion of the funding is provided by Federal programs, navigating the funding process may take longer than other funding methods and may result in additional constraints including Federal environmental regulations (e.g. National Environmental Policy Act – NEPA) and Buy America provisions (see Section 3.4 for more information) which may create additional hurdles.

Finally, if advertising revenues are desired, the jurisdiction may encounter legal restrictions to advertising in public space, as some jurisdictions do not allow it. Also, as the cost-sharing goals for jurisdictions and vendors may not be fully aligned, local jurisdictions require additional financial management and negotiating skills to reach agreements that maximize public benefits and ensure that revenues are directed to enhancing the program.

Examples: Capital Bikeshare, the multi-jurisdictional system that operates in Washington, DC and Arlington County, VA, is an example of this type of model. In this partnership, both governments serve as co-owners of the equipment, sharing the costs and any revenues



Figure 20: Capital Bikeshare user
Credit: Capital Bikeshare

generated by system, while contracting all day-to-day activities to a third party operator.⁵¹ Another example of this model includes Boston's Hubway, which requires its operator to share a percentage of any profits, while being able to sell advertising on each bicycle and sponsorship for each station.

NONPROFIT OWNED AND MANAGED

In this model, a nonprofit organization manages operations and service. The nonprofit may have been explicitly created for the operation of the bike share program, or it may have already been in existence and added bike sharing service to its existing programs. Local jurisdictions have participated in two ways in this model: 1) the nonprofit organization receives start up funding and some funding for operations from local and State governments; and/or 2) the local jurisdiction acts as a fiscal agent to request Federal funding and passes funds to the nonprofit. This model removes most of the financial liability from the jurisdiction and places it on the nonprofit organization, which is responsible for both fundraising and managing operational revenues and expenditures.

Funding: Systems using this model tend to use a broad mix of funding sources. Examples include private funding from foundations, local/national energy conservation and/or health grants, and local business sponsorships.⁵² Through this model, the nonprofit organization may be tasked with providing a financial match to receive certain grants. Because the organization is a nonprofit,

revenues generated by membership and usage fees, as well as sponsorships, are typically reinvested into the program.⁵³

Benefits and shortcomings: Benefits include government relief from most of the financial liability. Additionally, nonprofit organizations are often better able than government agencies to attract and co-mingle funding from different sources. Nonprofit organizations tend to be more nimble, adapting the bike share system to user needs. They are generally not required to go through all the procedural hurdles that government agencies may be required to. However, due to the nature of nonprofit organizations and their reliance on intensive fundraising strategies as a source for revenue, a large percentage of staff time may be consumed pursuing additional funding.⁵⁴ This may in turn, slow implementation or expansion of the system.

Examples: Boulder B-cycle, Denver B-cycle, Nice Ride MN (Minneapolis/St. Paul), San Antonio B-cycle and Spartanburg B-cycle have favored this implementation mechanism.

FOR-PROFIT BUSINESS

In this model, a private company provides, owns and operates the service and government involvement may be limited to certain aspects of planning for the stations, such as the issuing of necessary public space permits. To cover permitting costs for the use of public space, the private bike share company may be required to provide a percentage of profits to the jurisdiction (around 10-25% of profits in one example studied).⁵⁵ To generate additional profits, the bike sharing company may sell advertising space on its bicycles and stations. It is important to note that several successful European bike share models including Paris and Barcelona use this approach.

Funding: All capital expenses and operating costs are managed by the for-profit company, relying on a mix of revenues including private investment, sales of advertising on bicycles, stations, and membership and usage fees.

Benefits and shortcomings: The financial liability rests primarily with the for-profit business. Capital financing for implementation and expansion may be assembled and deployed more quickly, thus these systems may be able to respond to market demands more quickly.

As this model is oriented to market-driven deployment



Figure 21: Boulder B-cycle
Credit: Mat Barlow - Boulder B-cycle

of stations, expansion of the network is likely to happen only where it will result in profitable service. Finally, this model typically involves limited local government oversight which may result in a reduced ability to ensure that the service meets certain accessibility and equity goals the jurisdiction may have.

Example: Miami Beach's Deco Bike is the U.S.'s first

example of this model, with a local business running the service in a locality that receives a percentage of all profits in exchange for public space usage and permitting.

CHARACTERISTICS IN COMMON BETWEEN MODELS

While the models have core distinctions, there are several shared characteristics, including the following:

- Jurisdictions have encountered siting and permitting issues, although some business models allow for more efficient expedition of public space permitting. Finding the appropriate space for a station and filing the appropriate permitting paperwork can be burdensome, and in some cases it may curtail the deployment of a particular bike share station.
- Federal funding for bike share programs may be subject to additional regulations which may delay deployment of program (see Section 3.4 for additional details).
- Because some jurisdictions do not allow certain types of advertising on publicly-owned equipment, or in public space, some revenue sources within each business model may be precluded from the funding mix. Some jurisdictions have moved to amend their

local ordinances to allow for advertising on bike share equipment.

- Jurisdictions considering regional deployment should consider cross-jurisdictional agreements delineating individual jurisdiction responsibilities, profit sharing, and cost burdens prior to deployment. This agreement will also help divide the proportionality of costs and revenue between jurisdictions and the operator.

Although there is limited historical data, as most U.S. systems have only been in service for a short time, there may be a relationship between the size of the program and the selection of the business model. Early evidence suggests that small to medium size bike share systems (2 to 50 stations) tend to use the nonprofit model. Some larger systems (50 or more stations) have had more government involvement with the program. This may be related to funding, as large jurisdictions often have more direct access to large transportation funding sources.

Table 2 provides a description of how each model relates to ownership of equipment and day-to-day operations. The table is organized to enable comparisons between existing models.



Figure 22: Deco Bike
Credit: Deco Bike (Miami Beach, FL)

TABLE 2 – BIKE SHARE BUSINESS MODELS

Model	Ownership	Operations	Operating Procedures	Revenue Sources*	Potential Benefits	Potential Short-Comings	Examples+
Jurisdiction Owned and Managed	Jurisdiction	Independent contractor	<p>Provide bike sharing services under supervision of local public authority.</p> <p>Net revenues are reinvested into the program.</p> <p>Jurisdiction provides majority of capital funding.</p> <p>Contractor may use advertising and sponsorship to maximize revenues.</p> <p>All capital costs are covered by jurisdiction.</p> <p>Jurisdiction and contractor share net revenues.</p>	<p>Federal, State and local grants.</p> <p>Advertising and sponsorship.</p> <p>(Various sponsorship options including title sponsor, local businesses, advertisements on bike share equipment and communications, etc.)</p> <p>Membership and usage fees.</p>	<p>Greater control over permitting and deployment of stations.</p> <p>Reinvestment of profits is controlled.</p>	<p>Jurisdiction is financially liable for costs of program.</p> <p>Assembling funding sources may require more time.</p> <p>Some jurisdictions do not allow advertising on public space.</p> <p>Requires contract negotiation skills.</p>	<p>Capital Bikeshare (Washington, DC and Arlington County)</p> <p>Hubway (Boston)</p>
Nonprofit Business	Nonprofit organization	Nonprofit organization	<p>Nonprofit entity may be created to provide services under support of jurisdiction.</p> <p>Jurisdiction may provide some of initial capital while nonprofit charged with providing additional funding.</p> <p>Most operating costs are assumed by nonprofit.</p>	<p>Federal, State and local grants.</p> <p>Local/national foundation grants.</p> <p>Local business sponsorship.</p> <p>Membership and usage fees.</p>	<p>Reduced financial liability for the jurisdiction.</p> <p>Reinvestment of profits is controlled.</p>	<p>Reliance on fundraising for private grants can slow down deployment and expansion.</p> <p>Limited jurisdiction oversight.</p>	<p>Boulder B-Cycle</p> <p>Denver B-Cycle</p> <p>Nice Ride MN</p> <p>San Antonio B-Cycle</p> <p>Spartanburg B-Cycle</p>
For-Profit Business	Private company	Independent contractor	<p>Provide bike sharing services with minimal government involvement.</p> <p>Jurisdiction does not provide funding, only certain aspects of planning for stations.</p> <p>Percentage of profits is shared with jurisdiction in exchange for use of public space and permitting costs.</p>	<p>Private investment.</p> <p>Advertising and sponsorship on bicycles and bike sharing stations.</p> <p>Membership and usage fees.</p>	<p>Startup capital may be assembled more quickly.</p> <p>Flexibility to adjust the system to reflect changes in market.</p>	<p>Limited jurisdiction oversight.</p> <p>Requires contract negotiation skills.</p>	<p>Deco Bike (Miami Beach)</p>

* The revenue sources identified are not limited to each particular model.

+ Existing programs are placed in the category that most closely matches their characteristics. However, many of the programs studied for this Guide did not fall completely within a single category.

3.4 IDENTIFYING AND SECURING FUNDING

There are four basic types of funding: private, public, membership and usage fees, and selling of advertising/sponsorships. While programs have reported using multiple funding sources, generally, public funds and private foundations grants have been used to cover capital costs. Membership and user fees, as well as advertising/sponsorships revenues have typically been used to cover on-going operational costs. A balanced financial plan (covering initial capital investments as well as long term operating costs) is an important early task for new bike share programs. The following is a detailed description of each of the four types of funding.

PUBLIC FUNDING

Public funding represents a large portion of the total funding allocated for many of the programs reviewed for this Guide.⁵⁶ While various sources of public funding were identified (including Federal, State and local funds), most were derived from Federal sources in the form of transportation funds and health and sustainability grants. Some of these Federal grants provide dedicated funding for long periods of time (two to five years).⁵⁷

Jurisdictions accessing Federal funds should be aware that this type of funding may include additional requirements including “Buy-America” provisions which provide for a “a domestic manufacturing process for any steel or iron products (including protective

coatings) that are permanently incorporated in any project; alternate bid provisions; minimal usage criteria for non-domestic products; and a waiver process based on public interest or the availability of domestic products.”⁵⁸ This provision may curtail the procurement of bicycles and some parts of bike share stations if they are not manufactured in the U.S.

Additional requirements may include environmental assessments (i.e. NEPA studies) and accessibility considerations (i.e. requiring that the program considers how to serve people with disabilities as well as minority and low income communities). Additionally, Federal funds can be less flexible in terms of timeframe and delays are common – this can make deployment more difficult, particularly given the high profile nature of bike share roll out in many jurisdictions. Furthermore, the selection of a particular business model may impact a program’s eligibility for Federal funding, since certain funds may only be accessed by government agencies. Finally, Federal funds can only be used for capital costs and therefore cannot be utilized for system operations.

Table 3 provides an overview of public funding sources used by existing bike share programs reviewed for this Guide.

PRIVATE FUNDING

Seven of the twelve programs reviewed for this Guide used private funding to cover a portion of capital costs and/or day-to-day operations. Private gifts and donations are an important funding source in

TABLE 3 – EXISTING SOURCES OF FUNDING USED BY PROGRAMS STUDIED FOR THIS GUIDE⁶⁴

FEDERAL					STATE and LOCAL
U.S. Department of Transportation (USDOT) ⁵⁹		Centers for Disease Control (CDC)	Department of Health and Human Services (HHS)	Department of Energy (DOE)	
Federal Highway Administration (FHWA) ⁶⁰	Federal Transit Administration (FTA) ⁶¹				
Congestion Mitigation Air Quality (CMAQ)	Job Access Reverse Commute (JARC)				
Surface Transportation Program: Transportation Enhancements (TE)	Bus Livability Pilot Programs	Health and Obesity Prevention Grant	Communities Putting Prevention to Work ⁶²	Energy Efficiency Conservation Block Grant ⁶³	Local Transportation Funds
Transportation, Community and System Preservation Program (TCSP)					
Transportation Investment Generating Economic Recovery (TIGER) Grant	Paul S. Sarbanes Transit in Parks Grant Program				
Nonmotorized Transportation Pilot Program					

jurisdictions implementing their programs through the nonprofit model. For example, Boulder B-cycle⁶⁵ and Denver B-cycle⁶⁶ reported receiving between 5-10% of their funding from private gifts and donations.

Private funding can come in many different forms and can support different aspects of a bike share system. Private funding includes grants from private foundations, as well as private gifts and donations from individuals, sponsorships, and private investment. Currently, the biggest sources for private funding include health related organizations and private local foundations supporting active living initiatives.⁶⁷

CUSTOMER FEES

There are two revenue-generating streams within the customer fee structure of bike sharing programs. These include membership revenue and usage revenue. Existing bike sharing systems have implemented various types of memberships (ex. annual, monthly, weekly or daily memberships) and related fees, in addition to incremental usage fees which are dependent on the total usage time.

Among the programs studied for this guide, membership prices range between \$40 to \$85 for one-year memberships; \$15 to \$60 for a monthly pass; \$15 to \$30 for a three-day or weekly pass (some cities offer three day passes in lieu of weekly passes); and \$5 to \$8 for daily memberships. Annual and monthly memberships are typically purchased by local residents, while weekly and daily memberships target tourists and visitors.⁶⁸

With regards to usage fees, the majority of operating systems offer the first 30-to-60 minutes of every ride for free, which encourages usage of the system for short trips.⁶⁹ Following the free period, a user is required to pay an additional incremental fee for each additional half hour thereafter. This fee structure encourages turnover of the bikes and increases the probability that stations will have a sufficient number bikes to meet demand. Figure 23 features an example of an existing usage fee structure.⁷⁰

Jurisdictions implementing a bike share program should consider the impact of pricing strategies on turnover of bicycles and increased usage for short-term trips. Competitive pricing will increase usage, which may in turn generate increased revenues that can be reinvested into system optimization.

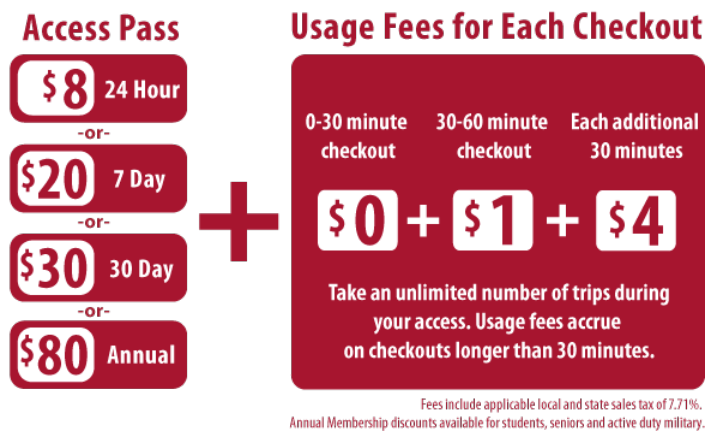


Figure 23: Pricing Structure for Denver B-cycle
Source: Denver B-cycle

ADVERTISING/SPONSORSHIP SALES

Some bike share programs allow the use of advertising on information panels located on stations kiosks throughout the service area.⁷¹ Additional advertising space may be allowed on bicycle fenders (i.e. half-circles measuring approximately 24 inches in diameter) and baskets (see Figure 24). Where such advertising is desired (and permitted by law), new programs should identify potential donors and an appropriate outreach strategy for securing this type of funding.

Local ordinances addressing advertising and sponsorships often impact a jurisdiction's ability to install advertising on the bicycles and/or stations. Jurisdictions considering this funding strategy should investigate their local ordinances early in the process to find out if advertising/sponsorship is allowed in the public right of way and if a public request for proposals is required to secure partnerships with advertising/sponsorship companies. Where local ordinances prohibit or restrict advertising on public property or within the right of way, some jurisdictions are working to amend these rules.⁷² Additionally, if FHWA funds are used there may be restrictions on outdoor advertising.⁷³

Some bike share programs use sponsorships to obtain additional funding. By leveraging sponsorship agreements with local businesses in exchange for recognition, programs are able to increase their available resources. For example, the City of Boston secured a system-wide sponsorship agreement which provides funding for the first three years of the program.⁷⁴ In contrast, Minneapolis secured smaller scale sponsorship



Figure 24: Deco Bike basket advertising
Credit: Deco Bike (Miami Beach, FL)

agreements, enabling the system to cover some capital expenses and operation and management costs.⁷⁵ Boulder B-cycle and Denver B-cycle secured sponsorship agreements for individual bike share stations from local businesses, which are then permitted to advertise on those stations. These types of agreements cover 25-30% of operation and management costs of the program.⁷⁶

3.5 EQUIPMENT SELECTION AND PROCUREMENT

Another step in the planning process is the selection of equipment, including bicycles, docking stations, and communications and data tracking technologies. In the United States, the selection of equipment and technology has usually been coupled with the selection of the vendor through a competitive process.⁷⁷ Some jurisdictions release public requests for proposals detailing specific equipment and technology needs

and wants (among other things). In several situations, jurisdictions that lie adjacent to others have joined into regional agreements with the same vendor to extend service into their jurisdiction.⁷⁸

A key consideration to equipment selection is what type of power supply will be used to operate stations. Currently there are two types of power supply available: 1) alternating current (AC) hard-wired into the power grid, and 2) solar power. The type of power supply impacts total capital costs. Bike share stations using solar panels tend to be more expensive to purchase,⁷⁹ but can be more cost-effective over time as AC-powered stations require additional infrastructure and time for deployment, and cannot easily be moved to other locations. Solar-powered stations are easier to relocate in response to market needs⁸⁰ but are not as easy to locate due to their need for a daily dose of direct sunlight in order to maintain power. In contrast, AC-powered stations can be placed in shady locations without access

to direct sunlight, as well as inside other structures within the built environment.

The costs for procuring the equipment and installing each bike share station (inclusive of the costs for 6 to 10 bicycles

TABLE 4 – APPROXIMATE EQUIPMENT COSTS⁸¹

Station Size (Docks)	Bikes	Equipment and Installation (includes bikes)	Approximate Annual Operating Costs
11	6	\$35,000 to \$40,000	\$12,000 to \$15,000
15	8	\$45,000 to \$48,000	\$18,000 to \$21,000
19	10	\$53,000 to \$58,000	\$24,000 to \$28,000

depending on the total size of the station), are presented in Table 4, along with an approximate range for annual operating costs per station (including redistribution, staff, and customer service support). The costs presented include the average costs for equipment and installation and may vary depending on the variables discussed above, as well as the size of the system and vendor differences.

3.6 CONSIDERING BICYCLE INFRASTRUCTURE IMPROVEMENTS

Many communities considering bike share may ask, “How extensive does our existing bicycle facility network need to be to successfully support a bike share program?” Among the cities analyzed for this Guide with bike share programs in operation, all but one had a concise network of on-street and off-street bikeways in place prior to launching bike share. However, among these cities, the bicycle network was by no means “perfect” – contacts from these cities have been quick to point out that numerous gaps and barriers exist within their bicycle infrastructure.⁸² Additionally, based on the experience of existing programs, bike share systems can give additional impetus to efforts to improve bicycle infrastructure. Planning judgment suggests it is better to locate bike share programs in portions of the community that have at least some visible bicycle infrastructure and could be considered bicycle-friendly.

As a bike share program grows, it is also important to implement complementary bicycle education and encouragement programs. Bike share programs can work hand-in-hand with programs that teach adult bicycle safety skills, helmet promotions, safety awareness campaigns targeting unsafe motorist and



Figure 25: Capital Bikeshare user
Credit: Capital Bikeshare (Washington, DC Area)

bicyclist behaviors, and similar efforts.

3.7 CONSIDERING ISSUES OF EQUITY

Bike sharing can serve as an affordable mobility option for low income and minority communities.⁸³ However, use of bike share systems by these communities has so far been limited in the U.S., despite their increased reliance on public transit and historically low rates of auto ownership.⁸⁴ The reason may be that low income residents often have more difficulty obtaining credit cards,⁸⁵ thus they are not able to access bike share as an alternative because a credit card is required to check out a bicycle.

To counter low usage rates by low-income and minority communities, some jurisdictions are experimenting with additional programs to facilitate access. For example, Capital Bikeshare has developed a partnership with a local banking institution to offer access to free checking account in addition to reduced-rate memberships, which bypasses the need for credit cards.⁸⁶ Programs in Boulder and Denver have worked with their local housing authority to offer reduced-rate or free memberships when new tenants sign a lease on an apartment near a bike sharing station.⁸⁷ Finally, Hubway has worked with local health officials to offer subsidized memberships to eligible users.⁸⁸

While there is early indication that these initiatives are having a positive impact on the number of low-income and minority residents accessing the program, additional time and assessment is needed to gauge their success. Future bike share programs should consider minority and low income populations early on, and tailor their strategies accordingly.

CHAPTER 4. IMPLEMENTATION

After the successful completion of the planning phase, a jurisdiction is ready to begin implementation of the program. Generally, the implementation process addresses the issues discussed below.

4.1 SELECTION OF SERVICE HOURS AND OPERATING SEASON

When selecting the hours of operation, an implementing agency should consider the needs of the local community while being mindful of how these will affect the costs of implementing a program. Hours of operation should reflect the travel habits and patterns of the users, as well as the capacity of the program operators.

Of the systems observed for this Guide, those with nonprofit operations tended to offer service hours from 5 a.m. to midnight every day. Their customer service hours were consistent with typical office hours.⁸⁹ Programs managed by for-profit companies tended to offer bicycle access 24 hours a day, with customer service available between 8 am to 6 pm.⁹⁰ In contrast, systems managed by government agencies generally enabled customers to check out bicycles, and have access to a customer service representative 24 hours a day, unless the program is closed for the season. The costs of providing live customer service should be considered when evaluating different service options.

Jurisdictions should also consider the operating season of the bike share program. Although some programs close for the winter months (particularly those in colder climates), others operate year round. While this can reduce operation and maintenance costs, it creates the need for aggressive ‘spring opening’ strategies to reorient customers to bike share.

It is important to note that programs operating year round, have opted to shut down system operations as necessary during inclement weather (i.e. hurricanes, winter storms, severe storms). Future research is needed to study the effect seasonal of closure on bike share membership and utilization rates.



Figure 26: Nice Ride customer
Credit: Nice Ride (Minneapolis/St. Paul, Minnesota)

4.2 PROGRAM MARKETING AND SUSTAINABILITY PLANNING

The ongoing success of a bike share program depends in large part on encouraging people to use and support the system. New programs should begin marketing early, once the initial planning phase is over and a timeline is set for program implementation. Early promotion helps to capitalize on the initial “buzz” about the program, and to build interest and excitement about the launch.

The grand opening for a bike share program should be carefully planned to gain the maximum amount of press and community interest. Special events with local elected leaders and social rides should be considered to promote the initiative. New programs should continue to engage the public throughout the implementation period. This ongoing promotion is needed to build membership levels, as well as to support future phases of the program.

One important strategy is the use of recognizable branding and marketing materials. Recognizable



Figure 27: Nice Ride t-shirt
Credit: Nice Ride (Minneapolis/St. Paul, Minnesota)

branding (including colors, taglines and images) has enhanced programs by making them easily identifiable throughout the jurisdiction. For example, Nice Ride has created a spectrum of merchandising products including t-shirts, hats and socks that not only help promote the Nice Ride brand, but also generate profits that are reinvested (See Figure 27).⁹¹

New programs should capitalize on social media outlets such as Facebook, Twitter and blog posts to promote the program. For example, Capital Bikeshare used Facebook, Twitter and posts in local blogs to announce plans for expansion and to generate public input on locations for future stations.⁹² Capital Bikeshare also reported using an online discount site called Living Social to increase membership and ridership numbers, nearly doubling its annual membership in the spring of 2011 by offering half-priced memberships online.⁹³ However, other programs such as Nice Ride in Minneapolis had less success with this strategy, recording only a small increase in the number of members.⁹⁴

Partnerships with bike shops can benefit bike share programs. During early stages of implementation, some bike shop owners have been concerned about the potential competition from bike share. However, anecdotal evidence suggests that bike sharing may actually benefit local bicycle shops because they get additional business from customers in search of protective gear and other

accessories. Furthermore, some bike shops see bike share as a means of re-introducing adults to bicycling and expanding the customer base of people in the market for new bicycles.⁹⁵

4.3 CONSIDERING SAFETY AND LIABILITY

Jurisdictions implementing bike share programs should make safety a top priority. Fortunately, given the relatively short period of data available for bike sharing implementation in the United States, bike share programs have experienced very low crash rates compared to crashes among bicyclists riding their own (non bike share) bicycles.⁹⁶ The following hypotheses may explain the low crash rates:

- Heavier bikes with more robust tires and low gearing may cause riders to go at slower speeds, which may reduce the number and severity of incidents.
- Drum brakes make slowing the bicycle easy and efficient.
- Integrated flashing lights in every bike can help increase visibility of bicyclists on the road.
- Most bike share bicycles are designed with low step over height (no top tube) which makes it easy for the rider to regain their balance quickly.
- Some bike share riders are relatively inexperienced, and thus may ride more cautiously.

For example, as of March 2012, Deco Bike users logged in more than 1.9 million miles since the program's inception without any recorded crash incidents.⁹⁷ New programs should however continue to study this issue as the popularity and prevalence of bike share grows in the United States.

Early reports suggest that the introduction of bike share programs has caused an increase in the levels of overall bicycling. Consequentially, this can lead to increased visibility for bicyclists – motorists become more accustomed to sharing the road with them. Safe driving and education programs promoting public awareness of the do's and don'ts of sharing the road should be a priority for new programs.⁹⁸ Some existing bike share programs worked with local bicycle groups to offer safe riding classes and publish citizen guides

for safe bicycling.

New programs should promote helmet use and safe riding practices. While none of the programs surveyed for this guide require the use of helmets by users over 16 years of age, all encourage and promote the use of protective gear. Some jurisdictions provide free helmets to bike share program members at social and promotional events. Others forged partnerships with local bike shops and businesses to offer discounted helmets.⁹⁹

Examples from international bike share programs have suggested that mandatory helmet laws may reduce ridership because they make impromptu trips less convenient.¹⁰⁰ New technologies including vending machines for purchasing or lending helmets on site are on the horizon, however these have not yet been field-tested and it remains a question as to whether customers will use helmets from a vending machine.¹⁰¹

As with any publicly accessible transportation program, there are liability issues associated with bike sharing. The Public Health Law Center at the William Mitchell College of Law in Saint Paul, Minnesota developed a brief fact sheet on liability issues for bike share programs.

The document contains general recommendations for limiting a bike share owner or operator's liability, including: "purchasing insurance to cover claims against the owner or operator; requiring users to sign waivers or otherwise release the program from liability for injuries; maintaining bikes and equipment; and educating users about proper bicycle use."¹⁰²

4.4 REDISTRIBUTION OF BICYCLES

The continual redistribution of bicycles throughout the system is a critical aspect of implementation that directly impacts bike share users. Redistribution is also affected by travel patterns within a jurisdiction, and is especially common in scenarios where bike share is used heavily for commute trips. Ridership patterns are also affected by proximity to jobs, housing and activity centers, as well as the topography of the jurisdiction.

Redistribution can become an issue particularly when bike share stations are full (no empty bicycle racks to receive a bike at the end of the trip) while others are empty (no bikes). Either scenario is a problem for bike share users, who expect to have access to a bicycle at any kiosk, and to be able to return a bicycle to an empty dock



Figure 28: Capital Bikeshare vans used to redistribute bicycles around stations
Credit: Flickr.com

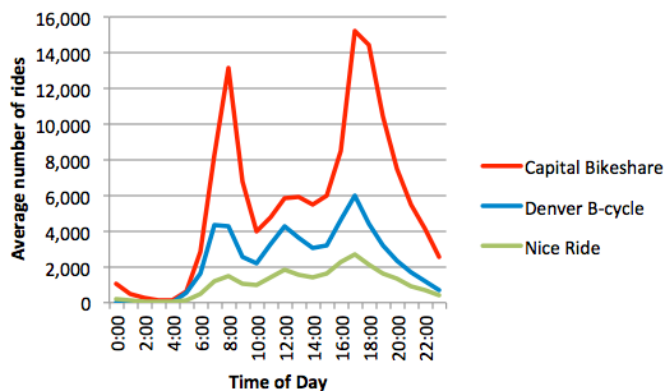


Figure 29: Average number of rides (Weekday), April-June 2012

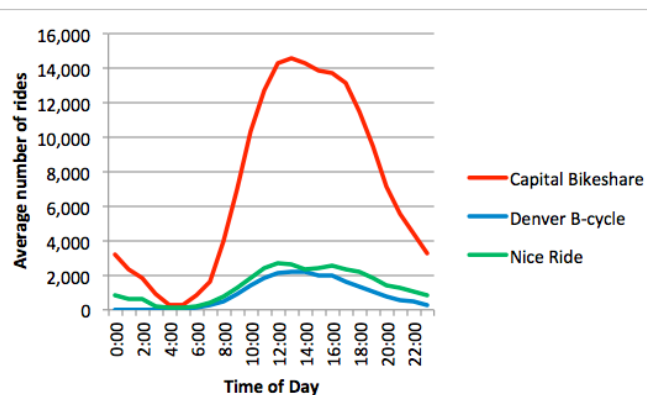


Figure 30: Average number of rides (Weekend), April-June 2012

within a short distance of their destination. To alleviate this inconvenience, some jurisdictions have added redistribution requirements to their contracts with their operators. For example, Capital Bikeshare requires that “during any day, no station has all empty docks or all full docks for more than three hours, between the hours of 6 a.m. and 12 a.m. (midnight); and for more than six hours between the hours of 12 a.m. (midnight) and 6 a.m.”¹⁰³

Existing bike sharing programs have exhibited characteristics of other more traditional transportation modes (i.e. rail, bus, single occupancy vehicles), which suggests that bike sharing has been used for commuting purposes and leisure rides alike. For example, ridership patterns during the work week (Monday through Friday) exhibit the same peaking characteristics during the morning and afternoon rush hours (7:00-9:00 a.m. and 5:00-7:00 p.m.) as other commuting modes (i.e. transit and single occupancy vehicles) do. Also during weekdays, bike share ridership experiences a third middle of the day peak which suggests that workers tend to use bike sharing to reach their lunch destinations. During the weekends, bike sharing ridership exhibits a more normalized pattern, where most rides occur during the middle of the day (peaking at around 1 p.m.). Figure 29 and 30 note the average number of rides for Capital Bikeshare, Denver B-cycle and Nice Ride during weekdays and weekends throughout the months of April through June 2012.

New programs should also consider how commuting patterns can affect the service provision of bike share programs. Existing programs reported experiencing some of the same characteristics of traditional transit (i.e. high morning and afternoon peaks

throughout weekdays) which has led to redistribution complications including empty and full stations. To counter these challenges, bike share programs have used various redistribution methods including trucks/vans to transport bicycles from one station to another, in addition to rewarding riders who help to manually redistribute the bikes and therefore help the program meet demand.¹⁰⁴ The truck/van based method is used in larger systems (50 or more stations) with larger service areas, where the operator used multiple vehicles (usually a van or truck) to respond to ridership demand around the service area.¹⁰⁵ It is important to note that



Figure 31: Bike powered trailer for bicycle redistribution
Credit: San Antonio Bikes

jurisdictions utilizing this rebalancing method are likely to incur additional costs (which tend to be factored into O&M costs, depending on contract negotiations with the operator) which can increase the overall operating costs for running the program. Other jurisdictions including San Antonio B-cycle reported using a bike-powered trailer to redistribute bicycles (see Figure 31).¹⁰⁶ Finally, new programs should consider how traffic congestion can affect the redistribution patterns and efforts, as the vehicles used to transport bicycles (i.e. trailer, van, truck) from one station to another can be delayed due to traffic jams, as reported by some existing programs.¹⁰⁷

New programs should assess the possible cost implications of a particular rebalancing method. Station density should be considered when determining the redistribution patterns. The closer the stations are from each other, the easier it will be for a rebalance to transfer bicycles from one bike share station to another, potentially decreasing the rebalancing costs. Rebalancing needs are difficult to predict prior to implementation, therefore some jurisdictions have taken a “wait and see” approach to determining the extent to which rebalancing is needed.

4.5 CONSIDERATION OF THEFT AND VANDALISM

Theft and vandalism have not been major issues in existing U.S. bike sharing programs. Current systems include highly secure locking mechanisms in their bicycles and station docks, which only allows users to unlock a bike with the use of a specialized radio frequency ID (RFID) key or an access code (see Figure 32). Another emerging feature is the use of tracking mechanisms including the use of integrated GPS transmitters that which allow for the tracking of the location of bicycles throughout the service area. In addition to helping in the rare case that a bike is stolen, this information can be useful both for planning bike share future system expansion as well as overall bicycle network infrastructure improvements.

Other issues helping deter the theft of bicycles within bike share programs are the specialized shape, size and branding of bicycles which make each bicycle immediately identifiable (see Figure 33). In addition,



Figure 32: Nice Ride docking mechanism
Credit: Nice Ride



Figure 33: Hubway bicycle.
Credit: Hubway

unique parts that are not transferable to conventional bicycles further deter theft of components. Finally, some bike share equipment suppliers are now including built-in armored cable locks on each bicycle, which allows users to secure their bikes for short periods of time if no docking station is near their intermediate stop.

New programs should take advantage of specialized bicycles and branding in addition to implementing systems that include secure locking mechanisms within each bicycle dock located at bike share stations.

CHAPTER 5. PROGRAM EVALUATION

Research conducted for this Guide suggests there is no standard measurement of success for evaluating a bike share program. The goals and expectations from each jurisdiction varied.¹⁰⁸ While a higher concentration of jobs and population tend to enhance the performance of a bike share system as measured by its ridership numbers,¹⁰⁹ interviews with existing programs suggest several other metrics of success, including (1) the program's ability to become self-sustaining, (2) its ability to help make bicycling more visible, (3) the program's ability to promote healthy living, and (4) the program's ability to provide connections for underserved communities.

5.1 PROGRAM SUSTAINABILITY

Economic self-sufficiency is an important measure of success. Particularly during this era increased competition for limited public funds for transportation programs, new programs that cannot generate sufficient revenue to be self-sustaining are not looked upon favorably. Some programs reported being able to sustain and enhance their implementation. Early revenue analysis for Capital Bikeshare suggests that each partner jurisdiction within the program was able to cover some or all of their operating expenses: Arlington, VA experienced a 53% cost recovery when comparing revenue to the costs for operations, management and marketing.¹¹⁰ In the case of Washington, DC, the cost recovery for revenue vs. operations amounted to 120% cost recovery.¹¹¹ In this case, economic self-sufficiency represented an important measure of success for the program.

5.2 BICYCLING VISIBILITY

In jurisdictions where bicycling is not yet considered a major mode of transportation, bike share programs may have the ability to help raise awareness of bicycling as an additional and complementary mode. For example, smaller programs reported experiencing an increased visibility of bicycling as a sustainable and efficient way of getting around town. Representatives from San Antonio B-cycle reported increased enthusiasm for the expansion of the bicycle network within their jurisdiction.¹¹²



Figure 34: Denver B-cycle
Credit: Denver B-cycle (Denver, CO)

Additionally, other systems reported higher numbers of people bicycling throughout the jurisdiction.¹¹³

5.3 PROMOTION OF HEALTHY LIVING

The promotion of healthy living can be a major consideration when determining the success of a program. Several existing programs document the number of calories burned by bike share users.¹¹⁴ Additionally, existing programs promote themselves as sustainable transportation alternatives which are health-conscious and environmentally-friendly.

5.4 ACCESSIBILITY BY MINORITY AND LOW INCOME COMMUNITIES

As previously stated, bike sharing represents a great opportunity to provide a low cost transportation option for low income and minority communities which historically have low automobile ownership rates and high dependency on transit.¹¹⁵ While jurisdictions with existing programs are exploring and implementing innovative approaches to service provision (see Section 3.7

- Considering Issues of Equity, pg. 27) and have been able to document early achievements, additional assessment of these programs is needed. New programs should implement additional mechanisms to provide program access to low-income and minority communities.

5.5 TRACKING DATA

Bike share is a transportation program that is rich in opportunities for data collection. By its very nature, bike share is a program that tracks when and where a bicycle is checked out, and returned. GPS-enabled bicycles offer further enhancements to the rich amount of data that bike share can offer. Ridership data and customer surveys are necessary tools to help improve the overall service quality. Ridership data can help the operator and jurisdiction determine system utilization, track ridership patterns and plan for necessary improvements. This data can also help determine the environmental and health impacts of the program as the computations for the number of calories burned and carbon offset are derived from the total number of miles ridden by customers.¹¹⁶ Finally, data analysis can help make the case for additional funding for program expansion. Some data items observed in various existing programs include:¹¹⁷

- Total number of trips per month and year to date per member and system-wide.
- Bike availability per hour of the day.
- Total and average number of calories burned per day and month by customer and system-wide.
- Year to date membership counts.
- Number of new members and cancellations.
- Carbon offset per day per month, by customer and system-wide.
- Number of bicycles in service.
- Total trips per day by station.

Some existing systems reported offering data visualizations¹¹⁸ which have allowed the general public to track the progress of the program and increase transparency, while also showing the impact of their bike share system.¹¹⁹ Bike share programs that have opted to make data collected by the system widely available to

anyone have been able to capitalize on a great deal of analysis done by private citizens.

Jurisdictions should maximize public involvement in the planning and implementation process by requesting feedback on service and implementation practices. Several existing programs conduct annual member satisfaction surveys¹²⁰ and use simple mapping technology to request feedback on future station locations.¹²¹ User feedback can also help evaluate the success of marketing initiatives and increase transparency about the management of the program. New bike sharing programs should consider how public involvement and feedback can have a positive impact on the overall functionality and provision of service.

5.6 CONCLUSION

Bike sharing is a relatively new phenomenon in the U.S. that is experiencing tremendous political and social support. It is also a very visible element of a community's bicycling program. Where successful, bike sharing has the potential to increase rates of bicycling significantly. Conversely, a bike share program falling short of expectations may be perceived as an unnecessary drain on public funds. Therefore, it is important that communities considering bike share educate themselves on the myriad of issues related to program planning and implementation.

This Guide is a primer on bike share, providing lessons learned from some of the pioneering communities. Communities considering bike share will have several important questions to answer, such as "Where should we start our program?" "How will we pay for this?" and "What business model should we use?" This Guide provides background and examples to educate the next wave of bike sharing communities.

The current generation of bike share has come a long way from its forebearers. The concept is rapidly evolving with new features, technologies, business models and funding sources. It is likely that future bike share programs will evolve in new and interesting ways.

APPENDIX A.

PROGRAM PROFILES

Figures presented are as of March 2012

BOULDER B-CYCLE

Jurisdiction	Boulder, Colorado
Opening date	May 20, 2011
Website	boulder.bcycle.com
Size	
Service Area:	4.69 sq mi.
Station Density:	3.20 stations per square mile in service area
Bikes (start/current):	110/110
Stations (start/current):	15/15
Docks per station range:	1 to 15
Solar vs. Wired :	Solar and wired
Operation:	Seasonal (Closed December through March)
Number of members	
Annual	1,171 members
Casual	6,200 users
Service Area demographics (per sq. mi)	
Employment	1,787 jobs
Median Household Income	\$51,767
Housing Density	2,294 units
Equipment Ownership:	Nonprofit owned
Operator name:	Boulder B-cycle
Equipment provider:	B-cycle
Business model:	Nonprofit owned and operated
Funding sources:	Sources not specified. Sponsorships - 22% Grants - 56% Gifts - 10% Membership and usage fees - 12%
City's denomination	
(League of American Bicyclists)	Platinum
Reported bike thefts	0
Reported bike share crashes	0
Bike facility characteristics:	300+ miles of bike lanes, routes, designated shoulders and paths
Membership and usage fees:	\$50 annual; \$15 - 7 day; \$5 -24 hours No fee first 60 min; \$4 for every half-hour thereafter



Credit: Boulder B-Cycle

CAPITAL BIKESHARE

Jurisdiction	Arlington, Virginia Washington, DC
Opening date	September 20, 2010
Website	capitalbikeshare.com
Size	
Service Area:	35.95 sq mi.
Station Density:	3.92 stations per square mile in service area
Bikes (start/current):	1100/1200
Stations(start/current):	110/140
Docks per station range:	11 to 39
Solar vs. Wired :	Solar
Operation:	Year-round
Number of members	
Annual	19,200 members
Casual	105,644 users
Service Area demographics (per sq. mi)	
Employment	5,010 jobs
Median Household Income	\$66,508
Housing Density	6,344 units
Equipment Ownership:	Jurisdiction
Operator name:	Alta Bikeshare
Equipment provider:	PBSC Urban Solutions
Business model:	Jurisdiction owned and managed
Funding sources:	Federal: CMAQ Local: vehicle decal fee, commissions from transit fare media sales Private: business sponsorship Membership and usage fees
City's denomination (League of American Bicyclists)	Silver (for both Arlington, VA and Washington, DC)
Reported bike thefts	9
Reported bike share crashes	14
Bike facilities characteristics	48 miles of marked bike lanes. Growing network of bike lanes, signed bike routes, and trails
Membership and usage fees	\$75 annual; \$25 30 days; \$15 3 days; \$7 24 hours. No fee first 30 min; \$1.50 /\$2.00 annual/casual members 30-60 min; \$4.50/\$6.00 for annual/casual members 60-90 minutes; \$6/\$8 for annual/casual members for every half-hour thereafter



Credit: Capital Bikeshare

DECO BIKE

Jurisdiction	Miami Beach, Florida
Opening date	March 15, 2011
Website	decobike.com

Size	
Service Area:	6.30 sq mi.
Station Density:	14.13 stations per square mile in service area
Bikes (start/current):	500/800
Stations (start/current):	50/91
Docks per station range:	8 to 34



Credit: Deco Bike

Solar vs. Wired :	Solar
Operation:	Year-round
Number of members	
Annual	2,500 members
Casual	338,828 members
Service Area demographics (per sq. mi)	
Employment	3,425 jobs
Median Household Income	\$53,808
Housing Density	6,424 units
Equipment Ownership:	Privately owned
Operator name:	Deco Bike LLC
Equipment provider:	Deco Bike LLC
Business model:	For profit owned and operated
Funding sources:	Private investment Membership and usage fees Advertising space

City's denomination (League of American Bicyclists)	Silver
Reported bike thefts	7
Reported bike share crashes	1
Bike facilities characteristics	Sharrows throughout the city. Pathway along the and 35-85th street.
Membership and usage fees:	\$15 standard monthly (unlimited 30 min rides); \$25 deluxe monthly (unlimited 60 min rides); \$4 each additional 30 min. Hourly rentals of \$4 - 30 min \$5 - 1 hr; \$10 2 hr; \$18 4 hr; \$24 1 day; \$4 each additional 30 mins

DENVER B-CYCLE

Jurisdiction	Denver, CO
Opening date	April 22, 2010
Website	denver.bcycle.com
Size	
Service Area:	12.57 sq mi.
Station Density:	4.14 stations per square mile in service area
Bikes (start/current):	400/520
Stations (start/current):	40/52
Docks per station range:	7 to 23
Solar vs. Wired :	Solar and wired
Operation:	Seasonal (closed December through March)
Number of members	
Annual	2,659 members
Casual	40,600 members
Service Area demographics (per sq. mi)	
Employment	3,371 jobs
Median Household Income	\$56,039
Housing Density	7,582 units
Equipment Ownership:	Nonprofit owned
Operator name:	Denver Bikesharing
Equipment provider:	B-cycle
Business model:	Nonprofit owned and operated
Funding sources:	Federal: energy Efficiency and Conservation Block Grant program; Transportation Community Preservation program. State: Vehicle registration Tax, FASTER program. Private: local match Membership and usage fees
City's denomination (League of American Bicyclists)	Silver
Reported bike thefts	0
Reported bike share crashes	0
Bike facilities characteristics	76 miles of bike lanes, 30 miles of sharrows, 82 miles of paved trails.
Membership and usage fees:	\$ 65 annual; \$30 30 days; \$20 7 day; \$6 24 hours No fee first 30 min; \$1 30-60 min; \$4 for every half-hour thereafter



Credit: Denver B-Cycle

HUBWAY

Jurisdiction	Boston, MA
Opening date	July 28, 2011
Website	thehubway.com
Size	
Service Area:	11.79 sq mi.
Station Density:	4.83 stations per square mile in service area
Bikes (start/current):	400/600
Stations (start/current):	40/60
Docks per station range:	13 to 19
Solar vs. Wired :	Solar
Operation:	Seasonal (closed December through March)
Number of members	
Annual	3,600 members
Casual	30,000 members
Service Area demographics (per sq. mi)	
Employment	7,084 jobs
Median Household Income	\$54,832
Housing Density	9,311 units
Equipment Ownership:	Jurisdiction owned
Operator name:	Alta Bikeshare
Equipment provider:	PBSC Urban Solutions
Business model:	Advertising and sponsorship concession with profit-sharing
Funding sources:	Federal: CMAQ and FTA State: Public Health Grant Private: direct system sponsor and other smaller sponsors Membership and usage fees
City's denomination (League of American Bicyclists)	Silver
Reported bike thefts	0
Reported bike share crashes	0
Bike facilities characteristics	50 miles on street bike lanes; 50 miles off street
Membership and usage fees:	\$85 annual; \$12 3 days; \$5 24 hours; No fee first 30 Min; \$1.50 /\$2.00 annual/casual members 30-60 min; \$1.50/\$2.00 for annual/casual members 30-60 minutes; \$4.50/\$6.00 for annual/casual members for every half-hour thereafter



Credit: Hubway

NICE RIDE

Jurisdiction	Minneapolis, MN Saint Paul, MN
Opening date	June 10, 2010
Website	niceridemn.org
Size	
Service Area:	33.30 sq mi.
Station Density:	3.30 stations per square mile in service area
Bikes (start/current):	1200/1300
Stations (start/current):	116/145
Docks per station range:	11 to 39
Solar vs. Wired :	Solar
Operation:	Seasonal (closed November through March)
Number of members	
Annual	3,521 members
Casual	37,103 subscriptions
Service Area demographics (per sq. mi)	
Employment	3,137 jobs
Median Household Income	\$44,011
Housing Density	3,838 units
Equipment Ownership:	Nonprofit owned
Operator name:	Nice Ride MN
Equipment provider:	PBSC Urban Solutions
Business model:	Nonprofit owned and managed
Funding sources:	Federal: FHWA funds through local program, Private: Blue Cross-Blue Shield, other private/nonprofit investors, and station sponsorships Membership and usage fees
City's denomination (League of American Bicyclists)	Gold
Reported bike thefts	0
Reported bike share crashes	2
Bike facilities characteristics	40 miles on street bike lanes when program started and 80 miles by the end of the year
Membership and usage fees:	\$65 annual/ \$55 student; \$30 30 days; \$5 24 hours; No fee first 30Min; \$1.50 - 30-60 min; \$4.50 60-90 min; \$6 for every half-hour thereafter



Credit: Nice Ride

SAN ANTONIO B-CYCLE

Jurisdiction	San Antonio, TX
Opening date	March 1, 2011
Website	sanantonio.bcycle.com
Size	
Service Area:	4.77 sq mi.
Station Density:	4.19 stations per square mile in service area
Bikes (start/current):	200/200
Stations (start/current):	20/23
Docks per station range:	7 to 23
Solar vs. Wired :	Solar and wired
Operation:	Year round
Number of members	
Annual	1,000 members
Casual	2,800 members
Service Area demographics (per sq. mi)	
Employment	1,570 jobs
Median Household Income	\$27,732
Housing Density	1,455 units
Equipment Ownership:	Jurisdiction owned
Operator name:	San Antonio Bikeshare
Equipment provider:	B-cycle
Business model:	Nonprofit managed
Funding sources:	Federal : EPA (EECBG), CDC (Communities Putting Prevention to Work), Obesity Reduction Grant; Advertising and Corporate Sponsorships; Membership and usage fees
City's denomination	
(League of American Bicyclists)	Bronze
Reported bike thefts	0
Reported bike share crashes	0
Bike facilities characteristics	Growing network of bike lanes, signed bike routes, and trails
Membership and usage fees:	\$60 annual; \$24 7 days; \$10 24 hours; No fee first 30 min; \$2 each additional 30 mins



SPARTANBURG B-CYCLE

Jurisdiction	Spartanburg, SC
Opening date	July 7, 2011
Website	spartanburg.bcycle.com
Size	
Service Area:	1.42 sq mi.
Station Density:	1.41 stations per square mile in service area
Bikes (start/current):	14/14
Stations (start/current):	2/2
Docks per station range:	9 to 11
Solar vs. Wired :	Solar and wired
Operation:	Year round
Number of members	
Annual	127 members
Casual	828 members
Service Area demographics (per sq. mi)	
Employment	2,513 jobs
Median Household Income	\$24,540
Housing Density	5,801 units
Equipment Ownership:	Non profit owned
Operator name:	Partners for Active Living
Equipment provider:	B-cycle
Business model:	Nonprofit owned and managed
Funding sources:	Local Grants: City of Spartanburg, Mary Black Foundation, and JM Smith Foundation Management Membership and usage fees
City's denomination (League of American Bicyclists)	Bronze
Reported bike thefts	0
Reported bike share crashes	0
Bike facilities characteristics	3.6 miles of bike lanes and signed routes; 2.7 miles of sharrows; 24.38 miles of trails; 7 miles of mountain bike trails; 172 Bike Racks
Membership and usage fees:	\$30 annual; \$15 - 30 days;\$5 - 24 hours; No fee first 60 min; \$1 for each additional 30 min



ZOTWHEELS*

Jurisdiction	University of California, Irvine
Opening date	October 1, 2009
Website	parking.uci.edu/zotwheels
Size	
Service Area:	1.29 sq mi.
Station Density:	3.11 stations per square mile in service area
Bikes(start/current):	28/28
Stations (start/current):	4/4
Docks per station range:	8 to 12
Solar vs. Wired :	Wired
Operation:	Year-round
Number of members	
Annual	100 members
Casual	Non reported
Service Area demographics (per sq. mi)*	
Employment	1,557 jobs
Median Household Income	\$45,548
Housing Density	2,018 units
Equipment Ownership:	University owned
Operator name:	Transportation and Distribution Services University of California, Irvine
Equipment provider:	Collegiate Bicycle Company; Central Specialties, Lt.
Business model:	University owned
Funding sources:	Revenue (parking fees, citations) - Transportation and Distribution Services
City's denomination (League of American Bicyclists)	Silver (university denomination)
Reported bike thefts	0
Reported bike share crashes	0
Bike facilities characteristics	Sharrows, on inner university ring with one side for bike one side for pedestrians, Trails, dedicated bike lanes.
Membership and usage fees:	\$40 annual/no usage fees

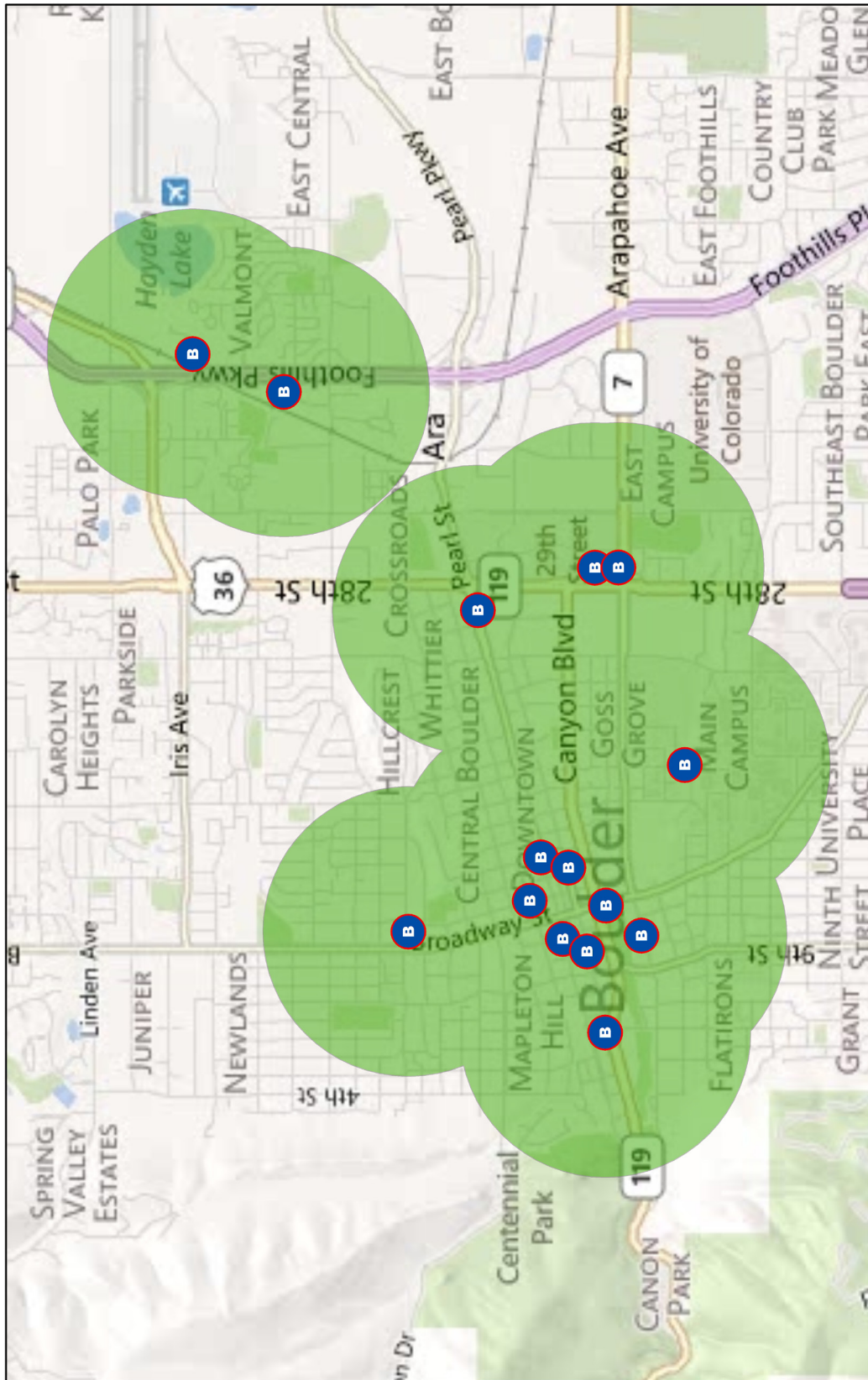


Credit: Zotwheels

* These numbers are representative of the city of Irvine, not the University population

APPENDIX B. MAPS

BOULDER B-CYCLE



Boulder B-cycle Service Area



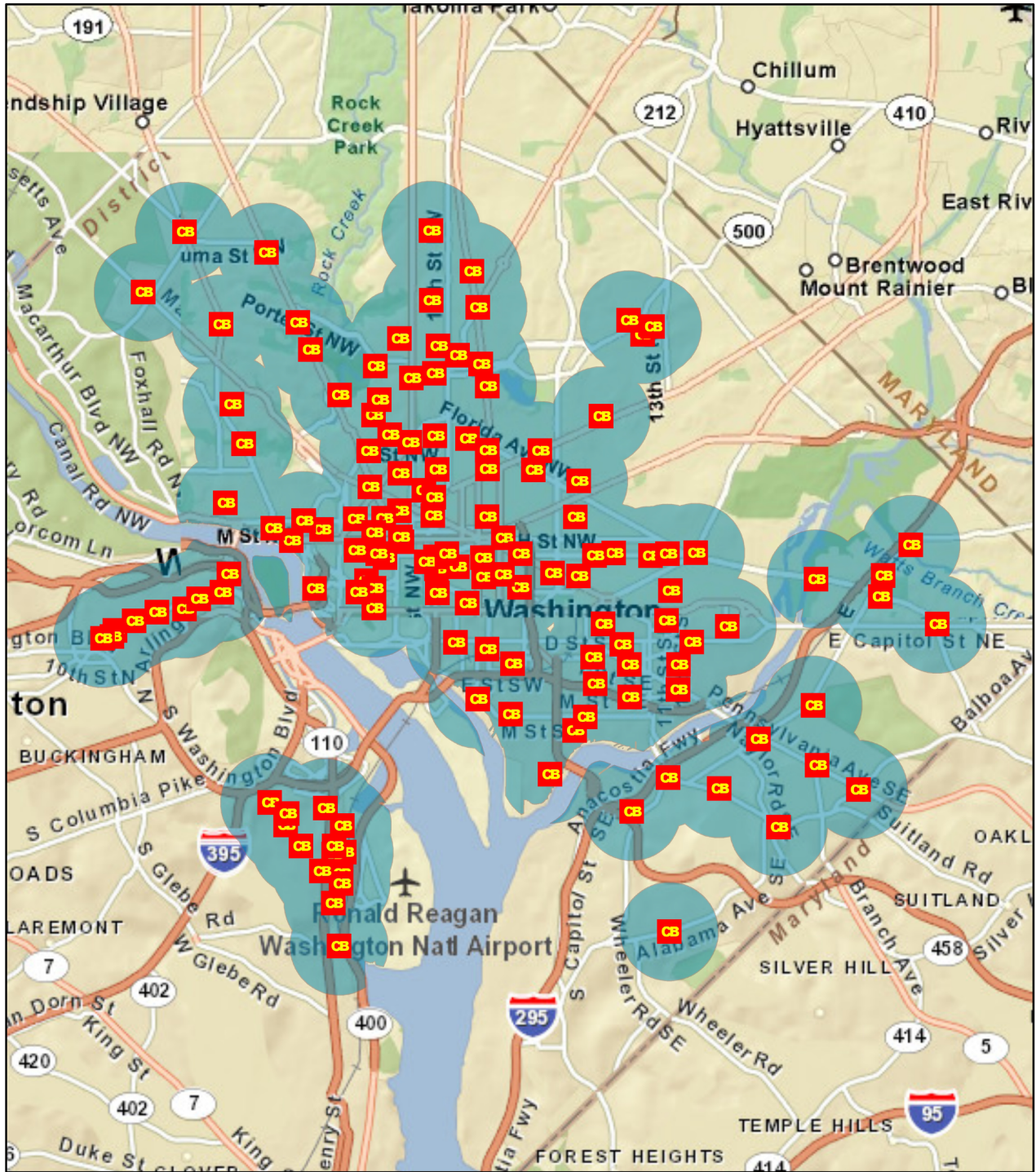
B Boulder B-cycle Stations

Service Area





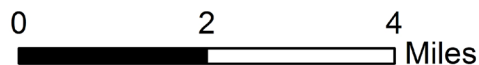
February 1, 2012
 Projection: NAD 1983 StatePlane Colorado North (FIPS0501) Feet

CAPITAL BIKESHARE (WASHINGTON DC/ ARLINGTON, VA)



Capital Bikeshare Service Area

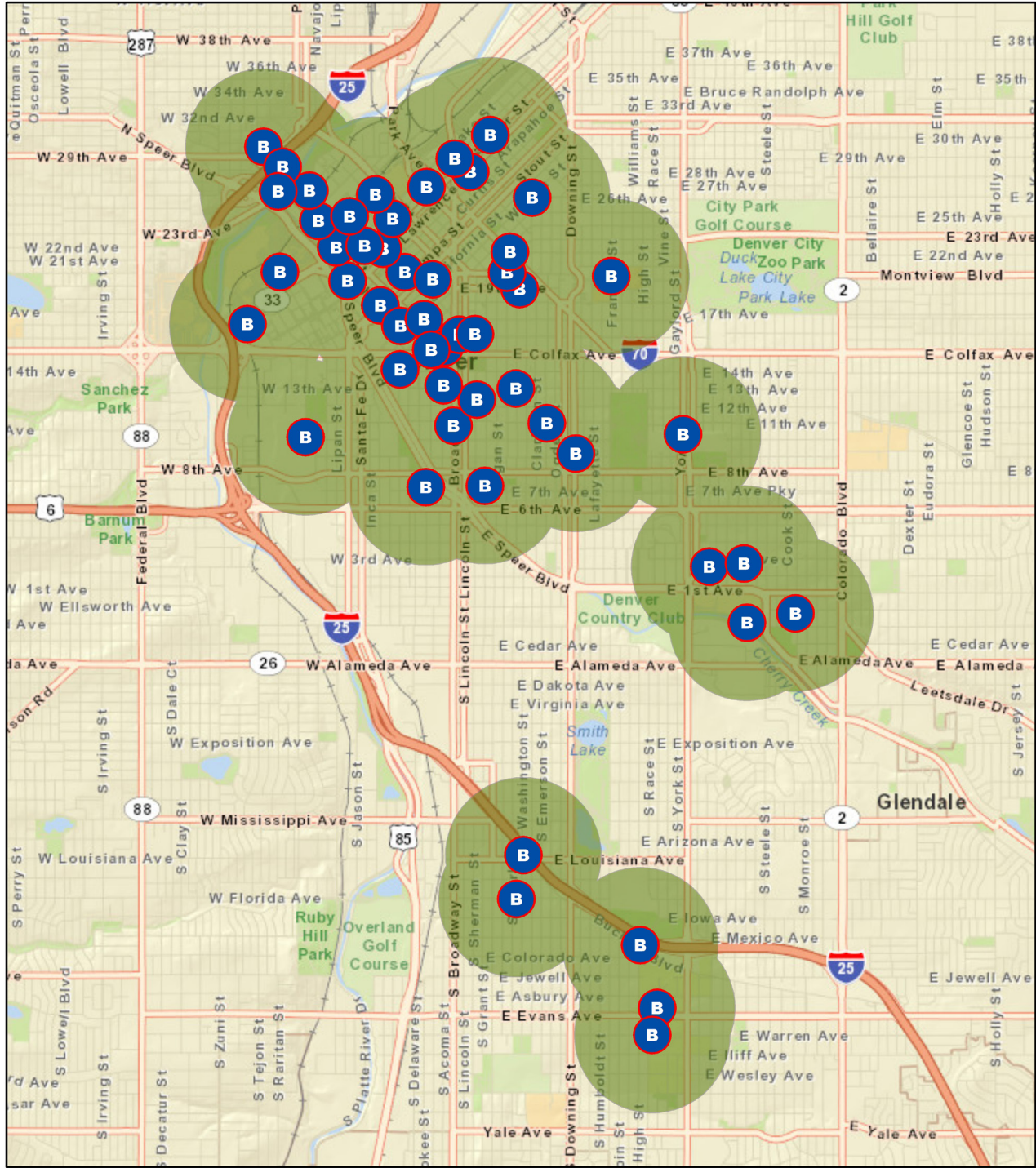
-  Capital Bikeshare Stations
-  Service Area




February 1, 2012

Projection: NAD 1983 StatePlane Maryland (FIPS1900 Feet)

DENVER B-CYCLE (DENVER, CO)

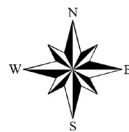


Denver B-cycle Service Area

 Denver B-cycle Stations

 Service Area

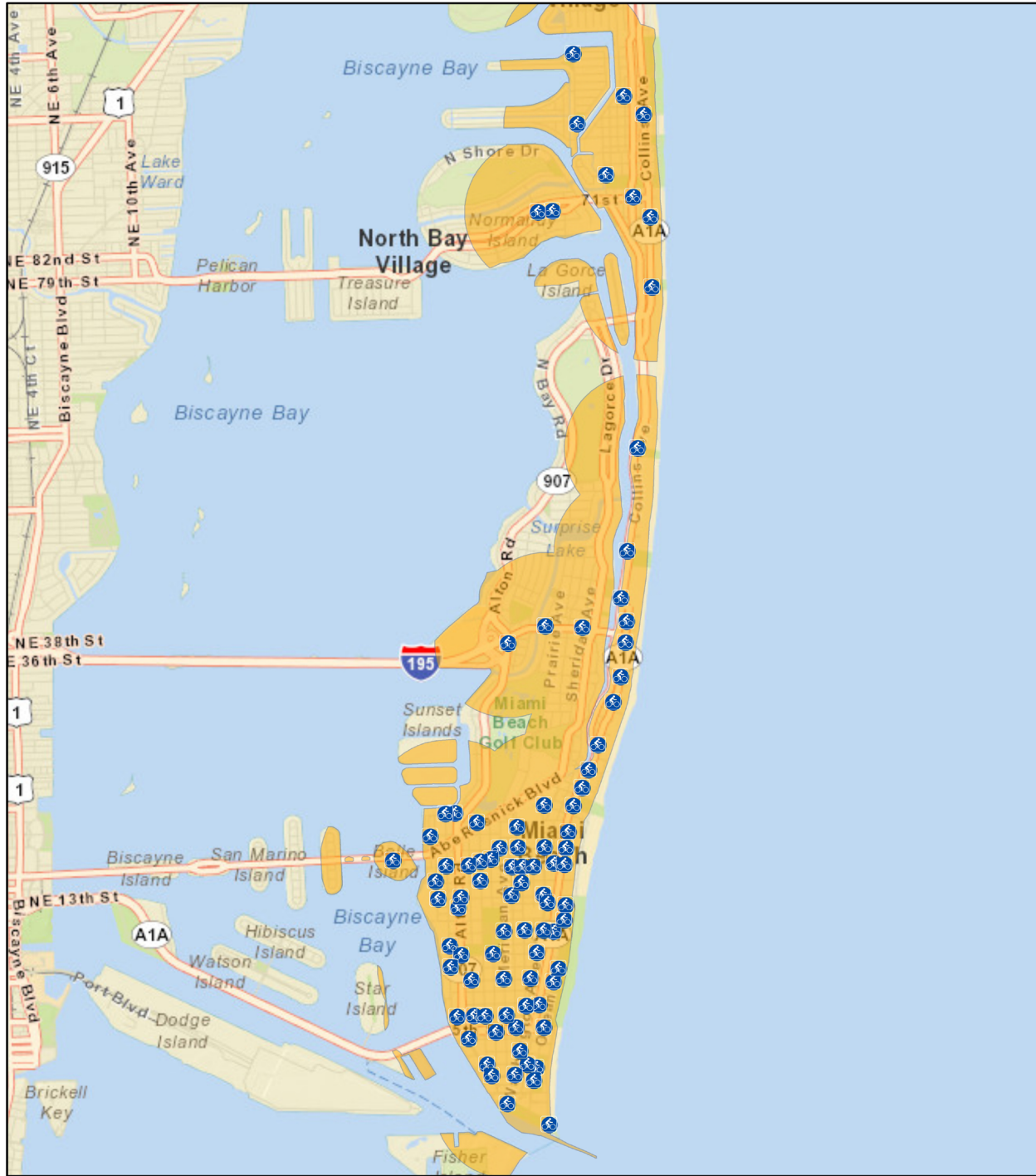
0 1 2
Miles





February 1, 2012

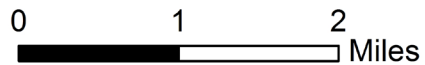
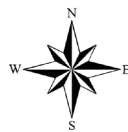
Projection: NAD 1983 StatePlane Colorado Centra (FIPS0502Feet)

DECO BIKE (MIAMI BEACH, FL)



Deco Bike Service Area

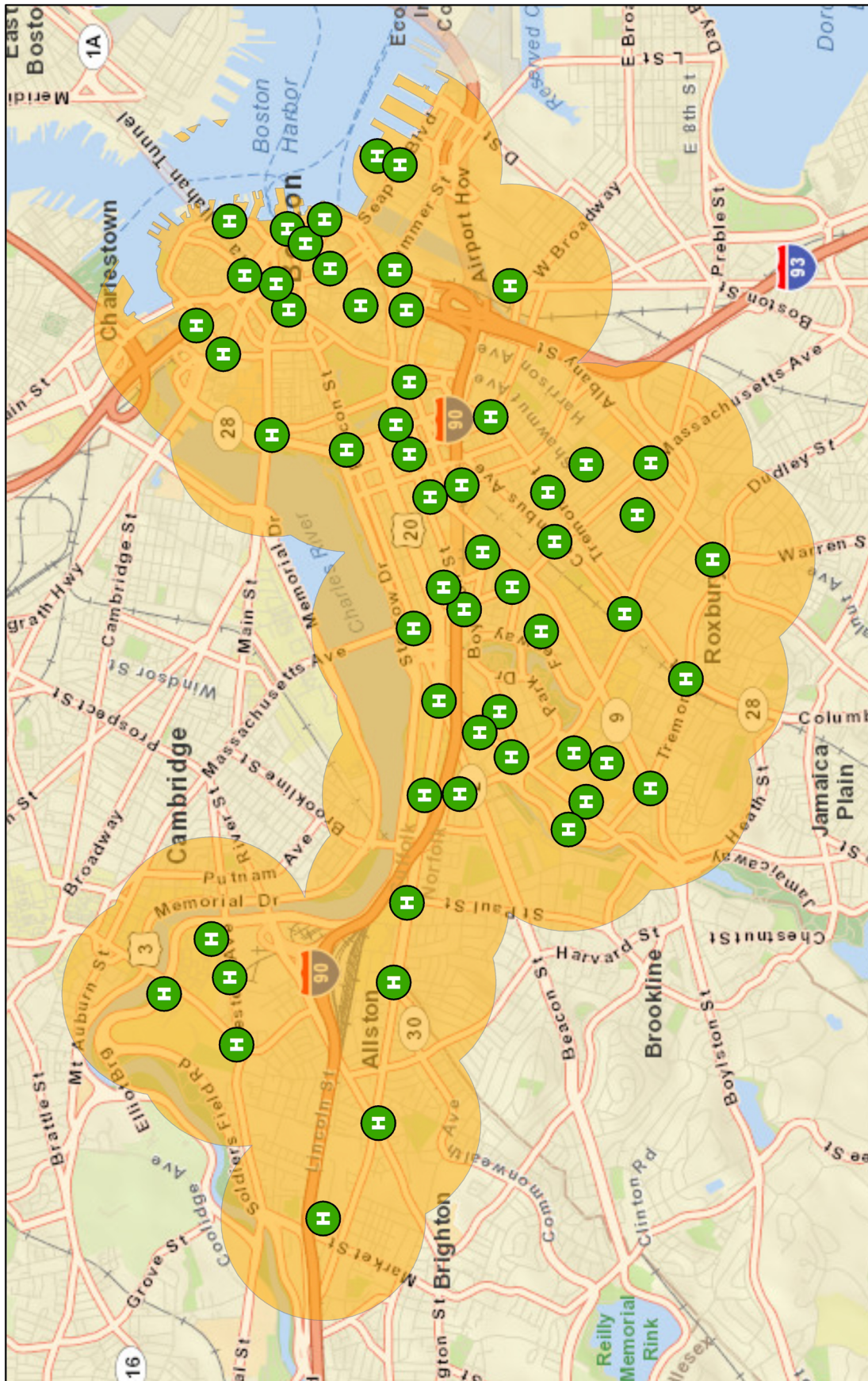
-  Deco Bike Stations
-  Service Area





February 1, 2012

Projection: NAD 1983 StatePlane Florida East (FIPS0901Feet)


HUBWAY (BOSTON, MA)



Hubway Service Area

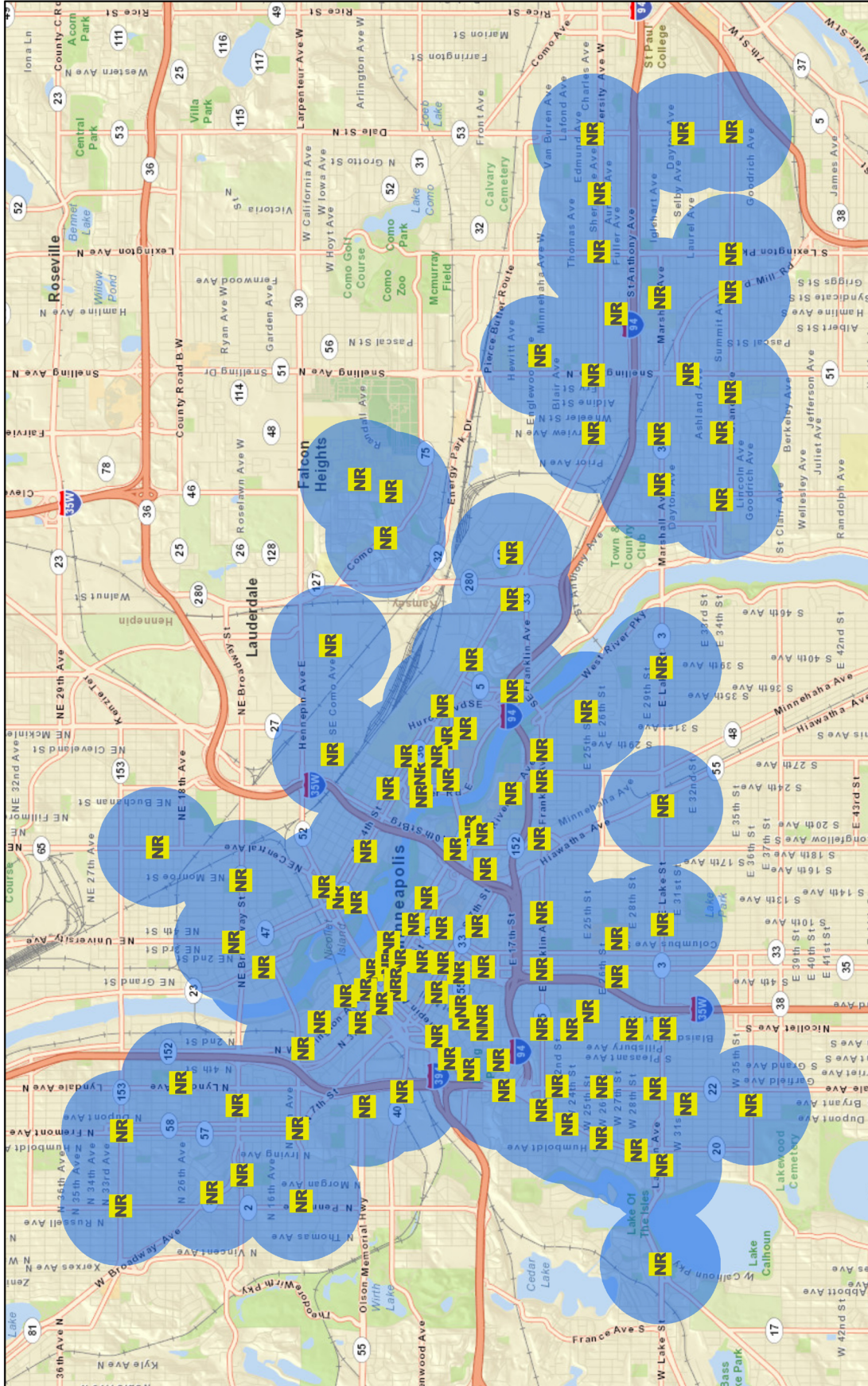
-  Hubway Stations
-  Service Area

0 1 2 Miles

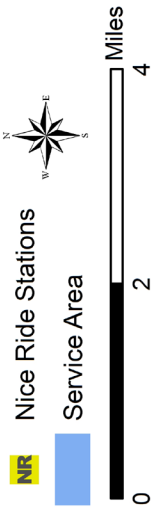



February 1, 2012
 Projection: NAD 1983 StatePlane Massachusetts Mainland (FIPS2001Feet)

NICE RIDE (MINNEAPOLIS/ST. PAUL, MN)

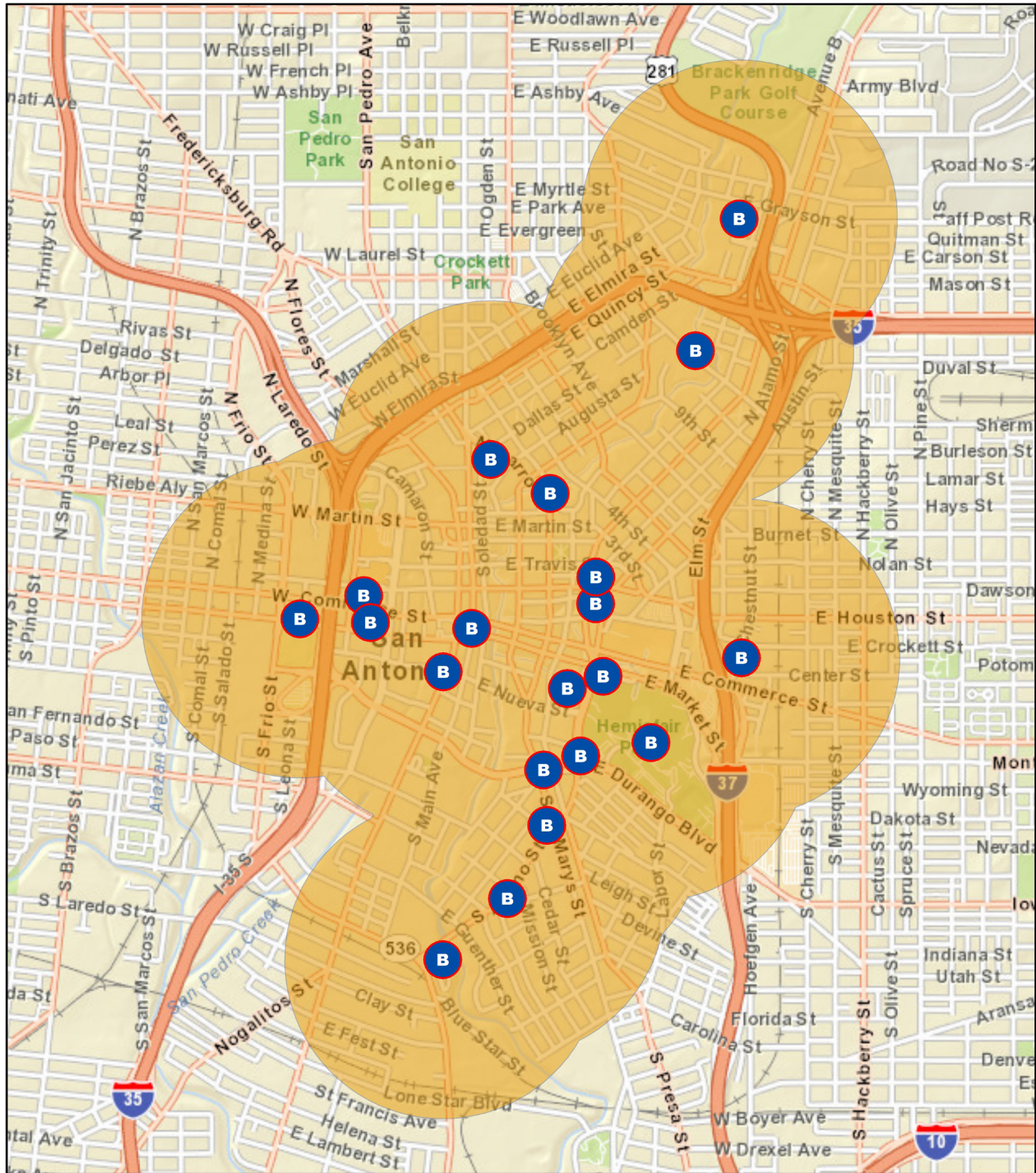


Nice Ride Service Area




February 1, 2012
 Projection: NAD 1983 StatePlane Minnesota South (FIPS2203Foot)

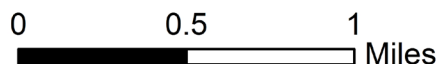
SAN ANTONIO B-CYCLE (SAN ANTONIO, TX)



San Antonio B-cycle Service Area

 B-cycle Stations

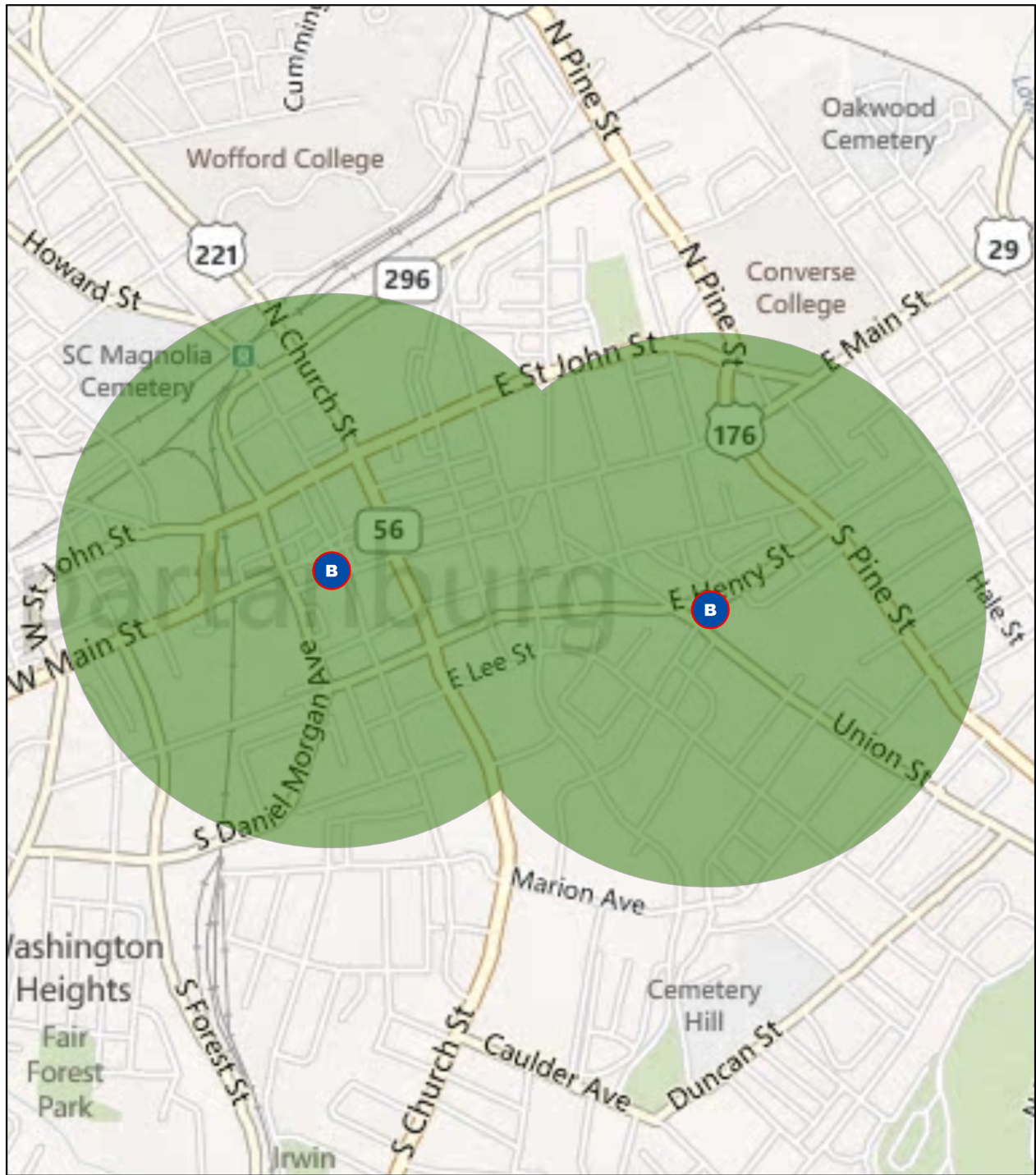
 Service Area



February 1, 2012
 Projection: NAD 1983 StatePlane Texas South Central (FIPS4204Feet)




SPARTANBURG B-CYCLE (SPARTANBURG, SC)

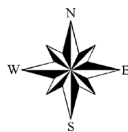


Spartanburg B-cycle Service Area

 Spartanburg B-cycle

 Service Area

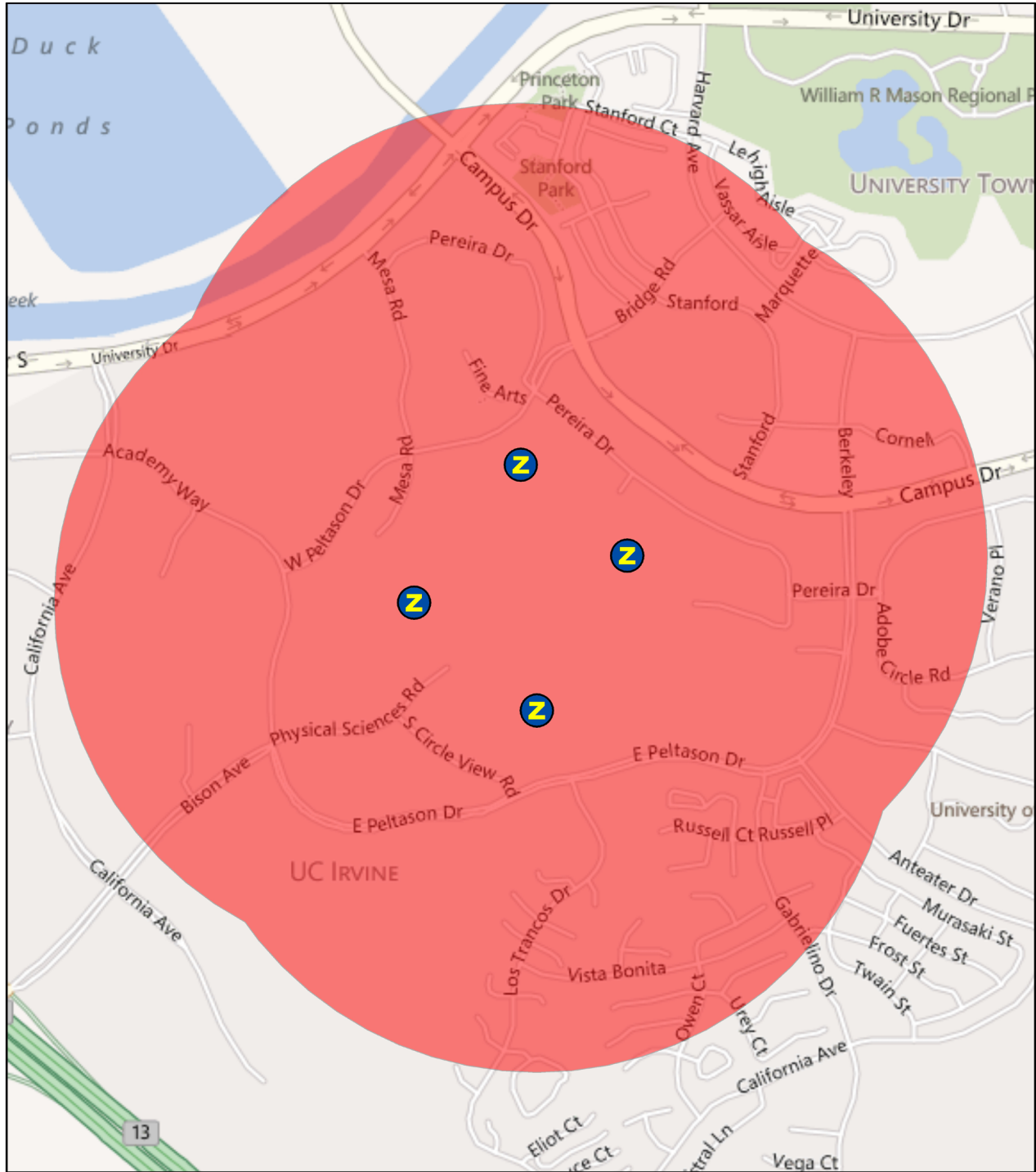
0 0.25 0.5
 Miles





February 1, 2012

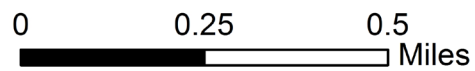
Projection: NAD1983 StatePlane South Carolina (FIPS3900Feet)

ZOTWHEELS (UNIVERSITY OF CALIFORNIA AT IRVINE)



ZotWheels Service Area

-  UC Irvine - Zotwheels Stations
-  Service Area



February 1, 2012
 Projection: NAD 1983 StatePlane California V (FIPS0405Feet)

APPENDIX C. ADVISORY COMMITTEE SURVEY QUESTIONS

The survey was administered through a series of in-depth guided interviews during the months of October 2011 through February 2012 with program managers for existing bike sharing programs in the following cities: Boston, Boulder, Chicago, Denver, Miami Beach, Minneapolis, San Antonio, Spartanburg, University of California Irvine, and Washington DC/Virginia. Additional interviews were conducted with bicycle planners and administrators in Atlanta, Baltimore and Chicago, which have shown interest on implementing a bike share program.

GENERAL

1. Bike sharing System – Name of the Bike sharing system
2. City – municipality where the program is being implemented. Is the program multi-jurisdictional?
3. State(s) – state where the program is being implemented
4. Website – what is the program’s website
5. Twitter handle – what is the program’s Twitter handle
6. Facebook page – what is the program’s Facebook page
7. Operator – who is the system operator?
8. Type of System – what are the bike and station specifications? Who manufactures them?

COMMUNITY DEMOGRAPHICS

1. Sex by Age – total number of people
2. Income – income distribution of population in your city/municipality
3. Density – how many people per square mile.
4. Service area Density – how many people per square mile served
5. Ethnicity – total number of people by ethnicity
6. Bike to work rate – what is the total number of people commuting by bicycle to work?

7. Transit availability – are there any other transit options (i.e. bus, rail, taxi, commuter train, etc) available in the community? If so, what?
8. Number of colleges and universities

PROGRAM INFORMATION

1. Program beginnings – how did the program start? Who advocated for it? Was there any mayoral/business influence? What was the start-up timeframe?
2. How does the program relate to the locality’s provision of increased transit accessibility?
3. Bicycle friendly communities – how does the program relate to the pursuance of bicycle-friendly community status? Is this something the locality is pursuing? What other programs/infrastructure investments complement the initiative?
4. Status – is it open, closed or on planning stages
5. Open date – if open date when it opened. If planned, projected dates.
6. Organizational Scheme – which organization runs the program and how?
7. Seasonal information – Does the program shut down for the winter season? If so when is it on hiatus?
8. Methodology used to locate stations – how did you determine the geographic locations of the stations? What studies, if any were conducted? Who conducted these studies?
9. Number of bikes (over time) – current number of bikes vs. when program started
10. Number of stations (over time) - current number of stations vs. when program started
11. Geographic coverage – is it concentrated in CBD or is it spread throughout the city? Why?
12. Number of members – current vs. at the beginning of the program
13. Types of memberships available – membership schemes (i.e. annual, daily, monthly, other)

14. Average Ridership data – average number of rides per day, week, month and time of day.
15. Membership/rental rates – how much does each membership cost to the public. What are the rates?
16. Program promotion. Who does the promotion? Methods used? Is there any multi-modal collaboration? Which agency serves as marketing agency?
17. How does the program address transit accessibility for minority and economically challenged populations? Does the program offer discounted rates?
18. New media- website, twitter, smart phone applications, Facebook, etc.
10. Redistribution – What scheme does the program run to help redistribute the bicycles?
11. Data requirements – is the vendor required to report on any data? If so, what are the required items? How often does the operator report?
12. Member data – do program administrators collect data from members? If so, what? How often? How is this data gathered?
13. Customer Service - How is technical support handled (e.g. can't unlock bikes)?

PROGRAM LOGISTICS

1. Safety –are there any helmet laws? How is the system promoting the use of helmets? Does the system have liability insurance? If so, who is insured? Who pays for the insurance? Have there been any accidents since the program started? If so, how many?
2. Supporting programs are there any additional supporting programs promoting bike sharing?
3. Infrastructure – Was the bicycle infrastructure in place before implementation of the program? Is there any infrastructure program in place to complement bike sharing efforts? How is it managed?
4. Partnerships: What kind of partnerships exists, if any, between the implementing organization and other State, nonprofit, governmental or other organizations?
5. Permitting – which department does all permitting for station deployment
6. Number of vendor staff (over time) – how many people work for the vendor and function
7. Number of city staff (over time) – how many people work for the city and their function
8. Technology used – what types of bikes are being used
9. Different vendors/operators involved – e.g. Payment processing, bike supplier, operations, etc.)
1. Costs – what were the initial capital costs? What are the annual operating and managing costs?
2. Annual budget (operating/capital/etc.) – please share your most up-to-date annual budget
3. Funding scheme – how was the funding allocated? How were capital expenses funded? How are operation and management costs funded?
4. Funding Streams – please provide a list of funders and their capacity (i.e. advertising vs. sponsor). Is there Federal, State, local, and/or private funds are being used. If using Federal, what sources?
5. Ownership scheme – who and what is owned? Does the city own the bikes? E.g. city owns equipment, operator owns equipment, city owns bikes and operator owns stations, sponsor owns system, etc.
6. Revenues- are there any monthly/yearly revenues? What sort of revenues are coming in? Are there any advertising/sponsorship opportunities?
7. Profit sharing – if there is a profit, is there a profit sharing scheme? Does the city receive all revenues? Does the operator get all revenues?
8. Contract term – how long is the contract between the city/municipality and the operator
9. Copy of contract – Would you be able to share a copy of the most up-to-date contract
10. Copy of RFP used to start program – Would you be able to share a copy of the RFP used to start the program

APPENDIX D. LEAGUE OF AMERICAN BICYCLISTS: BIKE SHARING QUESTIONNAIRE

The electronic survey was administered from January 25th through February 1st, by the League of American Bicyclists to its Bicycle Friendly Communities. A total response rate of 78 out of 190 (41% response rate) jurisdictions completed the online survey.

DESCRIPTION OF THE PROJECT

The Pedestrian and Bicycle Information Center (PBIC) and Toole Design Group are conducting an independent, national study of current bike sharing programs in the United States on behalf of the Federal Highway Administration. The final report will be a resource of information about the implementation of the different bike sharing schemes, and will provide a guide for communities that are considering investments in bike sharing infrastructure. The following questionnaire will help provide some feedback to be used in the report.

QUESTIONNAIRE

1. Name of your Jurisdiction
2. Do you currently have a bike sharing program?
 - a. Yes
 - b. No
3. If no, are you considering the implementation of such a program?
 - a. Yes
 - b. No
4. If yes, what stage of the process are you in?
 - a. Initial stages of discussion – have not initiated a feasibility study
 - b. Feasibility and planning
 - c. Funding and procurement
 - d. Deployment and implementation
5. If a feasibility study was/is being conducted, how much did it cost?
 - a. N/A – no study conducted
 - b. The study was done in-house
 - c. Less than \$20,000
 - d. \$20,000 to \$50,000
 - e. \$50,000 to \$75,000
 - f. More than \$75,000
6. What model of implementation have you selected (or are likely to select) for your program?
 - a. Municipally owned and operated
 - b. Municipal concession (i.e. City owns equipment/ contractor operates system)
 - c. Nonprofit owned and operated
 - d. For-profit operated
 - e. We have not yet decided
 - f. Other (Please describe)
7. How big is the proposed program?
 - a. 1-25 stations
 - b. 25-50 stations
 - c. 50-100 stations
 - d. 100-200 stations
 - e. More than 200 stations
8. Any final comments? (Provide comment box)
9. May we contact you for additional information? If so, please provide your contact information below.

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – LARGE SYSTEMS

Figures presented are as of March 2012

	LARGE SCALE SYSTEMS		
	DC/Arlington	Minneapolis	Miami Beach
System Name	Capital Bikeshare	Nice Ride	Deco Bike
Web Address	capitalbikeshare.com	niceridemn.org	decobike.com
Start date	20-Sep-10	10-Jun-10	15-Mar-11
Number of bicycles (start/current)	1100/1200	1200/1300	500/800
Number of stations (start/current)	110/140	116/145	50/91
Docks per station (Range)	11 to 39	11 to 39	8 to 32
Solar vs. wired	Solar	Solar	Solar
Jurisdiction Bike to Work Rate (%)	Total: 3.1% Female: 32% Male: 68%	Total: 3.5% Female: 24% Male: 76%	Total: 5.0% Female: 25% Male: 75%
Service Area (Sq Mi)	35.95	33.3	6.3
Average Station Density (# station per Sq. Mile)	3.92	3.48	14.13
Emp. Density (# Jobs per mile in Service Area in Srvc Area)	5,010 jobs	3,137 jobs	3,425 jobs
Median Household income (within service area)	\$66,508	\$44,011	\$53,808
Housing Density (# of housing Units per Sq. Mile in Srvc. Area)	6,344 units	3,838 units	6,424 units
# of Members (Annual/Casual)	19,200 Annual 105,644 casual	3,521 annual 37,103 casual	2,500 annual 338,828 casual
Year round or seasonal	Year-Round	Seasonal (Closed Nov-Mar)	Year-round
# of Trips per year	1,171,562 trips in 365 days	217,530 trips in 212 days	1,107,175 trips in 474 days
Climate Description	Hot and humid summers. cool winter	Humid summers, cold winters	Hot, rainy summers, mild winters
Average Temperatures (Summer/Winter)	78° F/38° F	72° F/19° F	83° F/69° F
Average Precipitation in inches (Summer/Winter)	3.48/2.86	4.20/0.96	6.33/2.19
Bike facilities in city	48 miles of marked bike lanes	40 miles on street bike lanes when program started and 80 miles by the end of the year	Sharrows throughout the city. Pathway along the sand 35-85th street.
Bicycle Friendly Community Ranking	Silver	Gold	N/A

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – LARGE SYSTEMS

Figures presented are as of March 2012

	LARGE SCALE SYSTEMS		
	DC/Arlington	Minneapolis	Miami Beach
System Name	Capital Bikeshare	Nice Ride	Deco Bike
Oversight Entity	District Department of Transportation, Arlington County Commuter Services	Nice Ride MN	Deco Bike LLC
Operator Name	Alta Bike Share	Nice Ride MN	Deco Bike LLC
Equipment ownership	Jurisdiction owned	Nonprofit owned	Privately owned
Equipment provider	PBSC Urban Solutions	PBSC Urban Solutions	Deco Bike LLC
Business Model	Municipally Owned/ Managed	Nonprofit	For-Profit
Funding Sources	Federal: CMAQ, Local: vehicle decal fee, commissions from transit fare media sales Private: business sponsorship Member and usage revenues	Federal: FHWA funds through local program, Private: Blue Cross-Blue Shield, other private/nonprofit investors, station sponsorships Membership and usage fees	Private investment, memberships and advertising space.
Fares / Usage Fees	\$75 annual \$25 30 days \$15 3 days \$7 24 hours No fee first 30 min \$1.50 /\$2.00 annual/casual members 30-60 min \$4.50/\$6.00 for annual/casual members 60-90 minutes, \$6/\$8 for annual/casual members for every half-hour thereafter	\$60 annual \$30 30 days \$5 24 hours No fee first 30 min \$1.50 30-60 min \$4.50 60-90 min \$6 for every half-hour thereafter	\$15 standard monthly (unlimited 30 min rides), \$25 deluxe monthly (unlimited 60 min rides), \$4 each additional 30 min. Hourly rentals of \$4 - 30 min, \$5 - 1 hr, \$10 - 2 hr, \$18 - 4 hr, \$24 - 1 day \$4 each additional 30 mins
Reported Thefts	9	0	0
Reported Crashes	14	2	0

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – MEDIUM SYSTEMS

Figures presented are as of March 2012

	MEDIUM-SCALE SYSTEMS		
	Boston	Denver	San Antonio
System Name	Hubway	Denver B-Cycle	San Antonio B-Cycle
Web Address	thehubway.com	denver.bcycle.com	sanantonio.bcycle.com
Start date	28-Jul-11	22-Apr-10	26-Mar-11
Number of bicycles (start/current)	400/600	400/520	200/210
Number of stations (start/current)	40/60	40/52	20/23
Docks per station (Range)	13 to 19	9 to 19	7 to 23
Solar vs. wired	Solar	Solar and Wired	Solar and Wired
Jurisdiction Bike to Work Rate (%)	Total: 1.4% Female: 39% Male: 61%	Total: 2.2% Female: 35% Male: 65%	Total: 0.2% Female: 23% Male: 77%
Service Area (Sq Mi)	11.79	12.57	4.77
Average Station Density (# station per Sq. Mile)	4.83	4.14	4.19
Emp. Density (# Jobs per mile in Service Area in Srvc Area)	7,084 jobs	3,371 jobs	1,570 jobs
Median Household income (within service area)	\$54,832	\$56,039	\$27,732
Housing Density (# of housing Units per Sq. Mile in Srvc. Area)	9,311 units	7,582 units	1,455 units
# of Members (Annual/Casual)	3,600 Annual 30,000 Casual	2,659 Annual 40,600 Casual	1,000 Annual 2,800 casual
Year round or seasonal	Seasonal (Closed Dec-Mar)	Seasonal (Closed Dec-Mar)	Year-round
# of Trips per year	60,000 trips in 120 days	202,731 trips in 271 days	23,272 trips in 180 days
Climate Description	Warm summers, cold winters	Mild Summers, cold winters	Hot and humid summers, mild winters
Average Temperatures (Summer/Winter)	72° F/32° F	69° F/32° F	85° F/54° F
Average Precipitation in inches (Summer/Winter)	3.49/3.51	1.91/0.73	2.99/1.84
Bike facilities in city	50 miles on on-street bike lanes, 50 miles off street	76 miles of bike lanes, 30 miles of sharrows, 82 miles of paved trails.	Modest biking infrastructure. The hope is to use the program to get more people biking who can "request" more bike infrastructure
Bicycle Friendly Community Ranking	Silver	Silver	Bronze

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – MEDIUM SYSTEMS

Figures presented are as of March 2012

	MEDIUM-SCALE SYSTEMS		
	Boston	Denver	San Antonio
System Name	Hubway	Denver B-Cycle	San Antonio B-Cycle
Oversight Entity	City of Boston	Denver Bike sharing	City of San Antonio
Operator Name	Alta Bike Share	Denver Bike sharing	San Antonio Bike share
Equipment ownership	Jurisdiction owned	Nonprofit owned	Jurisdiction owned
Equipment provider	PBSC Urban Solutions	B-Cycle	B-Cycle
Business Model	Municipally Owned	Nonprofit	Nonprofit
Funding Sources	Federal: CMAQ and FTA State: Public Health Grant Private: direct system sponsor and other smaller sponsors Membership and usage fees	Federal: EPA (EECBG); Transportation Community Preservation program. State: Vehicle registration Tax, FASTER program. Private: local match Membership and usage fees	Federal : EPA (EECBG), CDC, Communities Putting Prevention to work., Obesity Reduction Grant advertising and corporate sponsorships Membership and usage fees
Fares / Usage Fees	\$85 annual \$12 3 days \$5 24 hours No fee first 30 min \$1.50 /\$2.00 annual/casual members 30-60 min \$1.50/\$2.00 for annual/casual members 30-60 minutes, \$4.50/\$6.00 for annual/casual members for every half-hour thereafter	\$65 annual \$30 30 days \$20 7 day \$6 24 hours No fee first 30 min \$1 30-60 min \$4 for every half hour thereafter	\$60 annual \$24 7 days \$10 24 hours No fee first 30 min \$2 each additional 30 mins
Reported Thefts	0	7	0
Reported Crashes	Not reported	1	0

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – SMALL SYSTEMS

Figures presented are as of March 2012

	SMALL-SCALE SYSTEMS		
	Boulder	Spartanburg	Irvine
System Name	Boulder B-Cycle	Spartanburg B-Cycle	ZotWheels
Web Address	boulder.bcycle.com	spartanburg.bcycle.com	parking.uci.edu/ZotWheels
Start date	20-May-11	7-Jul-11	1-Oct-09
Number of bicycles (start/current)	110/110	14/14	28/28
Number of stations (start/current)	15/15	2-Feb	4-Apr
Docks per station (Range)	11 to 15	9 to 11	12-Aug
Solar vs. wired	Solar and Wired	Solar and Wired	Wired
Jurisdiction Bike to Work Rate (%)	Total: 9.9% Female: 29% Male: 71%	Total: 0.1% Female: 9% Male: 91%	Total: 2.1% Female: 36% Male: 64%
Service Area (Sq Mi)	4.69	1.42	1.29
Average Station Density (# station per Sq. Mile)	3.2	1.41	3.11
Emp. Density (# Jobs per mile in Service Area in Srvc Area)	1,787 jobs	2,513 jobs	1,557 jobs
Median Household income (within service area)	\$51,767	\$24,540	\$45,548
Housing Density (# of housing Units per Sq. Mile in Srvc. Area)	2,294 units	5,801 units	2,018 units
# of Members (Annual/Casual)	1,171 Annual 6,200 Daily	127 Annual 828 Casual	100 Annual No casual data reported
Year round or seasonal	Seasonal (Closed Dec-Mar)	Year-round	Year-round
# of Trips per year	18,500 trips in 270 days	2802 trips in 365 days	2200 rides in 252 days
Climate Description	Mild summers, cold winters	Warm summers, cool winters	Warm summers, mild winters
Average Temperatures (Summer/Winter)	70° F/35° F	78° F/44° F	72° F/59° F
Average Precipitation in inches (Summer/Winter)	1.94/0.85	4.24/4.27	0.05/2.81
Bike facilities in city	300+ miles of bike lanes, routes, designated shoulders and paths	3.6 miles of bike lanes and signed routes; 2.7 miles of sharrows; 24.38 miles of trails; 7 miles of mountain bike trails; 172 bike racks	Sharrows, on inner university ring with one side for bike one side for pedestrians, Trails, dedicated bike lanes.
Bicycle Friendly Community Ranking	Platinum	Bronze	Silver (university)

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – SMALL SYSTEMS

Figures presented are as of March 2012

	SMALL-SCALE SYSTEMS		
	Boulder	Spartanburg	Irvine
System Name	Boulder B-Cycle	Spartanburg B-Cycle	ZotWheels
Oversight Entity	Boulder B-Cycle	Partners for Active Living	University of California, Irvine
Operator Name	Boulder B-Cycle	Partners for Active Living	UC Irvine -Transportation and Distribution Services
Equipment ownership	Nonprofit owned	Nonprofit owned	University owned
Equipment provider	B-Cycle	B-Cycle	Collegiate Bicycle Company, Central Specialties, Lt.
Business Model	Nonprofit	Nonprofit	Nonprofit
Funding Sources	Sponsorships - 22% Grants - 56% Gifts - 10% Membership and usage fees - 12%	Local Grants: City of Spartanburg, Mary Black Foundation, and JM Smith Foundation Management Membership and usage fees	Revenue (parking fees, citations) - Transportation and Distribution Services
Fares / Usage Fees	\$50 annual \$15 - 7 day \$5 -24 hours No fee first 60 min \$4 for every half-hour thereafter	\$30 annual \$15 - 30 days \$5 - 24 hours No fee first 60 min \$1 for each additional 30 min	\$40 Annual / no usage fees
Reported Thefts	0	0	0
Reported Crashes	0	0	0

APPENDIX E.

BIKE SHARING PROGRAM ANALYZED – PLANNED SYSTEMS

Figures presented are as of March 2012

	PLANNED SYSTEMS	
	Atlanta	Chicago
System Name	N/A	N/A
Web Address	N/A	N/A
Start date	N/A	Projected Summer 2012
Number of bicycles (start/current)	N/A	Proposed 3000
Number of stations (start/current)	N/A	Proposed 500
Docks per station (Range)	N/A	N/A
Solar vs. wired	N/A	Solar
Jurisdiction Bike to Work Rate (%)	Total: 0.9% Female: 22% Male: 78%	Total: 1.3% Female: 28% Male: 72%
Service Area (Sq Mi)	N/A	N/A
Average Station Density (# station per Sq. Mile)	N/A	N/A
Emp. Density (# Jobs per mile in Service Area in Srvc Area)	N/A	N/A
Median Household income (within service area)	N/A	N/A
Housing Density (# of housing Units per Sq. Mile in Srvc. Area)	N/A	N/A
# of Members (Annual/Casual)	N/A	N/A
Year round or seasonal	N/A	N/A
# of Trips per year	N/A	N/A
Climate Description	Hot and humid summers, mild winters	Mild, humid summers, cold winters
Average Temperatures (Summer/Winter)	79° F/46° F	74° F/28° F
Average Precipitation in inches (Summer/Winter)	4.37/4.31	4.02/2.22
Bike facilities in city	N/A	282 miles of bikeways including 125 miles of marked on-street bike lanes and 50 miles of off-street trails.
Bicycle Friendly Community Ranking	N/A	Silver
Oversight Entity	N/A	City of Chicago
Operator Name	N/A	N/A
Equipment ownership	N/A	Jurisdiction owned
Equipment provider	N/A	N/A
Business Model	N/A	N/A
Funding Sources	N/A	Federal CMAQ and TIGER advertising, Private: sponsorship agreements Membership and user fees
Fares / Usage Fees	N/A	Projected \$60-100 per year \$3-7 for daily

APPENDIX F. CALCULATIONS AND METHODOLOGY

This analysis used geographic data to calculate the employment, income and housing densities for each jurisdiction. The data used included, bike share station locations, U.S. Census Tracts and U.S. Census American Community Survey data.

To begin the analysis, the research team constructed maps for each jurisdiction showing the geographic location of each bike share station. To display the geographic extent of each program, a service area was constructed by creating a distance buffer of ½ mile for each station. The buffer created for each station was then combined into one aggregated shape file, and the total area of the service area was then calculated.

This analysis used tract boundaries from the 2000 U.S. Census for each of the jurisdictions being analyzed, rather than the slightly revised boundaries of the more recent 2010 U.S. Census tracts. This permitted the direct incorporation of U.S. Census American Community Survey (ACS) data for 2005-2009 into the analysis.

Census Tract employment data were used to account for job density in the area in the immediate vicinity of bike sharing stations. Median household income data was used to account for any impact that income might have on bicycling directly. Housing density data was used

to account for the impact that increased density can have on ridership patterns within a bike share system. Because the buffer area around each station is uniform (1/2 mile), the estimated population lying inside this area approximates residential density. All of these independent variables were compiled for each census tract within each jurisdiction analyzed, and joined with a GIS shape file of the 2009 block groups.

The Census Tract files were linked to the bike share station buffer areas. Because the buffer areas do not closely match the shapes of the Census Tracts, a GIS function called a 'union' was used to measure the proportion of each block group's area that falls within each bike sharing station buffer. This proportional area for each census tract was then used to give a weight to that Census tract's data, and the product was combined with data for other tracts lying wholly or partially within the station buffer area. The result is a weighted average of Census tract data for station buffer area. Finally, each of the weighted census tract averages were aggregated into one final number for each service area. The final employment density, median household income and housing density calculations for each jurisdiction are reported on Appendix E.

ENDNOTES

- ¹ The information in this guide was obtained through in-depth interviews with a bike share advisory group. In the fall and winter of 2011-2012 a bike sharing advisory group was convened to provide oversight and guidance. The group consisted of managers and planners from twelve different jurisdictions implementing or planning for the implementation of bike sharing programs in the US. To ensure the applicability to the broadest possible audience, the bike share programs selected for the in-depth analysis varied in size of program, size of city/county, geographic representation, stage of implementation, and types of technology used. The following programs were selected: East Coast: Hubway (Boston, MA) and Capital Bikeshare (Washington, DC/Arlington, VA); Southeast: Deco Bike (Miami, FL) and Spartanburg B-cycle (Spartanburg, SC); Midwest: Nice Ride (Minneapolis, MN); Mountain West: Denver B-cycle (Denver, CO) and Boulder B-cycle (Boulder, CO); Southwest: San Antonio B-cycle (San Antonio, TX); West: Zotwheels (University of California, Irvine).
- ² As of March 2012, the following is a list of major US cities implementing or planning to implement a bike share program within the next year: Atlanta, Charlotte, Chicago, Houston, Los Angeles, New York, Oklahoma City, Portland, San Francisco and Seattle.
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- ⁵ Midgely, Peter. "Bicycle-Sharing Systems: Enhancing Sustainable Mobility in Urban Areas." Background Paper No. 8. United Nations Commission on Sustainable Development. Pg 7-8. May 2011. http://www.un.org/esa/dsd/resources/res_pdfs/csd-19/Background-Paper8-P.Midgley-Bicycle.pdf
- ⁶ Interviews with Advisory Committee Members conducted November 2011 – January 2012
- ⁷ Interview with Lee Jones, Director of Sales, B-cycle LLC. July 27, 2012
- ⁸ Interviews with Advisory Committee Members conducted November 2011 – January 2012
- ⁹ Program profiles were created through interviews with different jurisdictions. See Program Profiles for more information.
- ¹⁰ Di Caro, Martin. DC Bike Shop Owners See Big Returns From Bike Share. *Transportation Nation*. Retrieved from <http://transportationnation.org/2012/06/29/dc-bike-shop-owners-see-big-returns-from-bike-share/> on June 30, 2012.
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- ¹² Although Chicago had an existing small-scale bike sharing system (7 stations), at the time this guide was being researched, the City was planning a larger, jurisdiction-wide system.
- ¹³ Although some are expanding to offer more than one type including tri-cycles and bicycles with additional cargo space.
- ¹⁴ Classic bike sharing schemes began in highly concentrated and dense jurisdictions according to the literature reviewed.
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- ¹⁶ Voeller, Gabrielle Elise. *Optimizing the locations of Bike-sharing Stations in Denver, Colorado: A suitability Analysis*. Cornell University. May 2011.
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- ¹⁸ Boulder B-cycle. Annual Report 2011. January 2012.
- ¹⁹ Interview with Julia Diana, Manager, San Antonio Bikes - City of San Antonio. December 7, 2011.
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- ³¹ Interviews with Advisory Committee Members conducted November 2011 – January 2012.
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- ³⁴ This area was calculated through GIS technology using the geographic location of bike share stations. The research group created a ½ mile buffer around each station and then calculated the combined area of the buffering around each station (see Appendix F for more information).
- ³⁵ Litman, T., & Steele, R. Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior. (2008). Vancouver, British Columbia: Victoria Transport Policy Institute.
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- ⁴¹ This number was calculated through GIS technology using the geographic location of bike share stations and the service area of each program. To obtain a final number, first a service area measurement was calculated. Using this number, a proportion was created dividing the number of available stations between the service area calculations. See Appendix F for more information.
- ⁴² Interviews with Advisory Committee Members conducted November 2011 – January 2012
- ⁴³ Interview with Josh Moskowitz, Program Coordinator and Chris Holben, Program Coordinator. DC Department of Transportation. November 30, 2011.
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- ⁴⁵ B-cycle Station dimensions (2011) and Capital Bikeshare Public Meeting presentation. Expansion to Montgomery County. November 29, 2011.
- ⁴⁶ Figures were obtained through interviews with Advisory Committee Members as well as a review of available literature and bike sharing resources available publicly.
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- ⁴⁸ Interviews with Advisory Committee Members conducted November 2011 – January 2012
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- ⁵² Boulder B-cycle 2011 Annual report and Interview with Elizabeth Train, Executive Director - Boulder B-cycle. December 20, 2011. ⁵³ Interviews with Advisory Committee Members conducted November 2011 – January 2012.
- ⁵⁴ Interview with Elizabeth Train, Executive Director - Boulder B-cycle. December 20, 2011.
- ⁵⁵ Interview with Colby Reese, Vice President, Deco Bike. November 8, 2011.
- ⁵⁶ In some cases, public funding represented 100% of the funding allocated for program implementation

- ⁵⁷ Interviews with Advisory Committee Members conducted November 2011 – January 2012
- ⁵⁸ Construction Program Guide: Buy America Provisions. Federal Highway Administration. US Department of Transportation. Retrieved from <http://www.fhwa.dot.gov/construction/cqit/buyam.cfm> on June 6, 2012.
- ⁵⁹ The extension of some of the US Department of Transportation funding authorized through Federal legislation (SAFETEA LU) was under review as this guide was being completed.
- ⁶⁰ As of March 2012, Federal Highway funds may be used the procurement of both bicycles and bike sharing stations as reported by Advisory Committee members and representatives from Federal Highways Administration
- ⁶¹ As of March 2012, Federal Transit Administration funds can only be used for the procurement of bike sharing stations, as bike share bikes are considered Single Occupancy Vehicles under FTA definitions.
- ^{62, 63} Grant is funded through Federal mandate of the American Recovery and Reinvestment Act of 2009.
- ⁶⁴ Please note that there are additional Federal sources which can support bike share programs. Additional information can be found under http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/bp-guid.cfm#bp4
- ⁶⁵ Boulder B-cycle 2011 Annual report and Interview with Elizabeth Train, Director - Boulder B-cycle. December 20, 2011.
- ⁶⁶ Denver B-cycle 2010 Annual Report
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- ⁶⁹ Ibid.
- ⁷⁰ Denver B-cycle pricing. <http://denver.bcycle.com/pricing.aspx>. Retrieved February 3, 2012.
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- ⁷² Interview with Josh Moskowitz, Program Coordinator and Chris Holben, Program Coordinator. DC Department of Transportation. November 30, 2011.
- ⁷³ For more information please refer to FHWA's bike share Frequent Asked Questions page: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/faq_bikeshare.cfm
- ⁷⁴ Interview with Nicole Freeman, Director of Bicycle Programs, City of Boston. December 01, 2011.
- ⁷⁵ Interview with Mitch Vars, I.T. Director, Nice Ride. December 14, 2011.
- ⁷⁶ Ibid.
- ⁷⁷ Interviews with Advisory Committee Members conducted November 2011 – January 2012
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- ⁷⁹ Interview with Anne Hudak, Active Lifestyles Coordinator. Partners for Active Living and Cate Ryba, Media and Communications Officer. Mary Black Foundation. November 8, 2011
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- ⁸¹ Interviews with Advisory Committee Members conducted November 2011 – January 2012
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- ⁸³ Capital Bikeshare commuters share why they ride — and its drawbacks. http://www.washingtonpost.com/local/capital-bikeshare-commuters-share-why-they-ride--and-its-drawbacks/2012/01/26/gIQAQzdGjQ_story.html. Washington Post online. Retrieved February 9 2012.
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- ⁹⁷ Interview with Colby Reese, Vice President, Deco Bike. November 8, 2011
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