



# City of Providence Bike Share Feasibility Study Final Report May 2011

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*Cover photo of B-cycle station at lower right courtesy of Rand McNally's web site (all others, Alta)*



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# 1 Executive Summary

As they have become instituted in more and more cities throughout North America, bike share systems are becoming part of a city's transportation network. Their popularity in cities such as Montreal and Washington DC have shown that when presented with an efficient and well-run system, people will indeed take to bike share as they do with transit or walking. This is likely to be the case in Providence. As the City embarks on a quest to implement a modern streetcar system along with enhanced transit nodes, bike share will help to fill in the gaps between the transit lines in the core of the city and the surrounding neighborhoods.

Providence is poised for a successful bike share system because it exhibits many of the qualities that have lead to successful programs in other cities, including:

- A compact urban core with high employment density and good connections to nearby residential neighborhoods
- A significant population of students within the bike share service area
- Close-in universities and other institutions that can provide support for bike share (along with students who frequently do not have access to a car)
- A relatively temperate climate, especially considering that bike share is not recommended to be a year-round system
- A built-in bike culture and a foundation of a bike-facility network of bike lanes and paths



Parts of Downcity Providence feature plentiful bike parking, such as at the corner of Memorial Blvd. and the College Street Bridge

However, some challenges do remain for system implementation and operations. These include:

- The steep grade between the downtown area and College Hill, leading to an imbalance of bikes being ridden downhill but very few being taken uphill.
- The lack of existing or planned bike facilities on many key streets
- Interstate 95, which creates a psychological—and physical—barrier between the Jewelry District and Rhode Island Hospital and between the Downcity and Federal Hill

These issues are common for cities pursuing bike sharing systems, and are solved with operations, as well as continued improvements in bike facilities, signage and education and outreach.

This feasibility study is a reference to help the City of Providence establish a city-wide public bike share system. It includes an in-depth review of bike share systems and technologies, makes recommendations for bike share in Providence, and details the capital funding requirements for a bike share system.

Section 2 of the study is a review of existing and planned bike share systems and technologies. Systems range in size from 18 to 5,000 bikes, and include systems that are based in the U.S. and abroad. Cities with bike share systems have a range of size, climate, and quality of bicycle infrastructure. The intention of this inventory is to provide the basis on which an appropriate system can be recommended for Providence, a system that conforms to the city's size, density, climate, bike network and demographics.

In Section 3, a series of bike share characteristics are discussed and evaluated based on their appropriateness for Providence. These characteristics include months of operation, linkages to transit, extent of service area, type of vendor, type of rentals available, infrastructure/equipment required, and maintenance strategy. Overall, a seasonal, station-based system is recommended that offers both walk-up and long-term rentals, as well as tie in to transit hubs. Low maintenance and vandal-resistant bikes and stations should be used in this system to minimize theft and damage.

The most successful bike share stations that yield the most potential use of the system will be located in areas where there is the highest level of residential, employment, and academic density in addition to pedestrian activity. The extent of the initial service area should be based on an analysis of the overall population density and the bicyclist population density, employment density, transit stops, bicycle facilities, park and recreational spaces, commercial corridors, and other major destinations. A "heat" map shows the area of Providence that has the highest potential use of a bike share system. Ideally, within the service area no individual is ever more than a five minute walk from a bike share station. Based on a heat mapping exercise using data from the City of Providence, the estimated number of stations and bicycles for an initial launch is 20 and 200, respectively.

Section 4 discusses the capital funding of a bike share system in Providence. Alta recommends that Providence pursue public funds and grants to subsidize the initial equipment purchase and launch as well as some private sponsorship from the local corporate and institutional market. Based on the 20 stations/200 bikes estimate, the capital costs for the system will be approximately \$1 million, not including the inaugural launch costs of \$200-300,000 and annual operating costs of \$300-500,000 per year for the first three years. (Over time, system revenue will cover increasing amounts of the operating costs.) While this clearly is a significant expenditure, it needs to be looked at within the context of other transportation-related projects that can run in the tens or hundreds of millions of dollars.

Ideally, the management of the bike share system should be a non-profit entity guiding a private contractor. This arrangement provides good public image, grassroots outreach, transparency, and local knowledge, as well as operating efficiency, expertise, and high levels of service. A key component of this relationship is the ability of the non-profit to work closely with local colleges and other institutions in order to get full buy in and take advantage of potential sponsorship opportunities.

## 2 Bike Share Systems and Technologies

Third-generation, RFID-based<sup>1</sup> bike share systems are a recent trend in urban transportation. In just the past few years, systems have sprung up around the United States and the world, utilizing a variety of technologies, distribution strategies and economic models. Nearly all have had some significant level of success. Finding the most successful and appropriate model is critical for bringing a future bike share system to Providence.

This section includes a review of several existing and planned bike share systems, as well as new bike share technologies that have yet to be incorporated into an on-the-ground system. The systems and cities reviewed provide a diversity of urban contexts, bike share systems and sizes, geographic locations and user interfaces. The goal is to provide the City of Providence with a number of comparables so that it can evaluate (a) whether a bike sharing system should be implemented in the City and (b) what are the key characteristics of this system that should be used in Providence. The criteria include:

- Size and climate of city
- Bicycle infrastructure of city
- Type of technology and bikes
- Reported statistics from system
- Economic considerations

The bike share systems and technologies that are reviewed in this section include:

- Avignon, France, Velopop, 200 bikes
- Denver, B-cycle, 500 bikes
- Des Moines, B-cycle, 18 bikes
- Miami Beach, DecoBike, 1,000 bikes
- Montreal, Public Bike System, 5,000 bikes
- UC Irvine, ZotWheels, 25 bikes
- Washington DC, Capital Bikeshare, 1,100 bikes
- Washington DC, SmartBike DC, 120 bikes
- Boston, Public Bike System, in planning
- Boulder, B-cycle, in planning
- Social Bicycle from New York City, bike share technology
- Urbikes, Barcelona, bike share technology



Figure 1: Capital Bike Share station in Washington, D.C.

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<sup>1</sup> RFID stands for Radio Frequency Identification. It is this technology that allows a bike sharing system to connect a user to a bike with the security of a credit card. The success of bike sharing globally is attributed to this technology which has helped to minimize theft and vandalism, both of which were problems with first-generation (free bikes) and second-generation (coin-operated) bike share systems.

**System Summary**

Local System Name	Velopop
Technology Provided by	Smooove
Web Address	<a href="http://www.velopop.fr/">www.velopop.fr/</a>
Launch Date	July 2010

**Size / Local Conditions**

# of Bikes	200
# of Stations	17 (11 - 12 bikes/ station)
Square Miles Covered	1.25 sq mi (approx)
Average Station Density	14 stations per sq mi
Membership / Ridership	Not reported
Population of city	94,787
Bike infrastructure of city	135 km of bike lanes and paths



Photo courtesy of Velopop

Climate conditions	Annual average temp = 57° Cool, rainy winter and warm summers
Year round or Seasonal	Year-round

**Economic Considerations**

Price structure	\$20 annual, \$2.60 monthly with 1 month bus season ticket, \$3.90 weekly, \$1.30 daily, first 30 min free, \$1.30 for each 30 min more; membership is free with 1 year bus season ticket
Economic Model	Publicly financed
Funding	Undisclosed
Management	Private Vendor, Transport Region of Avignon (TCRA)
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

**Equipment**

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Credit card at console or call toll free number, access code sent to user's mobile phone by text Member use: Scan season ticket at console Key access to bicycle
Type of Bike	Step through design, internal gearing, basket, anti-theft lock

**System Summary + Analysis**

The population of Avignon is similar to Providence and, as a modest-sized system of 200 bikes, is a potential model for Providence. This system is unique among the systems reviewed in that Velopop bikeshare memberships have been integrated with monthly and annual transit passes.

**System Summary**

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

**Size / Local Conditions**

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



Photo courtesy of Rand McNally

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

**Economic Considerations**

Price structure	\$65 annual, \$30 monthly, \$20 weekly, \$5 daily + usage fees: first 30 minutes free; \$1.10 for 30-60 min; \$2.20 for 60-90 min; \$3.30 for 90-120 min; \$4.40 for each 30 min more
Economic Model	Non-profit created by city; public and private funding
Funding	Began with \$1 million in city and county funding
Management	Non-Profit, Denver Bikesharing
Reported Theft / Vandalism	2 bikes stolen
Long-term Local or Walk-up Renters	Both

**Equipment**

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

**System Summary + Analysis**

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

**System Summary**

Local System Name	Des Moines B-Cycle
Technology Provided by	B-Cycle
Web Address	desmoines.bcycle.com/
Launch Date	September 2010



Photo courtesy of Learfield News

**Size / Local Conditions**

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

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

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

**Economic Considerations**

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

**Equipment**

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

**System Summary + Analysis**

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

**System Summary**

Local System Name	DecoBike
Technology Provided by	Sandvault Group Global Solutions
Web Address	www.decobike.com/
Launch Date	December 2010

**Size / Local Conditions**

# of Bikes	1,000
# of Stations	100 (10 bikes/station)
Square Miles Covered	6.5 sq mi (approx)
Average Station Density	15 stations per sq mi
Membership / Ridership	TBD
Population of city	86,916 (census 2006)
Bike infrastructure of city	Few on-street bike lanes and paths that run along the beach
Climate conditions	Annual average temp = 76° Warm winters and hot, rainy summers
Year round or Seasonal	Year-round



Photo courtesy of DecoBike

**Economic Considerations**

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

**Equipment**

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

**System Summary + Analysis**

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

**System Summary**

Local System Name	Bixi
Technology Provided by	Public Bike System
Web Address	www.bixi.com
Launch Date	May 2009

**Size / Local Conditions**

# of Bikes	5,000
# of Stations	400 (12 - 13 bikes/ station)
Square Miles Covered	16 sq mi (approx)
Average Station Density	25 stations per sq mi
Membership / Ridership	30,000 members after 2 seasons, 3.3 million rides in 2010 season, 118,000 new users in 2010
Population of city	1,620,693
Bike infrastructure of city	Extensive network of cycle tracks, bike lanes and "route verte" - a provincial-wide path system
Climate conditions	Annual average temp = 45° Cold, snowy winters and mild, rainy summers
Year round or Seasonal	Closes in November



Photo courtesy of Alta

**Economic Considerations**

Price structure	\$78 annual, \$25 monthly, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$3 for 60-90 min, \$6 for each 30 min more
Economic Model	Publicly funded through city parking authority
Funding	Began with \$33 million loan from parking authority
Management	Public-private organization, Bixi
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

**Equipment**

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike; Subscribers: Insert BIXI-key into reader at bike dock
Type of Bike	Standard Bixi Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3 or 7-speed, any color choices

**System Summary + Analysis**

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

**System Summary**

Local System Name	ZotWheels
Technology Provided by	Collegiate Bicycle Company
Web Address	<a href="http://www.parking.uci.edu/zotwheels">www.parking.uci.edu/zotwheels</a>
Launch Date	October 2009

**Size / Local Conditions**

# of Bikes	25
# of Stations	4 (6 - 7 bikes/station)
Square Miles Covered	0.25 sq mi (approx)
Average Station Density	16 stations per sq mi
Membership / Ridership	250 members
Population of city	17,000 students
Bike infrastructure of city	On-street bicycle lanes and multi-use paths
Climate conditions	Annual average temp = 63° Mild winters and sunny, warm summers
Year round or Seasonal	Year-round, sunrise to sunset, 7 days a week



Photo courtesy of University of California Irvine

**Economic Considerations**

Price structure	\$40 annual, 3 hour rental maximum
Economic Model	Fully funded by Parking and Transportation Services
Funding	Undisclosed
Management	Parking Department, subs to bike shops
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	UCI student and employee members only

**Equipment**

Hard-wired or Solar	Hard-wired
Station Based or Other	Station-Based
User Interface	Members receive a membership card that must be used at the station console to access a bicycle.
Type of Bike	Single-speed beach cruisers, no lights or reflectors, with a modified basket containing the dock locking mechanism

**System Summary + Analysis**

While many universities in the United States have bike sharing, the UC Irvine system is one of the best. Most others incorporate more standard bikes that are used as shared bikes, loaned out to students in a library-system. The UC Irvine system functions similar to a 3rd-generation high-tech bike share system with required paid membership and specially designed bikes. For such a large campus, the existing stations provide inadequate coverage.

**System Summary**

Local System Name	Capital Bikeshare
Technology Provided by	Public Bike System
Web Address	www.capitalbikeshare.com
Launch Date	September 2010

**Size / Local Conditions**

# of Bikes	1,110
# of Stations	114 (9-10 bikes/station)
Square Miles Covered	27 sq mi (approx)
Average Station Density	4 stations per sq mi
Membership / Ridership	5,000 members, 100,000 rides in 4 months, 10,000 casual users
Population of city	817,140 (census 2009)
Bike infrastructure of city	Growing network of bike lanes, signed bike routes, and trails
Climate conditions	Annual average temp = 58° Cool winters and warm, humid summers
Year round or Seasonal	Year-round



Photo courtesy of Alta

**Economic Considerations**

Price structure	\$75 annual, \$25 monthly, \$5 daily + usage fees: first 30 minutes free; \$1.50 for 30-60 min; \$3 for 60-90 min, \$6 for each 30 min more
Economic Model	DC 100% publicly funded; Arlington 65% privately funded
Funding	Began with \$6 million CMAQ and local funding for District, \$200,000 private funding for Arlington
Management	Private Vendor, Alta Bicycle Share
Reported Theft / Vandalism	None reported
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

**Equipment**

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike Subscribers: Insert subscriber key into reader at bike dock
Type of Bike	Standard Bixi Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3 or 7-speed, any color choices

**System Summary + Analysis**

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

**System Summary**

Local System Name	SmartBike DC
Technology Provided by	Clear Channel
Web Address	www.smartbikedc.com/
Launch Date	August 2008

**Size / Local Conditions**

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

**Economic Considerations**

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

**Equipment**

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

**System Summary + Analysis**

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



Photo courtesy of Smartbike DC

**System Summary**

Local System Name	TBD
Technology Provided by	Public Bike System
Web Address	TBD
Launch Date	Spring 2011

**Size / Local Conditions**

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

**Economic Considerations**

Price structure	TBD, first 30 minutes free
Funding	Federal grant (\$3 million), station sponsorship, and ads
Management	Private Vendor, Alta Bicycle Share
Long-term Local or Walk-up Renters	Both long-term and walk-up renters

**Equipment**

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based
User Interface	Casual use: Pay with credit card at console, get a 5-digit code to access bike Subscribers: Insert subscriber key into reader at bike dock
Type of Bike	Standard Bixi Bike, step through design, internal gearing, internal brakes, basket, dynamo lighting, 3 or 7-speed, any color choices

**System Summary + Analysis**

The planned bike share system for Boston will likely expand into Cambridge in Phase 1 and into Somerville and Brookline in Phase 2. Coordination with the Massachusetts Bay Transit Authority and the Department of Conservation and Recreation is critical. Boston is becoming more and more bicycle-friendly and will link well with Cambridge.

**System Summary**

Local System Name	Boulder B-Cycle
Technology Provided by	B-Cycle
Web Address	boulderbcycle.com/
Launch Date	Spring 2011

**Size / Local Conditions**

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



Photo courtesy of B-Cycle

**Economic Considerations**

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

**Equipment**

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

**System Summary + Analysis**

Although Boulder is an extremely progressive biking city and seemingly perfect for bike sharing, some questions remain as to how much bike sharing will be accepted in a community where a large majority already own bicycles, and most people live in single-family homes, eliminating the bike storage constraint found in larger cities. Boulder is one of the most bike-friendly cities in the United States and weather is quite pleasant for 7 - 8 months of the year. Though Providence is not as bike-oriented as Boulder, this system is a good model for Providence based on size and scope.

**System Summary**

Local System Name	SoBi
Web Address	<a href="http://www.socialbicycles.com/">www.socialbicycles.com/</a>
Launch Date	Small NYC pilot anticipated in winter 2011
Company Location	New York City

**Equipment**

Hard-wired or Solar Powered	Infrastructure attached to bike rack and frame
Station Based or Other	Floating bikes, with optional stations



Photo courtesy of Social Bicycles

**System Summary + Analysis**

This system is in prototype phase only but has garnered much press. The company hopes to have a small pilot in New York City in winter 2011. It plans to use GPS, mobile communications, and a secure lock that can attach to most bicycles and lock to any regular bike rack. Because of an absence of stations, this system may be less expensive than other systems, as well as requiring no infrastructure construction. However, the additional cost and complication of requiring a communications packet on every bike may greatly increase both the operational cost and increased theft / vandalism liability. In addition, the requirement of a mobile phone to locate bikes changes the socio-economic cross-section of potential users. Finally, it is typically understood that bikes must be fitted specially for bike sharing (seats that can't be removed, internal cables, rideable by most of the population, etc), so SoBi must still address such important issues.

**System Summary**

Local System Name	Urbikes
Web Address	<a href="http://www.urbikes.com">www.urbikes.com</a>
Launch Date	Unknown
Company Location	Barcelona

**Equipment**

Hard-wired or Solar Powered	Solar
Station Based or Other	Station-Based

**System Summary + Analysis**

This system utilizes solar, wireless communication between docks. Wireless communication between station console and the docks allows the docks to be in multiple configurations to fit into different urban areas. The bikes are designed to be low maintenance and extremely durable, including an internal drive shaft and puncture resistant tires. A credit card is required to pay at the station console.



Photo courtesy of Urbikes

### **3 Bike Share Recommendations and Framework**

This section includes an analysis of the characteristics that will determine the success of a bike share system in Providence. These systems are evaluated based on the regional characteristics of Providence to determine systems most appropriate for the area. It also establishes a framework for the future placement of bike share stations.

#### **Bike Share System Characteristics**

The measures of success of a bike share system are its ability to be financially self-supporting, its function as an extension of the transit system, and/or its ability to make bicycling more visible.

Ridership per bike per day is often used to measure relative success, with most systems operating at 1-2 rides per bike per day. To achieve this level of success in Providence requires a system that conforms to the city's size, density, climate, existing/proposed bike network and demographics. The City of Providence has a population of approximately 175,000 people and is densely settled in the neighborhoods surrounding Downtown. Providence has cold winters with snow and warm, relatively-humid summers. The average annual temperature is 50° F. Demographically, inner Providence hosts many college students and younger professionals that, in other cities, are typically bike share users.

There are several popular bike paths in Rhode Island that terminate in or near Providence. There are connections from Downtown to the Woonasquatucket River Greenway through bike lanes on Promenade Street and Kinsley Avenue. A portion of the Northwest Bike Path traverses Riverside Park (also part of the Woonasquatucket River Greenway). In 2011, RIDOT plans to stripe part of the Blackstone River Bikeway down Blackstone Boulevard, Irving Avenue, and River Road. Plans are in development to continue the Blackstone Bikeway off road through Gano Street Park with an eventual connection to India Point Park and the Pedestrian/Bike Bridge next to the Washington Bridge (which will also connect the Blackstone Bikeway to the East Bay Bike Path). Bike lanes have been striped on Allens Avenue for many years and bike lanes will be striped on Broadway as part of a larger paving project in 2011. The City and RIDOT also plan to construct a new pedestrian bridge in place of the old I-195 bridge, which has been relocated further south. This bridge will provide an important connection for pedestrians and bicyclists between the Jewelry District and Fox Point.

There are several key characteristics that will play a prominent role in the success or failure of the system. These characteristics include:

- Months of operation
- Linkages to transit
- Extent of service area
- Type of vendor
- Relationship to advertisers and sponsors
- Type of rentals available
- Infrastructure/equipment required
- Maintenance strategy.

### *Months of Operation*

A seasonally-based bike share system is preferable for Providence as winter weather conditions discourage bicycling, especially short and spontaneous trips that typify bike share use. While the city does not currently have bicycle count data that quantifies the drop-off in winter cycling demand, it is understood among planners and bicycle advocates that winter cycling drops significantly in Northeastern cities. The Bixi bike share system in Montreal has published data on their monthly ridership which shows a steep decline in November before the system closes in December, as well as very low ridership in March and April when the system reopens. While it is possible that this drop-off represents only partial month data, a drop in demand can be expected based on the snowy climate of the city.

In addition to reduced demand for bicycles in winter, the additional street furniture required for some bike share systems (e.g. bike share stations and docks) can be a burden during the occasional large snowfalls that Providence experiences. The stations themselves provide an impediment to snow clearance. There is also a higher risk for equipment damage from snow plows and salt. Access to the stations and bikes will be limited due to snow piling. In Washington DC, the Capital Bikeshare system is shut down when more than two inches of snow accumulates (or in other severe weather, such as ice). During the Capital Bikeshare shutdown, bikes are not able to be removed from the stations, but the equipment remains on site. Such a shutdown requires intensive communications among staff, and with all users. In Montreal, emergency ground crews are deployed to remove the system from the street with the onset of any unseasonal snowfall.

Successful seasonal bike share systems exist in cities which have cold, snowy winters, including Denver, Des Moines, and Montreal<sup>2</sup>. Even some successful systems in European cities close for the winter months. These systems, provided by B-Cycle or Public Bike System, have stations which can be easily removed from the street and placed in storage for the winter. Des Moines and Denver both have some stations that are hardwired, that are simply turned off in the winter, while the infrastructure remains. Successful year-round systems are located in cities with winter weather significantly milder than Providence, such as Washington DC, Melbourne Australia, Irvine California, Avignon France and Miami Beach.

### *Linkages to Transit*

The Rhode Island Public Transit Authority (RIPTA) operates bus and trolley service throughout the state. Kennedy Plaza, in Downtown Providence, serves as RIPTA's regional bus hub, serving over 45,000 people each day. Additional transit hubs are being developed by RIPTA and the City at Thayer Street in College Hill, Rhode Island Hospital, Cahir Street, and at the Providence train station in Capital Center. The Providence train station provides access to the northeast regional Amtrak and Massachusetts Bay Transit Authority (MBTA) commuter rail to Boston. Approximately 1,300 Amtrak and 2,700 MBTA passengers pass through the Providence train station each day. New commuter rail service between Wickford, T.F. Green Airport, and Providence is expected to serve nearly 2,000 additional passengers by

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<sup>2</sup> Montreal is experimenting with a limited year-round bike share based on the success of their seasonal model. This may be a consideration for Providence in the future, after the proven success of a seasonal system.

2020. There may also be opportunities to tie-in with the streetcar system currently proposed for Downtown, Upper South Providence, and College Hill. The presence of transit stops, particularly major transit hubs such as Providence Station and Kennedy Plaza, should be among the criteria used to locate bike share stations (see *Station Placement Framework*).

Additional tie-ins to transit, such as combined bus and bike-share passes (following the Velopop example in Avignon, France) are also possible. It is important to note, however, that there are many technical issues involved in integrating a bike share membership with transit. Only one city in the world, of which we are aware (Avignon, as mentioned above) has been able to overcome the technical and financial issues. It has not been proven on a large-city scale, even when attempted to do so with the Oyster Card system in London.

Bike sharing extends the reach of transit (particularly for longer distance transit trips) and a number of European bike share systems have found an increase in transit ridership following implementation. It can also fill a void in the transportation spectrum for trips that are too far to walk but not long enough to justify waiting for transit. Early North American studies have shown that approximately 20% - 40% of bike share trips replace transit trips, likely over shorter distances.<sup>3</sup>

### ***Extent of Service Area***

With Alta's extensive experience planning and operating bike sharing systems, we recommend assuring that the initial launch of a system has a critical mass of stations and bikes to make it usable for some sector of the population. A launch that is too small, often undertaken because of limited availability of funding, can lead to failure because of low usage. The core aspect of a bike sharing system is that there are sources and destinations where people will begin and end trips. However, we also believe that phasing in a system with a final, system-size goal is completely appropriate, and often the most financially viable way to start a bike sharing system.

The key to a successful bike share system is regular turn-over of bicycle use. In this way, areas that have a mixture of land uses and therefore a variety of trip types and patterns are typically the most successful locations.

An initial launch of the bike share system should concentrate in areas where there is the highest amount of residential/employment/academic density and pedestrian activity, and therefore the highest potential use of the system. The initial launch area should include sections of Providence that feature college campuses, large employment centers, elements of a bike network and the presence of the train station and transit centers. The launch area can also tie in to neighborhood market program areas at Thayer Street, Atwells Avenue, and Olneyville Square.

Downcity, Capital Center, Fox Point, the Jewelry District, Rhode Island Hospital, College Hill, and Federal Hill are all active neighborhoods that are contiguous with one another. Expansion of the system can

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<sup>3</sup> The pilot system operated in Washington DC in 2008 by Clear Channel showed that 41.4% of bike share trips replaced transit. Surveys from Nice Ride in Minneapolis (2010) have shown approximately 20% of trips replace transit.

radiate out from the initial launch area toward Smith Hill, Providence College, Upper South Providence, and the rest of the East Side. Depending on the success of the system, expansion south to Roger Williams Park and to key trailheads of the East Bay Bike Path may be feasible as a later phase. With long-term connections to the East Bay Bike Path, partnership with other communities along the route (Barrington, Warren and Bristol) should be explored.

Criteria for the placement of the bike share stations will be discussed in further detail in the *Station Placement Framework* section of this memo.

***Type of Vendor***

There are several different operating models to define the relationship between the vendor and the city. Unilaterally in the United States, municipalities have opted out of operating a bike sharing system directly because of liability issues involved in such an undertaking.

Following are operating models of various cities around the United States. As shown in the table below, the operating structure is deeply related to the funding:

<b>Name</b>	<b>Stations / Bikes</b>	<b>Operations</b>
Denver Bikesharing	50/500	New non-profit set up by the City
Minneapolis Nice Ride	65 / 700	Non-profit set up by City. Note there were no operations companies in 2009 when Nice Ride was established
Chicago B-Cycle	6/100	Completely private system, privately owned and operated
Des Moines B-Cycle	4/18	Already existing local non-profit
Capital Bikeshare	114 / 1,110	Operator direct contract with both Washington DC and Arlington County
Miami Beach Decobike	100 / 1,000	Completely private system, privately owned and operated
Boston Bike Share (2011 launch)	61 / 610	Public – private partnership; operator direct contract with the City of Boston (RFP issued by regional planning agency)
Chattanooga Bike Share (2011 launch)	30 / 300	Public – private partnership; operator direct contract with local transit agency (who received federal funding)
New York City Bike Share (2012 launch)	TBD	Completely private system, privately owned and operated (based on 11/23/2010 RFP)

The following table presents issues associated with each type of operating structure. A letter is placed in the box for items where that entity has an advantage. The associated letter below the table offers explanation for these choices:

Associated Issues	Type of Entity			
	Local non-profit	Private contractor / Public – private funding	Privately owned and operated	Non-profit guidance, private contractor operated
Public Image and Grassroots Outreach	A			A
Operating Efficiency / Expertise		B		B
Service Level Accountability		C		C
Transparency	D	D		D
Control over Site Locations and Operations	E	E		E
Best Potential for Regional System				F
Financial Risk to City / Financial Contribution Required			G	

- A. A non-profit organization can have a very good image in the public eye. Having a non-profit either operate or guide the system can help avoid some of the public negativity that can accompany a bike sharing system, such as “Why are we wasting millions of dollars of taxpayer money on bikes?”, as well as users feeling more involved in the community aspect of building a bike sharing program and potentially being more likely to forgive errors than to a private company. Please note, however, that a non-profit can also denote a lower-quality product if not positioned and funded correctly.
- B. Operating a bike sharing system is a large and complex undertaking. There is a large amount of efficiency lost and uncertainty introduced each time a new organization decides to operate a bike sharing system. In effect, the wheel is recreated each time. Therefore, a private operator can give a client more security that a system will be successfully launched and well-run. In addition, an operator who works across multiple cities can more quickly learn the lessons of other cities to incorporate and continuously improve on best practices on running world-class bike sharing systems.
- C. A direct contract with an operator that includes service levels for the system (such as the amount of time stations can be down, response time for full or empty stations) gives the client security that the operator must run a system consistent with the goals and values of the client, and the operator must be accountable with these service levels or there are financial consequences.

- D. A completely private system lacks the transparency that the other structures have. Please note, however, that any non-profit must have the appropriate funding for strong accounting and reporting capabilities for such transparency.
- E. A completely private system gives the vendor much more (if not complete) control over site locations and operations. This control occurs out of necessity, as a completely private operator is taking on a significant financial risk, so they must be able to locate stations and operate the system so that it is financially viable for them.
- F. If there is the potential for a system to span across municipal boundaries, it is recommended that a central governing body should be established to guide the philosophy of the system. Although Capital Bikeshare is a regional system that is running very smoothly without such a central governing body, there is potential for complications should a third entity desire to enter the system.
- G. A completely privately owned and operated system requires no capital or operating funds to be contributed by a municipality, which can be very attractive for cash-starved cities.

### *Type of Rental Available*

The Providence bike share system should be available to both walk-up (daily) and long-term (monthly and yearly) local renters. Walk-up rentals are convenient for people visiting the city and for spontaneous travelers.

Statistics from the Bixi system in Montreal show that walk-up rentals make up a smaller share of overall rides on the system (See Figure 1). However, a greater proportion of casual riders exceed the free 30-minute period compared to annual members who use the system and hence a larger proportion of user-generated revenue typically derives from casual users. In fact, the Nice Ride system in Minneapolis generates approximately  $\frac{1}{4}$  of their revenue from annual membership fees,  $\frac{1}{2}$  from casual user (daily) fees and  $\frac{1}{4}$  from “overtime” charges for trips beyond the first 30 minutes of free use.<sup>4</sup>

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<sup>4</sup> Association of Pedestrian and Bicycle Professionals, January 19, 2011 Webinar: “Bike Sharing Programs,” Bill Dossett, Executive Director of Nice Ride Minnesota, presentation.

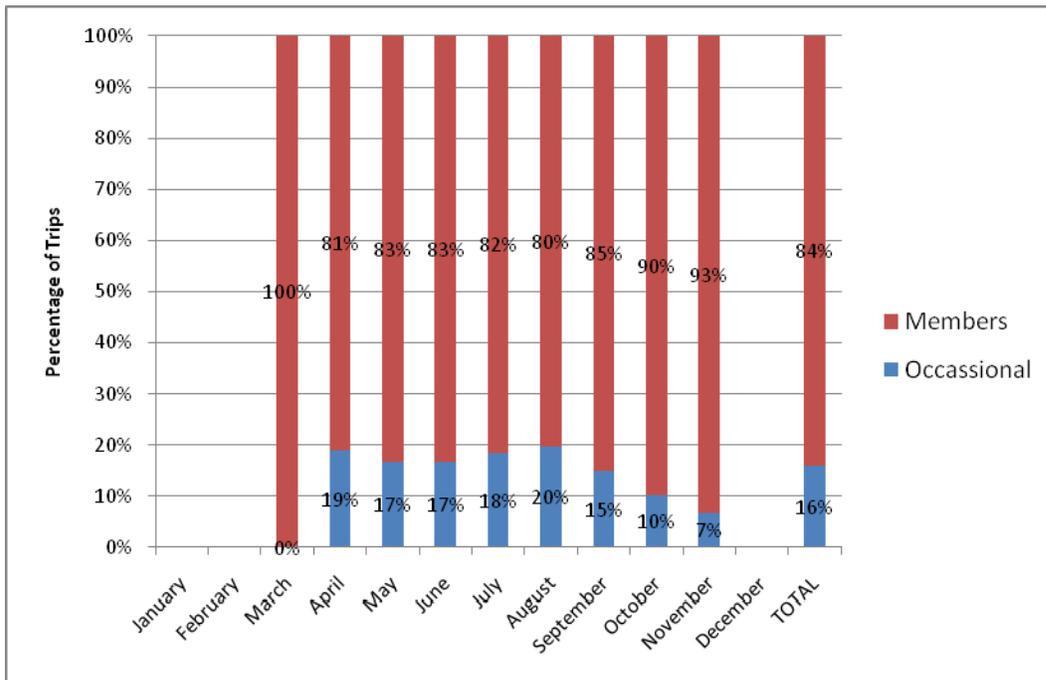


Figure 1: Monthly Breakdown of Member and Occasional Trips (BIXI)

Making walk-up rentals available also helps to market the system: once a Providence resident has been able to use a bike with a walk-up rental a few times, he or she may be encouraged to purchase a longer-term membership. Long-term memberships typically provide access to the system at a discounted rate for a month or year at a time. These memberships are targeted toward residents who will use the system regularly. In fact, the Montreal BIXI system saw a huge spike in annual members in their second season (the only large-scale North American system to have undergone a second season), likely due to the conversion of casual members to annual members after a trial first year.

Both the Denver and Minneapolis systems showed an unexpectedly high number of casual users (approximately 30,000) versus members (1,000 – 1,500) in their first season. Capital Bikeshare, however, showed a much faster first season uptake of membership (5,200 as of this writing) with only 11,000 casual users. Alta believes the faster membership uptake was due to education of the DC market about bike sharing because of the 100-bike SmartBike system, which, although it was considered a failure, exposed the community to bike sharing.

### ***Infrastructure and Equipment Required***

Although investing in equipment is the most costly element of installing a bike share system, the benefits of this investment include fully functioning bicycles and stations that in other North American systems have experienced low levels of theft and vandalism. After the first season of bike sharing in the United States, opposite of fears and expectations, have shown one bike, two bikes and two bikes stolen in Minneapolis, Denver and Washington DC, respectively. These thefts have been due to users using stolen credit cards to take a bike, rather than the bikes being forcibly removed from docks.

Low maintenance and vandal-resistant bikes do not have interchangeable parts with regular, commercially available bikes, making them less of a target for anyone wanting to steal them. It is understood that the moment bike sharing systems are put out on the street, thieves will try to force

them out of their docks. One can see videos on the internet of this happening in systems around the world. It is important that the system be 100% theft-proof of a bike being forcibly removed from a dock. It is also important to work with an equipment vendor who will respond immediately should a new way be discovered to remove bicycles from docks. If such a technique goes “viral”, then the security of the whole system, and of all systems of this vendor, is jeopardized.

Vandal-resistant bike components are internalized as much as possible to avoid weather- and user-damage. Having a station-based system allows these bicycles to be securely locked in a visible location when they are not in use. Station kiosks offer a payment interface for renters.

One of the key decisions for station-based bike share systems is whether they should be hard-wired or modular. Modular systems are typically solar powered, making them environmentally sustainable, and offer the advantage of having no obtrusive wiring which makes them completely moveable, which is especially important if they are to be removed during winter, and easier to install with fewer permitting issues and impacts on nearby utilities. Some vendors have battery backups for solar stations, and some also can install both solar and hardwired stations, should a key station require location under an obstruction. We strongly recommend a solar-powered system with a vendor that also has a proven capability to hardwire stations.

Station-based systems, however, are limited in their ability to respond to high demand because of a finite number of docking points. Therefore, operations are focused on rebalancing bikes – keeping stations with some docking points empty, yet stocked with bicycles. There are no proven systems, however, that are non-station-based, although there are several currently in development. It appears from the prototypes that these systems do not feature vandal-proof bicycles.

Therefore, it is our recommendation that Providence pursue a station-based system, unless the equipment for non-station-based system has been proven by the time the City would like to procure and launch a system. While the vandal-resistant bikes will be uniform in design, they should stand out as a transportation system unique in Providence and Rhode Island. A distinctive color treatment and/or logos are recommended.

### ***Maintenance Strategy***

The strategy for maintenance and repair of bikes and/or stations strongly depends on the size of the system and the level of accountability required. Alta-operated systems include preventative on-street bike maintenance, as well as in-shop maintenance.

Ultimately, the decision on how to undertake the bike maintenance should be the decision of the operating organization. For a small system (up to 300 bikes), it is feasible to work with a local bike shop for maintenance. Whether a local bike shop can do this depends on the desire and skill to take on such operations (which requires extensive record-keeping for liability purposes), the space capacity of the shop, and the size of the system. The maintenance provider for a bike share system must have storage capacity of up to 10% of the system at any time. For a 200-bike system, that would be 20 bikes. Additional complications involving working with bike shops include the fact that if a discounted rate is

charged by the bike shop for bulk business, there is little incentive for the shop to put bike share bicycles in front of their retail jobs, as they are being paid less.

## Recommended Systems

The matrix in Figure 2 below shows how each of the bike share system providers rank relative to the preferred characteristics for the Providence bike share system. (Please note: it is not the intent of this report to endorse any particular bike share provider, but rather to show how the different existing bike share companies do or do not suit Providences’ bike share needs.)

**Desirable Characteristics for Providence Bike Share**

Vendors	Seasonal operation with removable stations	Stations placed near transit hubs	Large initial launch in key mixed-use areas	Non-profit guidance, private contractor operated	Walk-up and Membership Rentals	Vandal-resistant bikes	Modular, solar powered station
B-Cycle	Solar powered stations are removed, not hardwired			Managment involves non-profit			
Public Bike System	Stations are removed from street			Public-private partnership in Montreal system			
Clear Channel	Stations are hard-wired, not removable			Privately owned and operated	Member only		Hard-wired
Collegiate Bicycle Company	Stations are hard-wired, not removable			Managed by university	Member only	Beach cruisers	Hard-wired
Smooove		Integrates with bus passes		Public-private partnership			
Sandvaut Group Global Solutions	Potentially removable			Privately owned and operated			
Social Bicycles Urbikes	Not station-based	Not station-based	Not station-based			Regular bicycles	Not station-based, dynamo-powered

	= good
	= neutral
	= poor
	= unknown or untested in a US urban environment

Figure 2: Vendor Matrix

Of the bike share vendors reviewed in *Section #1: Bike Share Systems and Technologies*, the ones that will best match Providence’s needs are B-cycle, Public Bike System, Smooove and Urbikes.

## Station Placement Framework

In addition to choosing a bike share system vendor, Providence will also need a framework for considering the placement of bike share stations. The most successful bike share stations will be located where people live, work, shop, play, study and take transit.

Total population density within a context of walkable, mixed-use urban development is an important consideration. It is also important to specifically consider the density of the biking population, which is

20 – 49 years old. This age range has the highest distribution of usage throughout North American bike sharing systems. Income can also be included, as surveys from other cities have shown that the most likely bicycling population includes people with incomes at or slightly above the area’s median, frequently with professional office jobs. Employment density is another important factor. Data from the Bixi system in Montreal shows that long-term members use the bike share system most at morning and evening rush hour times, presumably as part of a commute to and from work. Other points of interest, such as museums, colleges, libraries, and tourist attractions should be included. Parks, commercial corridors and recreational areas should be considered, and can be weighted based on the area they cover. Transit stops and bicycle facilities are also nodes of activity for cyclists which may be weighed in to the analysis.

Alta Planning + Design has developed a mapping method that overlays all of the previously described characteristics, producing a “heat map” that indicates what areas would be optimal for bike share stations. Figure 3 shows the result of a heat mapping exercise created with available data, in which an approximately 1.4 square mile area covering the Capital Center, Downcity, the Jewelry District, Fox Point, Rhode Island Hospital, College Hill and parts of Federal Hill shows the highest potential demand for bike share. When considering a phased-in bike share system, this high demand area would be the best place to launch the system. Subsequent expansions can radiate outward from this core area.

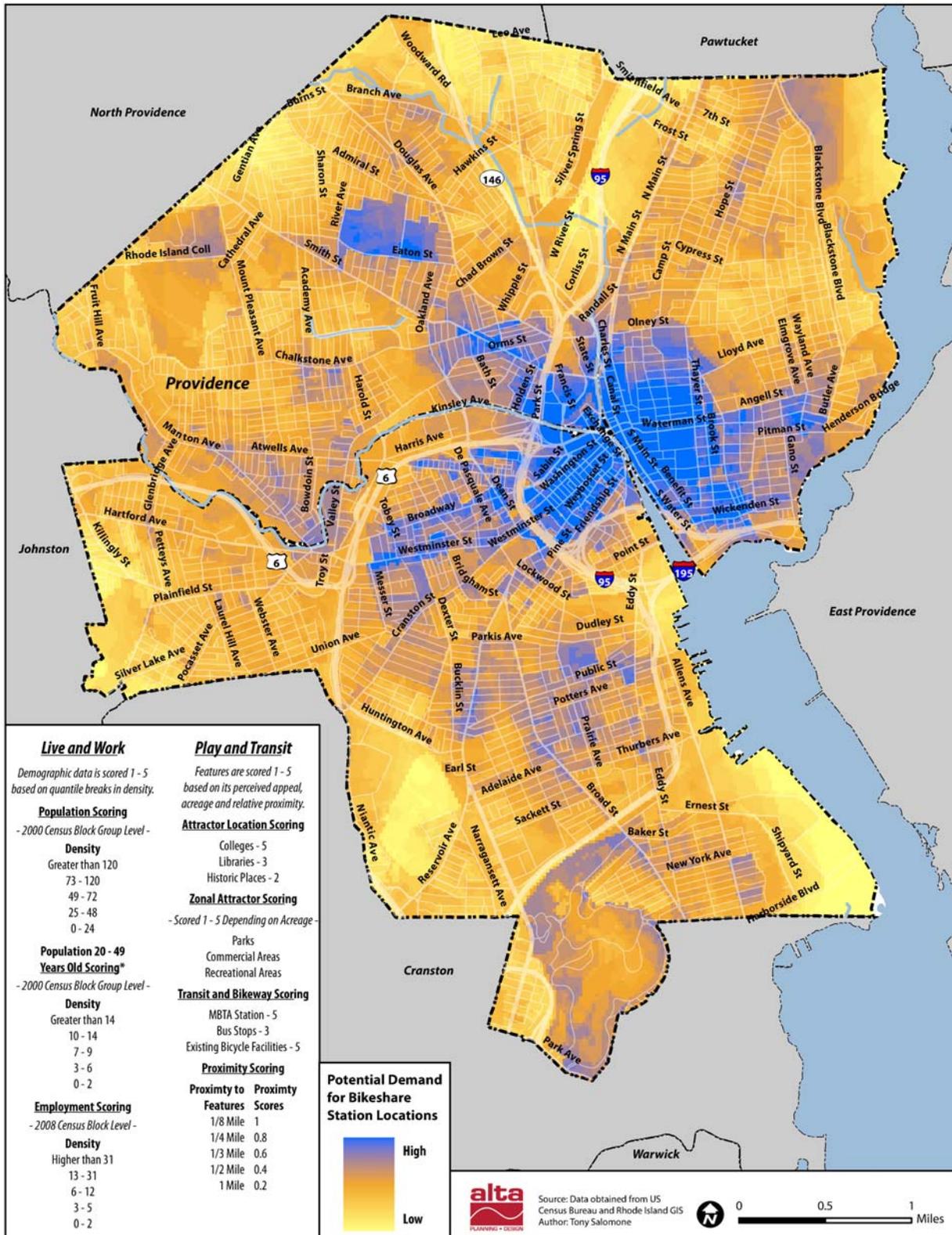


Figure 3: Providence Bike Share Station “Heat” Map

Ideally bike share stations are placed approximately 0.25 miles from each other, so that within the area where bike share is available, a person is never more than a five minute walk from a station. Based on the heat map, the area determined to have the highest potential for bike share in Providence could have up to 22 stations, each 0.25 miles apart (see Figure 4). Assuming each station contains 8 - 10 bikes, there would be a range of 176 - 220 bikes available in this area.

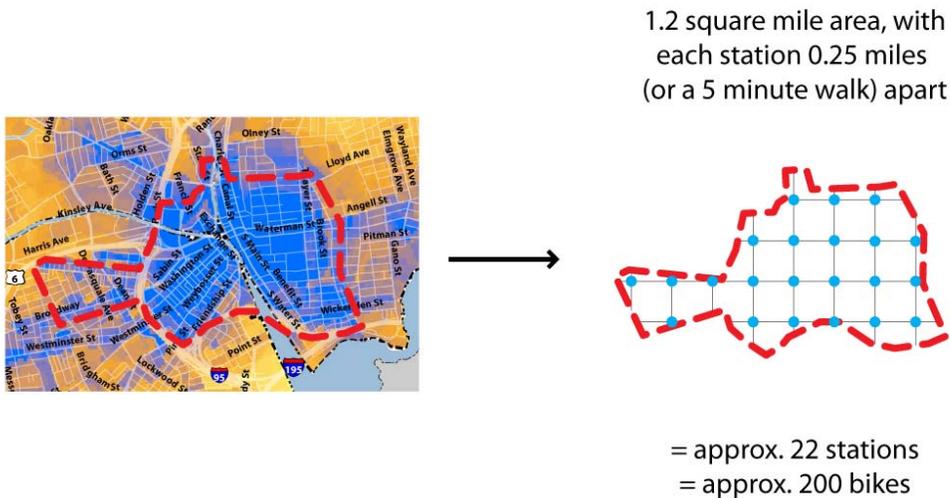


Figure 4: Estimate of stations to cover core demand area

Other tools can also be used to determine station demand and placement. Alta has developed demand models to forecast monthly or annual demands which also can be used to estimate the number of annual or casual users for business model calculations. Depending on data availability, it is also possible to identify the exact location on the street and have prepared station footprints considering street furniture, utilities, etc.

While these methods can help to narrow the field, ultimately station placement will also require field work to verify station locations based on sidewalk width, pedestrian/ADA access, sight lines (especially if placed on-street), lighting, (potential) solar exposure and available city property.

## 4 Capital Funding Requirements

This section will describe the numerous economic models available to fund a bike-share system and recommend the preferred alternative for Providence. The memo will also include an estimate of the capital cost for the bike share system and funding options to make the next step to implementation.

### Funding Options

Funding options for a bike share system include federal grants and earmarks, city and state funding, user fees, advertising revenue and station sponsorship, as well as private, corporate, or institutional donations. It is important to note the distinction between capital funding (for the launch of the system) and operational funding.

One of the largest questions regarding the funding of a bike share system is whether to rely on public or private funding, or both. Most systems launched in 2010 and 2011 have a combination of public and private funding. However, no system used purely *local* public funds. The table below shows sources of capital funds for systems that are funded as a combination of public and private funds:

#### Proportions of Public/Private Funds

System	Launch Date	Total Capital Funding	Amount Public (% and sources)	Amount Private (% and sources)
Denver Bikesharing	April 2010	\$1.5 million	\$210,000 (16%, ARRA federal Energy Efficiency and Conservation Block Grant program)	\$1.3 million (84%, Kaiser Permanente as “presenting sponsor”, Denver 2008 DNC Host Committee, several foundations, multiple station sponsors)
Minneapolis Nice Ride – Phase 1	June 2010	\$2.75 million	\$1.75 million (63%, Bike Walk Twin Cities / FHWA)	\$1 million (37 %, Blue Cross Blue Shield tobacco settlement funds)
Capital Bikeshare – Washington DC – Phase 1	September 2010	\$5 million	\$5 million (100%, CMAQ)	\$0
Capital Bikeshare – Arlington – Phase 1	September 2010	\$500,000	\$200,000 (40%, state grants)	\$300,000 (60%, local BID sponsorship)

<b>System</b>	<b>Launch Date</b>	<b>Total Capital Funding</b>	<b>Amount Public (% and sources)</b>	<b>Amount Private (% and sources)</b>
San Antonio	2011	\$840,000	\$840,000 (100%, U.S. Department of Energy's Energy Efficiency and Conservation Block Grant (EECBG) program, CDC)	0%
Fort Lauderdale	2011	\$1.1 million	\$300,000 (27%, Florida DOT funds)	\$800,000 (63%, sponsorship / advertising)
Boston	2011	\$4 million	\$3 million (75%, CDC Communities Putting People to Work, CMAQ, FTA Bus and Bus Facilities Livability Initiative Program, State grants)	\$1 million (25%, multiple local sponsors and a naming sponsor)
Chattanooga	2011	\$2 million	\$2 million (100%, CMAQ)	\$0 (seeking sponsorships)
Capital Bikeshare – Washington DC – Phase 2	2011	\$1 million	\$1 million (100%, CMAQ)	\$350,000 (revenues from system)
Capital Bikeshare – Arlington – Phase 2	2011	\$1.5 million	Undisclosed	Undisclosed
Minneapolis Nice Ride – Phase 2	2011	\$1.5 million	\$1.2 million (67%, Bike Walk Twin Cities / FHWA, ARRA US Department of Health and Human Services)	\$500,000 (33%, Blue Cross Blue Shield)

Note: All numbers in this table are round numbers from various publicly available sources, as well as other sources.

### *Public Funding*

Following are sources of public funding that are likely to be potentially available to municipalities for bike sharing:

- Federal Transit Administration (FTA)
- Federal Highway Administration (FHWA)
- Congestion Mitigation Air Quality (CMAQ) from FTA and FHWA
- Centers for Disease Control (CDC)
- Department of Energy (DOE)
- State Grants (misc.)

The advantage of public funding is that the municipality has more control over many aspects of the system than a privately funded system. A disadvantage is that Federal funding can be effected by political changes, and it is unknown at this time how long the feasibility of Federal funding going towards bike sharing will last. It is important to note that funding for bike share has brought cities a net increase in money, as it is project-specific, and not coming out of local taxpayer dollars. However, public funding can be difficult to obtain, and many cities would prefer a private partner provide funding for equipment, launch and operations.

*Private Funding*

Private funding can come in many different forms and can support different aspects of a bike share system. Private funding is still new, however, and new valuations and methods of private funding are developing rapidly. (Note that this memorandum does not cover the advertising company business model that became popular in Europe by companies like Clear Channel Communication and JC Decaux because this business model has not taken hold in any North American bike share system.)

**Types of Private Funding**

<b>System</b>	<b>Type of Funding</b>	<b>Amount</b>	<b>What it Funds</b>
London	Naming rights to system (London Cycle Hire)	\$40 million	Unknown
Boston	Naming rights and station and bike sponsorship	Approx \$1 million total	Equipment and operations
Miami Beach	Private equity investor	Unknown (1,000 bikes)	Purchase of equipment; unknown if required for operations
New York City* (proposed)	In proposal stage – likely naming rights	In proposal stage	In proposal stage

\*This is significant because New York has proposed a program requiring no public funding. There are two or three finalists at the time of this memorandum, but no contract has been signed or sponsor identified.

## Recommendation

Although it is attractive to seek a completely privately financed system similar to New York City's aspirations, it may be difficult for the Providence market to support a system-wide sponsor. Therefore, it is Alta's recommendation that Providence vigorously explore the availability of public funds and grants to subsidize the initial equipment purchase and launch. However, we believe that the local corporate and institutional market will support some private sponsorship and investments for the system.

### *Contracting / Governance Structure*

The method of funding chosen by the City of Providence will drive the chosen contracting and governance structure.

*Section 3: Bike Share Recommendations and Framework* discussed and compared types of bike-share system vendors. These included local non-profit, private contractor/public-private funding, privately owned and operated, and a non-profit guidance of private contractor. In summary, the largest number of benefits can be found with a system that has a non-profit entity guiding a private contractor. The non-profit's involvement improves public image, grassroots outreach, transparency, and local knowledge. The private contractor offers operating efficiency, expertise, and high levels of service.

Should Providence desire to proceed in this vein, a non-profit organization should be incorporated and a Board of Directors named. This Board of Directors should include some members of the Public Bike Share Feasibility Study Steering Committee. If an official non-profit is not desired at the time, the Steering Committee could act as the *de facto* Board, and the decision to incorporate can be made at a later date.

In addition, an early decision for the non-profit should be whether inter-operability with the Metro Boston bike share system is important. Such inter-operability would allow a member of one system to seamlessly use the other system. If this is important to the Providence system, this could drive the choice of equipment for the system.

### *Capital and Operating Costs*

The capital investment cost estimates that follow are based on Alta's past experience with the planning and development of bike share systems in multiple cities as well as industry standards. The cost estimates apply to the bike share system recommended for the City of Providence in Section 3 of this report and the funding model recommended in the previous section.

Capital investments for a station-based bike share system include vandal-resistant bicycles and solar-powered stations with kiosks for credit card transactions. Based on the preliminary heat-mapping exercise from Section 3, the initial launch of the Providence bike share system will be approximately 22 stations, each with 8 – 10 bikes, for a total of roughly 200 bikes. Because the system in Providence will be seasonal, storage space will also be necessary.

Following are estimated costs for a 200 bike, 22-station system:

- Capital costs (including software): \$800,000 to \$1.2 million

- Inaugural launch costs: \$150,000 to \$300,000
- Annual operating costs: \$300,000 to \$500,000 (includes annual re-launch in the spring, maintenance, all required insurance, etc.)

Variations in price include:

- Capital costs:
  - Equipment vendor chosen (each has different pricing model)
  - Variations on equipment, such as GPS, more gears, etc.
  - Station size (smaller average station size is more expensive)
- Launch costs:
  - Whether the City or a consultant does site planning / permitting
  - Whether the City or a consultant undertakes marketing
  - Whether the City can provide in-kind services, vehicles or facilities such as forklifts or warehouse space
- Ongoing operating costs:
  - Equipment vendor chosen (each has different pricing model for software fees)
  - Whether the City or a consultant undertakes marketing
  - Whether the City can provide in-kind services, vehicles or facilities such as forklifts or warehouse space
  - Service levels required (more stringent service levels indicate higher operating costs)

## *Revenue*

Revenues reported from 2010 bike share system usage indicate that in year 1, system revenue will cover approximately 50% of operating costs. Minneapolis has reported that a revenues for their system covered 100% of operating costs. Their operations have included significant in-kind donations to lower costs, however. Most systems anticipate breaking even on operations by approximately year 3; however, this estimate has yet to be proven in reality because all systems are so new.

The standard revenue structure of most existing bike share systems collect revenue from two sources: membership revenue and usage revenue. Memberships can be annual, monthly, weekly or daily. Typically, annual and monthly members are purchased online by local residents. Weekly and daily memberships are purchased at the kiosk by visitors or local residents who desire to trial the system.

The pricing structure for usage encourages short-term trips. Once a person is a member, they typically pay no additional fee for a use under 30 minutes, and pay gradually escalating costs if they keep the bike for more than 30 minutes. This structure is designed to encourage primarily short trips and high turnover, increasing the probability that stations will typically have a number of parked bicycles available for use.

Following is a sample pricing structure for Alta’s Capital Bikeshare in Washington D.C.:

- Annual membership: \$75
- 30-day membership: \$25
- 5-day subscription: \$15
- 24-hour subscription: \$5
- Usage fees:
  - 1<sup>st</sup> 30 minutes: free
  - 30-60 minutes: \$1.50
  - 60-90 minutes: additional \$3.00
  - 90-120 minutes: additional \$6.00
  - Additional 30 minute increments: \$6.00
  - Maximum one-rental charge: \$70.50

In Montreal, the only North American system operating for two full seasons, the system began with a large number of short-term renters, who, after using the system for the first season as daily users, convert to long-term members. In consequence, membership jumped from 10,000 to 30,000 at the beginning of the second season.

## 5 Conclusion

The City of Providence should use this document as the springboard for moving forward. This Feasibility Study has made the case that a bike share system is indeed possible and that if carefully planned and managed, will enhance the mobility needs of those living, working and visiting central Providence. Many members of the public and the project Steering Committee feel that launching a bike-share program would be an excellent way to increase the popularity and visibility of bicycling in Providence and that it would eventually lead to improvements to bicycle infrastructure in the city. However, it should also be noted that others have expressed concern about launching a bike-share program in Providence without first investing more money into the bicycle infrastructure throughout the city. Either way, improvements to the city’s bicycle network should be considered while any further work on a possible bike-share program continues.

Outreach in these early stages to key civic leaders, elected officials, the business community and the nearby colleges will be made much easier with this document in hand. Additionally, the City should also consider establishing a new non-profit organization to oversee the creation of a bike share system. Finally, the analysis and information can be used by the Department of Planning and Development to formulate a Request for Proposals to vendors interesting to bringing a system to Providence. Since New England will have its first bike share system this year—Boston’s “Hubway”—it is certainly possible for the Creative Capital to follow suit in the near future.