

# bike share business plan

Sacramento Metropolitan Air Quality Management District

## **Technical Working Paper #6: Operations and Maintenance Best Practices**



SACRAMENTO METROPOLITAN  
  
AIR QUALITY  
MANAGEMENT DISTRICT

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*Technical Working Paper #6: Operations  
and Maintenance Best Practices*

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## EQUIPMENT PROCUREMENT

Bike share is a new, competitive, and rapidly-changing market. A Request for Information (RFI) process with informational interviews can help Sacramento Area Bike Share Program decision makers and the responding equipment vendors come to a mutual understanding about the technologies, capabilities, and expectations for the requested bike share equipment before proceeding to a Request for Proposal (RFP). The RFI period can also be an opportunity for decision makers to experience the vendors' equipment firsthand, and even to introduce the concept of bike share to selected stakeholders or the general public.



L.A. Metro's bike share demonstration, open to the public.  
Photo: thesource.metro.net

In addition to the information that can be gathered from the RFI process, **Appendix A** provides example bike share equipment elements that can be included in an RFP. The Sacramento Area Bike Share Program's lead organization and decision makers should review these elements and revise them to reflect the needs and values of the program.

Denver Bike Sharing (DBS) shares its key considerations in working with a bike share equipment provider:

### CAPACITY AND CAPABILITY

#### **Assess all sub-vendors.**

Be sure to consider the experience, capabilities, and reputation of the bike manufacturer, software developers and station manufacturers.

#### **Is the business model viable?**

Will the vendor be around for the long haul? Is the supply chain reliable for parts for maintenance and repairs?

#### **Operating bike share is a learning process.**

What is the vendor's level of customer service and responsiveness? Is there capacity and a plan for the vendor to help develop the organization and its staff?



## A LONG-TERM WORKING RELATIONSHIP

***It's more than a business.***

The vendor's heart should be in the "movement."

***Bike share is IT.***

The information technology system will never be perfect, so the co-problem solving relationship between operator and vendor is at the heart of continued smooth operations.

***The equipment provider is a long term relationship.***

The relationship does not end with the purchase. Open communication procedures and styles are critical. There must be a capacity for ongoing service and support.

## OTHER CONSIDERATIONS

***Made in America***

Ask the vendor to provide a Made in America waiver for all components if they are made overseas with non-U.S. steel.

***Equipment Lifespan***

The vendor will establish the lifespan of the bikes.

## PUBLIC OUTREACH

Engaging the public early in the planning process is essential to introducing a new transportation service, building support for bike share, and collecting valuable information about the public's desires for bike share station locations. NYC Bike Share conducted an exemplary outreach effort in the 18 months leading up to system implementation.<sup>1</sup> Outreach efforts included public meetings, demonstrations, exhibits, and an online presence: [nyc.gov/bikeshare](http://nyc.gov/bikeshare); attention was given to engaging diverse populations throughout the process.

## PUBLIC MEETINGS AND WORKSHOPS

The New York Department of Transportation (NYDOT)'s public planning process included 159 public meetings, presentations, and demonstrations and another 230 meetings with elected officials, property owners, and other stakeholders. Initial outreach with community boards, business improvement districts, and other civic groups was used to explain the bike share concept, describe the public process, and gather input on suggested station sites.

As the process progressed, NYDOT organized public workshops for the community boards within the program area. Staff provided maps of station location options, with three to five times as many locations as ultimately desired. Stakeholders were then able to comment on the viability and



Workshop participants provide feedback on station locations.  
Photo: [nyc.gov](http://nyc.gov).

<sup>1</sup> "NYC Bike Share – Designed by New Yorkers." <http://www.nyc.gov/html/dot/downloads/pdf/bike-share-outreach-report.pdf>

desirability of the identified locations. Ultimately, stakeholders considered nearly 2,900 options for the 600 desired station locations. In addition to outreach through community organizations, NYDOT contacted



Table-sized graphic used in community workshops.

Photo: nyc.gov.

people who had submitted station suggestions and messages through the website (described below) to participate in the community workshops at which their locations would be discussed.

The workshops were also an opportunity to engage the public on their vision for bike share, including their transportation needs, how bike share could meet those needs, features of the program, safety concerns, and station location types. Some communities expressed strong preferences for stations not to be located on sidewalks, while others preferred sidewalk locations.

## DEMONSTRATIONS

Field demonstrations of the bike share equipment were also an important outreach tool. NYC Bike Share and NYDOT conducted 21 field demonstrations to introduce the public to the concept. In conjunction with the demonstrations, the organizers distributed cards encouraging people to participate in the planning process and visit the program website. Staff installed the demonstration station in real time, about an hour ahead of the demonstration, to alleviate concerns about a lengthy or disruptive installation process for the full system. Staff also organized presentations in Spanish, Mandarin, and Cantonese to engage non-native English speakers.



Demonstration bikes from various bike share programs.

Photo: Nona Varnado. *Inhabitat New York City*.

## EXHIBITS AND EVENTS

NYDOT staff presented information on bike share at dozens of events and institutions, such as schools, libraries, and civic and business organizations. The American Institute of Architects' Center for Architecture also hosted a month-long exhibition entitled *Two Wheel Transit: NYC Bike Share*, which included graphics of the sizes and densities of bike share systems from around the world, New York travel time comparisons by bike, car, and subway, and a computer terminal where attendees could suggest station locations through the program website.

## WEBSITE

NYC Bike Share's community engagement website, [nyc.gov/bikeshare](http://nyc.gov/bikeshare), provided educational posts and video entries, a calendar of bike share events, and an interactive "Suggest-a-Station" map to solicit input from the public. The site encouraged visitors to place markers that identify locations where they would want a bike share station and to provide comments about the merits of their recommended locations. Visitors to the site could also support stations suggested by others. Over the nine-month period during which the site was available, visitors suggested nearly 10,000 locations and supported others' locations over 55,000 times. The website also collected contact information that was used to notify site visitors of upcoming meetings relevant to their areas of interest.



Suggested station locations from the suggestion archive.  
Image: [nyc.gov](http://nyc.gov)

## SERVICE HOUR SELECTION

Most U.S. bike share systems are open 365 days a year, closing only when inclement weather or other incidents threaten rider safety or pose the risk of damage to equipment. Systems in cities with more severe winters close seasonally, citing seasonal ridership declines, the end of tourist season, and cold and snowy winter weather. Seasonal closures also help to protect equipment from storm damage; for example, Nice Ride, Minnesota removes its bikes and stations from the streets in winter months and stores them in a warehouse. With relatively low annual precipitation, mild winter temperatures that generally remain above freezing, and only extremely rare snowfall, the Sacramento area is a good candidate for year-round operation.

Most U.S. bike share systems also operate 24 hours a day. Systems that close overnight likely do so out of potential liability concerns. Denver Bike Sharing expressed concerns over the potential for nighttime alcohol-related accidents and lawsuits, as well as safety and liability issues during dark, icy months; however, accident rates in U.S. systems have been low, even in bike share systems with 24/7 operations. Offering 24-hour customer service is another cost consideration.

**Table 1** summarizes the service hours of selected bike share systems.

**TABLE 1 – SERVICE HOURS OF SELECTED U.S. BIKE SHARE SYSTEMS**

	Seasonal (Mar/Apr through Nov/Dec)	Year-Round
7am to 10pm	—	Charlotte B-cycle
5am to 10pm or 6am to 11pm	—	Spartanburg B-cycle Houston B-cycle
5am to Midnight	Denver B-cycle Madison B-cycle	Boulder B-cycle
24/7	Nice Ride, Minnesota Boston Hubway	Divvy (Chicago, IL) Capital Bikeshare (Washington, D.C.) Citi Bike (New York, NY) DecoBike (Miami Beach, FL) San Antonio B-cycle Bike Chattanooga Bay Area Bike Share (anticipated August 2013)

## SYSTEM MARKETING AND SUSTAINABILITY PLANNING

Outreach and marketing are ongoing efforts for expanding bike share ridership and supporting financial sustainability after launch.

Currently, bike share's novelty helps it attract free press; Denver Bike Sharing's 2010 annual report, for instance, declared that over 775 news stories ran on the system in the previous year.<sup>2</sup> New York's Citi Bike program also attracted significant local and national-level press attention.

Social media sites such as Facebook and Twitter, as well as conventional email distribution lists allow additional possibilities to engage with members. Capital Bikeshare and Citi Bike have active twitter accounts with nearly 14,000 and 8,000 followers, respectively. Social media and email are Denver Bike Sharing's main forms of communication with members.

Deals provided through social discount sites such as Groupon and Living Social have been successful in attracting new members. In Washington D.C., Capital Bikeshare attracted 8,000 new members via its social discount site promotions.<sup>3</sup>

For bigger media stories, Denver Bike Sharing issues press releases. DBS has also benefitted from support from elected officials at the local and state level, with



Free press for bike share in New York City.

Image: newyorker.com

<sup>2</sup> [http://www.denverbikesharing.org/files/DBS\\_2010\\_Annual\\_Report.pdf](http://www.denverbikesharing.org/files/DBS_2010_Annual_Report.pdf)

<sup>3</sup> Weber, Erik. "GGW debates: Is CaBi getting a good deal on Living Social?"

<http://greatergreaterwashington.org/post/10024/ggw-debates-is-cabi-getting-a-good-deal-on-living-social/>. 12 April 2011.

mention of Denver B-cycle often finding its way into major speeches. Sacramento stands to benefit from similar state-level visibility.

Face-to-face community outreach is another key component of engagement. Denver Bike Sharing has a booth presence at about 30 events per year. The organization also sends staff to Denver Housing Authority buildings to educate residents about the program and help them join.

Traditional media campaigns also support program visibility. Denver Bike Sharing has trade agreements with billboard operators, local media, and the Denver Regional Transportation District to cross-promote on bike share stations, transit vehicles, and other billboards. A presence with the Visitors' and Convention Bureau and participating hotels increases visibility to tourists and business travelers.

Promotions and contests are often part of existing systems' marketing efforts. Capital Bikeshare, for instance, held a "Winter Weather Warrior Contest," which awarded its most frequent user during winter months with a free membership extension, additional memberships for friends, and gift card prizes. Another prize was awarded to those who used the bicycle system every day during the same period. In Denver, "Tour de B-cycle" provides those who visit all local B-cycle stations in one day with recognition and prizes. User experience video contests can also be used to promote the program.

Efforts to increase ridership directly support the program's financial sustainability. Although Denver Bike Sharing continues to pursue a variety of funding sources, the organization seeks to increase the portion of operating costs covered by membership and user fees to build a more stable funding base.



Mayor Guillermo "Bill" Vidal at a Denver Nuggets game.  
Image: Denver Bike Sharing.

## REDISTRIBUTION METHODS

### NEED

Because of directional peaking in demand for bike share bikes, some stations become full or empty during peak operating periods. For example, during the morning commute hour, stations near large employment centers may become full, meaning there are no docks for users to check in additional bikes. When this happens, system operators can rebalance the system by loading extra bikes into a truck or step van and delivering them to other empty or nearly-empty stations. Bike redistribution is a costly part of bike share system operation; in the case of Capital Bikeshare, nearly half of the operating costs in the first year were due to the need to redistribute bicycles among the stations.<sup>4</sup> Denver Bike Sharing reports regular rebalancing during the morning and afternoon commutes with some spot-rebalancing during the day, as needed. Weekend rebalancing activities are more sporadic, with less-predictable riding patterns and occasional events leading to demand peaks.

### APPROACH

Although Denver Bike Sharing's software alerts staff to stations that are approaching full or empty, balancers develop an understanding of system use patterns over time, knowing which stations will empty and fill due to regular commuting patterns. On weekends, when festivals, ball games, and other events can distort demand, each balancer uses his own judgment to rebalance the bikes.

Denver Bike Sharing suggests that it would be possible to rebalance station networks in both Sacramento and Davis from a single location under one of two models:

- **Dual-crew** – a separate operations crew for each network. Both crews would operate out of the same facility, but each crew would develop local knowledge and handle all aspects (e.g., balancing, bike maintenance, station troubleshooting) of its own geographic area with dedicated vehicles and equipment for each crew.

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<sup>4</sup> Holben, Chris, District Department of Transportation, Washington, D.C. Personal interview. 24 January 2011.

- **Single-crew** – a single operations crew, with staff tiered by duty, such as dispatchers with knowledge of both networks, drivers/field-checkers, and in-shop maintenance staff.

DBS operations staff have general knowledge of all operations tasks, such as understanding balancing patterns, bike maintenance, and station hardware troubleshooting; however, as the staff grows, operations staff will be divided into two tiers, with one group focused on station cleaning, minor field checks, and in-shop bike repair and a second group focused on higher-level rebalancing management and technological troubleshooting.

For a system of roughly 100 stations, DBS estimates that the Sacramento Area Bike Share Program will need an operations team of approximately 15 full-time equivalent employees and four balancing vehicles capable of carrying 20 to 24 bikes each.

## PRICING AND INCENTIVES

Differential pricing or other incentives can also theoretically be offered to encourage users to check out bikes from stations that are nearing capacity and return them to stations that are emptier. Although this approach has not been implemented, Pfrommer et al. (2013) calculate that price incentives could replace rebalancing crews on less-peaked weekend days; weekday rush periods would still require active rebalancing crews.<sup>5</sup>

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<sup>5</sup> Pfrommer, J., J. Warrington, G. Schildbach, and M. Morari. "Dynamic vehicle redistribution and online price incentives in shared mobility systems." 14 April 2013. Available: <http://arxiv.org/abs/1304.3949>.

## **EQUIPMENT MAINTENANCE**

Although damage and vandalism to bikes is generally rare in existing American bike share programs, normal use of bicycles requires bike share operators to maintain their system. Many bicycle share systems have a central maintenance facility for most repairs; redistribution vehicles bring bikes to central facilities to address issues with elements such as lights, brakes, gears, grips. Systems also employ field “checkers” to inspect bikes regularly and make minor repairs and adjustments and inflate tires at the stations themselves. Each time Denver Bike Sharing staff inspect a bike, it is recorded in the system’s software so that staff can ensure they have inspected every bike at least once every two weeks. To address user-determined maintenance issues, many bike stations have docks with built-in buttons that notify a need for maintenance at a given kiosk or dock when pressed.

Bike share bikes are purported to have a useful life of five years, but since most systems have been operating for three years or fewer, this is an estimate. Denver Bike Sharing now estimates its bikes’ frames will last ten years, with many components being replaced gradually over time.

## KIOSK-BASED VERSUS GPS-BASED SYSTEMS

GPS-based, fourth generation systems do not require stations and the associated hardware. As a result, they are less capital-intensive than kiosk-based third generation systems, with fewer technical and logistical barriers to implementation; concerns about permitting, siting, and installing multiple kiosks do not apply. However, fourth generation systems also suffer substantial drawbacks:

- **Visibility** – Third generation stations and kiosks are publicly visible and typically placed in prominent locations, which can encourage use and attract new users; the location of a fourth generation bike cannot be guaranteed.
- **Perceived reliability** – Clusters of multiple bikes in a known place increase user perception of system reliability; fourth generation bikes might be returned in poorly visible or inaccessible locations.
- **Maintenance** – Bikes returned to established stations can be easily inspected and maintained at regular intervals, while in the case of fourth generation systems, bikes left in dispersed locations are difficult and costly to collect.
- **Simplicity** – The locations of a finite number of third-generation stations can be easily communicated to users, while educating unfamiliar users on a fourth-generation service area can be challenging.

The proven success of third generation bike share systems in the United States further commends them for use in the Sacramento Area Bike Share Program. In particular, wireless, solar-powered third generation stations are most appropriate, because they can be installed and relocated quickly and inexpensively, relative to hardwired stations.



A Capital Bikeshare crew installs a station in Crystal City, VA.  
Image: [www.commuterpageblog.com](http://www.commuterpageblog.com)

## SERVING CUSTOMERS WITHOUT A CREDIT CARD

Serving customers without credit cards has been an ongoing struggle for American bike share systems. Low-income people are less likely than higher-income people to have a credit card, which is typically required for bike share use.

Capital Bikeshare has partnered with Bank on DC to offer discounted memberships and debit and credit accounts to unbanked individuals who would not otherwise have access to bike share;<sup>6</sup> the program has also reached out to the homeless and unemployed communities, providing discounted memberships to those enrolled in job training sessions.<sup>7</sup>

NYC Bike Share, the operator of Citi Bike, has also partnered with local housing authorities to increase access to its program.<sup>8</sup> New York City Housing Authority residents and select Community Development Credit Union members are eligible for discounted, \$60 annual memberships (a \$35 savings).

Denver Bike Sharing offers free B-cycle memberships, not tied to a credit card, to Denver Housing Authority residents of buildings adjacent to B-cycle stations. Although DBS has found funding to subsidize these membership and usage fees, significant time and effort go into providing the memberships: Housing Authority staff screen applicants for eligibility and good standing and DBS staff visit sites to recruit members; staff also need to manually adjust records in the software system to exempt these users from fees.

Minneapolis' Nice Ride system has eliminated the credit card hold held as a deposit, which presented a barrier to some potential users, but still requires a credit card for payment, identification, and security.<sup>9</sup>

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<sup>6</sup> "Capital Bikeshare Launches Bank on DC Program." 16 December 2011.

<http://www.capitalbikeshare.com/news/2011/12/16/1140>

<sup>7</sup> DePillis, Lydia. "Capital Bikeshare Rolls Out Homeless Pilot." 20 March 2012.

<http://www.washingtoncitypaper.com/blogs/housingcomplex/2012/03/20/capital-bikeshare-rolls-out-homeless-pilot/>

<sup>8</sup> Schmitt, Angie. "Why Isn't Bike-Share Reaching More Low-Income People?" 3 October 2012.

<http://dc.streetsblog.org/2012/10/03/why-isnt-bike-share-reaching-more-low-income-people/>

<sup>9</sup> "Frequently Asked Questions: What about low income New Yorkers?"

[http://citibikenyc.com/faq#\\_What\\_about\\_low\\_income](http://citibikenyc.com/faq#_What_about_low_income)

## CONSIDERATION OF THEFT AND VANDALISM

Although European systems such as Paris' Vélib have experienced difficulties with vandalism and theft, U.S. systems have had very few problems, as shown in **Table 6**. In their first season of operation, Capital Bikeshare, Nice Ride, and Denver B-cycle collectively lost only four bikes.<sup>10</sup>

Requiring members to register and place a deposit or credit card hold before renting a bike provides accountability and a disincentive to steal or lose the bike. Limiting the number of bikes that can be checked out with a single credit card also reduces the risk that a thief could use a stolen credit card to steal multiple bikes.

The mechanism that locks the bike to the dock is secure; none of the lost or stolen bikes went missing while docked at the station. A cable lock built into the bike, as in the case of some B-cycle bikes, might help to prevent theft while the bike is not docked at the station, but is not as secure as the station dock.

**TABLE 2 – BIKE SHARE LOSS AND DAMAGE**

Bike Share System	Bikes in System	Stolen/Lost	%	Vandalized/ Damaged	%
<b>Capital Bikeshare</b>	1,110	2	0.18%	0	0.00%
<b>Denver, B-cycle</b>	500	1	0.20%	1	0.20%
<b>Nice Ride Minneapolis</b>	700	1	0.14%	3	0.43%
<b>Biki (Montreal, QC)</b>	3,000	12	0.40%	75	2.50%
<b>Vélib (Paris, France)<sup>1</sup></b>	20,600	4,000	19.42%	8,000	38.83%

Vélib reported 8,000 lost/stolen and 16,000 vandalized/damaged bikes in its first two years

<sup>10</sup> Rixey, Rodney A. "Case Studies in Bike Sharing: Lessons for Santa Monica." 2012.

## **APPENDIX A: EQUIPMENT PROCUREMENT ELEMENTS**



## APPENDIX A: EQUIPMENT PROCUREMENT ELEMENTS

This appendix compiles example equipment elements that could be included in a Request for Proposal (RFP) for bike share equipment, compiled from RFPs issued in Portland, Oregon; Arlington, Virginia; Boston, Massachusetts; Chicago, Illinois; and New York, New York. Example elements for stations, bicycles, terminals, docks, and the system website are included, organized by level of desirability: required, most desired, and desired. These priorities should be reexamined in light of program goals and values.

### STATION

The following are **required** elements:

1. Compliance with the Americans with Disabilities Act, and other requirements of municipality, institution, and/or private landowner in positioning stations;
2. If wireless internet connections are used, a system that is highly reliable and secure with encryption for financial data;
3. Estimate of the useful life of each of the station components and proposed warranty terms.

The following are **most desired** elements:

1. Adequate space at each terminal for a lighted map indicating both terminal locations and bicycle routes;
2. Bike map at all stations;
3. Capacity to maintain security of the system during a power failure event or loss of internet connection;
4. Capacity for station and major components (bicycle, hub, terminal) to self-report mechanical problems;
5. Capacity for user to identify a bicycle as needing repair;
6. Real-time communication between stations and headquarters particularly to report number of bikes per station and facilitate re-distribution;
7. Smallest feasible footprint to enable installation in a space currently used as a parking space or on a wide sidewalk with a layout that minimally impedes pedestrian traffic and ideally has no horizontal components that could trip a pedestrian or injure a rider approaching a terminal at night;
8. Aesthetic compatibility with streetscape and neighborhood context, both when terminal is full of bicycles and when it is empty;
9. Unified look and feel of all stations within the network;
10. Long expected useful life and high durability of station and station components;
11. Indicator showing whether the bicycle is available for use or out-of-service (such as when the system is shut down during an emergency or an individual bicycle has been identified as needing repair);
12. Capacity to convey safety information and laws affecting bicyclists;



13. Capacity to issue reports to repair crews indicating where to rebalance and where bicycles needing repair are located (Example: the system could signal repair crews when terminals are within two bikes of being full/empty);
14. Capacity to install stations on public or private property, in a covered area, or outside;
15. Easily movable stations that:
  - a. Require minimal time to install and/or remove;
  - b. When removed, do not leave behind attachment points that could impede a vehicle or trip a pedestrian;
  - c. Can be installed without trenching;
16. Grid-free: doesn't need to connect to electrical grid (this may be accomplished by solar power or other types of alternative energy sources and wireless communication, as feasible);
17. Use of reliable alternative energy sources;
18. If using reliable alternative energy sources, employment of a backup power source;
19. Ability to modify or design the system components (bikes, terminal, hub, and/or sign) to address issues specific to Sacramento, West Sacramento, Davis, and the Sacramento area.

The following are **desired** elements.

1. Ability to make a helmet available to each person renting a bicycle;
2. Low cost or subsidized helmets to all or selected user groups;
3. Capacity to add lighting where necessary to facilitate nighttime use of terminal and adjustment of bicycles and to reduce vandalism;
4. Capacity to add emergency call buttons, preferably using wireless technology;
5. Allows renters to choose a bike;

## BICYCLE

The following are **required** elements:

1. Lighting system (may include rear flasher and front headlight)
2. Puncture resistant tires;
3. Reliable and intuitive braking system;
4. One size to fit majority of adult population with seat-only adjustment;
5. Theft and tamper resistant (potentially through use of components not compatible with other bicycles and/or requiring tools not commonly available).

The following are **most desired** elements:

1. Protection from grease, dirt, and tire spray including enclosed drive train and full fenders;
2. Multiple gears (3 or more);
3. Pedal-powered front/rear lighting system;
4. Corrosion resistant material with rust-proof external parts;
5. Cargo capacity for items such as a typical briefcase, book bag, and/or grocery bag weighing up to twenty pounds;
6. Chainless bike or bike with a chain-guard;
7. Equipped with secondary lock to enable user to secure bike to any bike rack or post while making a quick stop;
8. Light weight (less than 35 pounds);



9. Capacity for sponsorship or advertising that can be easily changed;
10. Front, rear, and side reflectors;
11. Upright riding position allowing for confident riding in traffic;
12. Easy to operate: easy to mount and to hold in stopped position, including for shorter rider;
13. Kickstand or other device to allow the bicycle to be supported upright.

The following are **desired** elements:

1. Compatibility with racks on the fronts of Sacramento RT, YoloBus, Unitrans, and other regional transit vehicles;
2. Equipped with GPS tracking devices or equivalent;
3. Equipped with sensors on bikes to diagnose and self-report mechanical problems.

## TERMINAL

The following are **required** elements:

1. All terminals in system accept walk-up renters with agreement to liability waiver;
2. Data security, particularly for financial data, user names, and addresses.
3. Clear and prominent instructions at each terminal explaining the pricing structure and use of the system;
4. Clear and prominent instructions at each terminal directing the users who to call in the event of problems (to prevent calls to right-of-way owners);
5. A process for situations in which a user wants to return a bike to a terminal that is full or rent a bike from a terminal that is empty;
6. Multi-lingual.

The following are **most desired** elements:

1. Ability to accept ID cards and Smartcards from businesses, universities, and transit agencies;
2. Automatic confirmation that subscriber's credit card is valid and has sufficient funds to cover charges if bicycle is not returned, preferably before each bicycle is removed;
3. Ability to limit the number of subscriptions and walk-up rentals that can be purchased by one user or using one credit card;
4. Touch-screen;

The following are **desired** elements:

1. Ability to integrate bike share subscription with Connect Card;
2. Ability to disable walk-up registration at times;
3. Flexibility to add features and modify terminal as needed;
4. Ability to sign up to become annual subscribers or to upgrade day- or week- memberships to annual memberships at some or all terminals;
5. Flexibility to be reprogrammed to serve as a registration station for potential future automated scooter-share, e-bike share, or car-share system and/or facilitate transactions related to electric charging.



## DOCKS

The following are **required** elements:

1. Modular design of the docks, meaning the ability of the station design to accommodate a flexible number of bicycle storage and rental slots (so a hub can be configured to have, for example, three, six, or 18 bicycles) and therefore the ability to adjust capacity through the life of the station after initial construction.

The following are **most desired** elements:

1. Ability to self-report mechanical problems;
2. Vandal and theft-proof connection between dock and bike;
3. Useful life greater than five years.

There are no **desired** elements, other than the most desired elements above.

## WEBSITE

The following are **required** elements:

1. Data security, especially for financial data, user names, and addresses, that is Payment Card Industry (PCI) compliant and that satisfies minimum specifications of the municipality, institution, and/or private landowner;
2. A mechanism for users to report problems and make suggestions for system improvement;
3. Real-time communication with stations to track bicycle and dock status;
4. Capacity to provide safety information;
5. Access to all registration and travel data with regular reports provided to municipality, institution, and/or private landowner;
6. Ability for website to accept and/or allow user to change annual subscriptions.
7. Interactive map showing status of bicycles at stations, station locations with optional address and directions, and transit information;

The following are **most desired** elements:

1. Capacity for user to track number of available bikes and open docking points in each terminal via web page and mobile device;
2. Capacity to convey bicycle safety information, laws, and/or warnings affecting bicyclists (Ex: Brief safety and "rules of the road" video and interactive test);
3. Language options, particularly Spanish, on all webpages;
4. Phone contact information prominent on website;
5. Ability to collect survey information and customer satisfaction ratings;
6. Attractive, appealing, state-of-the-art features.

The following are **desired** elements:

1. Personalized customer web pages that provide information such as miles traveled, calories burned, etc.

