

King County Bike Share Business Plan

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Executive Summary

What is Bike Sharing?

Bike sharing is an innovative approach to urban mobility, combining the convenience and flexibility of a bicycle with the accessibility of public transportation. Bike share systems consist of a fleet of bicycles provided at a network of stations located throughout a city. Bicycles are available on demand, providing fast and easy access for short trips, transit-linked trips, and tourist trips.

Why do Bike Sharing?

Cities such as Montreal, Denver, Minneapolis, Washington D.C., Boston, Miami Beach, Toronto and over 300 other cities worldwide are investing in bike sharing as a relatively inexpensive and quick implementation urban transportation option.



Bixi, Montreal

These cities have been transformed by the many benefits of bike sharing that include improved individual and community health, economic development through green jobs and improved access to businesses, environmental benefits such as reduced vehicle emissions, and the community benefits of providing another mobility option as an extension of the transit system.

What are the goals for Bike Sharing in King County?

The Bike Share Partnership (BSP) is an ad-hoc group formed to guide the direction and development of bike sharing in the region. The BSP includes representatives from public agencies and institutions such as King County, the cities of Seattle, Redmond, and Kirkland, Sound Transit, the Puget Sound Regional Council, the University of Washington, and a number of other organizations including Seattle Children's, Microsoft, and the Cascade Bicycle Club.



Bike sharing extends the reach of transit.

The BSP has identified the following key goals for the program:

- Develop a regional bike share system that allows multiple jurisdictions to participate and provides a consistent user experience and single pricing structure.
- Provide a new mobility option for the region that extends the reach of public transit.
- Increase the opportunity for residents and visitors to take part in healthy physical activity.
- Reduce carbon emissions from the transportation sector.

Financial goals for the program include:

- Funding the system using a diverse range of sources and providing a balanced mix of public and private involvement.
- Minimizing risk while maintaining transparency and accountability for the agencies involved.

Is King County equipped for Bike Sharing?

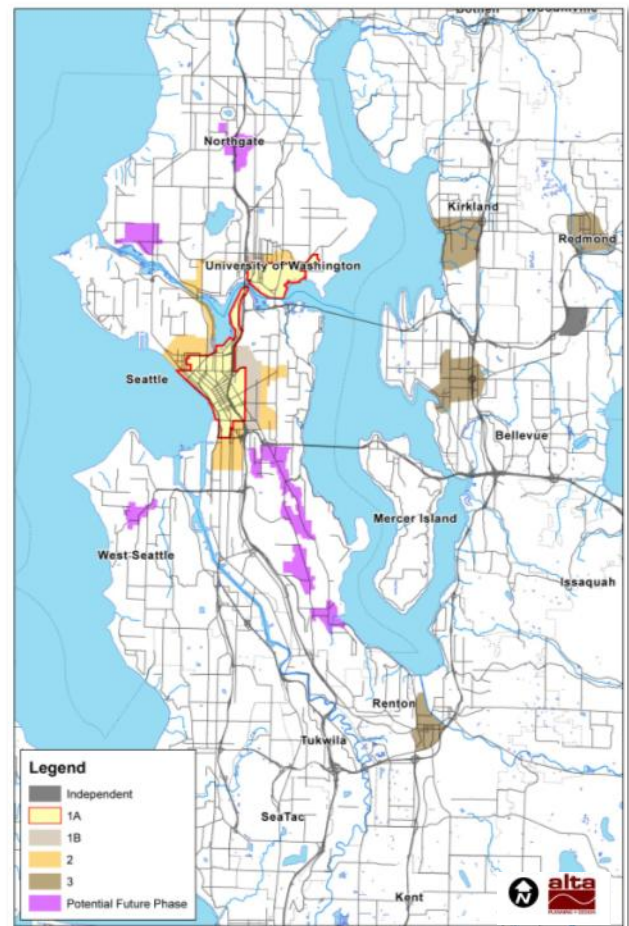
King County has many of the characteristics required to make bike sharing successful, including concentrated population and employment centers, an extensive public transit system, large numbers of visitors, a culture that supports cycling (including the largest bike club in the country), and a policy environment that supports the growth of walking and cycling.

Several issues were identified as potential barriers to success including: steep topography in a number of areas; limited bikeway infrastructure in certain parts of the county; King County's mandatory helmet requirement; local weather conditions, and limitations on signage and sponsorship. Strategies for addressing these concerns are presented below.

What part of the county will get Bike Sharing?

Eventually, it is hoped that bike sharing will spread throughout the county. However, to maximize initial success, the system will be launched in downtown Seattle, South Lake Union, the University District, Sandpoint, and part of Capitol Hill with a total of 50 stations and 500 bikes covering just over 3 square miles, before expanding to 220 stations and 2,200 bikes covering an area of 13.6 square miles in downtown Seattle, the University District, Redmond, Kirkland, Bellevue, and Renton.

Other areas that are discontinuous from the initial launch but could sustain smaller systems of their own, such as Northgate and Ballard, as well as areas not expected to have high demand, but that may benefit from the system, such as Seattle's Rainier Valley, Kent or Issaquah, can join the system at any time. Essentially any area of the county can join the system if sufficient funds are available to support and sustain operations. Any profits from the initial launch of the system will be reinvested into expanding the system.



Phasing Plan for King County Bike Share

Who will own and operate the system?

A number of business models were considered for administering and operating the system including an operating non-profit, direct contract with an operator, and privately owned and operated. The creation of an administrative non-profit with private operating contractor was recommended as the preferred business model as it maximizes potential revenue sources, utilizes the expert skills of the private sector to launch and operate the system, and strikes the greatest balance of minimizing risk while maintaining control and transparency for the agencies.

What is the launch schedule?

Establishing the non-profit framework, organizing funding, and procuring a vendor for equipment and operation of the system takes time. There is also lead-time associated with manufacturing the equipment and deploying it on the street. The system could be launched as early as fall 2012.

The following roll-out plan is proposed:

- **Phase 1A** (50 stations / 500 bikes / 3.1 square miles / launch in 2013): the initial launch is intended to maximize early success in Seattle's downtown core, south Lake Union, the University District, Sandpoint, and part of Capitol Hill.
- **Phase 1B** (60 stations / 600 bikes / 2.0 square miles / launch in 2014): will in-fill the initial launch area with more stations and expand the boundaries into more of Capitol Hill and north of the University District.
- **Phase 2** (50 stations / 500 bikes / 3.4 square miles / launch in 2015): will expand the Phase 1 area to cover an additional 3.4 square miles.
- **Phase 3** (60 stations / 600 bikes / 5.1 square miles / launch in 2017): will develop a series of sub-systems on the east side of Lake Washington in the cities of Redmond (including the Microsoft campus), Kirkland, Bellevue, and Renton.
- **Phase 4:** expand into other areas of the county such as Ballard, Northgate, Rainier Valley, Kent, etc. These areas can enter the system at any time with sufficient funding.

Where will stations be located and how far will I have to walk to get to a bike?

Stations will be placed an average of 1,000 to 1,300 feet apart, providing access to a bike within a short walk of anywhere in the service area and a variety of places to return a bike. Stations will require permitting approval, but are typically placed in sidewalks, public spaces, on-street (sometimes replacing on-street parking), or on public or private properties (in consultation with the land owner).



Example Station Placement

How will the helmet requirement be addressed?

King County has a law requiring all cyclists to wear helmets. Several options were considered, but providing helmets throughout the system was seen as an opportunity to reinforce the region’s commitment to safety, increase the distribution of helmets to all bicyclists, and to showcase innovative technical and non-technical solutions to providing helmets.



Helmet vending machine in Melbourne Bike Share

The business plan includes costs to provide helmet vending machines as part of the station design and for the operator to stock, clean, inspect, and replace helmets. Although there is expected to be a percentage of the population that will not want use the system because of the helmet requirement, there will be other riders that will ride more often because there is easy access to a helmet. This has been accounted for in ridership and revenue estimates for the program.

Are there enough bikeways to have a bike share system?

North American bike share systems are relatively new and most European programs were introduced in cities with established bikeway networks – as a result there is limited data to determine whether a dense network of bikeways is necessary for successful bike sharing. However, North American cities, some of which have similar bikeway infrastructure to King County have, to date, experienced ridership exceeding projections, recorded no fatalities and very few injury crashes. The style and speed of riding is more conducive to safe riding and the increased number of bikes on the streets introduces a “safety in numbers” effect with drivers more aware of bicyclists.

What about other issues such as steep hills and rain?

There are steep hills in many of the proposed service areas, including downtown Seattle. The system will be designed to encourage routes with easier grades and the bikes will have more gears than bikes in other cities (seven gears rather than three). Electric-assist bikes were considered, but the additional capital, maintenance, and redistribution costs, coupled with the unreliability of current technologies removed this option from consideration at this time.

In comparison to Washington D.C.’s Capital Bikeshare, the most comparable system in the US, cool and rainy winters in King County will likely decrease demand, particularly amongst casual users that are not acclimated to winter riding conditions. However, moderate and low humidity summer temperatures will likely increase demand during summer months.

How much will it cost to use the system?

Users will pay a fee to access the system for a specific period of time. During that period, users can make as many trips as they like and for each trip are allowed to ride for a certain time (known as the “free ride period” – typically 30 to 60 minutes) without charge. To encourage short trips, additional charges are assessed for trips longer than the free ride period. The proposed rate structure is based on other cities, adjusted for the relative cost of living:

- Annual subscription: \$75.
- Monthly subscription: \$30.
- 24-hour (casual) subscription: \$5.

It is expected that over 450,000 rides will be taken in the first year with over 2 million rides per year once all three phases are in place.

How much will the system cost?

Cost estimates have been prepared based on experience in other cities. Initial launch of the system (Phase 1A) is expected to cost **\$3.7 million** with an additional **\$1.4 million per year** required to operate it. The first three phases of the system will require capital of \$14.4 million and \$4.6 million per year to operate. This includes purchase of the equipment, launch of the system, operation and maintenance of the system, marketing, customer support, and the cost of providing and maintaining helmets throughout the system.

How will this be funded?

It is expected that a diverse funding strategy will be required and could include some combination of user-generated revenues, sponsorship of the system and/or its bikes and stations, public or grant funding, and private foundation funding.

Other cities have used grants and private sponsorship to provide initial capital for the system with user-revenues and station sponsorship covering operating costs. The proposed funding strategy for initial launch of the system includes:

- Capital (\$3.7 million):
 - Presenting sponsorship: \$ 1.0 – \$2.0 million.
 - Grants or other funding: \$1.7 – \$2.7 million.
- Operating (\$1.4 million / year):
 - User revenues: \$0.85 million.
 - Station sponsorship: \$0.3 million.
 - Grants or other funding: up to \$0.25 million.

Over the longer term, presenting sponsorship is expected to cover all but \$2.15 million of the capital cost associated with launching phases 1, 2 and 3 (approximately \$14.4 million). The combination of user-generated revenues and station / bike sponsorship revenues will be enough to cover annual operating costs (\$4.6 million per year) plus provide a surplus that can be used to pay back the initial capital shortfall or reinvested into the system to launch subsequent phases of the system. In the longer term, the system is expected to operate at a surplus, which can be reinvested into expanding the system.



Decobike, Miami Beach

Is there interest from the corporate community to sponsor the system?

Initial discussions with the corporate community have shown considerable support for the program and interest, in concept, for sponsoring the program. Corporate partners can benefit from sponsorship opportunities as a way to increase brand recognition, as a means for community investment, and as a means to support commute trip reduction programs.



Presenting Sponsor, Denver Bikes



Station Sponsorship, Boston Hubway

What are the next steps?

The BSP is currently working to establish a non-profit organization (NPO) to administer the program. An interim board of directors and executive director will be appointed. The NPO will guide the remainder of the process, which will include identifying and pursuing funding (including approaching potential corporate sponsors and applying for public and grant funding), preparing a set of consistent regional guidelines, establishing a common procurement process, and issuing an RFP to potential equipment vendors and operators.

1. Introduction

Bike sharing is an innovative approach to urban mobility, combining the convenience and flexibility of a bicycle with the accessibility of public transportation. Bike share systems consist of a fleet of bicycles provided at a network of stations located throughout a city. Bicycles are available on demand, providing fast and easy access for short trips, transit-linked trips, and tourist trips.

Cities such as Montreal, Denver, Minneapolis, Washington D.C., Boston, Miami Beach, Toronto and over 300 other cities worldwide are investing in bike sharing as a relatively inexpensive and quick implementation urban transportation option. These cities, like King County, recognize the economic, environmental, and social benefits of bike sharing.

This study outlines a business plan for the creation of a bike sharing system in Seattle and other communities in King County, Washington. It presents background information on the goals of the program and the proposed system size and phasing; it recommends a business model for administering and operating the system; it presents a business pro-forma that explores the financial feasibility of a countywide bike sharing system; it outlines potential strategies to address challenges in the county; and it identifies next steps towards implementation.

The Business Plan is a planning document, and as such makes a number of assumptions. It will be the job of the program administrator, in conjunction with the chosen equipment vendor and operator, to refine the assumptions as necessary.

This plan has been conducted in partnership with the Bike Share Partnership (BSP), an ad-hoc group formed to guide the direction and development of bike sharing in the region. The BSP includes representatives from public agencies and institutions such as King County, the cities of Seattle, Redmond, and Kirkland, Sound Transit, the Puget Sound Regional Council, the University of Washington, and a number of other organizations including Seattle Children's, Microsoft, and the Cascade Bicycle Club. The BSP has been instrumental in defining a bike share program and moving forward the framework for its implementation.

1.1 Program Goals

Bike sharing is a relatively inexpensive and quick implementation urban transportation option. It provides an additional mobility option for short urban trips for residents and visitors that can reduce reliance on the private automobile, extend the reach of transit by providing a 'last mile' solution, and fill the void between trips too long to walk, but not long enough to justify waiting for transit or the cost of driving or catching a taxi.

Bike share systems are truly transformative. Many cities are recognizing the numerous benefits these systems offer such as:

- **Health:** the health benefits of bicycling are well recognized and include the potential to reduce obesity, heart disease, and other sedentary lifestyle diseases. Other cities have attracted considerable interest from the health care industry with health care providers becoming major sponsors of bike sharing systems in Minneapolis and Denver.

- Environmental: bike sharing is practically carbon neutral. Not only does the increase in bicycling reduce emissions and reduce the hard space taken up by automobile parking, but the stations are solar powered and bike trailers and electric vehicles may be used for maintenance, redistribution, etc.
- Economic: bike sharing creates green jobs with on-going positions for managing and operating the system. They are also complementary with existing business providing new customers with “front-door” access and businesses with opportunities for sponsorship and brand development.
- Profile: bike sharing is not only transformative, but generates considerable media attention. The system can, in itself, become an attraction for visitors and tourists. The King County system could serve as a model of regional collaboration and celebrate the safety culture of the area with its unique response to the helmet requirement.

Although the BSP’s goals for the bike share system in King County are numerous, key program goals are to:

- Develop a regional bike share system that allows multiple communities to participate and provides a consistent user experience and a single pricing structure.
- Provide a new mobility option for the region that extends the reach of public transit.
- Increase the opportunity for residents and visitors to take part in healthy physical activity.
- Reduce carbon emissions from the transportation sector.

Additional financial goals for the program include:

- Funding the system using a diverse range of revenue sources and providing a balanced mix of public and private involvement.
- Minimizing risk while maintaining transparency and accountability for the agencies involved.

1.2 Community Preparedness

King County has many of the characteristics required to make bike sharing successful: concentrated population and employment centers, an extensive public transit system, large numbers of visitors, a culture that supports cycling (including the largest bike club in the country), and a policy environment that supports the growth of walking and cycling.

A number of concerns have been raised by stakeholders as potential barriers to the success of a bike share system in King County. These will be addressed in detail as part of this plan and include: designing the system to account for areas with steep topography; determining whether the amount of bikeway infrastructure is sufficient; developing a strategy to operate the system with King County’s mandatory helmet requirement; assessing the impact of weather; and identifying permitting and sign code limitations that may impact advertising and sponsorship.

1.3 Business Plan

The Business Plan is laid out as follows.

Chapter 2 presents planning considerations including a definition of the area to be covered by the initial phases of the program and how other areas of the county might be incorporated in future phases. It also presents a proposed station plan for the first phase of the program and shows typical station layouts.

Chapter 3 explores the various types of business models that have been adopted for bike sharing systems in the United States and internationally and recommends an administrative and operational framework for a system in King County.

Chapters 4 to 7 describe the costs associated with establishing and operating the system (Chapter 4), estimates potential revenue from user-generated trip and membership fees (Chapter 5), and identifies other revenue sources such as public funding, grants, and sponsorship (Chapter 6). These inputs are considered in a five-year financial pro-forma in Chapter 7.¹

Options for addressing local challenges such as topography, bikeway infrastructure, weather, and the helmet requirement are described in Chapter 8 along with a sensitivity analysis of their financial implications.

Chapter 9 explores operational characteristics that will need to be considered by the program administrator, the equipment vendor, and the operator. Examples of service level, reporting, and insurance standards are presented along with a discussion of potential smart card integration.

Finally, Chapter 10 wraps up the plan with next steps for the BSP and other partners to consider in moving towards implementation.

¹ In places a ten-year analysis horizon has been used to show possible trends beyond the five-year horizon. However, forecasting to this horizon is less precise and the results should be used cautiously.

2. System Planning

This section will define the size and service area of the King County bike share program and develop a phasing plan for its implementation. Preliminary station placements for Phase 1 of the system will be identified along with typical station layouts.

2.1 Service Area and Phasing

Defining the coverage, or “service area”, of the system considers a number of factors. Firstly, areas with the highest potential demand for bike sharing were considered. These locations will generate the most users and attract the highest value sponsorships, and as a result are the most likely to be financially successful. High demand areas were identified through a heat mapping exercise that allocated points to where people “live, work, shop, play, and take transit”. The heat map is shown on **Figure 2.1**.

Secondly, factors such as geographic and social equity were considered. Although difficult to measure, a number of metrics have been used to identify locations in the county where social equity concerns are most pressing. **Figure 2.2** shows concentrations of census tracts that rate in the lowest quartile of (a) median household income and in the highest quartile for: (b) non-white population, (c) renter-occupied housing units, and (d) households with access to one or fewer vehicles.

To maximize success of the bike sharing system, it is proposed to first launch it in areas with the highest demand. This will accelerate profitability of the system and allow subsequent revenues to be directed into growing the system in lower demand areas. Based on this, the initial phases of the program would include a network of “sub-systems” in Seattle’s downtown core, south Lake Union, the University District, Sandpoint, Capitol Hill, Redmond, Kirkland, Bellevue, and Renton.

Subsequent phases would include: expanding the boundaries of the initial phases; creating “satellite” systems in areas that have medium-to-high expected demand but are discontinuous from the initial phases (e.g. Ballard and Northgate); and lower demand areas that may be desirable mini-systems from a social or geographic equity perspective or as an extension of transit (e.g. Rainier Valley, Kent, Issaquah, West Seattle, communities along the Seattle Central Link Light Rail Line to the southeast, etc.).

The proposed phasing plan is shown on **Figure 2.3** and summarized in **Table 2.1**. It was developed by segmenting the proposed service area into a logical roll-out program. Phases 1 and 2 will be on the western side of Lake Washington and are intended to maximize early success in Seattle’s downtown core and the University District. Roll-out should occur in manageable stages that match funding and organizational capacity. The proposed roll-out strategy includes:

- Phase 1A (50 stations / 500 bikes): the initial launch will cover an area of approximately 3.1 square miles with an average spacing of 1,300 feet between stations.
- Phase 1B (60 stations / 600 bikes): will expand the Phase 1A boundaries to cover an additional 2.0 square miles and increase the station density of parts of the initial launch area to an average station spacing of 980 feet.
- Phase 2 (50 stations / 500 bikes): will expand the Phase 1 area to cover an additional 3.4 square miles with stations every 1,300 feet.

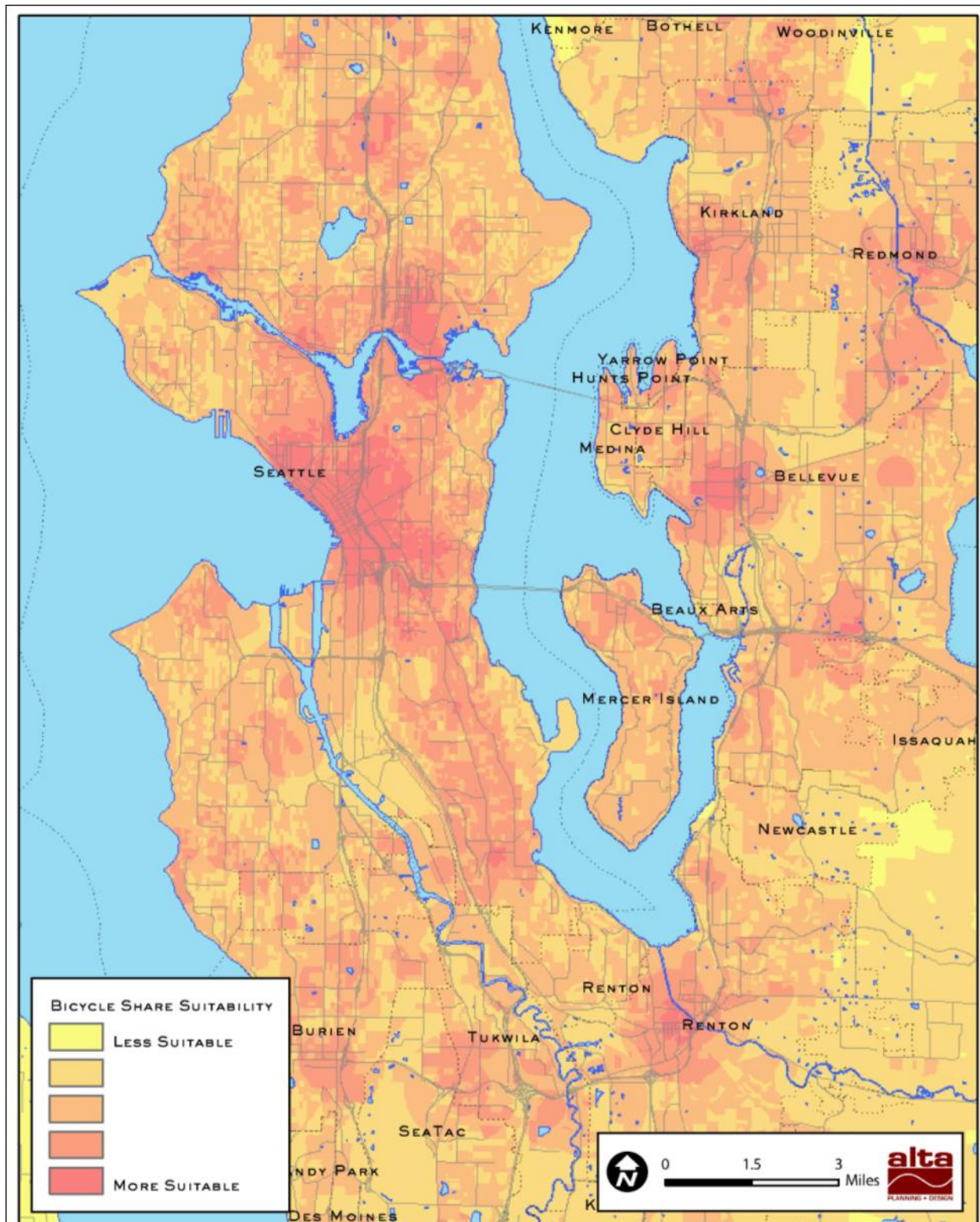


Figure 2.1: Map of Potential Bike Share Demand in King County.

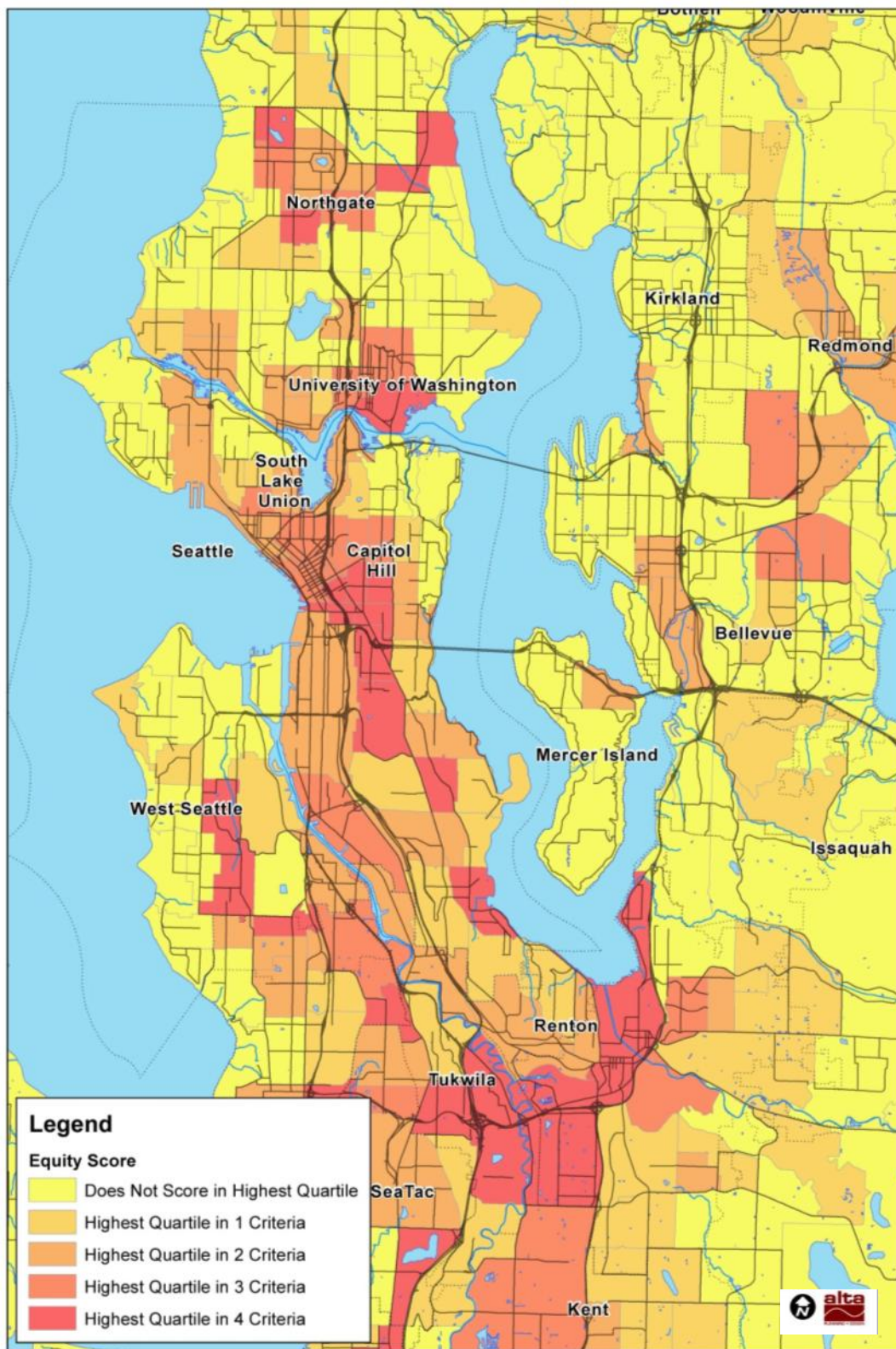


Figure 2.2: Concentrations of Low Household Income, High Non-White Population, High Renter-Occupied Housing, and Low Auto-Accessibility in King County.

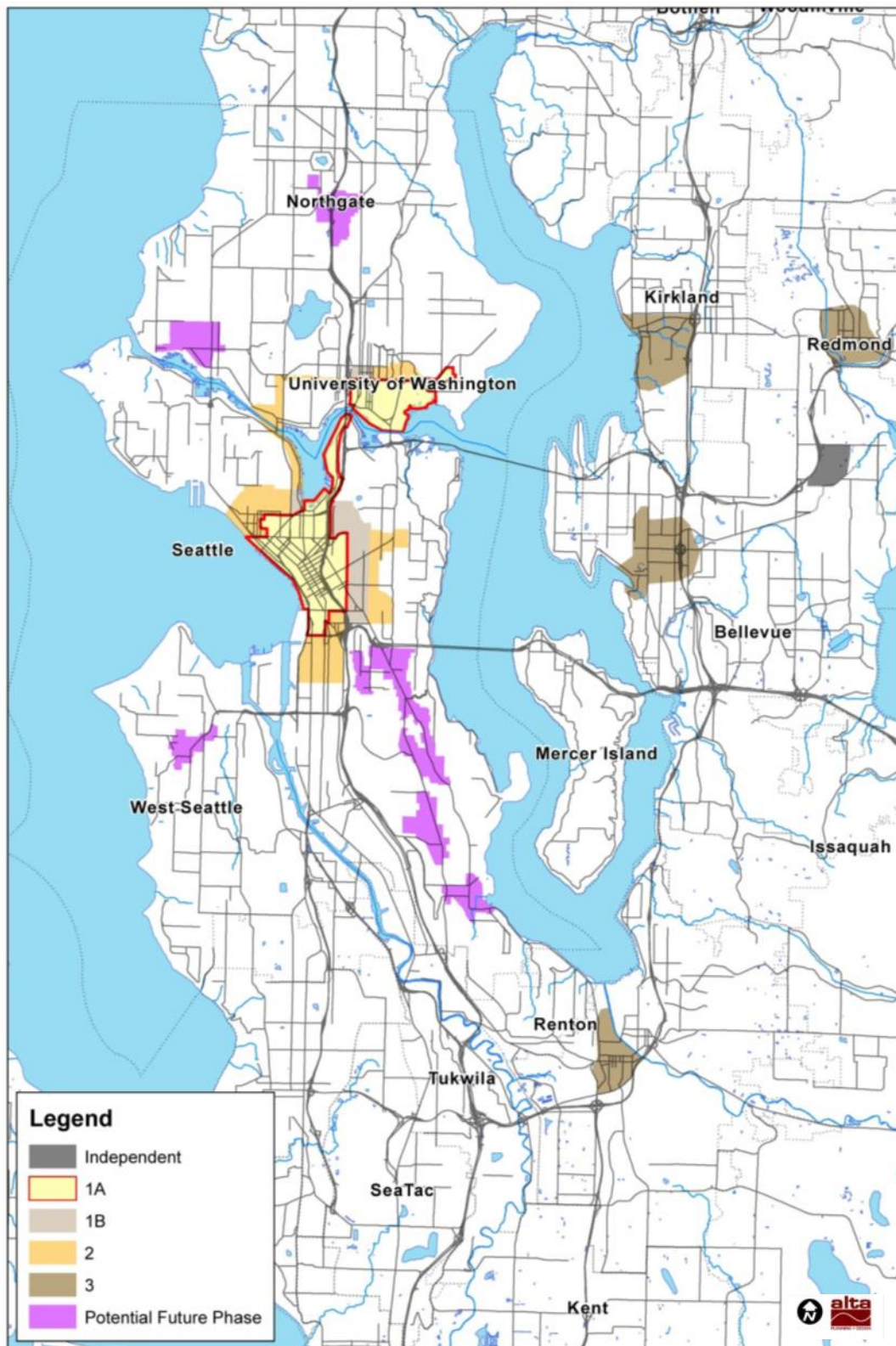


Figure 2.3A: Proposed King County Bike Share Phasing Plan.

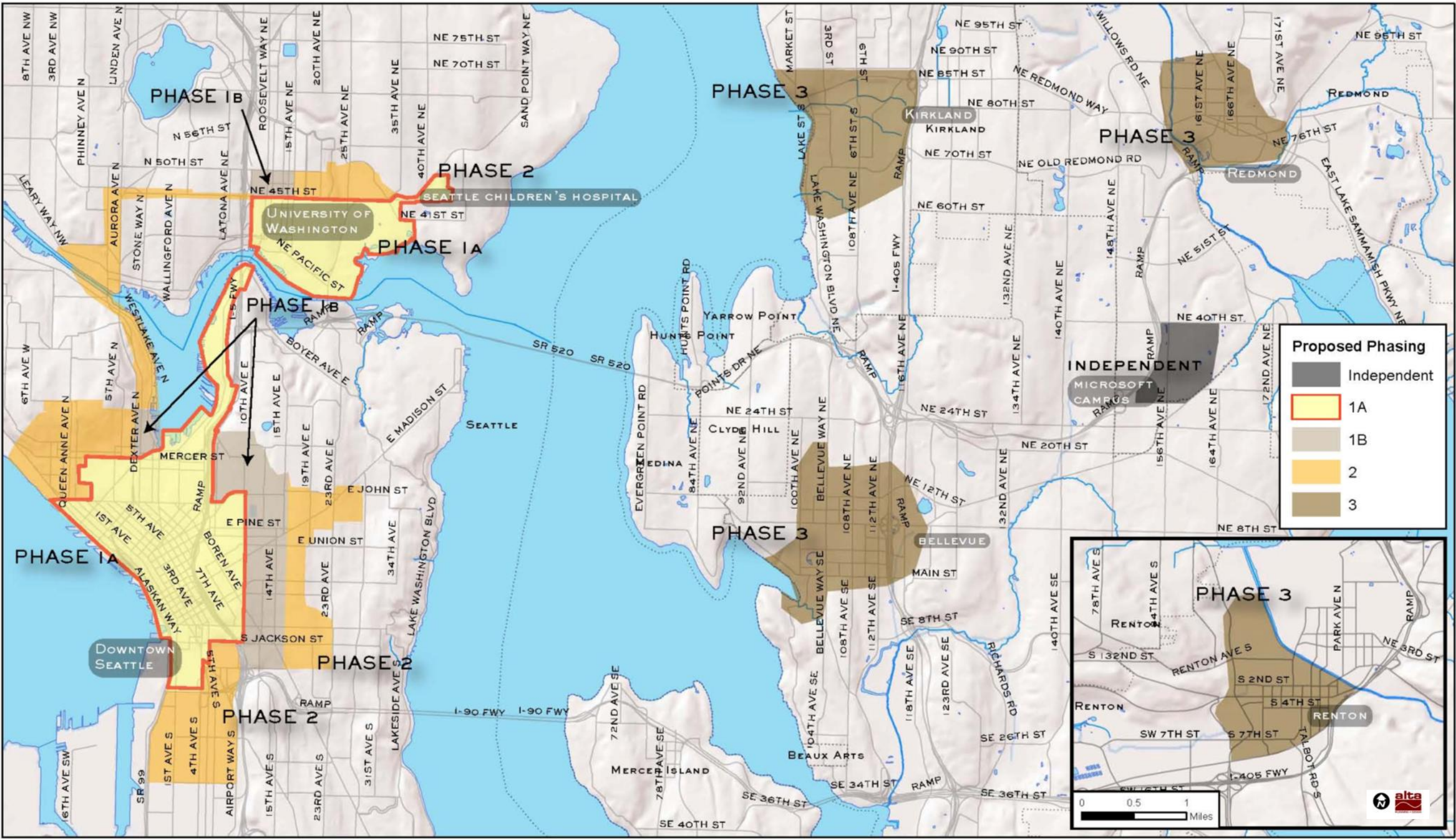


Figure 2.3B: Proposed King County Bike Share Phasing Plan – Phases 1 to 3.

Table 2.1: Proposed System Size and Phasing for King County Bike Share

Region	Spacing	Phase 1A	Phase 1B	Phase 2	Phase 3	Total
Downtown Seattle/ South Lake Union/ Eastlake / Capitol Hill	1,000 feet 1,300 ft ²	35 Stations (350 Bikes) 2.2 Sq. Mi.	55 Stations (550 Bikes) 1.7 Sq. Mi.	10 Stations (100 Bikes) 0.7 Sq. Mi.		100 Stations (1,000 Bikes) 4.6 Sq. Mi.
Lower Queen Anne	1,300 feet			10 Stations (100 Bikes) 0.8 Sq. Mi.		10 Stations (100 Bikes) 0.8 Sq. Mi.
Fremont/Westlake Avenue	1,300 feet			10 Stations (100 Bikes) 0.6 Sq. Mi.		10 Stations (100 Bikes) 0.6 Sq. Mi.
University District/ Sandpoint / Seattle Children's Hospital ³	1,300 feet	15 Stations (150 Bikes) 0.9 Sq. Mi.	5 Stations (50 Bikes) 0.3 Sq. Mi.	5 Stations (50 Bikes) 0.4 Sq. Mi.		25 Stations (250 Bikes) 1.6 Sq. Mi.
SODO/Upper Duwamish	1,300 feet			15 Stations (150 Bikes) 0.9 Sq. Mi.		15 Stations (150 Bikes) 0.9 Sq. Mi.
Seattle Sub-Total		50 Stations (500 Bikes) 3.1 Sq. Mi.	60 Stations (600 Bikes) 2.0 Sq. Mi.	50 Stations (500 Bikes) 3.4 Sq. Mi.		160 Stations (1,600 Bikes) 8.5 Sq. Mi.
Redmond	1,300 feet				10 Stations (100 Bikes) 1.0 Sq. Mi.	10 Stations (100 Bikes) 1.0 Sq. Mi.
Kirkland	1,300 feet				15 Stations (150 Bikes) 1.4 Sq. Mi.	15 Stations (150 Bikes) 1.4 Sq. Mi.

² Station spacing of 984 feet was applied south of Denny and west of I-5. Spacing of 1,300 feet was applied north of Denny and east of I-5.

³ The University of Washington campus and Seattle Children's Hospital are seen as important parts of the Phase 1 launch given the high uptake potential of these sites. The demographic of students, staff, and faculty at UW is prime for bike share usage and Seattle Children's has one of the best travel demand management programs in the region to which bike share is well suited. Their link to community health will also help to promote the system.

Region	Spacing	Phase 1A	Phase 1B	Phase 2	Phase 3	Total
Bellevue	1,300 feet				15 Stations (150 Bikes) 1.5 Sq. Mi.	15 Stations (150 Bikes) 1.5 Sq. Mi.
Renton	1,300 feet				10 Stations (100 Bikes) 0.8 Sq. Mi.	10 Stations (100 Bikes) 0.8 Sq. Mi.
Eastside of Lake Washington Sub-Total					50 Stations (500 Bikes) 4.7 Sq. Mi.	55 Stations (550 Bikes) 4.7 Sq. Mi.
Microsoft Campus (Phase Independent)	1,300 feet				10 Stations (100 Bikes) 0.4 Sq. Mi. ⁴	10 Stations (100 Bikes) 0.4 Sq. Mi.
Total		50 Stations (500 Bikes) 2.4 Sq. Mi.	60 Stations (600 Bikes) 2.7 Sq. Mi.	50 Stations (500 Bikes) 3.4 Sq. Mi.	60 Stations (600 Bikes) 5.1 Sq. Mi.	220 Stations (2,200 Bikes) 13.6 Sq. Mi.

Phase 3 (60 stations / 600 bikes) would introduce service to the communities on the eastern side of Lake Washington (e.g. Redmond, Kirkland, Bellevue, and Renton) that, although discontinuous from earlier phases, will generate their own demand and provide a connection to transit for longer trips.

Phase 4 has been reserved for smaller, “satellite” systems mentioned above such as Northgate, Ballard, Kent, Rainier Valley, Issaquah, West Seattle, and communities along the Seattle Central Link Light Rail Line. Phase 4 has not been included in the business pro-forma and these areas would be subject to separate evaluations as required.

The decision to expand beyond the first phase (and subsequent phases) will depend on available funding and the success of the system. System success is typically measured in terms of visible achievements such as high ridership, positive public response, neighborhood and corporate requests for service area expansion, and on-going financial performance. Essentially, the system will grow if the expansion can be sustained through existing funding or an additional influx of user fees, private sponsorship, grants, and/or public funding.

Importantly, areas included in Phase 4 or outside of the phasing list are not excluded from joining the bike sharing system or from accelerating their inclusion into an earlier phase. The reality is that locations interested in bike sharing can enter the system whenever they have sufficient funds in place to launch and sustain operations. Lower demand areas must recognize that entry into the system will be more difficult (e.g.

⁴ Microsoft campus is phase independent but for planning purposes has been shown as part of Phase 3.

the system should meet the minimum size requirements and lower demand will mean less revenue); however, the decision to enter will likely depend on how much additional subsidization is required and the source of these funds.

At full build out, i.e. with Phases 1, 2, and 3 in place, the system would include 220 stations and 2,200 bikes.

2.2 System Parameters

Other considerations in system planning include: providing stations at an appropriate spacing so users can easily access bikes; ensuring that satellite systems are not too small to be effective; and identifying an appropriate dock-to-bike ratio to balance capital and rebalancing costs.

2.2.1 Station Density

The size of the system is a function of the coverage area and the desired spacing of stations. Average station spacing in European and North American bike share systems is typically between 984 feet (300 m) and 1,300 feet (400 m). This represents a station density of approximately 16 to 28 stations per square mile. This range provides access to a bike within a short walk of anywhere in the service area and provides a nearby alternative to return a bike if the destination station is full.

2.2.2 Minimum System Size

Satellite systems should not be so small that they are not effective. The minimum satellite system size, such as those areas included in Phase 4, should consider a number of factors. Where the satellite is some distance away from the remainder of the system (“separated satellite”), a minimum of 10 stations should be considered to provide a mix of trip origins and destinations and to justify the cost of operations. For “nearby satellites”, e.g. in areas that are nearby other systems and that could be serviced in coordination with these areas, a smaller operation (minimum of 5 stations) may be acceptable. The latter may include a station at a transit hub or similar attraction and up to four stations radiating from the hub at key origins and destinations.

Some factors to consider in establishing the minimum system size include:

- The coverage area at which bicycling becomes a more attractive option than walking. The median walking trip is approximately 5 minutes, in which time a person can walk approximately 0.25 miles, but can cycle approximately 0.8 miles. A five minute bike trip represents approximately a 2 square mile catchment area.
- Providing a variety of trip origins and destinations.
- Providing a reasonable station density so that users can easily access a station. Typical station densities are a station every 984 feet (300m) to 1,300 feet (400m). As station spacing is increased, at some point users will consider they have to walk too far to access a bike and will be inclined not to make the trip or to take a different mode. A station density of one station every 1,300 feet (400 m) results in a minimum system size of 10 stations (0.2 square miles per station) but can mean up to a five minute walk to access a bicycle when a walk of 15 minutes would get you from the extent of the system to the center of the system.
- Creating a system of a reasonable size to justify the cost for an operator to service the system.

2.2.3 Number of Docks

It is important that there be sufficient empty docks for riders to return bikes. A dock-to-bike ratio of 2:1 has been found, in other systems, to provide the best balance between the cost of the system, the ability to return bikes, and the cost to rebalance the system. Ratios as low as 1.5:1 have been used but generally result in higher rebalancing costs.

2.3 Station Plan

Preliminary recommendations for bike share station locations and station size were made for the stations included in the Phase 1 service area.⁵

2.3.1 Station Placement

The methodology for determining station placement involved initially placing stations in a grid pattern across the Phase 1 service area at the recommended station spacing. Initial placements were then adjusted considering the following criteria:

1. If there was a major transit station nearby (e.g. a light rail station or ferry terminal) then the bike share station was moved to that location.
2. Where there was no major transit station nearby, stations were moved to the most “exposed” street intersection. Exposure was measured using street functional classification to represent passing pedestrians who might use the bike share system and passing motorists that would see sponsorship at the station or on the bikes.
3. Preference was given to streets with existing or proposed bikeway improvements to represent the readiness of these streets to accommodate bike share traffic.

Manual adjustments were made based on local knowledge to reflect nearby land uses, or to better distribute stations along primary bicycle travel corridors and less steep routes, etc. The resulting station placement map for Phase 1 of the King County bike share system is shown in **Figure 2.4**.

2.3.2 Bicycle and Dock Distribution

The 1,100 bikes associated with Phase 1 were distributed amongst the 110 Phase 1 stations based on the expected demand at each station. The minimum number of bikes at a station was set to 5 bikes and the ratio of docks to bikes was set as 2:1 to provide sufficient open docks for users to return bikes to their preferred station. The resulting number of docks for each station is shown on **Figure 2.4** (note: the number of bikes is half of the number of docks shown on Figure 2.4).

⁵ The locations for the 50 stations in the initial launch (Phase 1A) would be selected by the administrative non-profit and/or the operator from these sites.

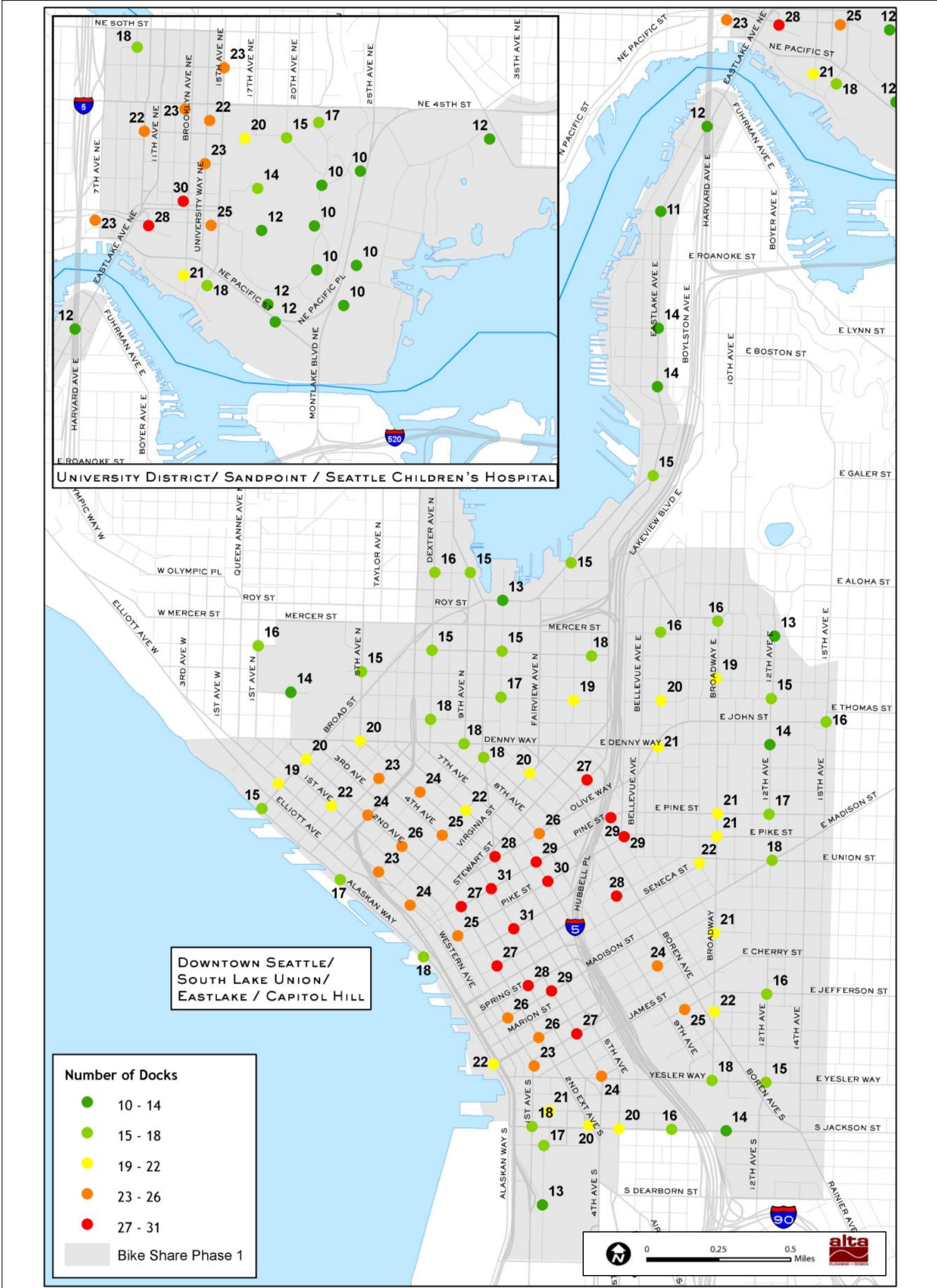


Figure 2.4: Proposed Phase 1 Station Placement Map.

2.3.3 Station Examples

The footprint of the station can be calculated from the number of docks, although will vary depending on the vendor. A number of sites were selected in Seattle and the University District to represent “typical” station placements. Station footprints or visualizations were prepared for each example as follows:

- Sidewalk placement: 4th Avenue and Union Street (shown in Figure 2.5).
- On-street parking removal: 42nd Street and University Way (shown in Figure 2.6).
- Connection to transit: Westlake Avenue and Denny Way (shown in Figure 2.7).
- Pedestrian plaza: Virginia Street and Western Avenue (shown in Figure 2.8).
- Public plaza: Central Library on 4th Avenue (shown in Figure 2.9).
- Historic setting: Pioneer Square, 1st Avenue and James Street (shown in Figure 2.10).

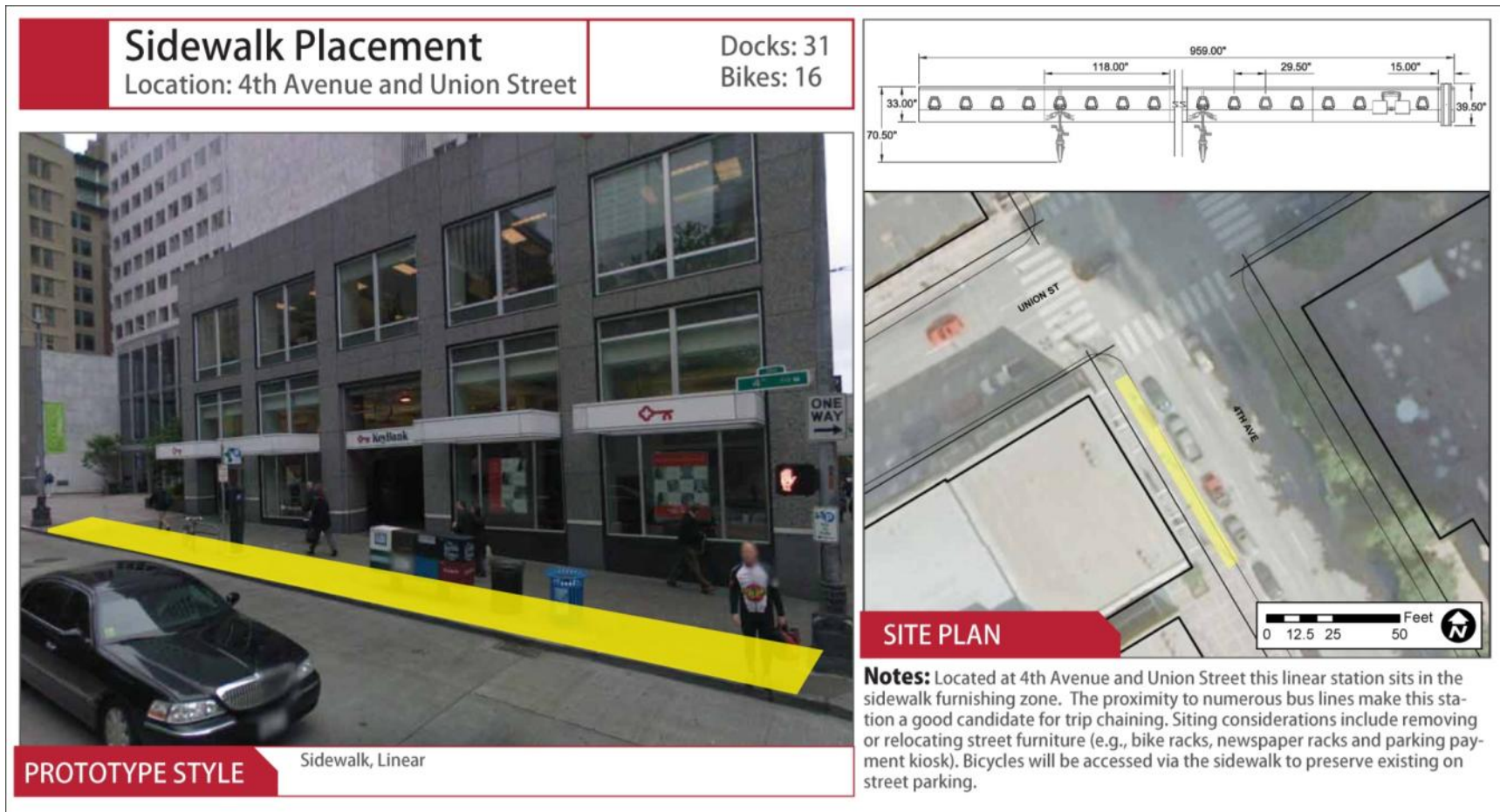


Figure 2.5: Station Example – Sidewalk Placement (4th Avenue and Union Street).

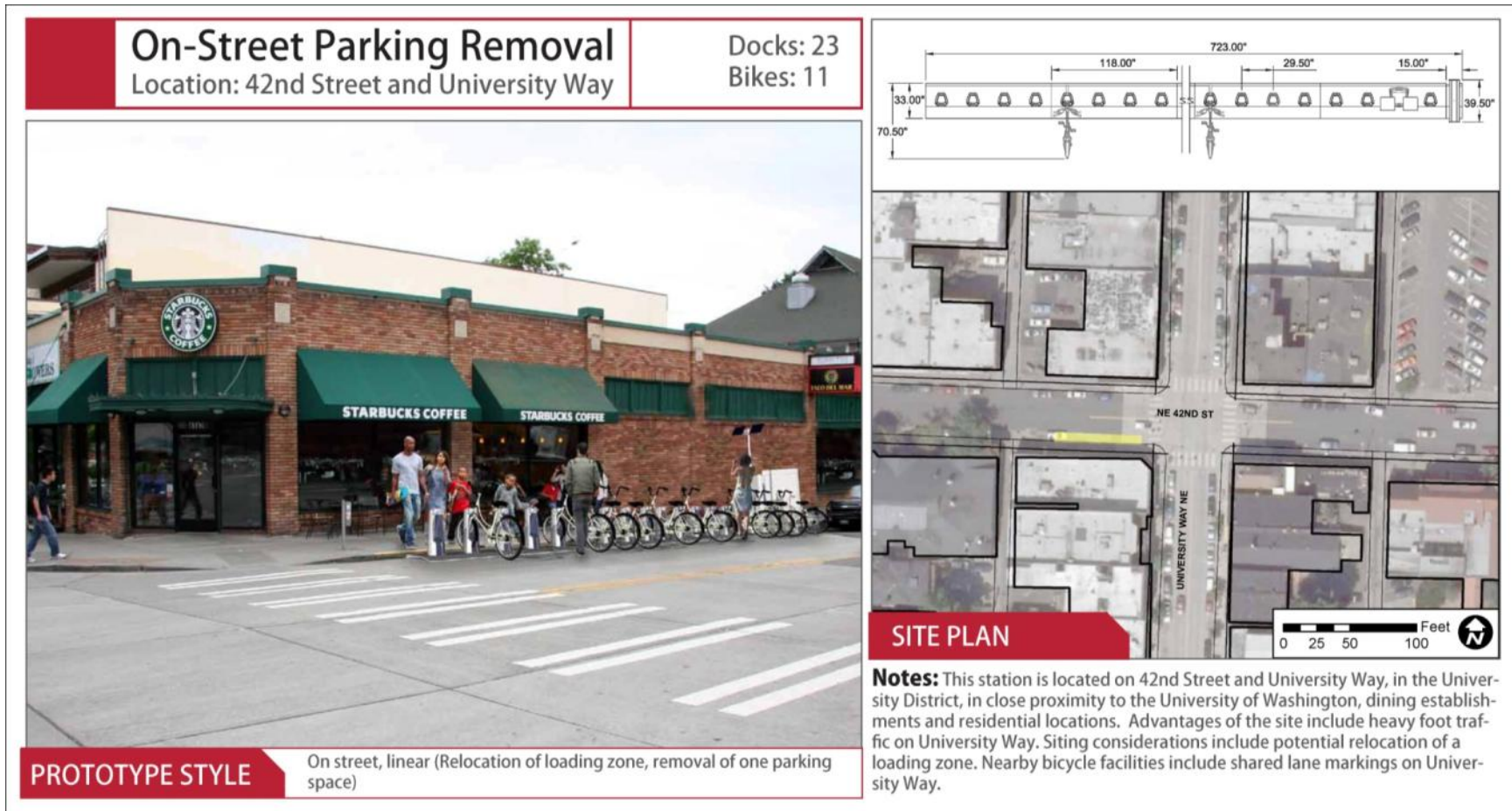


Figure 2.6: Station Example – On-Street Parking Conversion (42nd Street and University Way).

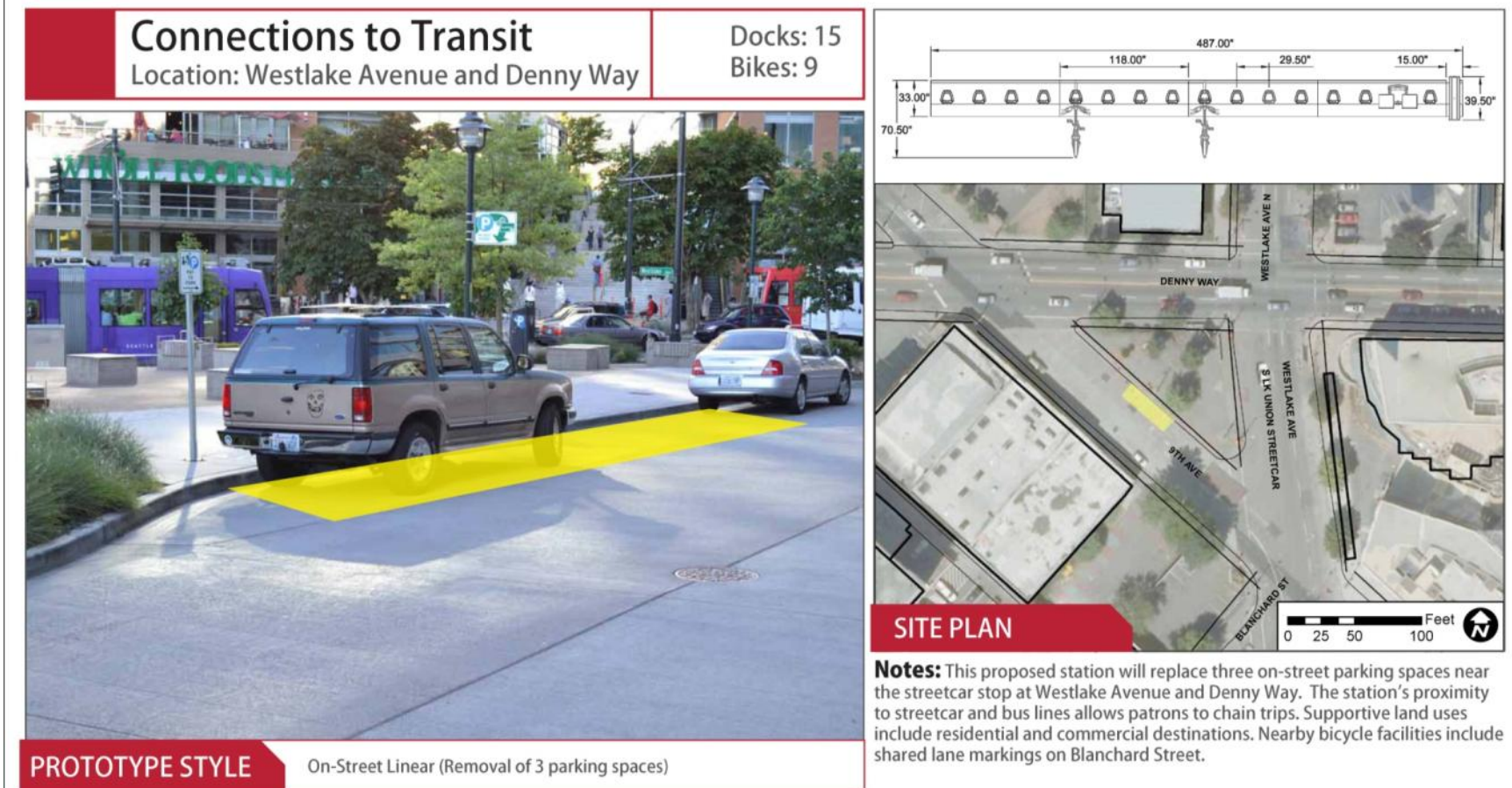


Figure 2.7: Station Example – Connection to Transit (Westlake Avenue and Denny Way).

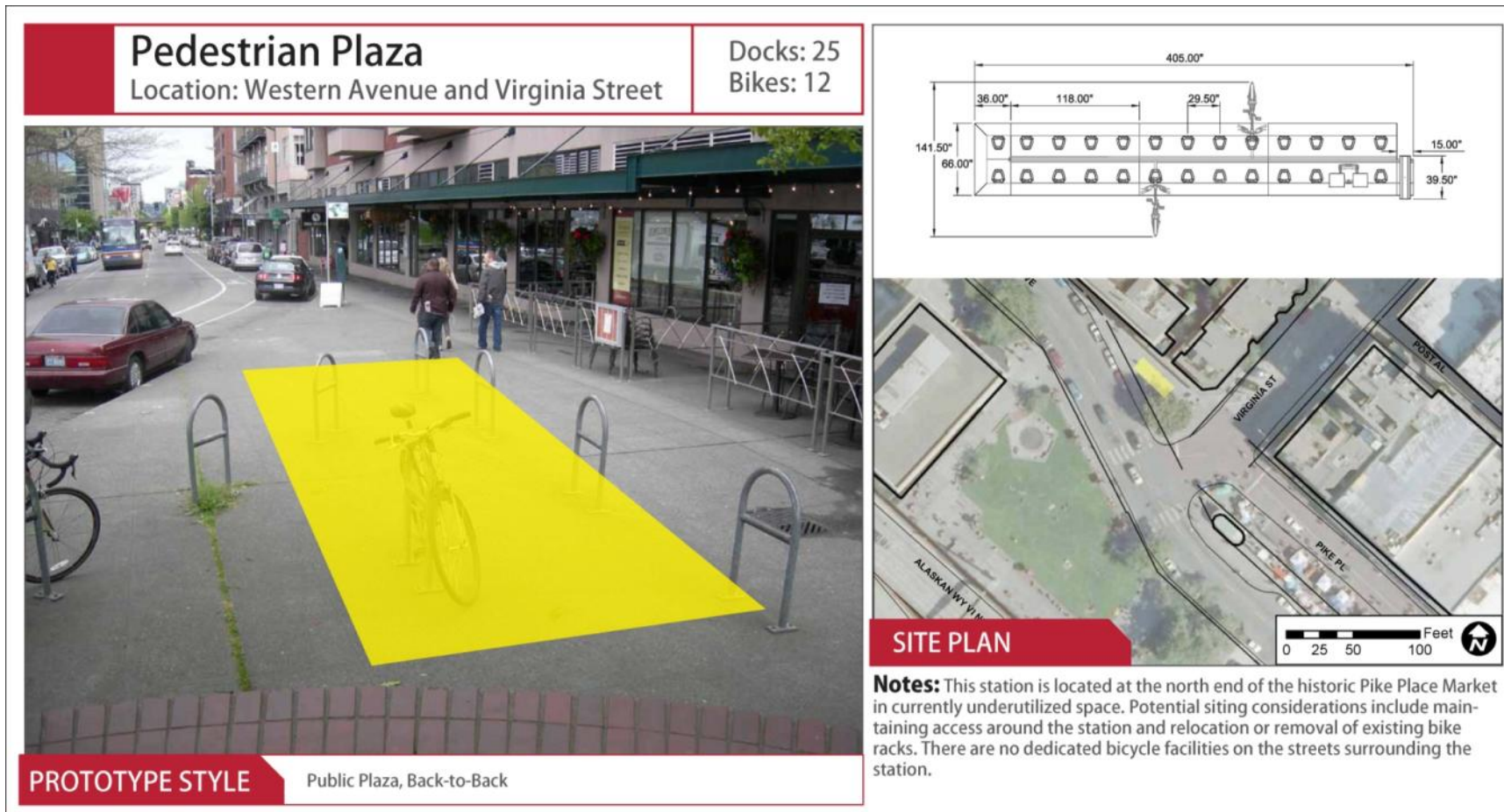


Figure 2.8: Station Example – Pedestrian Plaza (Virginia Street and Western Avenue).

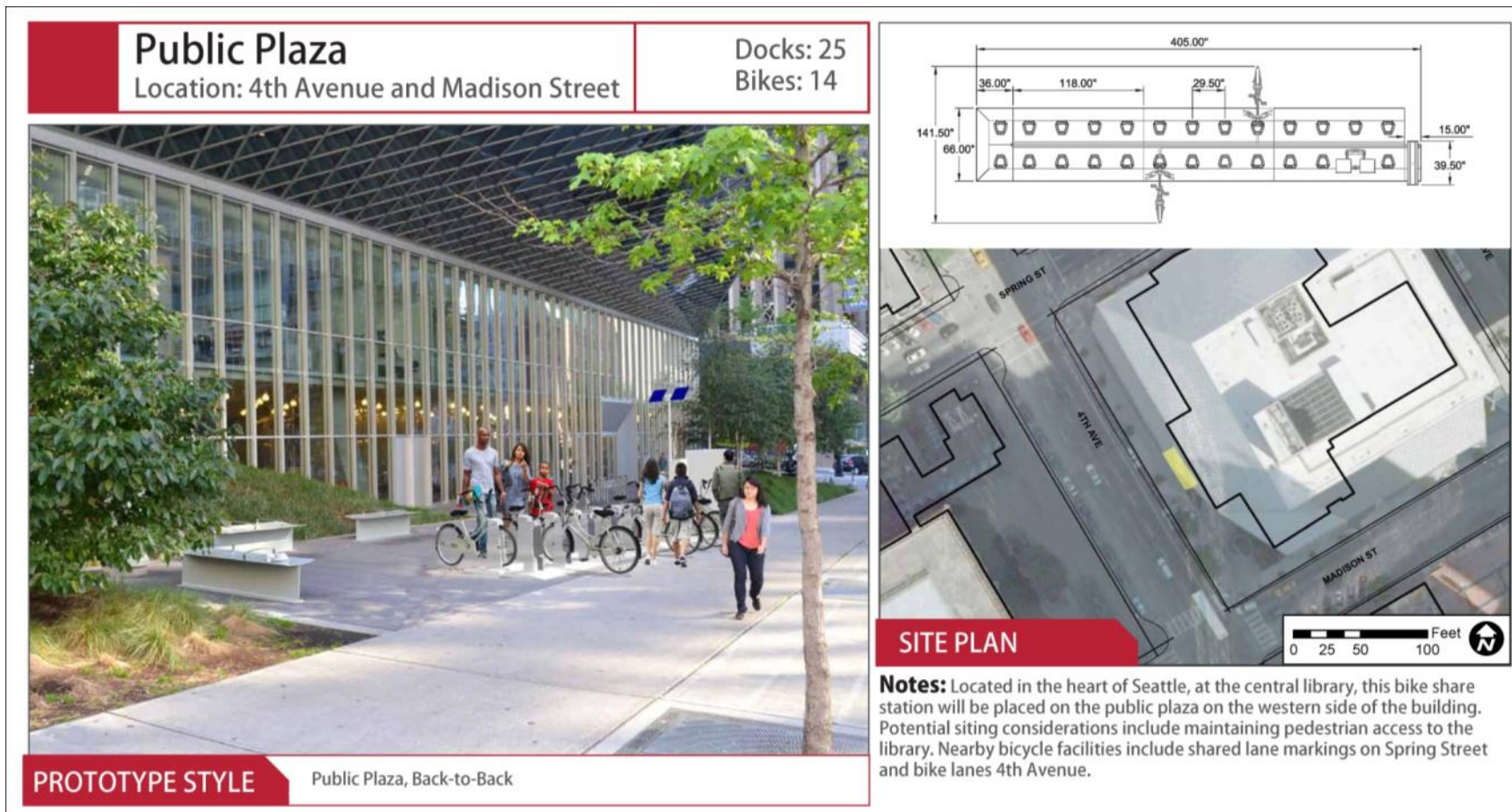


Figure 2.9: Station Example – Public Plaza (Central Library on 4th Avenue).

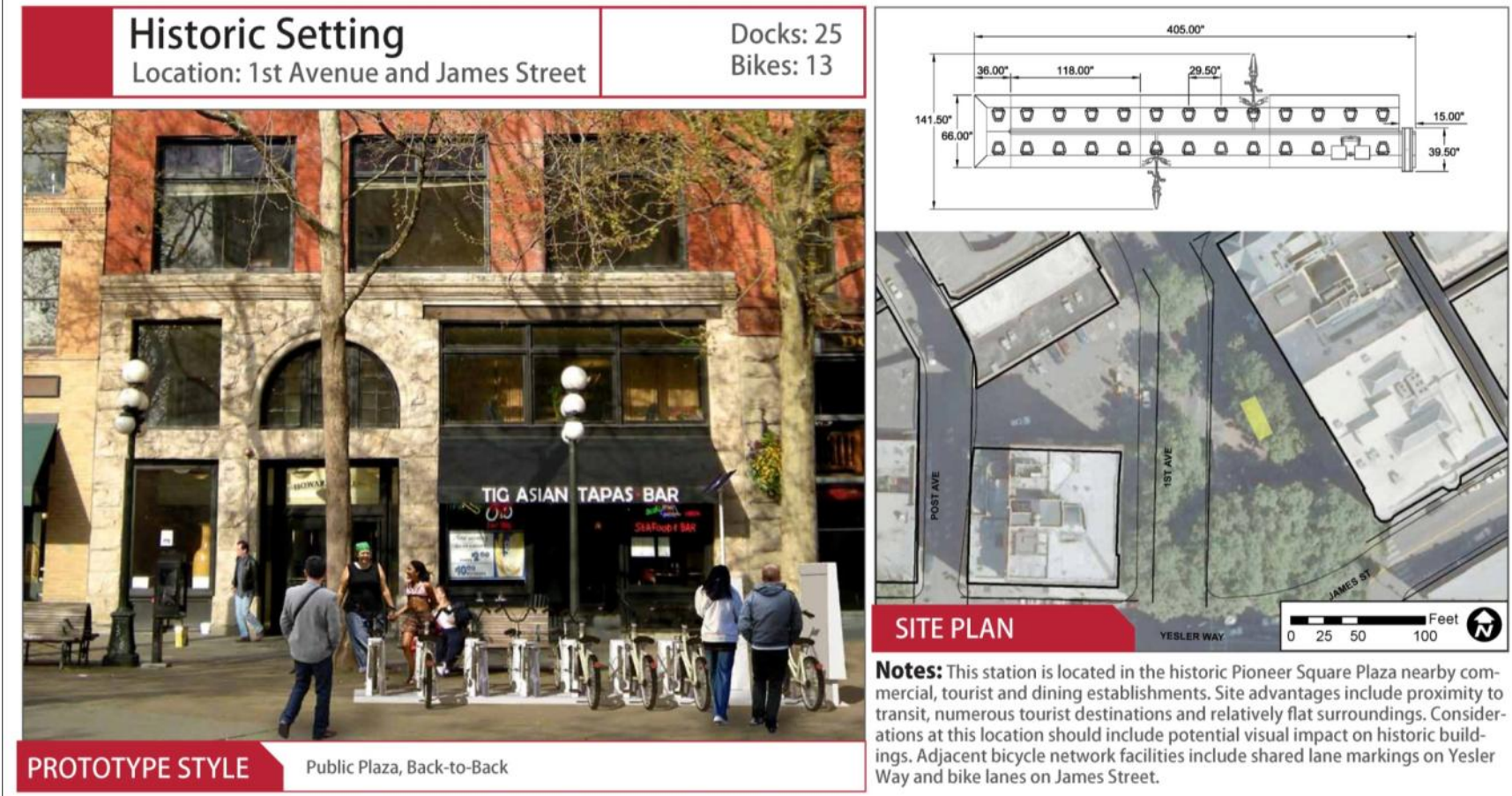


Figure 2.10: Station Example – Historic Setting (Pioneer Square, 1st Avenue and James Street).

3. Business Model

North American bike share systems operate under many different business models. In fact, each existing system (and those in planning) has identified a governance and organizational structure that fits the needs of the local market, the municipal and/or regional procurement offices, and the funding environment. A summary of North American bike share business models is included in Table 3.1.

Table 3.1: Bike Share Operating Models in North America

Name	Stations / Bikes	Operations	Ownership of Capital Infrastructure
Denver B-Cycle	50 / 500	Non-profit set up by city.	Denver Bike Sharing (non-profit)
Nice Ride Minnesota	116 / 1,200	Non-profit set up by city.	Nice Ride Minnesota (non-profit)
Des Moines B-Cycle	4 / 18	Already existing local non-profit (Des Moines Bicycle Collective).	Des Moines Bicycle Collective (non-profit)
San Antonio B-Cycle	14 / 140	Governed by non-profit set up by city – operated by bike rental company through tender.	San Antonio B-Cycle (non-profit)
Chicago B-Cycle	6 / 100	Completely private system, privately owned and operated, concession agreement only.	Bike N Roll (private company)
Miami Beach DecoBike	100 / 1,000	Completely private system, privately owned and operated, concession agreement only.	DecoBike (private company)
Capital Bikeshare	119 / 1,110	Operator direct contract with both Washington DC and Arlington County.	DDOT and Arlington County (government agencies)
Boston New Balance Hubway	61 / 610	Public – private partnership; operator direct contract with the City of Boston, other municipalities to contract directly with operator (RFP issued by regional planning agency).	City of Boston (government agency)

Name	Stations / Bikes	Operations	Ownership of Capital Infrastructure
Chattanooga Bike Share (2012 launch)	30 / 300	Public – private partnership; operator direct contract with local transit agency (which received federal funding).	Outdoor Chattanooga (government agency)
New York City Bike Share (2012 launch)	600 / 10,000	Completely private system; privately owned and operated.	Alta Bicycle Share (private company)
Montreal	405 / 5050	Owned and operated by Public Bike System Company (PBSC), a non-profit organization.	PBSC (non-profit)
Toronto Bixi	80 / 1,000	Program owned and operated by PBSC. City of Toronto provided a \$4.8 million loan guarantee.	PBSC (non-profit)
Capital Bixi (Ottawa / Gatineau)	10 / 100	NCC funding of \$785,000 for equipment and launch. Operated by PBSC.	National Capital Commission (government agency)
Ecobici, Mexico City	85 / 1,000	Private advertising-funded system.	Clear Channel Communications

Based on Table 3.1 and other examples globally, the core business models include:

- Operating non-profit (either pre-existing or established specifically) owns and operates the system.
- Administrative non-profit (either pre-existing or established specifically) owns and administers the system; operated by a private contractor.
- Privately owned and operated.
- Publicly owned; operated by a private contractor.
- Publicly owned and operated (no North American examples).
- Owned and operated as part of a street-furniture advertising contract.
- Transit agency owned and operated (no North American examples).

Several of these models were analyzed in more detail considering the stated goals of the King County bike share program. The analysis outlined below concluded that the most appropriate business model would be an Administrative Non-Profit with a Private Operating Contractor, a recommendation supported by the BSP.

Operating Non-Profit

Similar to Nice Ride Minnesota and Denver Bikesharing, a Non-Profit Organization (NPO) is formed whose mission is to create a bike sharing system. The NPO undertakes all aspects of creating the system, including funding it, establishing regional guidelines, procuring and establishing the equipment, procuring operations

facilities, and providing expertise for operations. Please see the comments below in the Administrative Non-Profit section regarding the makeup and role of the board of directors and the ability for regional cooperation.

In other cities where an operating NPO has been established, there has not been an operating contract between the jurisdiction(s) and the NPO to define required service levels, reporting and other operational metrics, giving less control to the jurisdictions. Because of this reduced accountability to service levels and reporting, as well as the absence of operational expertise in starting from scratch in terms of the operations, this scenario was not recommended.

Direct Contract with Operator

Similar to Capital Bikeshare (Washington D.C.) and Hubway (Boston), municipalities within the same region contract directly with the operator using the overarching umbrella of a regional planning organization to establish similar standards across jurisdictions. There is no official board of directors, although there is typically an ad hoc committee that forms consensus, and each jurisdiction acts as a separate client to the operator. Each jurisdiction can have a different source of funding and different revenue sharing arrangements with the operator. The jurisdiction(s) assume responsibility for initial and ongoing funding for the system.

Although this structure has proved successful in two multi-jurisdictional systems, it can introduce many unnecessary complexities, such as different pricing, different service levels and potentially conflicts of interest among the multiple clients. Therefore, this scenario was not recommended.

Privately Owned and Operated

Similar to Miami Beach DecoBike, Chicago B-Cycle, and the proposed system for New York City, municipalities contract with an operator for street space only using a concession agreement. The operator provides all funding for equipment and operations. Although this structure requires no public funding for capital or operations (a positive for the municipalities), it gives less control and transparency to the contracting jurisdictions, and there could be significant risk that such systems might fail due to the unknown long-term feasibility of completely privately funded and supported systems. Similar to the direct contract scenario, each jurisdiction would enter into a separate contract with the operator, which can lead to similar inconsistencies and conflicts of interest. Therefore, this scenario was not recommended.

RECOMMENDED: Administrative Non-Profit with Private Operating Contractor

In this scenario an NPO is formed whose mission is to create a bike sharing system for King County. The non-profit undertakes funding the system, establishing regional guidelines, procuring the equipment, and choosing an operator. Under this model the NPO hires a private contractor to implement and operate the system, acting as the client to the contractor. The non-profit could also undertake marketing functions for the system or outsource these services to a third party. Therefore, the NPO undertakes the “administrative” aspects of running the system, but not the operational aspects. This scenario was recommended because it minimizes risk, while maximizing control, transparency, and flexibility of funding.

The board of directors of the non-profit should have majority representation from private sector individuals but should also include representatives from participating municipalities, Metro, larger sponsors, and eventually, the operator. The non-profit should be supported politically by the participating municipalities, and be the body through which public or sponsorship funding flows. The NPO may contract with agencies and others to provide services to support bike share operations.

Ideally a collective procurement process could be established that allows individual agencies to provide the funds to the NPO who takes responsibility for sub-contracting procurement, implementation and operation avoiding the need for individual procurement processes. The funding strategy for the bike share program should be flexible and explore as many sources as possible. Corporate sponsorship, an important revenue stream for other North American bike share systems, will be maximized under a non-profit arrangement.

In summary, the recommendation to establish an Administrative Non-Profit with a Private Operating Contractor is based on:

- Alignment of this model with the stated goals of the bike share program.
- Flexibility of funding sources available to a non-profit, which includes grant funding, public funding, and sponsorship.
- Positive public image generated by a non-profit organization.
- Best potential for regional cooperation.
- Maintains city / agency control and input on site locations and operations.
- Provides operating expertise and transparency.
- Minimizes risk of system failure and public image and financial risk to agencies and sponsors.

4. System Costs

There are two primary costs associated with the bike share system – **start-up** (capital and launch) and **operating**. This section summarizes cost estimates for each of these components and presents a five- and ten-year cost forecast for the system.

Two important over-arching assumptions are that: firstly, vendor and operator costs are included in these estimates, but costs for the non-profit, the executive director, and other non-profit staffing are assumed to already be in place and funded. Secondly, it is assumed that an established and turn-key bike share technology will be chosen as the preferred equipment for the system, i.e., that there will be no research and development costs associated with creating a new technology (with the exception of developing helmet vending machines – see below).

4.1 Start-up Costs

Start-up (i.e. capital and launch) costs are placed into two categories – “general system start-up costs” and “phase start-up costs”.

4.1.1 General System Start-Up Costs

General system start-up costs are those required to set up the framework for the system. These are necessary costs no matter what size of system or number of phases and include hiring employees for management and administrative positions as well as a number of direct expenses such as procuring a storage warehouse, purchasing bike and station assembly tools, website development, communications and IT set-up, and pre-launch marketing. A list of items included in calculating general system start-up costs is included in Appendix A.

For the proposed system in King County, general system start-up costs are expected to be a onetime cost of approximately \$0.6 million.

4.1.2 Phase Start-Up Costs

Phase start-up costs are those required specifically to install each phase and include things such as equipment purchase, site planning and permitting, bike and station assembly, and station installation. In the case of King County, the Phase 3 start-up costs also include procuring an additional warehouse facility on the east side of Lake Washington. A list of items included in calculating phase start-up costs is included in Appendix A.

Expected start-up costs for the first three phases of the King County bike share program are as follows:

- Phase 1A: \$3.1 million.
- Phase 1B: \$3.8 million.
- Phase 2: \$3.1 million.
- Phase 3: \$3.8 million.
- Total: \$13.8 million.

Phase start-up costs include the cost of providing helmets throughout the system and additional gearing on the bikes to assist riders on steep hills. These are described in more detail below.

Helmet Costs

A number of options were considered for addressing the needs of King County's all ages helmet requirement (see Section 8.1). The recommended strategy supported by the BSP is to provide helmet vending machines, integrated into the station furniture, throughout the system. Table 4.1 presents a cost estimate for providing this service based on a prototype design developed for Alta Bicycle Share.

Table 4.1: Cost Estimate for Providing Helmet Vending Machines

Item	Rate	Unit Cost	Units	Cost
Capital Costs				
Vending Machine	Per station	\$8,000 - \$10,000	220 stations	\$2,200,000
Operating Costs				
Helmet Cost ¹	Per station per year	\$450	220 stations	\$100,000 / year
Operations ²	Per helmet per year	\$5	13,200 helmets	\$65,000 / year

Notes:

¹ Helmet cost assumes 20 helmets x 3 times overstock = 60 helmets per station at a cost of \$7.50 per helmet.

² Operating costs include: stocking helmets (\$1.50 / helmet / year), collecting helmets (\$1.50 / helmet / year), and checking/cleaning/collecting damaged helmets (\$2.00 / helmet / year). It also includes overhead such as extra rent, staff, administration, and materials.

Topography

King County's topography presents a challenge to both using and operating bike share. Generally, more people will ride downhill than uphill, resulting in a net gain of bicycles at downhill stations. There are several solutions to this issue including good system design and effective rebalancing. Other potential strategies are described in Section 8.2. The recommended strategy supported by the BSP is to provide additional gearing on the bike share fleet (i.e. increase the gearing range from the standard three gears up to seven gears). The additional cost of this change equates to approximately \$50 per bike or by phase:

- Phase 1A: \$25,000 (assuming 500 bikes).
- Phase 1B: \$30,000 (assuming 600 bikes).
- Phase 2: \$25,000 (assuming 500 bikes).
- Phase 3: \$30,000 (assuming 600 bikes).
- Total: \$110,000 (assuming 2,200 bicycles).

4.2 Operating Costs

Operating costs include those required for operating and maintaining the system and include hiring employees for operational tasks such as maintaining the stations, bikes, and other infrastructure, rebalancing the system, providing customer service, etc. There are also a number of direct expenses associated with maintaining an operations facility, purchasing tools and spare parts, upkeep of software, communications, and

IT, and general administrative costs such as insurance. A vendor management fee / profit is also included in this estimate. A list of items included in calculating operating costs is included in **Appendix A**.

For the proposed system in King County, operating costs are expected to be approximately:

- Phase 1A: \$1.4 million / year.
- Phase 1B: \$1.1 million / year.
- Phase 2: \$1.0 million / year.
- Phase 3: \$1.1 million / year.

4.3 Cost Summary

Capital and operating costs are summarized in **Table 4.2** and show that:

- Initial system launch (Phase 1A) would cost approximately **\$3.7 million** to set up and launch and approximately **\$1.4 million / year** to operate.
- Full system build out (i.e. Phases 1 - 3) would cost a total of \$14.4 million to set up and launch and approximately \$4.6 million per year to operate.

Table 4.2: King County Bike Share System Cost Summary

	Capital / Start-Up Cost	Annual Operating Costs
General	\$0.6 million	
Phase 1A	\$3.1 million	\$1.4 million / year
Phase 1B	\$3.8 million	\$1.1 million / year
Phase 2	\$3.1 million	\$1.0 million / year
Phase 3	\$3.8 million	\$1.1 million / year
Total Cost	\$14.4 million	\$4.6 million / year
<i>Cost / Station (including installation)</i>	\$65,500	\$20,100 / year

Note: these include costs to provide and operate helmet vending machines and to increase bike gearing from three to seven gears.

Five-year (and ten-year⁶) cost forecasts for the King County Bike Share system are presented in **Table 4.3**.

⁶ The ten-year analysis has been used only to show possible trends beyond the five-year horizon. Forecasting to this horizon is less precise and the results should be used cautiously.

Table 4.3: Ten-Year Cost Estimate for King County Bike Share

		Year										
		0	1	2	3	4	5	6	7	8	9	10
Start-Up ¹	General System Start-Up	\$600,000										
	Phase 1A	\$3,100,000										
	Phase 1B		\$3,800,000									
	Phase 2			\$3,100,000								
	Phase 3					\$3,800,000						
Operations ¹	Phase 1A		\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000
	Phase 1B			\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000
	Phase 2				\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
	Phase 3						\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000	\$1,100,000
Total		\$3,700,000	\$5,200,000	\$5,600,000	\$3,500,000	\$7,300,000	\$4,600,000	\$4,600,000	\$4,600,000	\$4,600,000	\$4,600,000	\$4,600,000

¹ These include costs to provide and operate helmet vending machines and to increase bike gearing from three to seven gears.

5. User Revenue Projections

One of the goals of the BSP is to “fund the system using a diverse range of revenue sources”. Potential revenues include user-generated trip and membership fees – the focus of this chapter – as well as public funding, grants, sponsorships, and other sources that are addressed in the next chapter.

Forecasting user-generated revenues for the King County Bike Share system required: (a) establishing a rate schedule, (b) estimating the expected number of trips that would be made by members and casual users, and (c) determining how many members and casual users can be expected to sign up for the program.

5.1 Rate Schedule

Users pay two types of fees to use the system:

- Access fees: paid up-front to register to use the system. These are offered for a variety of time periods ranging from a 24-hour subscription to annual membership.
- Usage fees: charged to the user based on how long they use the system. Most systems offer a “free ride” period, typically between 30 and 60 minutes where the user pays no additional costs if the bike is returned within that time period. Fees are charged to users who exceed the free ride period.

The logic of the rate system is to: (1) make annual membership attractive to the general public, (2) make the rates comparable to other bike share system rates, accounting for cost of living differences, (3) encourage use to the extent it does not compete with existing bike rental vendors, (4) provide reasonable and comparable prices to other public transportation modes, and (5) discourage trips longer than the free ride period (typically 30 to 60 minutes). Following are the types of memberships that have been implemented in other bike share systems:

- Annual (365 days).
- Monthly (30 days).
- Weekly (7 days).
- 5-day.
- 3-day.
- 24 hour.

In many systems, monthly and annual memberships are purchased online via a credit card. The operator mails an RFID-based card or key to the member at the address given on the website. All other memberships are purchased at the kiosk.

Table 5.1 shows a summary of membership options and pricing in North American bike share systems (please note that tax is treated differently for different systems – some of the prices below are plus tax, some are tax-inclusive).

All of the systems listed have pricing structures that encourage short trips, with no extra fees if bikes are returned within the free ride period, typically between 30 and 60 minutes depending on the system and increasing fees for subsequent 30 or 60 minute periods.

Table 5.2 summarizes usage fees for North American systems.

Table 5.1: Membership Options and Access Fees for North American Bike Share Systems

System	Number of Bikes / Stations	Annual	Monthly (30-day)	Weekly (7-day)	5-Day	3-Day	24-hour
Capital Bikeshare	1,110 / 119	\$75	\$25	-	\$15	-	\$5
Nice Ride Minnesota	1,200 / 116	\$60 ¹	\$30	-	-	-	\$5
Denver Bikesharing	500 / 50	\$65	\$30	\$20	-	-	\$6
Miami DecoBike	1,000 / 100	-	\$15-\$25 ²	-	-	-	\$24 ³
Boston Hubway	610 / 61	\$85	-	-	-	\$12	\$5
Boulder	200 / 25	\$50	-	\$15	-	-	\$5
Madison	350 / 35	\$65 ¹	-	\$30	-	-	\$10
Des Moines	18 / 4	\$50 ¹	\$30 ¹	-	-	-	\$5
San Antonio	140 / 14	\$60 ¹	-	\$24	-	-	\$10
Montreal Bixi ⁴	5,050 / 405	\$78	\$28	-	-	\$12	\$5
Toronto Bixi ⁴	1,000 / 80	\$95	\$40	-	-	\$12	\$5

Notes:

¹ System offers reduced student rates.² Available only to residents with a minimum 3 month commitment. The \$15 membership allows rides up to 30 minutes without additional fees, the \$25 membership allows rides up to 60 minutes without additional fees.³ Current fee structure costs \$4 for a 30-minute rental, \$5 for an hour long rental, up to \$24 for an 8-hour rental.⁴ Prices in Canadian dollars.

Table 5.2: Usage Fees for North American Bike Share Systems

System	Usage Fees (cumulative)						
	0-30 min	30-60 min	60-90 min	90-120 min	Each 30 minutes thereafter	Each 1 hour thereafter	Max 24-hour charge
Capital Bikeshare	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	\$70.50
Nice Ride Minnesota	\$0	\$1.50	\$4.50	\$10.50	\$6.00	-	-
Denver Bikesharing	\$0	\$1.00	\$5.00	\$9.00	\$4.00	-	-
Miami DecoBike	\$0	\$4.00	\$8.00	\$12.00	\$4.00	-	-
Boston Hubway	\$0	\$2.00 ¹	\$6.00 ¹	\$14.00 ¹	\$8.00 ¹	-	\$100
Boulder	\$0	\$0	\$4.00	\$4.00	-	\$4.00	-

System	Usage Fees (cumulative)						
	0-30 min	30-60 min	60-90 min	90-120 min	Each 30 minutes thereafter	Each 1 hour thereafter	Max 24-hour charge
Madison	\$0	\$2.00	\$7.00	\$12.00	\$5.00	-	\$75
Des Moines	\$0	\$0	\$1.25	\$2.50	\$1.25	-	-
San Antonio	\$0	\$2.00	\$4.00	-	-	\$4.00	\$35
Montreal Bixi ^{2,3}	\$0	\$1.50	\$4.50	-	-	\$12.00	-
Toronto Bixi ³	\$0	\$1.50	\$4.50	-	-	\$16.00	-

Notes:

¹ Usage fees shown for Boston are for casual users. Annual members receive 25% off these usage fees.

² Bixi Montreal offers different fee structure for annual and monthly members.

³ Prices in Canadian dollars.

The length of the free-ride period varies between systems. For most systems, the free-ride period is 30 minutes, but some systems have increased this to 45 minutes (in Montreal - for annual members only) or 60 minutes (in Boulder). The decision to lengthen the free-ride period beyond 30 minutes needs to consider:

- The impact to and encroachment on the bike rental market. The original intent of bike sharing is to provide a short trip mobility option not in competition with bike rental shops that accommodate users for longer trips.
- Reduction in user fees, particularly from casual users. Providing a 45-minute or 60-minute free-ride period lengthens the window for a user to return the bike. Currently, 16% of casual subscribers' trips in Minneapolis and 19% of casual subscribers' trips in Washington D.C. are between 30 and 60 minutes and subject to user fees (\$1.50 per trip). Although this distribution may change with a new time-limit structure, this represents lost revenue. It is feasible to have a longer free-ride period for annual members only, which would result in minimal revenue loss, while retaining the 30 minute period for casual users.
- Increasing to 45- or 60-minutes is convenient for tourists and visitors. Accommodating this market may attract added interest from the tourist industry to become potential sponsors, which may subsidize reduced revenue from user fees.

The proposed rate schedule for King County is shown in **Table 5.3** and has been developed from the rate structures and cost of living in other cities. The cost of living is generally cheaper in Seattle than on the east coast of the United States or in Canadian cities, but more expensive than in many other parts of the US. As a result, an access fee structure of \$75 annual membership, \$30 monthly, and \$5 for a 24-hour pass is recommended for King County.

The recent launch of Boston Hubway had particular success with signing annual members at an introductory rate (\$60 per year compared to \$85 per year). Hubway has also introduced a 3-day membership to capture the weekend market. These initiatives should be considered for the King County Bike Share system.

Table 5.3: Cost of Living and Usage Fee Comparison

City	Cost of Living Comparison ¹	Price Structure		
		Annual	Monthly	24-hour
Seattle (Proposed)	1.00	\$75	\$30	\$5
Minneapolis	0.91	\$60	\$30	\$5
Denver Bikes sharing	0.85	\$65	\$30	\$6
Washington D.C.	1.15	\$75	\$25	\$5
Miami Beach	0.87	-	\$15	\$14
Boston	1.09	\$85	-	\$5
Madison	0.83	\$65	-	\$10
Des Moines	0.75	\$50	\$30	\$5
San Antonio	0.76	\$60	-	\$10
Montreal ²	1.03	\$78	\$28	\$5
Toronto ²	1.23	\$95	\$40	\$5

Notes:

¹ Cost of living comparisons sourced from CNN Money: <http://cgi.money.cnn.com/tools/costofliving/costofliving.html>

² Prices in Canadian dollars.

5.2 User-Generated Revenue Estimates

The bike share system in King County will rely in part on user-generated revenues to offset the capital and operating costs associated with the system. Operating revenues are calculated by applying the adopted rate structure (see Section 5.1) to estimates of usage by membership type.

Usage forecasts were based on Alta's Bike Share Demand Model, an empirical model developed using data from bike share systems in Washington D.C. and Montreal (a detailed description of the Alta Bike Share Model is included in **Appendix B**). The results of the model were adjusted to account for specific factors that will affect operations in King County such as year-round operation, the helmet requirement, and other local conditions.

This section provides a step-by-step explanation of how the Bike Share Demand Model results have been applied to develop 5-year and 10-year usage and revenue projections for the business pro forma⁷. For the purposes of the business plan the following implementation schedule was assumed:

- Phase 1A: implemented at the beginning of Year 1 (funds raised during Year 0).
- Phase 1B: implemented at the beginning of Year 2 (funds raised during Year 1).
- Phase 2: implemented at the beginning of Year 3 (funding raised during Year 2).
- Phase 3: implemented at the beginning of Year 5 (funding raised during Year 4).
- Phase 4 and beyond: subject to separate business plan as required.

5.2.1 Bike Share Demand Model Description and Results

The Bike Share Demand Model was developed using data from bike share systems in Washington D.C., and Montreal, Quebec (see Appendix B for a detailed description of the Bike Share Demand Model). The empirical relationship between bike share demand and land use and system variables was applied to the proposed service area in King County to develop an estimate of expected demand.

Monthly and annual demand was then extrapolated from the results of the model based on: (1) Washington D.C. (Capital Bikeshare), Montreal (Bixi), and Minneapolis (Nice Ride) usage statistics, and (2) bicycle usage patterns observed on bicycle facilities in the Pacific Northwest, including automatic and seasonal counts in Portland, Seattle, and Vancouver, BC. The resultant monthly demand (that includes consideration of the helmet law) is shown in Table 5.4.

It is important to note that Washington D.C.'s Capital Bikeshare is just one year old, while the Montreal system is less than three years old. Usage figures from Montreal show consistent growth every year of operation, as have other systems around the world. In other words, forecasts generated by the Bike Share Demand Model represent relatively young systems and the expected low end of usage rates. As a result, a profile of how demand is expected to "ramp up" over a three-year period to system maturity was applied to these results.

Trips were then broken into those taken by casual users and those taken by annual members based on splits observed in Minneapolis and Washington D.C. Observed rates of trips / member were applied to each category to estimate the number of annual members and the number of casual subscribers (e.g. casual users make an average of four trips per 24-hour subscription in Washington D.C.).

Membership and casual usage rates are a function of many factors, including local demographics and employment patterns, density, rate structure, marketing, and helmet requirements. The "baseline" forecast assumes that casual trip making will be approximately 30% lower in King County than it is in Montreal or Washington D.C. due to the helmet requirement.

Section 8.1 provides more detailed discussion on the impact of the helmet law; however it is expected that there will be a much smaller impact on annual membership rates as these patrons are expected to still sign up for the system even if they use it less than expected.

⁷ Note: revenue projections do not include estimates of revenue derived from recovery of deposits from stolen or vandalized bicycles.

Table 5.4: Expected Monthly Bike Share Demand at Full System Maturity

Month	Monthly Demand (Trips)				
	Phase 1A	Phase 1B	Phase 2	Phase 3	Total
January	27,000	32,000	19,000	12,000	90,000
February	43,000	51,000	30,000	19,000	143,000
March	40,000	48,000	28,000	18,000	134,000
April	46,000	55,000	33,000	20,000	154,000
May	62,000	74,000	44,000	27,000	207,000
June	69,000	83,000	50,000	30,000	232,000
July	99,000	120,000	72,000	44,000	335,000
August	86,000	103,000	61,000	38,000	288,000
September	62,000	74,000	44,000	27,000	207,000
October	53,000	64,000	38,000	23,000	178,000
November	29,000	35,000	21,000	13,000	98,000
December	25,000	30,000	18,000	11,000	84,000
Annual Total	641,000	769,000	458,000	282,000	2,150,000

The five-year (and ten-year⁸) trip and membership forecast is presented in Table 5.5. Assumptions used to develop membership and usage forecasts are included in Appendix C.

Table 5.5 shows an annual forecast demand of approximately 450,000 trips in Year 1 ramping up to approximately 2.2 million trips in Year 5 (at which time all three phases are assumed to be in place). The number of trips taken per bike per day is expected to start out at approximately 2.4 trips / bike / day in Year 1 and increase to 2.7 trips / bike / day in Year 5.

⁸ The ten-year analysis has been used only to show possible trends beyond the five-year horizon. Forecasting to this horizon is less precise and the results should be used cautiously.

Table 5.5: Ten-Year Usage Forecast for King County Bike Share

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Annual Trips										
Phase 1A	446,000	548,000	641,000	641,000	641,000	641,000	641,000	641,000	641,000	641,000
Phase 1B		540,000	653,000	769,000	769,000	769,000	769,000	769,000	769,000	769,000
Phase 2			322,000	393,000	458,000	458,000	458,000	458,000	458,000	458,000
Phase 3					198,000	241,000	282,000	282,000	282,000	282,000
Total	446,000	1,088,000	1,616,000	1,803,000	2,066,000	2,109,000	2,150,000	2,150,000	2,150,000	2,150,000
Trips / Bike / Day	2.4	2.7	2.8	3.1	2.6	2.6	2.7	2.7	2.7	2.7
Annual Members										
Number	4,000	9,500	14,000	16,000	18,000	18,500	19,000	19,000	19,000	19,000
Trips	364,000	882,000	1,313,000	1,466,000	1,680,000	1,716,000	1,749,000	1,749,000	1,749,000	1,749,000
Casual Users										
Number	20,500	51,500	76,000	84,000	96,500	98,000	100,000	100,000	100,000	100,000
Trips	82,000	206,000	303,000	337,000	386,000	393,000	401,000	401,000	401,000	401,000
Revenues										
Member Subscription	\$300,000	\$720,000	\$1,070,000	\$1,190,000	\$1,360,000	\$1,380,000	\$1,410,000	\$1,410,000	\$1,410,000	\$1,410,000
Member Usage Fees	\$60,000	\$160,000	\$230,000	\$260,000	\$300,000	\$310,000	\$310,000	\$310,000	\$310,000	\$310,000
Casual Subscription	\$100,000	\$260,000	\$380,000	\$420,000	\$480,000	\$490,000	\$500,000	\$500,000	\$500,000	\$500,000
Casual Usage Fees	\$400,000	\$1,010,000	\$1,480,000	\$1,640,000	\$1,880,000	\$1,920,000	\$1,960,000	\$1,960,000	\$1,960,000	\$1,960,000
Total User Revenue	\$860,000	\$2,150,000	\$3,160,000	\$3,510,000	\$4,020,000	\$4,100,000	\$4,180,000	\$4,180,000	\$4,180,000	\$4,180,000

5.2.2 Forecast Validation

Forecasts for King County were compared to usage and membership statistics for existing systems in Washington D.C., Minneapolis, Montreal, Denver, and Paris for the following metrics:

- Trips / bike / day: the Year 1 forecast for King County of 2.4 trips / bike / day is within the range of other systems. It is slightly less than first year statistics for Washington D.C. (2.5 trips / bike / day) and somewhat lower than Montreal (3.2 trips / bike / day) and Paris (3.7 trips / bike / day⁹). Table 5.6 includes a comparison with other bike share systems.
- Members per bike ratio: the King County system is expected to have a members per bike ratio of 8.1, which is within the range of other bike share systems (see Table 5.7).
- Trips per member ratio: the King County bike share system is expected to operate at approximately 110 trips per member, which is higher than first-year levels in Washington D.C. and Minneapolis, and in the same order of magnitude as Montreal (see Table 5.7).

Table 5.6: Trip Comparison for First Year of Operation

	Operating Days	Trips	Bikes	Trips / Bike / Day
King County	365	446,000	500	2.4
Capital Bikeshare	375 ¹	1,045,000	1,100	2.5
Minneapolis	150 ²	101,000	600	1.1
Montreal	212 ^{2,3}	3,400,000	5,000	3.2
Denver	224 ²	103,000	500	0.9
Boston	117	138,000	610	1.9
Toronto	169	336,000	1,000	2.0
Paris	365 ⁴	27,500,000	20,600	3.7

Notes:

¹ Based on the first 375 days of operation of Capital Bikeshare.

² The number of operating days during the 2010 season.

³ Represents 2010 data from the third season of operation.

⁴ Represents 2008 data from the first season of the Velib system.

⁹ Based on Velib data from the first season of operation (July 2007 to July 2008) that recorded 27.5 million trips with 20,600 bikes.

Table 5.7: Membership Comparison in First Year of Operation

	Bikes	Members	Members / Bike	Total Annual Trips ¹	Total Trips / Member ¹
King County	500	4,000	8.0	446,000	112
Capital Bikeshare	1,100	18,900	17.2	1,045,000	55
Minneapolis	600	1,295	2.2	101,000	78
Montreal	5,000 ²	32,370	6.5	3,400,000	105
Denver	500	1,785	3.6	103,000	58
Boston	610	3,620	5.9	138,000	38.1
Toronto	1,000	3,750	3.8	336,000	90
Paris	20,600 ³	200,000	9.7	27,500,000	138

Notes:

¹ This includes trips made by both annual members and casual subscribers.² Represents 2010 data from the third season of operation.³ Represents 2008 data from the first season of the Velib system.

The comparison of predicted statistics for King County to operating bike share systems confirms that the usage and revenue estimates are realistic.

6. Other Revenues

This chapter investigates other potential revenue sources including grants, public funding, advertising, sponsorship, and other revenues that could be used to bridge any financial gap between system costs and user-generated revenues.

6.1 Grants and Public Funding

Most U.S. systems launched in 2010 and 2011 used a combination of public and private funding (see Table 6.1). However, these systems have used limited *local* public funding (versus federal or state public funding) beyond in-kind services such as staff time, right-of-way use, lost on-street parking revenues, etc. Some sources (organizations) of capital funds for systems that have utilized public funding include:

- Federal Highway Administration (FHWA) including the Congestion Mitigation and Air Quality Improvement Program (CMAQ).
- Centers for Disease Control and Prevention (CDC).
- Federal Transit Administration (FTA).
- Department of Energy (DOE).
- State grants.
- County transit oriented development funding tied to project areas around high frequency bus lines (e.g. Nice Ride Minnesota).
- Transportation enhancements associated with transit oriented development around new and existing rail and bus routes.

Table 6.1: North American Bike Share Systems Using Public Capital Funding Sources

System	Launch Date	Total Capital Funding	Amount Public (% and sources)	Amount Private (% and sources)
Denver Bike Sharing	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)
Nice Ride Minnesota Phase 1	June 2010	\$3.0 million	\$1.75 million (58%, Bike Walk Twin Cities / FHWA) \$250,000 (8%, City Convention Center Fund)	\$1 million (33 %, Blue Cross Blue Shield tobacco settlement funds)

System	Launch Date	Total Capital Funding	Amount Public (% and sources)	Amount Private (% and sources)
Nice Ride Minnesota Phase 2	2011	\$2.3 million	\$1.0 million (43%, Bike Walk Twin Cities / FHWA). \$200,000 (9%, ARRA US Department of Health and Human Services). \$150,000 (6%, University of Minnesota).	\$700,000 (30%, Blue Cross Blue Shield). \$250,000 (11%, Central Corridor Light Rail Funders Collaborative). \$30,000 (1%, Macalester College).
Capital Bikeshare – Washington D.C. – Phase 1	September 2010	\$5 million	\$5 million (83% CMAQ, 17% District funding)	\$0
Capital Bikeshare – Arlington – Phase 1	September 2010	\$500,000	\$200,000 (40%, state grants)	\$300,000 (60%, local BID sponsorship)
Capital Bikeshare – Washington D.C. – Phase 2	2011	\$1 million	\$1 million (74%, CMAQ).	\$350,000 (26%, revenues from system).
Capital Bikeshare – Arlington – Phase 2	2011	\$1.5 million	Undisclosed.	Undisclosed.
San Antonio	2011	\$840,000	\$840,000 (100%, U.S. Dept 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 Prevention to Work, CMAQ, FTA Bus Facilities Liveability Initiative Program, State grants).	\$1 million (25%, multiple local sponsors and a naming sponsor).
Chattanooga	2011	\$2 million	\$2 million (100%, CMAQ)	\$0 (future sponsorship may be sought)
Montreal	2008	\$33 million	\$33 million (City funds) to develop and market technology and plan the initial system.	Subsequent stages funded by sponsorship, advertising, and user fees.

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

Public funding could potentially come from local “steady stream” sources such as parking revenues, bus bike rack advertising, special taxes, distribution of license plate fees, etc. Promotion and marketing of the system could also be funded and/or coordinated through established public agency departments as part of their financial contribution to the system.

6.2 Private Foundations

Private funding sources such as foundation grants or in-kind support offered by private organizations could also form part of a diversified financial strategy. These sources are unlikely to be a major revenue source for bike sharing for several reasons. Firstly, bike sharing seems to “fall through the cracks” between environmental and health foundation missions, and there are relatively few private foundations that explicitly fund non-motorized transportation; secondly, most foundation grants do not permit capital expenditures; and lastly, the scale of private foundation grants is small compared to the overall cost of launching a bike sharing system. A detailed review of potential private funding sources is included in Appendix D.

6.3 Advertising and Sponsorship Revenues

Advertising and sponsorship are common means of supplementing revenue for bike sharing systems. North American cities to date have generally steered away from systems supported by street furniture advertising contracts that are popular in Europe. This is mainly due to existing advertising contracts and the transparency of operations. However there may be opportunities to sell lower level advertising (i.e. smaller or less intrusive advertisements) or, like in other systems, to offer sponsorship opportunities on the bikes or stations. These opportunities are described below along with a calculation of potential sponsorship revenues in King County.

6.3.1 Advertising

Advertising includes a contract with a company to provide a regularly changing graphic and message, typically on the map frame or on other street furniture independent of the bike share system (see Figure 6.1). The advertiser and the display may not be associated with bike sharing or bicycling in general. The ability to provide street furniture advertising would need to be negotiated with the local agency and to date is not a realistic possibility in Seattle or on the University of Washington campus.

Many European systems are funded through sale of street furniture advertising contracts in return for capital, launch, and operation of the system. However, the street furniture advertising model has not been applied in the United States in part due to the premium on advertising space, more restrictive advertising regulations, and the transparency of operations. This means of funding the bike share system is not recommended for King County.



Figure 6.1: Street Furniture Advertisement in Vienna, Austria.

6.3.2 Sponsorship

Sponsorship is different from advertising in that it typically involves a long-term relationship between the sponsor and the vendor, where stickers are put on the infrastructure (bikes, stations, and/or website) with a logo and/or statement that “Company X supports King County Bike Share”. Sponsorship can come in a variety of forms, shown in Figure 6.2, including:

- Title sponsorship: where a company pays for full and exclusive sponsorship rights to the system and its components, i.e. stations, bikes, etc. Sponsor’s name is included in referring to the system, e.g., London Barclay’s Cycle Hire.
- Presenting sponsor: receives recognition in mention of the system, e.g. “Denver Bikeshare presented by Kaiser Permanente”. In most cases (e.g. Toronto, Boston, Denver), presenting sponsorship includes branding some of the station and bikes, however presenting sponsors do not have exclusive rights to the system and share sponsorship with other organizations. A detailed valuation of presenting sponsorship would need to be conducted and negotiated with any potential sponsor(s).
- Station and bike fleet sponsorship: generally presentation of the sponsor’s logo and/or a simple message, e.g., “this station is sponsored by company X” placed on the map frame, kiosk, and / or the docking points at a station or logos placed on the bicycle frames, baskets, or fenders. The value of station and bike sponsorship depends on the market and uptake is variable.
- Other: webpage, back of receipt, membership keys, helmets, mobile applications, etc.

The most likely sponsorship scenario for King County will be to secure a presenting sponsor (or sponsors) and several smaller station sponsors. Similar models in North American bike share systems include:

- Toronto: existing sponsors were brought along by the operator (Public Bike Share Company, who own and operate the Montreal Bixi system). This minimizes the effort of having to find new sponsors and pay marketing commission. These presenting sponsors were signed for approximately \$600,000 per year (\$800 per bike per year) and as part of the deal are provided logo placement on the map frames, bike fenders, and docking stations on 75% of the equipment (the remaining 25% is available to other sponsors although not yet sold).
- Boston: the presenting sponsor (New Balance) was signed for approximately \$600,000 for three years (\$333/bike/year) and is provided its logo on all the station map frames and bike fenders in the system but shares this space with station sponsors who pay an annual fee for logo placement on the station map frame and a certain number of bikes. At the time of system launch (July 2011), approximately 60% of station sponsorships had been sold for \$50,000 each for three years (\$16,667 per year). Advertising is also sold on one side of the map panel to supplement sponsorship revenue.
- Denver: a three-year presenting sponsorship was secured with Kaiser Permanente Colorado for \$450,000 (\$300 / bike / year). Station sponsorship is also available with sponsors paying \$30,000 for one year or \$20,000 per year for 3 years for a website listing, logo placement at a station kiosk, and logo placement on 10 bikes (current uptake uncertain).
- Minneapolis: Blue Cross Blue Shield of Minnesota contributed \$2.5 million as the presenting sponsor of Phases 1 and 2 of Nice Ride. The presenting sponsor takes all the bike advertising space as part of

its contract. As a result, station sponsorship is valued somewhat lower than in Denver at \$10,000 per station per year.¹⁰ Anecdotally, approximately 35% of stations were under sponsorship in July 2011.

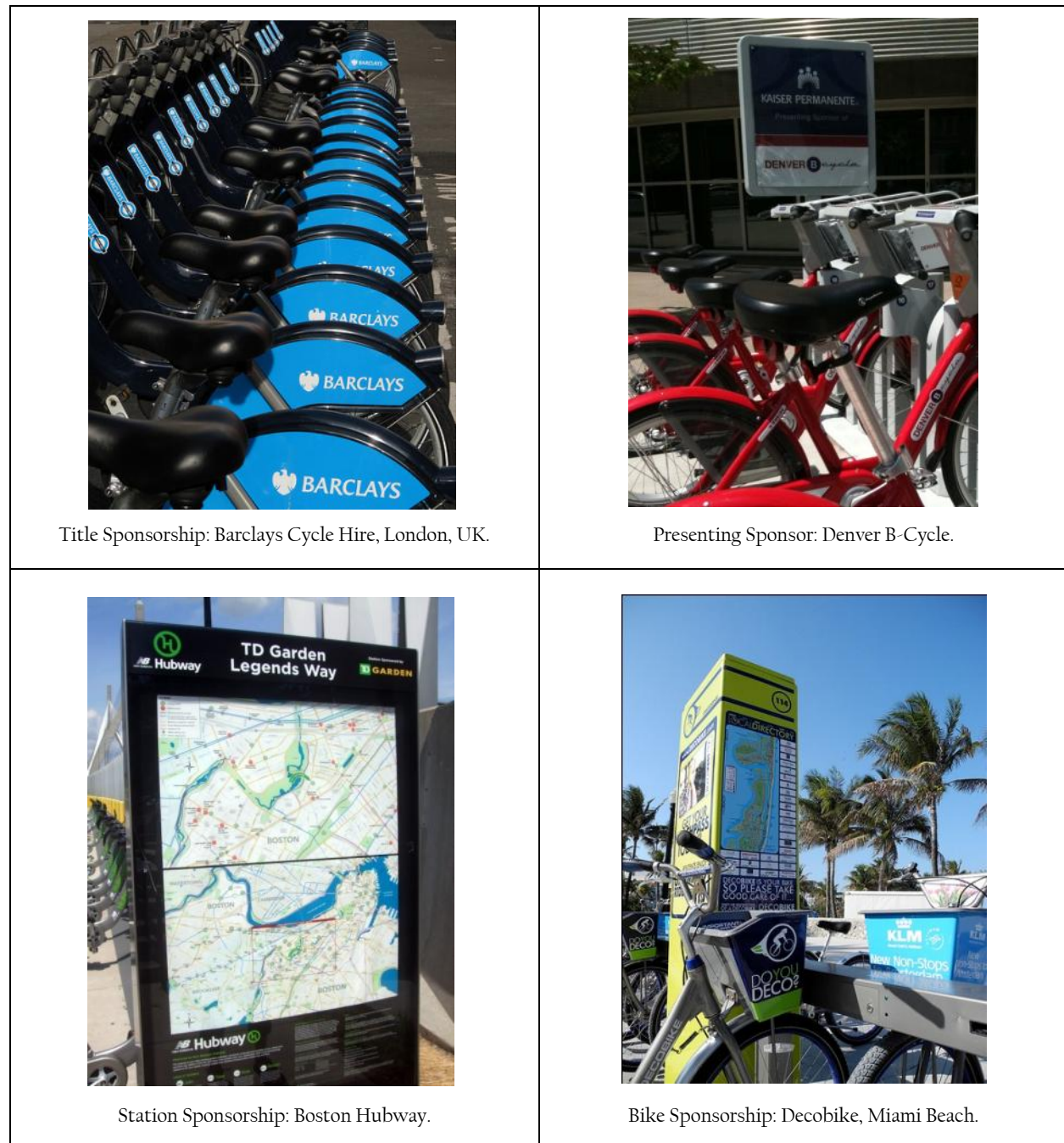


Figure 6.2: Bike Share Sponsorship Examples.

¹⁰ It is understood that Nice Ride is considering changing their stations sponsorship model to offer tiered station sponsorship pricing, valued according to the level of exposure. This is an effort to increase the uptake of sponsorship (goal of 100%) with an expectation to raise an average of approximately \$5,000 per station.

The value of sponsorship varies depending on the market and should be studied independently. Experience so far indicates that the market value of sponsorship increases once the system is launched and potential sponsors can see what they are buying. Potential sponsors may be interested for the following reasons:

- As advertising exposure for their business.
- As a means of being a good ‘corporate citizen’ and providing a community amenity.
- As a means of satisfying commute trip reduction and travel demand management goals.

If King County adopted a combined presenting / station sponsorship model where presenting sponsorship was sold for \$500 - \$750 per bike per year (five year deal) to generate initial capital, sponsorship revenues would total **\$1.25 to \$1.90 million** upfront for Phase 1A (from presenting sponsorship). The positive media exposure that will be generated by the launch of a bike share system in a pro-cycling community such as King County may add a premium to initial sponsorship. In fact, preliminary discussions with the corporate community suggested that an initial figure of **\$1.0 to \$2.0 million** might be achievable for the launch of the system (Phase 1A).

Operating revenues will be supplemented with station sponsorships. For the purposes of this analysis, station sponsorship was valued at \$15,000 per year and the uptake assumed to ramp up from 40% of stations sponsored in the first year increasing to 80% of stations sponsored in the fifth year. Under these assumptions, station sponsorship could generate approximately **\$0.3 million** in the first year and **\$0.6 million** in the fifth year.

An annual breakdown of these potential revenues is included in Table 6.2. Note that these revenue estimates are conservative in that they do not include potential revenues from other sponsorship opportunities such as on the website, mobile applications, and importantly – on helmets, which could generate particular attention from local health care providers and could be separated from other sponsorship opportunities.

Table 6.2: Potential Revenues from Presenting Sponsor Plus Station / Bike Sponsorship Scenario

Year	Presenting Sponsorship Revenue	Station Sponsorship Revenue	Total Revenue
0	\$1,250,000	\$300,000	\$1,550,000
1	\$1,500,000	\$735,000	\$2,235,000
2	\$1,250,000	\$1,200,000	\$2,450,000
3	-	\$1,440,000	\$1,440,000
4	\$1,500,000	\$2,040,000	\$3,540,000
5	\$1,250,000	\$2,295,000	\$3,545,000
6	\$1,500,000	\$2,460,000	\$3,960,000
7	\$1,250,000	\$2,550,000	\$3,800,000
8	-	\$2,640,000	\$2,640,000

Year	Presenting Sponsorship Revenue	Station Sponsorship Revenue	Total Revenue
9	\$1,500,000	\$2,640,000	\$4,140,000
10	\$1,250,000	\$2,640,000	\$3,890,000
Total	\$12,250,000	\$20,940,000	\$33,190,000

Table 6.2 notes:

Assumes that presenting sponsorship agreements are secured: (a) in Year 0 for a five-year sponsorship of Phase 1A, (b) in Year 1 for a five-year sponsorship of Phase 1B, (c) in Year 2 for a five-year sponsorship of Phase 2, (d) in Year 4 for a five-year sponsorship of Phase 3, and that these sponsorships are renewed for the same value and same length of time once they have expired.

Assumes that stations are valued at \$15,000 per station per year and the uptake rate ramps up from 40% of all stations sponsored in the first year to 80% of stations sponsored in the fifth year and beyond.

Assumes all sponsorship moneys are received in the year prior to sponsorship, e.g. money received in Year 0 for sponsorship starting in Year 1.

6.3.3 Potential for Corporate Sponsorship

A corporate focus group meeting was held on Friday July 8, 2011 to gauge the level of support for bike sharing and to gauge the corporate capacity of the Seattle area. Over 20 people attended the meeting representing a variety of corporate interests including health care, insurance, finance, technology, and property development. Subsequent meetings were held with REI and the Visitor's Bureau.

There was general support amongst these groups for bike sharing, in particular they recognized the potential benefits to the community, employees, and visitors. Most participants highlighted the ways bike sharing could improve employee quality of life and mobility options, while satisfying Commute Trip Reduction goals. Many organizations have well-established healthy and active living initiatives in place, and bike sharing was overwhelmingly supported as a way to enhance their existing programs. Possibly the most frequently mentioned benefit identified by participants was integrating the bike share system with transit and providing a "last mile" connection to employment sites.

The corporate community generally showed an interest in getting involved financially, but were adamant that this had to be in partnership with the public sector providing support, resources, and funding to the program. Corporate interest in providing financial support ranged from potential title sponsorship to station sponsorship, including some informal discussion that hinted at a potential healthcare partnership that would collaboratively fund part of the system. Others were interested in providing marketing, promotional, and educational support.

The enthusiasm shown by the corporate community lends itself to a system with multiple sponsors. However, it was recognized that this should not be a "free-for-all" and that potential presenting sponsor(s) should be an organization(s) that other sponsors would want to be aligned with and that is well respected in the business community. Other questions voiced by participants included how a bike share system would:

- Spur bikeway network development concurrent with bike share deployment?
- Provide opportunities and education on the importance of helmet use?
- Appropriately recognize title and station sponsors?
- Ensure long-term, multi-year sponsorship is rewarded with incentives? and
- Serve disadvantaged communities equitably?

6.3.4 Sign Code Issues and Advertising Restrictions

All of the agencies included in the first three bike share phases have guidelines for the application of signage and advertising that could impact the provision of sponsorship opportunities on the bikes, stations, and other infrastructure. A detailed review of the City of Seattle's sign code is included below – however, it is noted that a similar environment exists in Kirkland and in Redmond. As well, the University of Washington has a design review process that is also sensitive to the use and visual impact of signage and advertising.

The City of Seattle's sign code (Chapter 23.55 of the Municipal Code) presents unique challenges for installing promotional and informative signs. The sign code's strength and intents are to:

- Curb the proliferation of signs, while carefully attracting attention.
- Encourage signs that enhance the visual environment.
- Promote business and residential property enhancements while balancing the harmony of the surrounding environment.
- Protect public interest and safety.
- Protect the right of business to advertise and identify its premises.
- Communicate information of community interest.

Although bike share public service and informational signs respect most of these objectives and are largely exempt from the long list of permitting obligations and restrictions, any sign that is intended to advertise or recognize a sponsor will have a variety of restrictions including location/sign placement, design parameters, and permitting. Most restrictions are designed to limit the number and size of off-premise advertisements, or billboards. The following is a summary of how the sign code may impact sponsorship and advertising opportunities and, in turn, reduce potential revenue.

Signage Type and Orientation

Restrictions on signs vary depending on whether they offer public information, promote a system or station sponsor, or advertise a product. Any sign that advertises a product will trigger a range of restrictions on where they may be located and how large it can be. Advertising on bicycles may not be subject to the same restrictions because they (much like bus advertising) are not fixed and the sign code does not address on-vehicle advertising. However, the City has yet to determine whether docked bicycles could be interpreted as a stationary advertising sign and therefore be subject to the applicable advertising restrictions. On the other hand, sponsor recognition on kiosks would be met with less stringent regulations.

In addition, the nature of sponsor-adorned bike share equipment, whether determined to be a sign within a public infrastructure facility, a business premise sign (a sign that promotes a business site), or off-site advertising (i.e. billboards), can impact the type and intensity of advertising and sponsor recognition. If advertising or sponsor recognition at bike share stations is determined to be off-premise advertising, signs may only be installed if an existing advertising sign is relocated to a new location. The use of street

advertising is not a typical feature of North American bike share systems, and the difficulty in negotiating relocation is a further complication.

Land Use Zone and Special District Regulations

Regulatory barriers also vary by land use zone, special districts, and even along designated transportation corridors such as highways and streets that are intended to maintain visual access to scenic views or landscaping. Some street corridors, especially those within South Lake Union such as Fairview and Westlake and all streets that line Seattle Center, may restrict the number and type of signs used for sponsor recognition and advertising. The transportation corridor provision prohibits off-premise signs within 660 feet of a view corridor.

A major concern stemming from the sign code's stringent restrictions is the possibility of applying inconsistent sponsorship signs throughout the system. This could create confusion and deter potential sponsors. Certain special districts such as Pioneer Square and Pike Place Market pose considerable challenges to station development with uniform advertisements and sponsor recognition. On the other hand, many commercial districts slated for initial bike share deployment such as Neighborhood Commercial and Commercial zones have looser restrictions on sponsor signs and advertising. Downtown zones present far less of a challenge in terms of the permitting process and the type of signs that may be used. Signs are generally not permitted in residential zones.

Authority and Permitting Process

Securing sign permits for a bike share system will require several layers of approval depending on where signs are located. Contingent on whether signs are located within or outside of the public right-of-way, within a historic or special district, or near a park or community center, the bike share organization must secure permits through Seattle's Department of Planning and Development, Department of Transportation, Department of Neighborhoods, Department of Parks and Recreation, and a number of Preservation Boards.

It should be noted that permits are not required if removable advertisements on permitted sign structures are replaced or if the sign is posted by a public service company to provide public service or safety information.

Learning from Transit Advertising

The City of Seattle is well acquainted with the concept of using advertising and station sponsorship as a sustainable financial operating strategy for public transportation. In recent years, the City of Seattle has explored potential opportunities to deploy a citywide transit advertising program to generate station sponsorship revenue for operating cost shortfalls for the South Lake Union Streetcar line, fund stop amenities like street furniture, and to support general system maintenance and upkeep.¹¹

The City's preliminary investigation looked at how streetcar shelter advertising panels and advertising kiosks or signs at streetcar stops would challenge the City's ability to enforce sign code regulations. The City determined that the sign code is a critical policy tool used to maintain a standard visual order that is not degraded by excessive signage. Even though the current Mayor, City Council, and City Attorney is supportive

¹¹ South Lake Union Streetcar—Alternative Funding Sources Staff Memorandum, Seattle Department of Transportation, May 2010.

of implementing a transit advertising program, the regulatory hurdles currently hinder deployment of any comprehensive transit advertising program.

Potential Solutions

Several strategic actions should be made to ensure the optimal amount of sponsor revenue can be generated given the limiting circumstances presented by the sign code. These include:

- Making formal determinations with the help of City attorneys to clarify various legal grey areas including whether the map panel itself constitutes a sign (note: the determination has already been made that docked bikes do not constitute off-premise advertisement and are acceptable for sponsorship).
- Ensuring the proposed administrative non-profit develops a strategic sign plan that integrates considerations from the various zonal sign code restrictions on sponsor recognition and advertisements. This will likely include focusing any advertising in zones amenable to off-premise advertising and sponsorship.
- Placing greater emphasis on sponsorship-oriented signs, rather than off-premise advertising to avoid onerous restrictions and delays in the permitting process.
- Strategically focus station advertising in zones that are most amenable to advertising signs.

6.4 Other Revenue Sources

Bike share funding sources continue to evolve. Some other potential funding sources include:

- Funding the program as an extension of transit. The synergies with transit make bike sharing a logical extension of transit service. However, in practice, there are only a handful of systems globally where the transit agency actually operates the system including OV-Fiets in the Netherlands and Deutsche Bahn's Call-A-Bike system in multiple cities in Germany.
In the US, Boston and Chattanooga received FTA funding through the local transit agencies (MBTA and CARTA, respectively), but these agencies have acted as funding pass-through entities, not operating entities. Originally, Chattanooga envisioned the potential of CARTA having an operational role, however, upon a deeper understanding of the uniqueness of bike share operations, CARTA opted out of this role in favor of a contract operator. It is possible in the future that once a system is up and running, transit agencies could pick up an operational role, especially in smaller satellite systems. Because of the assessment of US transit agencies thus far, it is our recommendation that King County Metro be integrally involved in planning the system, but not in an operational role.
- Station purchase. Larger campuses such as the University of Washington, Seattle Children's, Microsoft, etc. may purchase stations directly (that may allow them to control sponsorship content). In these cases, stations could be purchased outright and at least cover the capital cost of \$65,000 per station, but should also consider some portion of operating cost if sponsorship of the station is not permitted or desired.
- Carbon offsetting. There are numerous examples in the transportation industry of funds collected from carbon off-setting programs being directed towards transportation projects, although primarily these projects have been in the developing world such as the TransMilenio bus transit system in Bogota, Columbia. More recently, similar use of carbon off-setting funds has been considered as a revenue source for bike sharing programs.

A preliminary assessment of the value of carbon offsets from the King County bike share system is included in **Table 6.3**. Based on these preliminary calculations, unless carbon off-sets can obtain a significantly high purchase price, funds from carbon off-setting are likely to be minimal. That said, the opportunity for companies (including the system sponsors) to off-set carbon emissions may be appealing and attract a premium.

Table 6.3: Estimate of Annual Carbon Offset Funding from King County Bike Share

	Initial Launch (Phase 1A)	Full Build-Out (Phases 1, 2, & 3)
Expected annual bike share trips	0.46 million	2.68 million
Percentage of bike share trips previously taken by automobile ¹	25%	
<i>Automobile trips saved by bike sharing</i>	<i>0.115 million</i>	<i>0.67 million</i>
Average bike share trip distance ²	2 miles	
<i>Vehicle miles travelled saved by bike sharing</i>	<i>0.23 million</i>	<i>1.34 million</i>
CO ₂ (or equivalents) emissions per mile of automobile travel ³	1.1 pounds	
<i>CO₂ (or equivalents) emissions saved by bike sharing</i>	<i>0.25 million pounds</i> <i>115 metric tons</i>	<i>1.47 million pounds</i> <i>669 metric tons</i>
Price to offset 1 metric ton of CO ₂ (or equivalents)	\$10 - \$100 / ton ⁴	
Cost of Carbon Offsetting	\$1,150 - \$11,500	\$6,690 - \$66,900

¹ Based on results of surveys in Minneapolis and Washington D.C. in 2010 that showed approximately 20% and 28% percent of bike share trips, respectively, were previously made by automobile.

² Based on average trip distance (station – station) recorded in Denver (2010). Note: the average trip distance (station – station) recorded in Washington D.C. was 1.2 miles (2010).

³ Sightline Institute: <http://www.sightline.org/maps/charts/climate-CO2byMode>.

⁴ Range based on: http://www.ecobusinesslinks.com/carbon_offset_wind_credits_carbon_reduction.htm and

<http://blogs.reuters.com/felix-salmon/2010/12/02/how-much-carbon-does-bike-sharing-save/>

7. Business Pro-Forma

The business pro-forma compares system costs (Chapter 4) and revenues (Chapters 5 and 6) over the course of a five-year forecast period to determine annual cash flow and resulting surplus or shortfall expected from the King County Bike Share System. A ten-year forecast has also been included to see how the financials may change over the longer term. However, forecasting to the ten-year horizon is less precise and the results should be used cautiously.

7.1 Profitability and Profit Sharing

This plan recommends a Non-Profit Organization (NPO) be formed to administer the bike share system with a private contractor to operate the system. An assumed profit margin of 10% of all costs for start-up and operations (excluding equipment) was applied to the pro-forma as the potential management fee / profit for the private operator of the system (note: the actual profit margin / operating fee should be negotiated between the operator and the NPO).

The objective of the administrative non-profit will be to operate the system at cost-neutral or better with surplus revenue being re-invested into the system as savings (to off-set low demand seasons), promotion and marketing, education programs and other community investments, or to fund system expansion into lower demand areas (e.g. the areas identified for Phase 4). To date, no bike share system operates at a profit with user-generated fees alone. With sponsorship revenues or public funds, these programs are financially sustainable.

7.2 Cash Flow Analysis

Previous chapters presented potential annual costs (Chapter 4), user-generated revenues (Chapter 5), and sponsorship revenues (Chapter 6) for the King County bike share system. These are compared over the five-year and ten-year forecast periods in Table 7.1.

Table 7.1: Five- and Ten-Year Usage Forecasts for King County Bike Share

	Year										
	0	1	2	3	4	5	6	7	8	9	10
Capital Costs ¹	\$(3,700,000)	\$(3,800,000)	\$(3,100,000)	-	\$(3,800,000)	-	-	-	-	-	-
Operating Costs ²	-	\$(1,400,000)	\$(2,500,000)	\$(3,500,000)	\$(3,500,000)	\$(4,600,000)	\$(4,600,000)	\$(4,600,000)	\$(4,600,000)	\$(4,600,000)	\$(4,600,000)
User-Generated Revenues ³	-	\$860,000	\$2,150,000	\$3,160,000	\$3,510,000	\$4,020,000	\$4,100,000	\$4,180,000	\$4,180,000	\$4,180,000	\$4,180,000
Presenting Sponsorship Revenue	\$1,250,000	\$1,500,000	\$1,250,000	-	\$1,500,000	\$1,250,000	\$1,500,000	\$1,250,000	-	\$1,500,000	\$1,250,000
Station Sponsorship Revenue	\$300,000	\$735,000	\$1,200,000	\$1,440,000	\$2,040,000	\$2,295,000	\$2,460,000	\$2,550,000	\$2,640,000	\$2,640,000	\$2,640,000
Surplus / Shortfall	\$(2,150,000)	\$(2,105,000)	\$(1,000,000)	\$1,100,000	\$(250,000)	\$2,965,000	\$3,460,000	\$3,380,000	\$2,220,000	\$3,720,000	\$3,470,000
Cumulative Surplus / Shortfall	\$(2,150,000)	\$(4,255,000)	\$(5,255,000)	\$(4,155,000)	\$(4,405,000)	\$(1,440,000)	\$2,020,000	\$5,400,000	\$7,620,000	\$11,340,000	\$14,810,000

Note: the ten-year analysis was included only to show possible trends beyond the five-year horizon. Forecasting to this horizon is less precise and the results should be used cautiously. For example, the pro-forma does not account for equipment replacement – the equipment is warrantied for 5 years and will need to be incrementally recapitalized during the ten year period.

A funding strategy for initial launch of the system (i.e. Phase 1A) is summarized in Table 7.2. Five and ten year comparisons of costs and revenues are summarized in Table 7.3.

Table 7.2: Funding Strategy for Initial System Launch (Phase 1A)

Item	Cost	Revenue
Capital	\$(3.7 million)	
Presenting Sponsorship ¹		\$1.0 – 2.0 million
Grants or other funding		\$1.7 – 2.7 million
Operating	\$(1.4 million / year)	
User Revenue ²		\$0.85 million / year
Station Sponsorship		\$0.3 million / year
Sponsors, Grants, Other Funding ³		\$0.25 million / year

¹ The value of presenting sponsorship could be as high as \$2.0 million and would be subject to more detailed assessment by the administrative non-profit. Shortfall would need to be picked up with additional grant moneys.

² This represents expected first year user-generated revenue for Phase 1A, which is expected to increase to \$1.05 million in Year 2 and \$1.25 million in Year 3 and beyond.

³ With increased user revenue (see note 2), this amount will reduce from \$0.25 million in Year 1, to \$0.05 million in Year 2, to no additional funding requirement in Year 3 and beyond.

The initial launch of Phase 1A would require capital of \$3.7 million. This could be covered through a combination of presenting sponsorship, grants, and other funding. The value of presenting sponsorship is somewhat uncertain and will need to be determined by the advisory non-profit – however preliminary discussions with the corporate community suggest that a figure of \$1.0 - \$2.0 million is not unreasonable.

Other funding sources will need to pick up the remaining shortfall, expected to be in the range of \$1.7 - \$2.7 million. Grants may be available to fund this amount. Another option would be to explore financing that allows the capital loan to be paid back with user fees and sponsorship revenues in subsequent years. There may also be other funding sources available as described in Section 6.4.

Operating costs for Phase 1A are expected to be approximately \$1.4 million per year. Some of this can be covered by user-generated revenues (which are expected to increase from \$0.85 million / year in the first year to \$1.25 million / year in Year 3 and beyond) and station sponsorships (\$0.3 million / year). This will leave a shortfall of approximately \$0.25 million in the first year and \$0.05 million in the second year that will need to be funded by some other means such as additional sponsorship (e.g. of the helmet distribution system, website, etc.), grants, or other funding.

Table 7.3: Five- and Ten-Year Cost and Revenue Summaries

Item	Five Year Total	Ten Year Total
Capital Cost	\$(14,400,000)	\$(14,400,000)
Operating Cost	\$(15,500,000)	\$(38,500,000)
User-Generated Revenue	\$13,700,000	\$34,520,000
Presenting Sponsorship	\$6,750,000	\$12,250,000
Station Sponsorship	\$8,010,000	\$20,940,000
Surplus Revenue	\$(1,440,000)	\$14,810,000

Note: forecasting to the ten-year horizon is less precise and should be used cautiously, e.g. recapitalization of the equipment has not been factored into the cost and will become necessary after the five year warranty period expires.

The five- and ten-year pro-formas for build out of the first three phases of the system (a total of 220 stations) shows capital costs of approximately \$14.4 million. This will be required in installments of: approximately \$3.7 million prior to the launch of Phase 1A (Year 0); \$3.8 million prior to the launch of Phase 1B (Year 1); \$3.1 million prior to the launch of Phase 2 (Year 2); and \$3.8 million prior to the launch of Phase 3 (Year 4).

Annual operating costs will increase from \$1.4 million per year in Phase 1A to \$4.6 million per year at full system build out (i.e. with Phases 1, 2, and 3).

Over the five year forecast period, costs will exceed revenue by approximately \$1.5 million. User-generated revenues (\$13.7 million) and station sponsorship (\$8.0 million) will be enough to cover operating costs (\$15.5 million) plus provide an operating surplus (\$6.2 million) that could be used to pay back the initial capital investment or reinvested into the system.

In the longer term (5-10 years), it is expected that capital costs will reduce (although there will be recapitalization costs on the infrastructure after the five year warranty period is exceeded – this has not been factored into the ten-year forecast) and revenues will mature resulting in the system generating annual profits that can be used to pay back capital costs or used to expand the system into lower demand areas.

8. Sensitivity Analysis

Several issues present unique challenges for King County and have implications on the system's capital costs, operating costs, and/or revenue-generating potential. These include:

- King County's mandatory helmet law.
- Steep topography in a number of the service areas.
- The extent of bikeway facilities.
- Weather, in particular the impact of rainy and wet conditions.
- Restrictions presented by the City's sign code.
- Operating challenges posed by the proposed dispersal of sub-systems throughout the region (i.e. Seattle, Redmond, Kirkland, Bellevue, etc.).

Options for addressing these issues are described below. For each, the "baseline" assumption included in the business pro-forma is described and a sensitivity analysis conducted based on adjustments to the baseline.

8.1 Helmet Requirement

King County's all-ages helmet law requires people to wear a helmet when riding a bicycle. The helmet law provides a unique opportunity to reinforce the region's commitment to safety and showcase innovative technical and non-technical solutions to providing helmets throughout the system.

The fact that the system will operate within a helmet law environment will impact how the system is used. Whilst there is likely a portion of the community that will decide not to use the bike share system because they are required to wear a helmet, there will also be potential users that will decide to use the system because of the access provided to helmets. This is discussed further below.

King County has a unique opportunity to be the first North American bike share system to operate with a helmet requirement. A list of possible approaches for addressing the helmet requirement was developed by the project team and each one analyzed in the context of King County to identify a preferred strategy. Possible options included:

- Repealing the helmet law prior to system implementation, i.e. overturning the requirement for cyclists to wear a helmet (this was the approach taken in Mexico City and Tel Aviv).
- Seeking an exemption of bike share bicycle riders from the requirements of the helmet law. All other cyclists are still required to wear a helmet.
- Making helmet law enforcement a secondary offense, with citations issued only after stops for other infractions.
- Alerting riders to the helmet requirements and requiring subscribers to acknowledge that they have read and accept these requirements at the kiosk when they check out a bike. Riders are required to bring their own helmet and are subject to prevailing levels of enforcement.
- Providing helmets. This can include helmet vending machines at the stations, partnering with retail stores, or using "street teams" to sell helmets to casual users. Helmets can be subsidized by public or sponsor funding. These approaches have been used in Melbourne, Brisbane, and Boston.

- Offering helmet purchase (and discounts) to people who register for the system online (Boston).

Currently there are only two systems in the world operating with a helmet requirement in place – Melbourne Bike Share and Brisbane’s CityCycle, both in Australia. In addition to King County, the City of Vancouver, British Columbia has a helmet requirement and is investigating the feasibility of providing helmets as part of a future bike sharing program. Mexico City and Tel Aviv repealed their helmet requirements prior to the implementation of bike sharing.

In Melbourne, helmet sales are subsidized by government funding and are made available through partnerships with local helmet retailers and two helmet vending machines. A survey conducted in Melbourne at the end of the 2010 season identified that approximately 25% of respondents identified having to wear a helmet as a barrier to using the system. However, 36% stated they may use the system if helmets were more easily accessible.

Boston is a case study from North America, where although not having a helmet requirement, the system has funding from the Center for Disease Control Communities Putting People to Work (CPPW) to make helmets available for users of the system. The program includes the following:

- Requiring users to agree that they will wear a helmet when using the bike share system.
- Helmet retailers shown on every bike share map.
- Funding of a full-time position to administer the helmet program.
- Purchase of several thousand helmets (for a cost of approximately \$7.50 each).
- Partnership with several retailers to distribute helmets (e.g. CVS and Walgreens).
- Providing a helmet (for a cost of approximately \$19) to online subscribers.
- A street team to sell helmets on the street to casual users.

The helmet law is well supported in King County and repealing the helmet requirement, making helmet enforcement a secondary offense, seeking an exclusion for bike share users, or simply alerting riders to the requirement and asking them to sign an acknowledgement would not sufficiently address the helmet requirement and would not be supported by many of the local partners.

Additionally, the bike share program has a unique opportunity to reinforce the existing helmet culture and increase the number of helmets in circulation. It is recommended that access to helmets be provided throughout the system.

8.1.1 Strategy for Providing Helmets

Innovative solutions to providing helmets to bike share users continue to evolve. Current practice in other cities includes helmet vending machines in Melbourne (also being explored in Vancouver, BC), partnering with local retailers in Boulder, and engaging a street team to sell helmets in Boston. Equipment providers in the United States have developed prototype designs for helmet vending machines integrated into the map frame or station kiosk – and although these are not currently operational, vendors are continuing to explore these technologies and operators are investigating ways to most efficiently operate and maintain these services.

To provide the highest level of access to helmets, it is recommended that helmet vending technologies be pursued to provide helmets throughout the system. This recommendation is reflected in the business proforma.

Some of the priorities for delivering this service include a system that:

- Provides a convenient, cost-effective means for users to obtain a helmet.
- Provides a completely automated solution that does not require labor to sell helmets or partnerships with local retail outlets.
- Provides reusable helmets that are cleaned and inspected for safety, between every use.
- Infrastructure that is completely solar-powered, i.e. no hard-wiring required.
- Returns deposit to user on same credit card that was used to rent.
- Tracks specific helmet to user, to provide incentive for the same helmet to be returned.
- Minimizes waste creation (e.g. selling thousands of disposable low-cost helmets).
- Does not compete with local bike shops or other helmet retailers.
- Recycles helmets beyond their useful life in an environmentally responsible manner.
- Financially supports itself.
- Vending machines that are not visually intrusive (e.g. integrate into the kiosk or map frame)
- Allow users to obtain a helmet as part of the same credit card transaction.

Similar to renting the bikes, riders would be charged a deposit for the helmet, part or all of which would be returned if the helmet is returned in an undamaged and usable state. It is important that the integrity of each helmet is checked between each use, which is no different from how helmets are shared at bike rental companies.

There are a number of funding opportunities available to provide helmets to users. In Melbourne, the system is subsidized through road safety grants. Similar grants may be available for King County. Secondly, the helmets themselves present a unique sponsorship opportunity (that could be separated from other elements of the bike share system) that may be attractive to a local health care provider or other public health organizations.

8.1.2 Impact of Helmet Law on Revenues

Although the helmet requirement may reduce some demand¹²; providing access to helmets throughout the system will attract other users, particularly those concerned with the safety of riding without a helmet.¹³

The primary impacts on demand are expected to be amongst casual users (i.e. walk up and 24-hour subscribers) who tend to be spontaneous users and are less likely to be aware of the helmet requirement or to have a helmet with them. Although annual member trip-making is also often spontaneous, the impact on annual membership registrations is expected to be less, i.e. people will still sign up for annual membership even though they may not make as many trips as they would if a helmet were not required. The financial impact of fewer annual member trips is small. Only a small percentage of annual members exceed the free-ride period and therefore do not generate significant trip fees. It can also be expected that annual members would plan for the helmet requirement and may carry a helmet with them or keep a spare helmet at work.

¹² Surveys in several cities have shown that there is a portion of the community that will not cycle because of the requirement to wear a helmet. This could be due to a number of factors including inconvenience of carrying a helmet, added cost, or the image of wearing a helmet. A survey conducted in Melbourne, Australia found that 25-percent of respondents were discouraged from using the system because they did not want to wear a helmet.

¹³ The survey conducted in Melbourne, Australia also found that 36-percent of respondents would use the bike share system more if seamless access to a helmet was provided.

To be conservative, the base assumption in the business pro-forma is that King County will experience a 30% suppression in casual demand compared to demand observed in Washington D.C. and Montreal, where helmets are not required. This figure is based on what limited data is available including a survey of potential users in Melbourne, Australia.

8.1.3 Helmet Sensitivity Analysis

The sensitivity analysis considers the financial implications of options to address the helmet requirement including:

- **Baseline:** Providing helmet vending machines throughout the system.
- **Sensitivity H1:** Providing helmet vending machines at 50% of stations in the system. This will reduce capital and operating costs, but will also result in some reduction in demand as potential users react to less convenient access to a helmet.
- **Sensitivity H2:** Maintaining the helmet requirement, but not providing users with helmets. Programs would be set up to allow website subscribers to purchase a helmet with their membership and to direct kiosk subscribers to nearby helmet retailers. This will result in reduced demand given less convenient access to a helmet.
- **Sensitivity H3:** repeal the helmet law or exclude bike share users from the requirement. This would reduce costs and increase demand.

The potential financial impact of these scenarios is summarized in **Table 8.1** that shows that the option to provide helmet vending machines throughout the system is the most conservative cost assumption.

Table 8.1: Financial Impacts of Alternative Solutions to Helmet Requirements

Alternative	Capital Costs	Operating Costs	Demand/Revenue	Total Change
Baseline – Provide helmet vending machine at all stations.	\$2.2 million	\$0.8 million over five years.	30% suppression in potential casual demand. \$3.4 million over five years.	-
Sensitivity H1 – Provide helmet vending machines at 50% of stations.	50% of Baseline. \$1.1 million (saving)	Approximately 60% of Baseline. \$0.3 million (saving)	Some reduction in demand because of reduced convenience to access helmet. Expect a further 10% reduction in casual users. \$1.2 million (less revenue)	Cost saving. \$0.2 million (saving)
Sensitivity H2 – Maintain requirement but do not provide helmets at stations.	0% of Baseline. \$2.2 million (saving)	0% of Baseline. \$0.8 million (saving)	Reduction in demand because of reduced access to helmets. Expect a further 20% reduction in casual users. \$2.4 million (less revenue)	Cost saving. \$0.6 million (saving)

Alternative	Capital Costs	Operating Costs	Demand/Revenue	Total Change
Sensitivity H3 – Repeal the helmet law, amend to make it a secondary offense, or exclude bike share users.	0% of Baseline. \$2.2 million (saving)	0% of Baseline. \$0.8 million (saving)	Increase in demand. No suppression of potential demand. Expect a 30% increase in potential demand. \$3.4 million (more revenue)	Additional revenue and cost saving. \$6.4 million (saving)

8.2 Topography

King County's topography presents a challenge to both using and operating bike share. Generally, more people will ride downhill than uphill, resulting in an accumulation of bicycles at downhill stations. There are several solutions to this issue including:

- System design: provide stations along routes that minimize the steepness of slopes and at locations that allow users to easily check in a bike, walk up the hill, and check out another bike.
- Rebalancing: topography is one of the many issues that operators deal with to redistribute bikes to the stations. The topography issue is not necessarily different from rush-hour commuting, where people ride en masse in a single direction.
- Pricing structure: The operator could implement a reward program that offers gift certificates or credits towards future membership fees to encourage riders to ride uphill. Such programs have been implemented in Paris and Washington D.C., and there is likely to be continued innovation in this field. Although these programs have been very positive in terms of public image, and increasing the number of trips from full stations to empty stations, they have not had a material effect on rebalancing issues.
- Additional gearing: the number of gears provided on the bike can be adjusted to give additional range in particularly hilly environments. Providing additional gears (e.g. increasing the gearing range from three gears to seven gears) does introduce additional capital cost. The base assumption in the pro-forma is that the gearing of the bicycle fleet is increased from the standard three gears to seven gears. The cost of this improvement is in the order of \$50 per bike or approximately:
 - Phase 1A: \$25,000 (assuming 500 bikes).
 - Phase 1B: \$30,000 (assuming 600 bikes).
 - Phase 2: \$25,000 (assuming 500 bikes).
 - Phase 3: \$30,000 (assuming 600 bikes).
 - Total: \$110,000 (assuming 2,200 bicycles).
- Electric assist bikes: providing electric-assist bicycles would greatly reduce the barrier of riding up hills but would add to capital costs, require more maintenance than regular bikes, introduce recharging needs, and increase the complexity of rebalancing (e.g. if only part of the fleet is electric-assist these bikes will have to be redistributed to the correct location). The following options were considered:
 - Introduce electric-assist bicycles to the entire King County bike share fleet. This would add the most cost, but would provide the most flexibility to users of the system.

- Introduce electric-assist bicycles only to certain phases or areas of the system. This provides less flexibility for users but targets the areas with the most significant hills, e.g. Phase 1 Downtown. Electric-assist bicycles ridden out of the select area would need to be returned requiring more complex rebalancing efforts.
- Introduce electric-assist bicycles to only part of the fleet, e.g. one or two docks at select stations. This is the lowest capital cost, but would require complex rebalancing to ensure that these bicycles are returned to the correct stations (and docks). Users that need electric-assist may find none available at the station unless access is controlled through special membership (perhaps at an increased price).

Electric assist bicycles were not considered for the initial system launch in King County due primarily to the unreliability of electric bike technology and the costs and logistics involved with operating an electric bike system. Electric bikes could be considered as an addition to Phase 1A or introduced as part of a future phase (e.g. in one of the cities east of Lake Washington) when electric bike technology is more reliable.

- Bicycle weight: bike share bicycles are generally heavier than private bicycles so as to withstand the rigors of the urban environment and to deter theft. Some vendors may have lighter bicycles, but adjusting the weight of the bicycle would be extremely difficult as it would require a retooling of the manufacturing process or use of lighter (often more expensive) materials.

8.3 Bicycle Infrastructure

There is little information to suggest whether a dense network of bicycle infrastructure is required in order for bike sharing to be successful. Bike share systems have generally been implemented in cities with established bikeway networks or in conjunction with an expansion of the bikeway network, as is the case in Boston, which is currently implementing a comprehensive bikeway network as part of its bicycle master plan. However, successful systems have been established in cities such as Lyon, France where the Velo'v system was introduced with few bikeways (at initial launch there was 33 miles of bicycle infrastructure – this has since expanded as a result of the success of the bike sharing system). In this way, bike sharing often acts as a catalyst for increased investment in bicycle infrastructure.

As of September 2011, Seattle had approximately 50 miles of bikeways in the proposed bike share service area. This included 13 miles of bike lanes, 26 miles of designated shared roadways or shoulders, and 11 miles of multi-use facilities. This represents a bikeway density of approximately 6 miles of bikeways per square mile of service area. The city is also committed to increasing the number of bikeways and exploring enhanced facilities such as bicycle boulevards and protected cycle tracks. It has an additional 4 miles of bikeways scheduled for 2012 and the current Bike Master Plan includes plans for an additional 65 miles of bikeways.¹⁴

At the time of this report, Redmond has approximately 25 miles of bikeways in the proposed bike share service area. This includes 10 miles of bike lanes, 3 miles of designated shared roadways, and 12 miles of paved trail. The city also has plans to increase its citywide bikeway total from 85 miles to over 150 miles¹⁵. At the

¹⁴ Planned bikeway mileage is based on the 2007 Bike Master Plan. At the time of this report, the City was about to undergo an updated of the Bike Master Plan, which could change the amount of planned bikeway mileage.

¹⁵ “Planned miles” are taken from long range plans including the 2022 bike network from the Transportation Master Plan and the 2030 paved trail network from the Parks Plan.

same time, Kirkland has 2 miles of on-street bike lanes in the downtown and approximately 4 miles in Totem Lake.

Bike share systems have to date observed a solid safety record. In North American systems, few serious injuries or fatalities have been reported, and in Washington D.C. a total of 14 crashes were reported in the first year of operation, of which one was serious in nature. Approximately one million trips were made during this same period – an injury crash rate of 0.83 injuries per million miles (the average trip length was approximately 1.2 miles per trip), which is lower than the injury rate of 7.3 injuries per million miles ridden for private bicycling.¹⁶

Some of the factors contributing to this safety record could include:

- Increased driver awareness due to increased media, increased numbers of cyclists on the street, and because many drivers now use the bike share system or own a bicycle.
- The safe design of the bicycle as a visible, slow-speed, upright bicycle fitted with internal safety features such as lights and bells. Further, the bikes are regularly inspected to ensure that all safety features are in proper working order.

8.4 Weather

Weather can have an impact on demand. The Pacific Northwest experiences overcast and wet winters with a generally short summer with sunshine and moderate temperatures. There is generally little humidity at any time of the year. There are occasional, but few, snow events in the built up areas of the county.

Data from the Capital Bikeshare program in Washington D.C. was compared to a variety of weather indicators including maximum temperature, mean humidity, cloud cover, maximum wind speed, and precipitation during the spring and early summer period of the 2011 season.

Figure 8.1 shows the relationship between daily usage and temperature and humidity. There appears to be a correlation between the ridership and temperature, which sees ridership generally increase as the temperature increases. However, significant variations in daily ridership seem to be more related to humidity, with particularly humid days experiencing less ridership.

Figure 8.2 shows the relationship between daily usage and precipitation and maximum wind speed. There appears to be a correlation between daily ridership and precipitation, particularly large precipitation events. For smaller amounts of precipitation (that could be expected most of the time in Seattle) there still appears to be some reduction in demand. In Washington D.C., large wind events seem to correspond to large precipitation events during summer (likely a result of thunderstorms). Where this is not the case, wind does not appear to influence ridership.

¹⁶ <http://bicycleuniverse.info/transpo/almanac-safety.html>

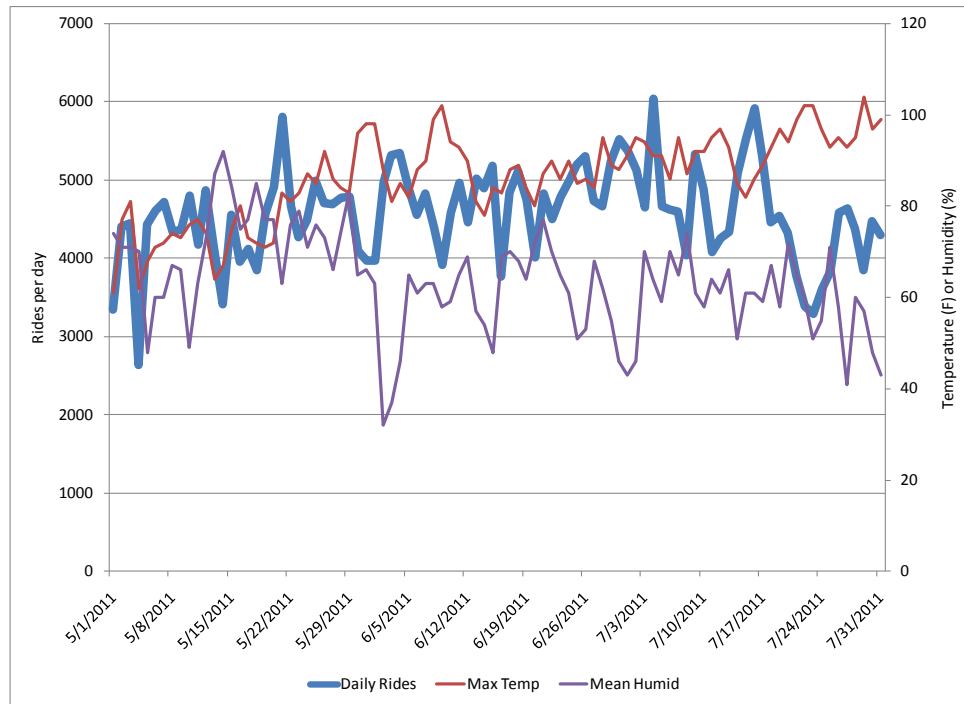


Figure 8.1: Comparison of Daily Capital Bikeshare Ridership with Maximum Daily Temperature and Average Daily Humidity.

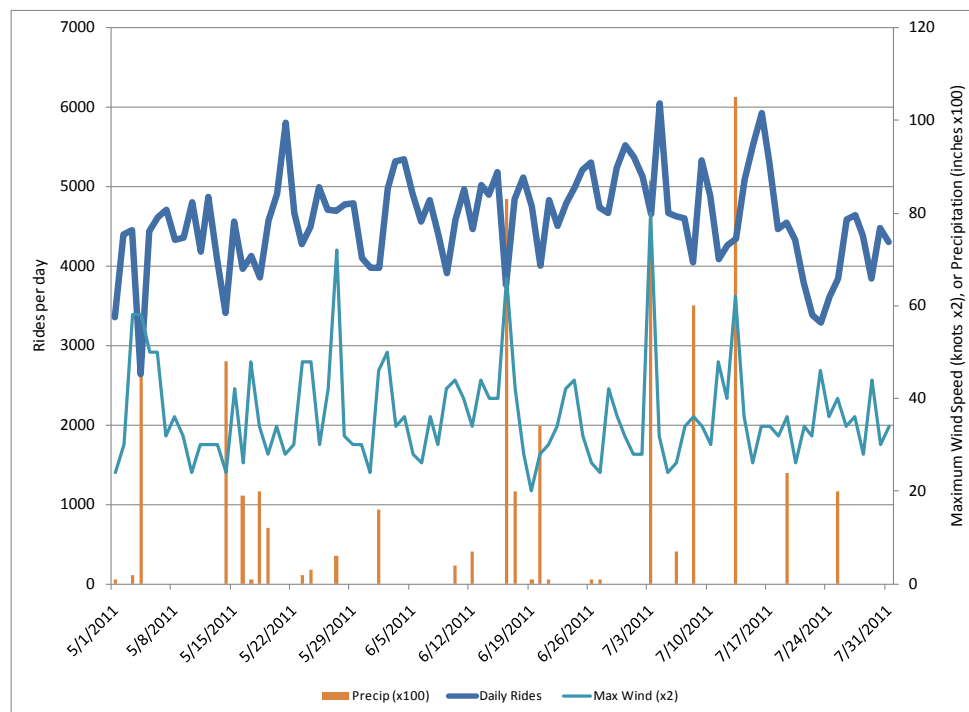


Figure 8.2: Comparison of Daily Capital Bikeshare Ridership with Daily Precipitation and Maximum Wind Speed in Washington D.C.

It is difficult to say with certainty the likely impact of weather on demand in King County. The data suggests that cooler temperatures and rainfall do impact demand. Although there are a larger number of cooler and rainy days in Seattle, the intensity of rainfall is typically less than rain events in Washington D.C. In addition, local residents may be more familiar and expectant of these conditions and be willing to ride in them. Promotion and marketing activities such as distributing seat covers as part of a membership package could be one way to reduce the impact of rain. There may be opportunities to place stations under existing cover, although stations do require a certain amount of vertical clearance and solar access.

There will likely be a reduction in casual demand during the rainy season, however on the flipside, Seattle summers are much less humid than on the east coast, which could increase casual demand during these months in comparison to Washington D.C.

8.5 Sponsorship

There are a number of sponsorship variables that are sensitive to fluctuation. As described previously, the sign codes of the various municipalities could have an impact on the amount, type, or ability to advertise at the stations. Certainly, significant additions to street furniture advertising are unlikely to be acceptable. However, less intrusive sponsorship of stations and bicycles is likely to be acceptable. The other variation is likely to be in the valuation and uptake of sponsorship.

The baseline forecast in the business pro-forma assumes that a presenting sponsor is secured for Phase 1A for between \$500 and \$750 per bike per year (for a five year sponsorship). It also assumes station / bike sponsorship taken up at 40% of stations in the first year increasing to 80% by the fifth year and beyond for a price of \$15,000 per station per year (slightly less than the current valuation in Boston).

The sensitivity analysis considers the financial implications of variations to these assumptions:

- **Sensitivity S1:** The value of presenting sponsorship achieves only \$350 per bike per year (similar to Minneapolis and Denver): potential loss of approximately \$2.0 million over five years.
- **Sensitivity S2:** Uptake of station sponsorship is 25% slower than assumed, i.e. 30% of stations in the first year are sponsored increasing to 60% of stations sponsored in the fifth year (no change in valuation): potential loss of approximately \$2.0 million over five years.
- **Sensitivity S3:** Station / bike sponsorship rates are:
 - 33% less, i.e. generate \$10,000 per station per year (similar to Minneapolis pricing structure): potential loss of \$2.7 million over five years.
 - 33% more, i.e. generate \$20,000 per station per year (similar to Denver pricing structure): potential increase of \$2.7 million over five years.

8.6 Geographic Distribution

The distribution of the proposed King County Bike Share system, especially the satellite systems on the east side of Lake Washington as part of Phase 3, pose some challenges to operations - in particular increased distance (and time) for rebalancing and maintenance crews to travel. It is proposed that two “operations” facilities be established, one in Seattle to service Phases 1 and 2 and one on the east side of Lake Washington to service Phase 3. This has been assumed in calculating system costs for the business pro-forma. Other assumed operating parameters are discussed in Chapter 9. No sensitivity test is required.

8.7 Demand

Demand estimates have been based on the Alta Bike Share Demand Model that was developed from data in Washington D.C. and Montreal, Quebec with a 30% suppression of casual user demand to account for the helmet requirement. Demand is influenced by numerous variables (including weather), and the following sensitivity tests analyze the impact of lower- and higher-than-expected demand for the system on user-generated revenues:

- **Sensitivity D1:** 20% less demand: potential loss of \$2.75 million over five years.
- **Sensitivity D2:** 10% less demand: potential loss of \$1.4 million over five years.
- **Sensitivity D3:** 10% more demand: potential gain of \$1.4 million over five years.
- **Sensitivity D4:** 20% more demand: potential loss of \$2.75 million over five years.

8.8 Sensitivity Test of Reasonable Worst Case

A sensitivity test was conducted to see the impact of a “reasonable worst case” combination of the sensitivities described in the sections above. This includes:

- Providing helmet vending machines throughout the system (existing baseline assumption). This is the highest cost of the options considered.
- Increasing the gearing on the bike fleet from the typical three gears to seven gears (existing baseline assumption). This is the highest cost of the options considered, except for introducing electric-assist bikes, which was ruled out.
- The value of presenting sponsorship is lower than expected at \$350 per bike per year rather than \$500 per bike per year (Sensitivity S1): potential loss of \$2.0 million over five years.
- Station sponsorship is taken up 25% slower than expected (Sensitivity S2): potential loss of \$2.0 million over five years.
- Demand is 10% less than expected (Sensitivity D1). This could be the result of weather or other factors influencing the predicted demand: potential loss of \$1.4 million over five years.

This scenario results in reduced revenues of approximately \$5.4 million over five years and would result in a five-year shortfall of approximately \$4.25 million that would need to be covered by other sources (e.g. public funds, additional financing, or up-front grant funding).

9. Operational Issues

This chapter presents a number of operational characteristics that will need to be considered by the program administrator, the equipment vendor, and the operator. These include items such as maintaining appropriate service levels, reporting, insurance, smart card integration, etc.

9.1 Service Levels

Service levels are crucial for a well-operated bike share system. They determine the customer experience (e.g. bikes with maintenance issues, graffiti on stations, full or empty stations) and are heavily correlated to operating costs. For example, if an operator is required to check each bike each day, the system will be more expensive to operate than if they are required to check each bike each month.

There are some aspects of the service levels that will be dependent on funding. Specifically, if operations for the bike share system are supported by system revenues, the model could allow for a relaxation of some service levels if the system is generating less revenue than anticipated. This allows an operator to reduce its baseline costs to provide longer-term financial sustainability of the system. If the operations contract is fully-funded, then there is no need to scale service levels to revenues.

The operator should also have a means to accurately record and report on all service levels, ideally through an electronic system.

A typical set of service levels has been included in **Appendix E** and are assumed in the business pro-forma. However, specific service levels will need to be determined during contract negotiations, and will likely include detailed definitions, service default penalties, and exceptions for force majeure events.

A plan for maintaining some sort of service during emergency events should also be considered. With appropriate planning and preparedness procedures, a bike sharing system could provide useful transportation options during disaster events.

9.2 Maintenance Plan

Stations should self-report problems through the software backend, and therefore will not need preventative maintenance checks. An accurate repair history should be maintained for each bike, with each one to undergo routine maintenance checks, e.g. bikes should be checked during station checks every two weeks and those not captured in that process be “chased down” once every calendar month. Typical maintenance activities are included in **Appendix E**.

9.3 Reporting

Data reporting and transparency is a key part of helping King County track and achieve its goals. A lot of useful data is reported directly from the system and others can be easily post-processed to track performance and predict activity. Some typical bike share reporting standards used to track usage and operations are included in **Appendix E**.

9.4 Insurance

There are several types of insurance typically required by cities for bike sharing, including liability, workers compensation, auto, etc. The contractor typically indemnifies related agencies, private property owners who host a station, and other stakeholders. Although this has not yet been mandated by cities, insurance that protects against force majeure is strongly recommended. So far, there have not been any insurance companies willing to provide insurance for theft and vandalism of bicycles. However, it is possible to find insurance that covers bikes while they are in stations or in storage. Cost estimates in Section 4 are based on industry knowledge and an example of insurance requirements (for the City of Boston) is included as Appendix F.

9.5 Integration with Smart Card

The regional transit systems currently operate with a smart card known as ORCA – “one regional card for all” that allows users to add value to a card that is then used for fares on the regional bus, train, and ferry services. There are advantages and challenges of integrating bike sharing into the ORCA regional transit pass program.

The market potential of integrating with ORCA is very positive. There are over 200,000 ORCA card users in the Puget Sound Region and in the near future, an additional 60,000 people will have access to the card as the University of Washington moves from the U-PASS system to an integrated version of the regional smart card. Major regional employers, like Microsoft, have also brought large numbers of ORCA cardholders to the marketplace.

The ORCA card has the dual capabilities of a monthly (or other time period) pass feature and an “e-purse” function where monetary value is added to the card. It is highly unlikely that a bike share program could be embedded into the existing monthly transit pass products, however there maybe opportunities to create a separate bike share product (similar to the Washington State Ferry pass) or to work within the e-purse function. If and when bike sharing is integrated with ORCA there will be both budget implications as well as customer outreach challenges.

In terms of governance, ORCA is operated through the authority of a joint powers agreement. Any integration of bike share will have to be cleared by this group. This will involve a number of complex considerations and fiscal costs. Adjustments to those agreements and the software behind the system could require a considerable period of time and unknown cost to negotiate, design, test, and deploy.

There are also costs associated with implementing the system. Bike share kiosks may need to be modified to accommodate ORCA cards and policies associated with member’s responsibilities might present program changes.

10. Next Steps

Next steps for the King County Bike Share Partnership are to:

- Establish an administrative non-profit organization (NPO). At the time of this report, the BSP had established a sub-committee that was investigating the formation of a NPO and gathering names of potential board members.
- Determine staffing needs to support the non-profit. If it is identified that an interim executive director is required, then the BSP should identify how this position should be funded (e.g. via a “loaned executive” program). The ED should be empowered by public agency officials to make decisions and shop the concept of bike sharing to the corporate community and other partners.
- Obtain the support of public agency staff and officials. At the time of this report, the BSP had conducted briefings of many of the senior staff amongst their organizations including the King County Executive and the mayor of the City of Seattle.
- The Bike Share Partnership should continue as a Technical Advisory Committee to the NPO.
- After establishment, the NPO should initially be responsible for:
 - Refining the assumptions in the business plan.
 - Identifying which jurisdictions will take part in the initial system.
 - Developing a sponsorship package.
 - Approaching corporate partners about sponsoring the system.
 - Developing a set of regional guidelines for the operation of the system.
 - Issuing an RFP for an equipment vendor and a bike share operator.
- Agency staff should be involved in:
 - Exploring grant opportunities and applying for those that may be applicable towards capital or operating costs.
 - Developing a streamlined permitting process for station siting.
- Once a vendor and operator are chosen and a contract is signed, the non-profit and the operator would seek sponsorships, pursue governmental support, work with the public sector on grants, etc. The following activities will need to occur prior to system launch. The lead time required for these activities prior to launch is approximately 6 months:
 - Undertake community education and outreach for the system.
 - Manufacture and deliver the equipment.
 - Create a system name and logo.
 - Undertake hiring.
 - Obtain warehouse, vehicles, and equipment.
 - Obtain permits.
 - Assemble stations.
 - Install stations.
 - Undertake pre-launch marketing.
 - Set up system back-end.
 - Launch event.

11. Summary

This study outlines a business plan for the creation of a bike sharing system in King County, Washington. It presents background information on the goals of the program and the proposed system size and phasing; recommends a business model for administering and operating the system; presents a business pro-forma that explores the financial feasibility of a countywide bike sharing system; and identifies next steps towards implementation.

Numerous cities in the United States are recognizing the health, environmental, and economic benefits of bike sharing. King County has many of the characteristics required to make bike sharing successful and has a unique opportunity to showcase advanced solutions to some of the perceived challenges – including providing helmets throughout the system to fit with the existing safety culture of the region.

Some of the primary goals for a bike sharing system in King County are:

- To develop a fully regional bike share system that: allows multiple jurisdictions to participate; provides a consistent user experience; is structured with a single pricing structure; and allows seamless transition between sub-systems and transit services in the region.
- To fund the system using a diverse range of funding sources.
- To minimize risk while maintaining transparency and accountability for the agencies involved.

The proposed King County bike share system will include a total of 220 stations and 2,200 bikes and cover an area of 13.6 square miles in five cities. Service areas were defined from a review of areas with the highest potential demand as well as considerations of geographic and social equity. A series of sub-systems were defined in Downtown Seattle, the University District, and in the cities of Redmond, Kirkland, Bellevue, and Renton. The following phasing and roll-out plan is proposed:

- Phase 1A (50 stations / 500 bikes): the initial launch is intended to maximize early success in Seattle's downtown core and the University District.
- Phase 1B (60 stations / 600 bikes): expansion and in-fill of the initial launch area.
- Phase 2 (50 stations / 500 bikes): expansion of the Phase 1 area.
- Phase 3 (60 stations / 600 bikes): development of a series of sub-systems on the east side of Lake Washington in the cities of Redmond (including the Microsoft campus), Kirkland, Bellevue, and Renton.

A fourth phase, that has not been included in the business pro-forma, would include further expansion of these boundaries, introduce “satellite systems” to medium-high demand locations that are discontinuous from the first three phases (e.g. Ballard and Northgate), and add satellite systems in areas that are expected to have lower demand, but may be desirable for social or geographic equity (e.g. Kent or Issaquah), or as an extension of the local transit system (e.g. Rainier Valley or along the Seattle Central Light Rail Line).

System expansion will depend on available funding and the success of the system, typically measured in terms of visible achievements such as high ridership, positive public response, neighborhood and corporate requests for service area expansion, and on-going financial performance. Lower demand areas, such as those in Phase 4 (as for any area), can join the system at any time but will need to meet the minimum size requirements and

understand that lower demand may mean less revenue. The decision to enter will likely depend on whether additional subsidization is required and the source of these funds.

Detailed station locations will need to be determined for each phase. The business plan includes preliminary locations for the stations in Phase 1. Average station spacing should be approximately one station every 1,000 to 1,300 feet. This density provides access to a bike within a short walk of anywhere in the service area and provides a nearby alternative to return a bike if the destination station is full. A dock-to-bike ratio of 2:1 is recommended to provide sufficient open docks for users to return bikes to their preferred station. There are numerous factors to consider in placing stations on the street, but typical station placements include: on sidewalks; public spaces, on-street (potentially converting on-street parking), and on private properties (in consultation with land owners).

A number of business models were considered for administering and operating the system including an operating non-profit, direct contract with an operator, and privately owned and operated. The creation of an administrative non-profit with private operating contractor was recommended as the preferred business model as it maximizes potential revenue sources, utilizes the skills of the private sector to launch and operate the system, and strikes the greatest balance of minimizing risk while maintaining control and transparency for the agencies.

The financial pro-forma compares five- and ten-year costs and revenues to determine the expected financial performance of the system over these timelines. Forecasting to a ten-year horizon is difficult and the results should be used to obtain a general sense of the direction of financial performance over that period.

System costs include:

- General system start-up costs: include administrative and overhead costs to establish a framework for the regional system.
- Phase start-up costs: include capital and launch costs for each phase.
- Operating costs: include procuring operations warehouse and staff costs associated with administration, maintenance, repairs, rebalancing, etc.
- Additional costs: such as those to provide seamless access to helmets throughout the system and to increase the gearing of the bike share fleet from the typical three gears to seven gears are included in the business pro-forma.

A diverse funding strategy that employs a variety of revenue streams should be pursued. Revenues may include:

- User-generated revenues that will come from membership fees paid to access the system and usage fees incurred by riders that exceed the “free ride period”. The proposed rate structure is based on other cities and adjusted for the relative cost of living as follows:
 - Annual subscription: \$75.
 - Monthly subscription: \$30.
 - 24-hour (casual) subscription: \$5.

Usage forecasts were calculated from an empirical model developed from usage statistics observed in Washington D.C. and Montreal and adapted to King County. Ridership is expected to increase from approximately 450,000 trips in Year 1 (with Phase 1A in place) to approximately 2.2 million trips in

Year 5 (with all phases assumed to be in place). The latter represents usage of approximately 2.7 trips / bike / day.

- Sponsorship potential in the region was assessed from corporate engagement undertaken as part of this project that showed there is general support for bike sharing amongst the corporate community and that there is capacity and interest in sponsorship opportunities from station sponsorship to presenting or title sponsorship.

Presenting sponsorship could generate up to \$2.0 million up front depending on the estimated value and the length of contract. Station / bike sponsorship could be expected to generate in the order of \$15,000 / station / year (similar to Boston and between the values of Minneapolis and Denver).

- Public or grant funding that could include Federal grants from programs such as CMAQ, FTA, and FHWA.
- Private foundation funding.

Initial launch of the system (i.e. Phase 1A) is expected to cost **\$3.7 million** with an additional **\$1.4 million per year** required to operate it. The proposed funding strategy to cover these costs includes:

- Capital (\$3.7 million):
 - Presenting sponsorship: \$ 1.0 – \$2.0 million.
 - Grants or other funding: \$1.7 – \$2.7 million.
- Operating (\$1.4 million / year):
 - User revenues: \$0.85 million (first year – increasing in subsequent years).
 - Station sponsorship: \$0.3 million.
 - Grants or other funding: up to \$0.25 million (first year – decreasing in subsequent years).

The five-year pro-forma shows total capital costs of approximately \$14.4 million to build out the system (i.e. Phases 1, 2, and 3). Each phase will initially operate at a shortfall as the capital costs will exceed revenues from user fees and sponsorship.

However, once capital costs are out of the way and revenues reach their full potential, the system is expected to operate at an annual profit. Profits could be used to expand the system into lower demand areas or to pay back capital costs. The system is expected to operate at a shortfall of \$1.5 million after five years (assuming that no grant funding is used for capital costs), but at a profit beyond five years.

Strategies have been developed for addressing several local issues such as topography, bikeway infrastructure, weather, and the helmet requirement. Sensitivity analyses were conducted to understand the financial implications of these options.

Although several options for addressing King County's helmet requirement were considered, it is recommended that seamless access to helmets be provided throughout the system. This is a unique opportunity to reinforce the region's commitment to safety and showcase innovative technical and non-technical solutions to providing helmets – part of which includes providing helmet vending machines as part of the station design.

The cost of providing helmets throughout the system was included in the business pro-forma. Although there is expected to be a percentage of the population that will not want use the system because it requires wearing a helmet, there will be other riders that will ride more often because there is easy access to a helmet.

The topography of some of the service areas could be a barrier to some potential users. Techniques to reduce topography as a barrier include designing the system to encourage routes with easier grades, developing a pricing structure that encourages users to ride bikes uphill, and expanding the gearing range of the bike share fleet from the typical three gears to seven gears. Electric-assist bikes were considered, but the additional costs, maintenance, and redistribution costs, coupled with the unreliability of this technology removed this option from consideration at this time.

There will likely be some effect on demand from weather in King County. Cool and rainy winters will likely decrease demand, particularly amongst casual users that are not acclimatized to winter riding conditions. However, moderate and low humidity summer temperatures will likely increase demand during summer months.

There aren't sufficient examples to determine whether a dense network of bicycle infrastructure is required for bike sharing to be successful. Local agencies in King County have shown their commitment to improving the amount and quality of bikeway infrastructure and the increase in cyclists may accelerate this investment. Bike sharing in North America to date has proven to be safe with no fatal and very few injury crashes reported – even though there is typically less bikeway infrastructure than in European and Asian bike share cities.

The next steps towards implementing a bike share system in King County include establishing an administrative non-profit organization, a board of directors, and funding staff (including an interim executive director). The NPO will issue an RFP for an equipment vendor and a program operator and work with the operator to gain support for the program and identify and pursue funding for the program.

Appendix A

Bike Share System Cost Breakdown

A.1 General System Start-up Costs

It is assumed that the start-up period will last approximately 6 months. However, many employees will be hired within the last 1-2 months of that period. Therefore, for purposes of the pro forma, we have used a weighted average time of 4 months to represent the launch period.

The vendor and operator's employee expenses for general system start-up include:

- General and Administrative positions:
 - Executive Oversight – Ultimately accountable for successful launch of system. Undertakes agency and client coordination, high level decision-making, policy establishment, etc.
 - General Manager – Involved in all aspects of setting up system, including marketing, operations, permitting, working closely with agencies to ensure all aspects of a successful launch.
 - Marketing and Public Relations – Manager to guide naming, branding and logo development, create and implement marketing and promotional plan, and manage all media relations.
 - Finance and Accounting – Department must keep accurate accounting.
 - Human Resources – As the contractor will hire 20-25 people within several months and have comprehensive contracts, potentially with federal funding and employment compliance metrics, solid HR practices are necessary.
 - General Administrative – This person will cover many different aspects of launch, including assisting with marketing, HR, key programming and fulfillment and accounting.
- Operations positions (i.e. those employees responsible for setup of facilities and employee training):
 - Operations Management – Oversees facility procurement and setup, system procurement, equipment purchase, vehicle leasing, employee technical training, station installation.
 - Information Technology – Oversees backend setup of system, communications for stations, facilities and employees, web site development, recordkeeping for employees, setup of reporting systems, online store (to sell merchandise), or any other specific systems for King County.
 - Station Tech – Oversees station assembly, hardware and programming; must obtain significant training during launch period.
 - In-Shop Bike Maintenance – Oversees bike shop setup, assembly, hiring of assembly and on-street employees, establishment of on-street bike maintenance protocols; must obtain training during launch period.

System start-up will involve a number of direct costs. The non-profit will determine a financial model to hire a contractor. Under this arrangement the contractor will likely be responsible for the following costs:

- Operations Facilities and Equipment:
 - Warehouse – a large warehouse is required for launch to receive equipment and station assembly. Costs for utilities and furnishing are included. It is possible that some outfitting might be required for this space.
 - Supplies and Equipment – a significant amount of tools and equipment is typically required for station and bike assembly. This can include tools, lubricants, cleaning materials, any required specialized equipment, forklift rental, as well as health and safety equipment for employees.
 - Vehicles – Rebalancing and general maintenance vehicles will be obtained approximately one month prior to launch. Pro forma reflects lease costs and fuel for that time.

- IT and Communications:
 - Website Development and Programming – A website for the system will be created. This website will provide information about the service, include the ability for members to register for the service, see a station map with live status of available bikes and docking points, obtain safety information, news and alerts, and have an online account where they can monitor their usage, billing, calories burned, etc.
 - System Software Setup – Charged by the equipment vendor to undertake initial system programming. The costs in the pro forma are a general estimate based on our industry knowledge, and would require specific quote from the providers.
 - Employee Communications – Computer and phone purchase for employees, and internet and cell phone costs for employees during the launch period.
- Bike Share Launch and Upkeep Materials:
 - Marketing and Promotional Materials – Design and production of branding, logo and related brochures, t-shirts, hats, bags or other collateral for the pre-launch marketing effort. This budget can go towards funding a staff member for marketing or hiring an agency to design these materials. It will also cover production of these items.
 - Map Design – Design for the system map that will be included on the map panel at every station. Printing is not included in this line item.

A.2 Phase Start-up Costs

The pro forma enumerates costs related to purchasing, assembling, permitting and installing stations. Please note that the Phase 3 start-up costs assume acquisition of a second warehouse and equipment east of Lake Washington.

- Station Purchase – planning for the system assumes an average 19-dock, 10-bike station. This average is based on our operations experience as to the ideal station size, feasibility of placing the stations in the public right of way, and ideal bike-to-dock ratio. Some will be appreciably larger, e.g. other cities have stations with up to 50 docks, and some will be smaller with the typical minimum being 5 to 7 bikes. The 19 dock / 10 bike ratio is becoming standard in Alta Bicycle Share systems where they have found that 11/10 is far too small for a big city and highly utilized system, that 15/10 is acceptable, and that 19/10 allows sufficient extra docks to accommodate high inbound demand, reducing rebalancing costs.

Station purchase costs are a general estimate based on industry knowledge, and would require specific quotes from the vendors. Features assumed to be included in the purchase are:

- Station-based system.
- Solar-powered, wireless communication and modular.
- Well-tested in a large urban environment, with a record of low theft and vandalism.
- Stations allow for members with a key or card to retrieve a bike, or for walk-up credit card users.
- Bike lights that retain charge after movement has stopped.
- Seven-speed bikes (see Section 4.3).
- Map panel.
- System keys.

- Shipping.
 - Warranty.
 - Helmet vending machine at each station (see Section 4.2).
- Site Planning and Permitting – This cost is for an outside consultant to obtain permits for the stations. This can be done in-kind by agency staff, but requires significant staff time. Even in the case of an outside consultant, agency staff will be required to assist this process in a timely manner. Some items to decide internally and investigate prior to embarking on this process are:
 - Whether this will be done by agency staff or through a consultant.
 - If the municipality will be willing to place stations in on-street locations, potentially giving up parking spots.
 - If the municipality will charge the contractor / non-profit to place stations on-street.
 - Who will be the “public face” of the permitting process, the municipality, non-profit, or the contractor?
 - What level of decision making authority will the agency have for station locations?
 - Whether contractor will be required to place stations in locations that are required by either sponsor or funder contract.
- Station Assembly – Estimate for labor to unpack, assemble, program, sticker and stage stations to make ready for deployment.
- Station Deployment Vehicle Costs – Estimate for the truck, equipment and operator to place stations.
- Bike Assembly – Estimate for labor to unpack, assemble, program, sticker and stage bicycles for deployment.
- Map Production – Estimate for printing cost of map panels. Note that when new phases are added to the system the map must be redesigned and all map panels must be reprinted.
- Bike Spare Parts – Estimate for initial spare parts purchase when new bikes are ordered. Estimate includes 10% of initial bike value to establish an inventory of parts to cover the time lag between warranty returns. Following the initial equipment order, annual spare parts ordering should only be consumables, as most other parts should be covered by warranty (warranty typically lasts 5 years).
- Station Spare Parts – Estimate for initial spare parts purchase when new stations are ordered. Estimate includes \$800 per station to establish an inventory of parts to cover the time lag between warranty returns. Following the initial equipment order, annual spare parts ordering should only be vandalized parts, as all other parts should be covered by warranty. This order includes paper for station receipts and extra batteries as power backup.
- On-Street Bike Maintenance Vehicles – Estimate for cost and number of cargo bikes required to perform on-street preventative bike maintenance. These vehicles will be purchased. The number required is directly correlated with the number of bikes on the street and distribution of service areas.
- Additional Warehousing and Equipment for East of Lake – For the Phase 3 launch, a separate warehousing facility will be required, with its own equipment. Shown is the estimate for start-up costs for that facility.

A.3 Operating Costs

Please note that in the pro forma employee costs are not always full positions. For direct costs, it is assumed that operational costs for Phase 3 include a separate facility, separate vehicles, and separate employees for the “satellite systems” east of Lake Washington.

The administrative and backend support positions between start-up and operations are the same. However, the operational positions shift from assembly and installation to bike and station upkeep and rebalancing. In addition, many of the direct costs remain similar. For succinctness, in the list below, only costs that are different from start-up are listed.

Employee expenses for operations include:

- Operations staff:
 - Operations Manager – Oversees all aspects of operations, including system expansion.
 - Shift Managers / Dispatchers – Tasked with responsibility for the system when they are on shift, also act as dispatchers for rebalancing employees. Necessary because of 24/7 aspect of system.
 - Information Technology – Oversees all technical aspects of system, including communications for stations, facilities and employees, web site upkeep and incremental development, recordkeeping for employees, reporting systems, online store or any other specific systems for King County.
 - Station Technicians – Undertake technical station upkeep, must be ready to respond at all times, and thus requires several to cover 24/7 operation of system, with one Lead Station Technician who undertakes inventory, warranty claims, and ordering parts.
 - Rebalancers – Drive rebalancing vehicles to keep system in balance. Require different shifts to cover 24/7 aspect of system. Limited by number of vehicles.
 - In-Shop Bike Maintenance – Undertake maintenance of bikes requiring in-shop maintenance. Lead bike mechanic responsible for inventory, warranty claims, and parts ordering with supplier.
 - On-Street Bike Maintenance – Bike checkers who undertake routine preventative maintenance of bicycles. Often interact with customers or potential customers.

Direct costs for operations include the following categories:

- Operations Facilities and Equipment:
 - Warehouse – After launch, a smaller operations warehouse will be required (estimated need for approximately 5,000 square feet). Costs for utilities and furnishing of this warehouse are included in the pro forma. It is possible that some outfitting might be required for this space.
 - Supplies and Equipment – Some supplies and equipment are required on an annual basis, approximately scaled to the size of the system. These supplies and equipment can include tools, lubricants, cleaning materials and equipment, as well as health and safety equipment for employees.
 - Redistribution Vehicles – Typically, these vehicles are leased or financed, although purchase of used vehicles is also a possibility. Different operations teams use different vehicles. Options include the Mercedes Sprinter (Extended Length), which can hold approximately 25 bikes; Ford F150 truck hauling a trailer, which can hold 20-40 bikes (large trailer). Thus far, there are no electric or hybrid vehicles on the market which offer dependable, affordable operations.
 - All-Purpose Maintenance Vehicles – These vehicles are used for station maintenance, and can be either leased, financed or purchased.
 - Station Relocation Vehicle Costs – Stations will likely need to be moved to accommodate construction or special events.
- IT, Communications and Customer Service:

- Software License, Support, Upgrades – This is a pass-through cost to the equipment / software provider. May be a per-station or per-bike cost, depending on the provider. Costs shown are a general estimate based on industry knowledge and will require a quote from providers.
- Station Communications – Stations communicate with the server over the cell phone network. Therefore, each station must have its own cell phone plan with, for example, T-Mobile or AT&T. Costs are approximately \$35 per station per month.
- Customer Service – Contractor must provide a customer service solution that includes 24/7 multi-lingual service 365 days per year, with the ability to staff up or down for periods of high service. Customer service solution should also involve email responses, as well as potentially other communications technologies such as instant messaging or chat. Call center should be able to report length of calls, average call time, languages other than English, percentage of dropped calls, subjects of calls, number and types of emails responded to. Costs shown are a general estimate based on industry knowledge and will require a quote from providers. This line item should also include postage for mailing out the customer keys.
- Bike Share Launch and Upkeep Materials:
 - Marketing and Promotional Materials – Continued design and production of marketing materials for system, including website graphics, brochures, t-shirts, hats, bags, etc., as well as earned media.
 - Bike Spare Parts – After initial purchase for inventory, annual spare parts requirement should be smaller. This budget item should cover consumables, such as tires, as well as any parts damaged by vandalism, as all else should be covered by warranty.
 - Station Spare Parts – After initial purchase for inventory, annual spare parts requirement should be smaller. This budget item should cover only parts damaged by vandalism, as all else should be covered by warranty.
 - Annual Bike Replacement – To cover potential bike theft and vandalism, the budget includes an item to account for missing or irreparably damaged bikes at the end of the year. Theft rates in North American bike sharing systems have been approximately 2-3% per year, mostly due to incorrect docking of bikes or credit card theft.
- Other Administrative Direct Costs:
 - Insurance – See detailed discussion in Section 9.4.
- Vendor Management Fee / Profit – Costs above are noted as direct costs. If operations are contracted out, some profit margin will be required. This has been estimated at 10% of all costs to operate the system, but will be determined by the contractor quote and the contract structure. There are different ways to structure these contracts. Only one profit-sharing bike share contract has been signed in the US, in Boston's Hubway system.

Appendix B

Bike Share Demand Model

Appendix C

Membership and Usage Assumptions

Appendix D

Review of Private Funding Sources

Appendix E

Description of Operational Characteristics

E.1 Example Service Level Requirements

- Level of Operational Bicycles: Bike-to-dock ratio at least 50%.
- Damaged Bicycles Removed from Service: 95% of damaged bicycles removed from service within twenty-four (24)-hour period after discovery by operator that a bicycle has been damaged.
- Rebalancing: 95% of the time, stations are not full or empty in rush hour centers (these stations to be defined) or for more than 2 hours during rush hour (hours to be defined). No stations full or empty for more than 4 hours during hours of 6 a.m. to 10 p.m. If the system shows less than 1.5 uses per bike per day (or some other pre-defined metric), this service level is not enforced.
- Station Availability: Stations available for public use at least 95% of operating hours.
- Call Center Availability: Call center available at least 99% of operating hours.
- Call Center Answer Time: 80% of calls answered within 30 seconds.
- Website Availability: Website available at least 99% of operating hours.
- Graffiti: 95% of the time, graffiti is removed (if possible, or covered) within 24 hours of discovery.
- Preventative Bike Maintenance: Each station is visited every two weeks, and all bikes at that station are checked. Each bike is inspected at least once every calendar month.

E.2 Example Maintenance Standards

- Check tire pressure and add as needed to recommended PSI.
- Check tightness of handlebars, headset bearings, and full handlebar range of motion.
- Check tightness of seat, seat post quick-release, and that the seat post moves freely in full range of motion.
- Check brake function front & rear.
- Check grips for wear and brake levers for tightness and damage.
- Check bell for tightness and correct function.
- Check handlebar covers for damage & instruction stickers.
- Check front basket for tightness & damage, and bungee cord for wear.
- Check for correct gears & shifter function through all gears.
- Check fenders front & rear for damage and clean inside fenders.
- Check tires front & rear for damage/wear.
- Check wheels front & rear for trueness, broken/bent spokes & hub/axle tightness.
- Check LED lights front & rear for function.
- Check reflectors on wheels, seat and basket are present, clean & undamaged.
- Check pedals & cranks for tightness.
- Lubricate/clean chain and check chain tensioner for correct function.
- Check kickstand for correct function.
- Brief test ride to ensure overall correct function of bike.
- Wipe down bike with cleaner/polish & remove graffiti or stickers and grime as needed.
- Clean station of grime and graffiti within 24 hours to avoid blight.

On an annual basis, every bike should undergo the following preventative maintenance in-shop:

- Remove, clean and adjust entire drive train, including brakes and gear systems.
- Inspect and adjust tension, and true wheels.
- Inspect tires for excessive wear, defects, and replace inner tubes.

- Inspect hubs to make sure they are functioning properly.

E.3 Example Reporting Standards

Monthly Reporting

- Membership:
 - YTD membership counts at the end of the reporting month by membership type and jurisdiction.
 - Number of new members by type and jurisdiction who signed up during the reporting month, by day and month.
 - Number of cancellations and/or expirations of registered members by type and jurisdiction during the reporting month.
- Ridership:
 - Trips per day per jurisdiction, member type and system wide.
 - Total trips per month and YTD per jurisdiction, member type and system wide.
 - Breakdown of total trips per day of week and hour of the day by jurisdiction and system wide.
 - Average duration of trips by jurisdiction, member type, and system wide.
 - Average and total length of trips by jurisdiction, member type and system wide.
 - Distribution of trip origin and destination by station.
- Environmental Impact:
 - Total and average calories burned per day/month by jurisdiction, member type and system wide. Based on calculation using total and average trip durations.
 - Carbon offset per day/month by jurisdiction and system wide. Based on calculation using total miles travelled (straight line distance).
 - Average carbon offset per member and jurisdiction. Based on “total members/total carbon offset”.
- Rebalancing Operations:
 - Number of bikes rebalanced per day.
 - Bikes on the street per day per jurisdiction.
 - List of full/empty instances (station, start time, end time, date).
 - Count of full/empty instances per station and jurisdiction by day/month.
 - Breakdown of full/empty instances by duration.
 - Percentage of time stations are normal, full, or empty.
 - Breakdown of additional time granted when stations were full.
- Station Maintenance Operations:
 - Number of active stations.
 - Count of station visits by technicians for normal maintenance.
 - List of all station malfunctions (station, start/end date/time, event).
 - List of all dock malfunctions (station, start/end date/time, event).
 - Percentage of time stations were available to provide rentals for all membership types by station and system wide.
- Bicycle Maintenance Operations:
 - Count of bikes checked per day/month.
 - Count of bikes repaired per day/month.
 - Average time per repair.

- Breakdown of repair types (minor, major, annual overhaul).
- Breakdown of the cause of repair needs (normal wear, crash, warranty failure, vandalism).
- Incident Reporting:
 - List of all incidents (crash, vandalism, theft, police action) with dates and summary of outcomes.
 - Stolen/missing bike list and status.
- Customer Service Reporting:
 - Number of calls/emails. Total and broken down by classification.
 - Average time to answer call.
 - Average time of call.
 - Number of refunds and amount given per month.
 - Upon call center software availability, number of calls of different types of issues, average length of call.
- Customer Outreach:
 - Web site analytics.
 - FB/twitter posts count and summary.
 - Gift Certificate sales summary.
 - Corporate membership sales summary.

Quarterly Reporting

- System Statistics:
 - Demographics of registered members (age, gender, zip code).
 - Maps showing density of registered members.
 - Maps showing popularity of station pairs.
 - Revenue generated per station (casual member purchases and trip fees incurred by trips starting at the station).

Weekly Reporting

- System Statistics:
 - Trips per day per jurisdiction for previous week.
 - New members per type for previous week.
 - Bikes on the street per day for previous week.
 - Total revenue generated from trips that lasted for more than 30 minutes for the previous week.

Other Reporting

Other reporting could include user surveys to collect statistics such as demographics, usage statistics such as how users would have travelled if bike share systems were not available, how many bike share trips are replacing or used in conjunction with transit trips, whether users are using transit more or less, whether the bike share system has influenced vehicle ownership decisions, etc.

Appendix F

Insurance Example

INSURANCE

8.1 Insurance Coverage. Prior to the Effective Date, Alta shall deliver to the Purchasing Agent a Certificate(s) of Insurance, attached hereto as Exhibit A, indicating that Alta has in force the insurance coverages described below. Alta agrees to maintain such insurance coverages until the completion of all of Alta's obligations pursuant to this Agreement, including without limitation, all warranty periods. As such, all liability insurance coverages shall be written on an occurrence basis. All required insurance coverages shall be acquired from insurers qualified to do business in the Commonwealth of Massachusetts and acceptable to the City. The minimum insurance coverages shall be:

A. Worker's Compensation, with Employer's Liability limits of not less than the greater of: (i) one million dollars (\$1,000,000) for each accident; or (ii) the statutory limit for each accident.

B. Commercial General Liability, including all coverages contained in an unamended I.S.O. Form CG 00 01 with limits not less than one million (\$1,000,000) dollars for each occurrence and three million (\$3,000,000) in the aggregate for each annual policy period of Combined Single Limit Bodily Injury and Property Damage. Such form includes Contractual Liability, Personal Injury, Advertising Liability, Broad Form Property Damage, Products and Completed Operations coverages.

C. Comprehensive Automobile Liability Insurance, with limits not less than one million (\$1,000,000) dollars each occurrence Combined Single Limit Bodily Injury and Property Damage, including owned, non-owned and hired auto coverages, as applicable.

D. Excess Liability Coverage, following the insurance referred to in clauses A, B, and C above in the amount of three million (\$3,000,000) dollars per occurrence, Combined Single Limit, and three million (\$3,000,000) dollars in the aggregate for each annual policy period.

8.2 Endorsements. Commercial General Liability and Comprehensive Automobile Liability Insurance policies shall be endorsed to provide the following:

A. To name as additional insureds, with respect to the operations of Alta under this Agreement, the City of Boston, and all of its elected and appointed officials, officers, employees, agents, departments, agencies, boards, and commissions, and those sponsors who own property on which Rental Site(s) that are a part of the System are located; and

B. To provide that such policies are primary insurance to any other insurance available to the additional insureds, with respect to any claims arising out of this Agreement, and that insurance applies separately to each insured against whom claim is made or suit is brought.

8.3 Notice. All policies shall be endorsed to provide that there will be thirty (30) days advance written notice to the City of cancellation, non-renewal or reduction in coverage.

8.4 Assumption of Risk. Alta assumes all risks for direct and indirect damage or injury to the property or persons used or employed on or in connection with the Work contracted for, and of all damage or injury to any person or property wherever located, resulting from any negligent action, omission, commission or operation under this Agreement, or in connection in any way whatsoever with the contracted Work.

No acceptance or approval of any insurance by the City shall be construed as relieving or excusing Alta from any liability or obligation imposed upon Alta by the provisions of the Contract Documents.

Alta shall be responsible for the Work performed under the Contract Documents and every part thereof, and for all materials, tools, equipment, appliances, and property of any description used in connection with the Work.

Alta shall be as fully responsible to the City for the acts and omissions of its subcontractors and of persons employed by the subcontractors as Alta is for acts and omissions of persons directly employed by Alta.