CAPITAL CITY DEVELOPMENT CORP

BOISE
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Parking Strategic Plan

APPENDIX A1

Arlington County Capital Bikeshare
Transit Development Plan

Fiscal Years 2013 to 2018

Kimley»Horn
Expect More. Experience Better.

Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018

ARLINGTON VIRGINIA
DEPARTMENT OF ENVIRONMENTAL SERVICES
Arlington County Commuter Services
Bike Arlington

FOURSQUARE INTEGRATED TRANSPORTATION PLANNING

ARLINGTON COUNTY CAPITAL BIKESHARE TRANSIT DEVELOPMENT PLAN

Fiscal Years 2013 to 2018

Prepared by **Foursquare Integrated Transportation Planning**

For **Arlington County Commuter Services**

November 2012

a special thanks to our partners...
Arlington County Transportation Division
Bike Arlington
Capital Bikeshare
District Department of Transportation

Cover Photo: Elvert Xavier Barnes Photography, 2011

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Arlington County Capital Bikeshare Transit Development Plan

Fiscal Years 2013 to 2018

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Boston Hubway, Radialus Blog, 2011

Chapter 1: State of the Practice

November 2012

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1 STATE OF THE PRACTICE RESEARCH

1.1 Introduction

A key step in any transit development plan is a peer review to gauge how the system being analyzed is performing and to gain ideas from other areas that could be applied. Many cities, both large and small, are home to bikesharing programs, and more are being added each year. This research looked at how these systems operate, how they make decisions on where to locate bikeshare stations, what type of riders they serve, how they market the program, and how they are funded.

1.2 Approach

Research Scope

The first step in the research was to develop a set of questions and topic areas that would help inform the rest of the Transit Development Plan. The full set of questions and topics is shown in Appendix A. Once the set of questions was developed, the research was targeted to those.

This state of the practice research includes both secondary and primary research. First, it includes information gleaned from published academic literature on bikesharing, focused primarily on the questions of interest to the Arlington Capital Bikeshare system. The research also includes information derived from secondary, web-based research, and finally includes information provided through telephone and email interviews with several existing and just-starting bikesharing systems in North America. While bikesharing is prevalent throughout Europe and even in Asia, those systems were reviewed using secondary research only, both through the academic literature and online research. As the North American systems are more similar in nature to Arlington Capital Bikeshare, the primary research effort for this peer review/state of the practice review focused on this continent.

Interviews

As noted, interviews were held with five bikesharing systems to gain further insight into the topics useful to planning for the growth of Capital Bikeshare in Arlington County. Prior to the interviews, as much information as possible was pulled from the system websites in order to better inform the questions and focus on information that could not be found through other means. The calls generally lasted one hour, and in some cases follow-up e-mails were sent to gain additional insight or detail. Montréal staff preferred responding to questions via email, so very little information was gleaned through the telephone calls. Table 2.1 lists the dates of the interviews, the participants, and their titles.

Table 1.1 Peer Interview Participants

System/Agency	Interview Date	Participants	Titles
B-Cycle Boulder	December 2, 2011	Elizabeth Train	Executive Director
Hubway Boston	November 30, 2011	Nicole Freedman	Director of Bicycle Programs City of Boston
Nice Ride Minnesota	November 22, 2011	Bill Dossett	Executive Director
Bixi Montréal	November 30, 2011	Gian-Carlo Crivello Nicolas Blain	Director of Business Development Urban Planner
Chicago	November 30, 2011	Scott Kubly	Managing Deputy Commissioner, CDOT

1.3 System Overviews

This section provides a brief overview of each bike share system interviewed in the course of the primary research. Following the brief overviews, Table 2.1 provides details of these bikeshare programs, plus several others for whom primary research was not conducted. All information presented hereafter is effective as of November/December 2011, when this research was conducted.

All programs interviewed that are currently operating use one of two systems: B-Cycle or Bixi. B-Cycle is a bicycle sharing company formed in partnership between Trek Bicycle Corporation, Humana (health insurance) and Crispin Porter + Bogusky (advertising agency). B-Cycle provides the bicycles and station equipment, but all planning and operations are undertaken by a non-profit or government agency. The Bixi system was developed by the Public Bike System Company (now known as PBSC Urban Solutions), which was originally set up by the City of Montreal. In cities with Bixi equipment, the planning and operations are conducted either by Bixi (in the case of Montréal) or by Alta Bike Share, as in the Capital Bikeshare program. In those cases, the equipment is provided by Bixi, but planning for station placement/growth, operations and maintenance are all taken care of by Alta under contract with the jurisdiction or non-profit, unlike in DC and Arlington where the jurisdictions do the planning.

B-Cycle (Boulder)

The City of Boulder, through the non-profit Boulder B-Cycle, started the city's bikesharing program on May 20, 2011. Beginning next season, Boulder and Denver B-Cycle systems will provide reciprocity for their members. The program is seasonal, from about March to November, but they will adjust upon seeing usage in the colder months, as there has been a significant decline in the number of trips taken since a cold week in October.

Hubway (Boston)

The City of Boston launched the Hubway bikesharing system in July 2011. The system began with 60 stations throughout the city and 600 bicycles. The system is managed by the city and operated by Alta Bicycle Share. Alta is responsible for marketing and membership sales, station and bike repair and

maintenance, station redeployment, and reporting on system and operation performance. Bicycles are available 24-hours a day and three seasons a year; the stations are removed during the winter months. Hubway has plans to expand the system into Cambridge, Somerville, and Brookline in 2012.

Nice Ride (Minneapolis)

Nice Ride is a non-profit set up to operate the bike sharing service in Minneapolis. In 2008, Minneapolis Mayor R.T. Rybak observed the success of bikesharing in European cities and wanted to implement the concept there, but preferred that a non-profit own and operate the program rather than having the city do so. The mayor and the City of Lakes Nordic Ski Foundation developed a non-profit business plan for the program and proceeded to secure funding. The City does serve as the fiscal agent for receipt of FHWA money for use on capital equipment purchases. Most of Nice Ride's 116 stations are in the city of Minneapolis, but 20 are in St. Paul and another 3 are on the St. Paul Campus of the University of Minnesota, which is in another small jurisdiction.

Bixi (Montréal)

Bixi Montreal is the original system implemented by the Public Bike System Company, now known as PBSC Urban Solutions. It is a non-profit that has operated the program for the past three years, beginning in 2009; Bixi Montréal operates seasonally. Stations are densely concentrated in the downtown core and residential areas, with stations no more than 500 meters apart.

Chicago

Chicago DOT is currently in the middle of RFP process to for a vendor to establish and operate a bikesharing program for the city; the city will own all of the assets. This draft report will be updated with new information upon award by the City.

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Table 1.2 Bikeshare Systems Overview Information (As of November/December 2011)

	Capital Bikeshare (Arlington)	B-Cycle (Boulder)*	Hubway (Boston)*	Nice Ride (Minneapolis)*	Bixi (Montréal)*	Chicago*	NYC Bike Share (New York)	Vélib' (Paris)
Date of Program Start	September 2010	May 2011 (operates seasonally)	July 2011 (operates seasonally)	June 2010 (operates seasonally)	May 2009 (operates seasonally)	Summer 2012 (also has small existing B-Cycle system)	Summer 2012	July 2007
Oversight Agency	Arlington County Commuter Services and District DOT	Boulder B-Cycle (non-profit)	City of Boston	Non-profit	Non-profit Public Bike System Company (PBSC)	City of Chicago	City of New York DOT	City of Paris
Contractor Name/Role	Alta Bicycle Share, Inc.	N/A	Alta Bicycle Share, Inc.	Use contracted construction firm to replace/remove docks at beginning and end of season	N/A	TBD	Alta Bicycle Share, Inc.	JCDecaux (advertising corporation)
# Stations/Docks	20 fixed stations, ranging in size from 11 to 19 docks	15 fixed stations (stations are winterized and left during the winter months)	60 fixed stations (stations are removed during winter months)	116 fixed stations, smallest has 15 docks, largest has 39	405 modular and moveable stations	300 fixed stations in 2012, plans for 200 more in following two years	600 fixed stations	1,800 fixed stations
#/Type of Bicycles	1,113 system/Around 120 typically docked in Arlington/ PBSC Urban Solutions (Bixi) through supplier Cycle Devinci	130/110 on the street at one time/Trek Bicycles	600/ PBSC Urban Solutions (Bixi) through supplier Cycle Devinci	1,200/ PBSC Urban Solutions (Bixi) through supplier Cycle Devinci	5,050/ PBSC Urban Solutions (Bixi) through supplier Cycle Devinci	3,000 in 2012, plans for 2,000 more in following two years/bicycle type TBD	10,000/ PBSC Urban Solutions (Bixi) through supplier Cycle Devinci	20,000/Mercier

	Capital Bikeshare (Arlington)	B-Cycle (Boulder)*	Hubway (Boston)*	Nice Ride (Minneapolis)*	Bixi (Montréal)*	Chicago*	NYC Bike Share (New York)	Vélib' (Paris)
# of Members (Annual/Casual)	19,200 system wide cumulative annual members, of which over 1,200 are Arlington residents/105,644 casual members system wide since September 2010	1,200 annual members, 6,000 casual users since May	3,650 annual members/ 30,000 casual members	4,000 annual/35,000 24-hour subscriptions/year (2010)	29,760 at end of 2010 season	N/A	N/A	Unknown
# of Trips	As of October 2011, 1,171,562 system wide, with 58,760 of these trips originating in Arlington; average trip length 1.2 miles	18,000 trips by all members; highest numbers in June – August (700-1,000 trips/week); average trip length 2-3 miles	60,000 trips by casual members in 2011; average trip length 1.1 miles	230,000 trips/year (range from 1,200 to 2,400 trips/day)	3.3 million trips in 2010 (470,000/month)	N/A	N/A	110,000 average weekday trips
Funding Sources	CMAQ, local vehicle decal fee, commissions from transit fare media sales, member and usage revenues and private sponsorships (BID, TMA and university)	Capital campaign, state transit funding, federal stimulus funding, sponsorship and user fees	Corporate sponsorship (New Balance), Boston Public Health Commission, Station sponsorship, Advertising, FTA Bus Grant, CMAQ Grant, State Grant, user fees	Corporate funding (Blue Cross-Blue Shield fund), other private/non-profit investors, FHWA funds through local program, station sponsorships, user fees	Corporate sponsorship $1.5 million annual fare revenue (FY end 1/31/11)	Federal CMAQ initially; program will be self-sustaining through member and user fees, advertising, sponsorship	Corporate sponsorships and user fees	JCDecaux provided start-up funding and ongoing operational funding in exchange for advertising revenue

	Capital Bikeshare (Arlington)	B-Cycle (Boulder)*	Hubway (Boston)*	Nice Ride (Minneapolis)*	Bixi (Montréal)*	Chicago*	NYC Bike Share (New York)	Vélib' (Paris)
Fares / Usage Fees	$75 annual $25 30 days $15 3 days $7 24 hours No fee first 30 min $1.50 /$2.00 annual/casual members 30-60 min $4.50/$6.00 for annual/casual members 60-90 minutes $6/$8 for annual/casual members for every half-hour thereafter	$50 annual $15 7 days $5 24 hours No fee first hour $4 each additional half hour	$85 annual $12 3-day $5 24-hour No fee first 30 min $1.50 /$2.00 annual/casual members 30-60 min $4.50/$6.00 for annual/casual members 60-90 minutes Increased costs per 30 minutes thereafter $5 subsidized annual membership and usage fees(for qualifying residents)	$60 annual $50 annual student $30 30-days $5 24-hours No fee first half hour $1.50 up to 60 min $4.50 up to 90 min +$6 each additional 30 min	$78 CAD annual $28 CAD monthly $12 CAD 72 hours $5 CAD 24 hours No fee first 45 min (first 30 minutes for casual users) $1.50 CAD 46-60 min $3 CAD 60-90 min $6 CAD each additional 30 min	No fee first 30 min Specific fee structure to be proposed by vendors	<$100 annual, TBD	€29 annual €39 annual w/45 free minutes €8 7 days €1.70 24 hours After 30 minutes free, €1 - €4 each subsequent 30-minute period

* Programs interviewed

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All of the systems reviewed are relatively new, and all U.S. programs reviewed started in 2010 or later. Four of the seven systems reviewed operate seasonally; Chicago and New York both plan to offer year-round operations, as does Paris. Four of the seven systems use Bixi bicycles, one uses B-Cycle, the Paris system uses a street furniture contract, and Chicago is to be determined. All of the systems allow both annual and short-term memberships, all with similar cost structures. The funding sources of the systems reviewed vary widely, and will be discussed in greater detail in Section 2.7 of this chapter.

The following sections provide more detail and analyses on many of the systems reviewed in this section, as well as include information gleaned from published bikesharing literature.

1.4 Customers and Trips

Customer Demographics

As a generalization, bikesharing members tend to be young, often male, highly educated, and have high incomes. The most typical member is between 18 and 34 years of age, has a high level of education, requires a high level of mobility, may not own a personal vehicle, and has awareness of social and environmental issues.

Primary Research

A survey of Hubway's membership revealed that 49% of its members are 20 to 29 years of age, 56% of have a household income over $100,000, and 70% are male. Bixi Montréal's members have an average age of 34, with 46% of members in 2011 falling between the ages of 24 and 34 years of age. 57% of the members are male, 82% have a university degree, and their income is higher than average.

In Minnesota, the two main drivers for bikeshare are visitors in hotels downtown and people who live in apartments within three blocks of downtown. They expected suburban residents who work downtown to use it during the day, but that market has not materialized.

Literature

The bikesharing literature documents that members take the form of different ages, genders, fitness levels, etc. The defining characteristics of the most typical member are: 1) 18 to 34 years of age, 2) high level of education, 3) requires high level of mobility, 4) may not own a personal vehicle, and 5) awareness of social and environmental issues. In 2009, more than half of BIXI's (Montréal, Canada) members owned a vehicle (53%), 59% owned a bike, and 71% lived in the service area.[1]

The gender profile of Vélo'v (Lyon, France), Vélib' (Paris, France), and Bicing (Barcelona, Spain) indicate that the majority of their users are men. The employment profile (available only for Vélo'v and Bicing) shows that, in both Lyon and Barcelona, "professionals" comprise approximately one-third of total

[1] CityRyde, 2009

users, presumably for daily commuting purposes. Not surprisingly, the proportion of student users is related to the size, location, and degree of integration with major educational institutions within a service area. The information below shows the demographic breakdowns available for a number of programs in Europe from several of sources.[2]

- Velo'v: 40.6% women/59.4% men and 34% professional/32% student/34% other
- Vélib': 36% women/64% men
- Bicing: 49% women/51% men (2007); 59% are over 30 years old (2009)

Attraction of and Marketing to Non-Traditional Users

Attracting low-income users is a challenge for most systems, both from a marketing perspective but also the practical issue of membership without a credit card.

Primary Research

Many systems are trying to address the use of the systems by lower income residents. Boulder B-Cycle is working on different models particularly to get to folks who don't have credit cards. Right now they are working with the housing authority to perhaps tie the membership and deposit to people's leases. The non-profit is also trying to get grants from the Colorado health foundation and other community wellness grants to put stations in low income areas. Either before the start of operations or during the first year, Chicago would like to address this by ensuring that low-income riders can participate without having a credit card; they plan to work with a banking partner to figure out the best approach.

Hubway markets to low-income Boston residents by offering reduced price annual membership that is subsidized by the Boston Public Health Commission. The subsidy reduces the annual membership from $85 to $5 per year, reduces the usage fees, and also includes a free helmet.

[2] JzTI and Bonnette Consulting, 2010; Bicing Report, 2009

Use of Bike Share for Job Access or Reverse Commutes

Not much is known about the actual use of bikesharing for reverse commuting, although it has the potential to play an important role for the first mile/last mile of work trips. Several systems offer incentives to encourage trips in the reverse direction and/or have data on high usage by commuters in general. Among the selected bikeshare systems abroad, the following percentages of members use bikesharing to get to work: 51% Bixi Montréal, 57% of Bicing (Barcelona, Spain), 64% in Lyon (France), and 70% occasionally and 30% regularly in Hangzhou (China).

Primary Research

There is no data as yet on the use of bikesharing for job access or reverse commute. Fifty-one percent of the members of Bixi Montreal have used the bikes at least two times per week to go to work, however there is no information as to whether this is peak direction or reverse commute. Some systems provide an incentive to use the bikes in the reverse direction or to less desirable locations. Similar to Capital Bikeshare's Reverse Riders Rewards program where users received a credit for picking up a bike at a full station or returning it to an empty station, The Vélib system in Paris allows and extra 15 minutes of free rental to return a bicycle to a station at higher altitudes.

Literature

Shaheen et al. (2010) note that bikesharing provides a low-carbon solution to the "first mile/last mile" problem (i.e., the issue of connecting the short distance between home and public transit and/or transit stations and the workplace). Thus, bikesharing has the potential to play an important role in bridging the gap in existing transportation networks, as well as encouraging individuals to use multiple transportation modes. Bicing[3] reports that 57% of their users employ bikesharing to commute to work, and in Lyon, 64% of members use bikesharing to commute.[4]

The largest bikesharing system in the world today, Hangzhou Public Bicycle, is located in China. It appears to be playing an important role in facilitating new forms of travel behavior among Hangzhou residents. A Hangzhou Public Bicycle user's survey[5] suggests that most users are commuting to work via public transportation and bicycling. Those responding to this survey commuted to work an average of five days per week; roughly 230 respondents commuted to work six or more days a week. The authors' analysis of bikesharing usage patterns in Hangzhou indicates that 70% of bikesharing members used the service in their commute at least occasionally; however, only 30% regularly used it as part of their commute.

[3] Bicing Report, 2009
[4] JzTI and Bonnette Consulting, 2010
[5] Shaheen et al., 2011

1.5 Station Location and Size

Station Location Decisions, Criteria, and Weighting

Table 2.3 shows the distance between stations in cities for which this information is available in the literature. These cities, all outside the U.S., all have much greater station density than is seen in the United States; the last rows of the table show the approximate distances between stations in several U.S. cities. The U.S. based programs are less focused on minimum station spacing distance in their planning than those outside the U.S.

Table 1.3 Station Spacing[6]

City	Distance Between Stations
Montréal, Canada	500 meter standard
Paris, France	250-350 meters
Lyon, France	250-550 meters
Barcelona, Spain	250-350 meters
Hangzhou, China	300 meters
Nice Ride Minnesota*	200-600 meters downtown, up to 2,000 meters in residential areas
Hubway Boston	400 meters in downtown
Capital Bikeshare Arlington	100-800 meters
Capital Bikeshare DC*	200-1,500m

*Rough calculations from station maps

General Station Location

Primary Research

Most, if not all, of the systems reviewed use similar techniques for determining station locations, creating a spatial analysis of key bikesharing drivers, such as density, transit accessibility, and access to bicycle facilities. They also use public input and the availability of space as inputs. About a ten minute walk to a bike sharing station seems to be the standard accessibility assumption.

The City of Boston worked with Alta to identify the initial station locations for Hubway. Alta developed a demand map with overlays of existing transit, tourism, residential, population, and commercial densities. Locations with the highest levels of activity were selected for station locations. Many of the initial station locations are performing as anticipated and others are being considered for relocation.

[6] JzTI and Bonnette Consulting, 2010

Hubway staff acknowledged that the station locations probably would have been the same as the locations identified in the model just by using knowledge of the city to site stations.

In Chicago, the final station locations will be developed in concert with the selected vendor, however the methodology will be similar to what has been done in other cities, namely a heat map of demographic information, employment and residential density, and transit and bicycle facilities. The city has also analyzed CTA station (heavy rail) ridership as a driver for nearby bikesharing usage. They also plan to use some type of crowdsourcing site, such as OpenPlans, for getting input from potential users on stations sites. Once the general intersection or block is selected, the specifics of the location will dictate the exact location.

Before the Nice Ride program launched, they conducted a location study with Alta that looked at population, employment density, and transit boarding data, as that tends to be a good indicator of retail activity and on-street pedestrian activity. (Most of the transit data is bus, as the only rail currently open in Minneapolis is a commuter rail line; a light rail line is under construction.) Nice Ride believes that about 1.5 miles is the longest that someone will ride the bicycle for, so stations must be located close enough together to accommodate that. Their feeling is that for regular commutes people will use their own bicycles, which are easier to ride and don't have an additional cost for using it longer than a set time.

Boston also allows station sponsors to provide input on the location of their stations, which is commonly in the vicinity of the sponsor. Hubway also allows visitors of their website to identify locations on an interactive map where they would like to have a station. Customers can also send an email to Hubway to provide input and suggestions.

In Boulder, the most utilized stations are downtown, but the least used station in the system is also right downtown, however it is not visible; they quickly realized that the stations have to be in very obvious locations. They have tried to tie stations in with existing transit. Two of the newest stations are transit focused, both at major transit stops. The next four stations, to be opened at the start of the next season, are at transit locations, including local and regional transfer centers. B-Cycle sees bikesharing as helpful particularly for the final mile for people coming in from Boulder County.

Literature

Studies have used a variety of input measures to determine location, including population density, employment density, location of tourist attractors, proximity to parks and recreation facilities, proximity to transit, and access to bicycle facilities.

Mathematical tools and models have been created to address a range of bikesharing pre-launch concerns including bicycle flow, number of docking stations needed, and bicycle redistribution practices.[7] Such tools allow cities to evaluate various bikesharing scenarios to assess program viability before launch and during operation.

In a study[8] about the viability of bikesharing in Philadelphia, Pennsylvania, the team spatially analyzed various demographic, land use, and infrastructure factors understood to be favorable for bikesharing usage to define a core market area in Philadelphia, Pennsylvania for bikesharing stations. Variables for each ten-meter block included the following (the numbers in parentheses following each variable indicate the weight assigned): population density of residents ages 17-64 (x1), population density of non-institutionalized group quarters (shelters and dormitories) (x1), job density (x1), location of tourist attractors (x1), proximity to parks and recreation facilities (x0.5), proximity to rail stations (x1.5), proximity to "bicycle friendly streets (x1), proximity to streets with bicycle lanes (x1), and locations of bus and trolley sto9ps (x1). The research methodology employed was a weighted sum raster analysis using geographic information systems (GIS) software. The study found that the best match for siting stations is obtained when the widely accepted "stations per square-mile" criterion is applied. The analysis incorporated assumptions from European bikesharing industry standards, including: 20 to 40 stations per square mile and 7.67 daily uses per bike for Lyon, Paris, etc.

In China, the average distance between the Hangzhou bikesharing stations is 300 meters.[9] In the user survey of Hangzhou Public Bicycle in 2010, members indicated that they most frequently used a bikesharing station closest to either home (40%) or work (40%). According to a 2010 Philadelphia bikesharing feasibility study, it is recommended that the bikes be strategically distributed according to a general accessibility-based standard, and specifically that all residents should be within a ten-minute walk of a bikesharing station.

[7] Shu et al., 2010
[8] Krykewycz et al., 2010
[9] Shaheen et al., 2011

Specific Station Siting

In terms of actual station siting, Boulder B-Cycle has used what they could downtown, as there is not a lot of space. They are now looking at the presence of transit and density of population and employment more closely for determining their expansion locations.

Bixi Montréal locates their stations close together, in most cases no more than 500 meters apart. This ensures a high degree of redundancy, so if a station is full or empty there are plenty of nearby stations from which to choose. This is at the expense of having stations cover a larger geographic area within the city. With regard to specific station locations, Bixi Montréal focuses on several key criteria, including visibility and security and observation of municipal rights. The system also installs bicycles in the streets, with key criteria including installation in the direction of traffic and close to a stop sign.

Bike Station Sizing and Expansion

Stations with 15 docks seem to be about the average size in the systems reviewed; some cities can have larger stations than others, depending on land constraints.

Boulder B-Cycle's biggest station has 15 docks but in most cases Boulder B-Cycle can't get the land for such a large station, as they have very constrained land in downtown. The average size of a Hubway station is 19 docks, but stations at transit hubs require more docks because of higher demand; larger stations are as large as 25 docks. Hubway has expanded some stations, but attempts to expand other locations were hindered by station proximity to trees and utilities. Bixi Montréal tries to select station locations that give them the availability to add docks if needed. On average, stations in Montreal have 15 docks. Chicago's RFP stated that the average station will have ten bikes with 1.5 – 2 docks per bike, or 15-20 docks per station.

Station Siting: Residential Areas and Other Unique Locations

Residentially located stations have met with mixed success, but most have performed well as long as the residential areas have sufficient density and are well-served by other forms of transit.

One Boulder B-Cycle station in a completely residential area (specifically family housing for Colorado University) has been doing really well. For new residential locations, they are choosing locations that are an easy trip to downtown, but a bit too far to walk. Boulder B-Cycle believes that people not willing to walk more than 6-10 minutes to access a bicycle.

Boston Hubway stations are located in areas with a mix of transit, tourist, residential, and commercial activity. Stations are also located on university campuses, such as the Boston University Medical Campus

and Harvard University. Hubway usage on university campuses is lower than anticipated. To try to boost membership and usage, Hubway staff visited campuses offering discounted membership and free safety classes to help increase membership on campuses. [10]

Nice Ride doesn't currently have stations in purely residential areas. They do have a lot of stations in an area just outside downtown that is largely residential, but it is mostly condos and artist lofts with a lot of ground floor retail. One area that Nice Ride would like to focus on is the benefits of bikesharing outside of center city and how to take it to the next frontier; the non-profit that operates Nice Ride will be taking this idea to their board in the next several months. They are not sure yet of the exact approach, but it will probably not traditional bikesharing, as it will not be cost effective in the small towns, bedroom communities, and commuter rail stations that they are thinking about expanding to.

Bixi Montreal sites stations in residential areas, as more than half of their members use the system to commute to work.

Chicago plans to place bikesharing stations in residential areas, but only in those near high quality (high frequency) transit. They do not believe there is a particular density of residence that is the tipping point for use but rather the proximity to jobs and high quality transit. The city abides by the notion that the best station placement approach is to have a dense core of stations and then scatter stations in the outlying areas – by serving more people the program builds political capital and gets more people bought into the program. In the lower use areas, they may have smaller stations, such as with seven docks. The one point of caution is that the stations cannot be too far apart in the outlying areas, given the city's belief that about two miles is the farthest a user can be expected to travel using bikeshare.

Chicago has acknowledged the need to address equity considerations when siting the stations. The north side of Chicago is a more affluent area and is still gaining population, so it will be a natural fit for bikesharing. The south side population has lower income and is not well served by heavy rail, with the main line going down a major highway; it is also still depopulating. However the city needs to serve it from an equity standpoint, even if all of the locations may not work from a market perspective.

In Paris, some stations located above an altitude of 60 meters are called V+. In order to encourage members to ride to those stations so that bicycles are available there (and to give the riders extra time to ascent the terrain), Vélib gives any user returning a bicycle from a non-V+ station 15 free minutes of rental; if the rental lasted more than 30 minutes, 15 minutes will be deducted to calculate the amount the user has to pay (for example, a 45-minute trip to a V+ station is free). If the rental lasted 30 minutes or less, the 15 minutes are added to a bonus V+ account, and can be used for future rentals exceeding 30 minutes.

[10] http://bostinno.com/2011/10/20/hubway-offering-50-discounts-free-safety-classes-for-boston-area-college-students/

1.6 Operations

Stations

U.S. bikesharing systems all use fixed stations, although the stations are removed for the winter in a most of the programs. There has been some use outside of the United States of flexible pick up and drop off, but it has not been widely used.

The majority of existing bikesharing systems employ fixed stations. However, flex stations have been used as well. Flex stations are those in which members employ mobile phone technology and street furniture for bicycle pick up and drop off. With such a system, users receive a code on their mobile phone to unlock bicycles. Users leave bicycles at major intersections and inform the program where the bicycle is locked. This approach allows bicycles to be available throughout an entire city and minimizes the amount of infrastructure needed to operate a program. Primarily, Call-A-Bike in Germany has used flex stations. They have been successful in terms of ridership, but in the larger cities Call-A-Bike may be moving toward the use of fixed stations.

One of BIXI's major innovations is the creation of completely portablens solar powered docking stations. This portable technologyallows stations to be transferred to different locations according to usage patterns and user demands. The use of solar-powered stations alsoobviates the need to connect to a power grid and reduces program-related carbon emissions.[11]

Bicycles

The appropriate timing for when the bicycles will need to be replaced is currently unclear, due to the infancy of the programs reviewed. Most U.S. bike sharing systems utilize B-Cycle bicycles manufactured by Trek or PBSC Urban Solutions bicycles manufactured by Cycle Devinci. GPS units installed on bicycles is an emerging bikeshare trend; this allows the programs to better track usage patterns.

Boulder B-Cycle uses Trek bicycles, one of three companies that form the private partnership of "B-Cycle." Boulder B-Cycle just started, but Trek estimates the life of the bike at five years. Denver, which uses the same equipment, thinks that may be seven years as long as the bikes are maintained and winterized, however 2011 was only Denver's second season, so that is just an estimate.

Hubway uses PBSC Urban Solutions bicycles and has 600 bikes in its fleet. It estimates that 10 bikes will be lost this year. Nice Ride believes that no one has the answer to when the bikes will need to be replaced, but they have been very surprised with how durable the bicycles are – they need a lot less

[11] Shaheen et al., 2010

repair than they had anticipated. Bixi Montreal estimates the life of the bicycle at eight years, although this is speculation as the system has only been in place for three years.

In terms of the number of bicycles per dock, each system has a slightly different approach. Nice Ride is trying to figure out the right number of bikes to have out, but they believe that having about 45-50% as many bicycles as docks is a good ratio. In their first year they operated at about 52% and are now slightly lower. Boulder B-Cycle operates with about 80% as many bicycles as docks at any given time. Chicago is assuming 1.5-2 docks per bicycle in the system, a ratio of between 50% and 67%.

Both systems use RFID technology for users to access the bicycles. The Bixi systems use RFID and barcode on the keys for members to access the bicycles, and the B-Cycle technology uses just RFID for system access; if a B-Cycle member doesn't have their card with them, they can use the credit card that they purchased the membership with.

Bicycles with built-in GPS are becoming the state-of-the-practice. In Boulder, the bicycles were supposed to be outfitted with GPS, but an earthquake in Christchurch New Zealand, where the bicycles are manufactured, prevented the technology from being installed. Boulder B-Cycle expects for the GPS to be installed on their existing bikes before the start of the next season. They intend to use the GPS data for grant applications, i.e., CMAQ, to provide more concrete information on the reduction in vehicle miles traveled (VMT) and emissions. Chicago is pretty sure that the bikes will have GPS integrated into them. The data from the GPS units will allow the city to see specific routings to help plan for bike infrastructure, and will also provide insight as to whether customers typically take the shortest or safest path, providing valuable information for planning bicycle facilities.

Bicycle Redistribution

Bicycle redistribution is done in some form by all bikesharing programs, although some to a larger extent than others. Technological advances are helping with redistribution, such as computers on-board the redistribution trucks that relay real-time station usage information, and better use of historical data to predict needs.

Primary Research

Capital Bikeshare definitely has one of the larger rebalancing loads, but it is in line with other major cities. Hubway faces the majority of its bike availability concerns during the AM peak period. The redistribution of bikes is completed by Alta, who transports bikes from destinations back to their origin for reuse. Chicago hopes that having more docks than Capital Bikeshare will eliminate some of the need for rebalancing. Additionally, the downtown "west side" is a good mix of office and residential so that part of the city won't have as peaked usage as perhaps will be seen in the loop area, which is largely residential.

Boulder B-Cycle does have a fleet manager who rebalances the bicycles on weekday mornings an hour to an hour-and-a-half. They basically just make sure that there are stations with bikes in them, spreading them out so stations aren't empty or completely full. This seems to work for now, as the majority of the stations are downtown and in close proximity to one another.

The Nice Ride non-profit conducts rebalancing from 6:30am – 1am, but is not solely focused on moving bicycles from the downtown back to outside areas, as the downtown is very compact and mixed use; usage is not as focused on the residential to downtown flows like in DC. Because of the usage patterns, any station could go empty at any time, so they need to constantly update what they're going to rebalance; there are trends, but the residential commute is not as pronounced. They will let stations right in downtown get up to 80% full, but they won't let them fill up. Nice Ride uses small trailers with ramps to rebalance as quickly as possible. They work through rush hour, and use a warehouse in Center City.

In Montréal, a new improved faster redistribution strategy has recently been deployed, based on a computerization of the system and a better bike placement within the network.[12] The strategy is based on the weather of the day, whether it is a weekday or weekend, and historical information, which they use to create the typical origin/destination matrix of the day. The matrix allows them to evaluate how many free space or bikes will be needed in certain areas and redistribute the bikes accordingly.

In Paris, a fleet of 23 bicycle-transporting vehicles are used 24 hours a day, 7 days a week to redistribute bicycles between empty and full stations.

Literature

Vélib's experience in Paris, France highlights the need for bicycle redistribution (i.e., bicycles must be redistributed to key demand locations frequently after use). To manage its 20,600 bicycles Vélib' uses 20 natural gas powered vehicles to transport bicycles from one station to another.[13] As bikesharing programs grow and cover larger areas, emerging systems must find ways to address redistribution issues that have been raised in Vélib's experience. For instance, BIXI Montréal and Hangzhou Public Bicycle are employing trucks to redistribute bicycles. In addition, BIXI is redesigning redistribution trucks to include on-board computers that can provide drivers with real-time information on bicycle stations to facilitate a speedier and more efficient response to bicycle shortages and station overcrowding. As cities launch larger programs, it is important that emerging systems incorporate technological improvements for bicycle redistribution.[14]

[12] https://montreal.bixi.com/blog/2011/04/13/de-bonnes-nouvelles-et-plusieurs-nouveaut%C3%A9s-pour-la-saison
[13] Transport Canada, 2009
[14] Shaheen et al., 2010 and Shaheen et al., 2011

Costs and Payment

All programs reviewed require annual members to pay online via a credit/debit card; once registered, they are sent a key card. Casual members are only allowed to purchase membership by credit/debit card at station kiosks, and that generally requires a $100 per bike security deposit. Upon payment, a unique unlocking code is provided to enter into a bike dock to unlock the bike.

Boulder B-Cycle also has a corporate membership program that has been popular, which provides a group discount for employers purchasing memberships for their employees. There is a sliding scale for the price per employee based on the size of the company and the percentage of employees for whom the company is purchasing memberships. The corporations were also offered lunchtime training rides for their employees to familiarize the new members with the system and make sure they are comfortable with riding, particularly in the downtown area.

The fare structure in Chicago has not been set, and will be developed in conjunction with the selected vendor. The city is considering the idea of a bundled pass, such as a set number of minutes per month to include bikesharing, carsharing, transit, and taxi, but this is in the very early stages of discussions.

Payment in the Paris system is the same as in the North American systems, however in addition all types of sign-up can also be attached to a Navigo transit pass instead. Both the system-provided RFID card and the Navigo pass allow direct use of the card readers at Vélib' stations.

1.7 Management and Funding

Program Management and Oversight

The bikesharing literature identifies several operational bikesharing models including: 1) agency owns and operates, 2) agency owns but private company operates, and 3) private company owns and operates. The systems reviewed contained a mix of city run programs and those operated by non-profits; each model has advantages and disadvantages, and each city has chosen the most appropriate model that works in its context.

<u>Primary Research</u>

Boulder B-Cycle is run by a non-profit for several reasons, although current staff was not involved in the decision, so the reasons are somewhat speculative. First, the City has a tendency to outsource a lot of its programs, so bikesharing is no different. Another reason is that as a non-profit, it is easier to get sponsors to help pay for operations and capital than if the funders were providing money to a city agency. The only downside of operating as a non-profit is that they have to get the city to approve their plans and stations locations, and have the city provide permits (whether on city or private land), so

being a separate entity does cause these approvals to take a little longer than they would if Boulder B-Cycle were a part of the city government.

Hubway is managed by the City of Boston and operated by Alta Bicycle Share. The city examined other business models and selected the current arrangement, so that the city can guide and participate in the success of the system, but have the day-to-day operations conducted by an expert third party. The bikes and stations are owned by the city and repaired and maintained by Alta. Federal funding for the system requires that the city own the equipment, but it was also the preferred option from the city's perspective.

In terms of the pros and cons of the non-profit versus a government agency, Nice Ride thinks that their program works well with the non-profit. He thinks the first thing to consider is who pays the operating expenses for the program. All of the European systems are procured through street furniture advertising contracts so the public agencies are not involved in the system operating expenses. Montréal anticipated that user fee revenue would cover all capital and operating expenses. Nice Ride believes there is nothing wrong with a city owning the system, as long as the city builds performance objectives into the contract with the operator.

Literature

The bikesharing literature identifies several operational bikesharing models including: 1) agency owns and operates, 2) agency owns but private company operates, and 3) private company owns and operates.[15] *The Philadelphia Bikeshare Concept Study* documented the advantages and disadvantages of operational models, as adapted in Table 2.4. In the table, the system operator refers to the entity that has control over the management of the bikeshare program. Service provider refers to the entity selected to operate the bikeshare service itself.

[15] Alta Planning and Design, undated

Table 1.4 Advantages and Disadvantages of Operating Models

System Operator	Service Provider / Funding	Example	Advantages	Disadvantages
Private	Private/ Advertising	Paris- Velib'	• A proven method that can draw upon experienced vendors/operators • No upfront capital investment needed from city	• Limited options if dissatisfied with service • Loss of advertising revenue • Operator not mobility driven • No requirement for data sharing between operator and city
	Private/ Private	Chicago – St. Xavier University[16]	• A proven approach that can draw upon experienced vendors/operators • High degree of control over implementation	• Limited options if dissatisfied with service • Upfront capital investment costs could be high
	Private/ Public	Barcelona - Bicing	• A proven method that can draw upon experienced vendors/operators • Direct control over funding, implementation, and service • Retain street furniture contract as a general revenue generator	• Limited options, if dissatisfied with service • Upfront capital investment costs could be high
Public	Public	BIXI Montreal	• Operator devoted to mobility cause • Direct control over funding, implementation, and service • Access to federal funding and public financing (public bonds, etc.)	• Limited experience with operations • Upfront capital investment costs could be high • Unknown/highly variable operational costs
	Private	Boston Hubway	• Operator devoted to mobility cause • Easy to determine funding opportunities • Direct control over implementation and service	• Limited experienced public vendors/operators from which to choose • Limited methods to fund programs
Non-Profit	Public/ Private	Nice Ride Minnesota	• Operator devoted to mobility cause • Draws from a variety of local funding sources including private, institutions and attractions that are fully incorporated into the citywide system • Access to federal funding	• Limited experienced public/non-profit vendors/operators from which to select • Requires the creation or engagement of a non-profit institution to implement • Upfront capital investment costs could be high • Unknown/highly variable operational costs

Table Source: Philadelphia Bikeshare Concept Study

[16] St. Xavier University owns and operates a bikeshare program internal to its campus.

Bikeshare Systems Revenue Sources

Primary Research

Capital and operating funding sources for the systems reviewed came from a variety of sources, as summarized in Table 2.5. Only those systems for which information was available are included in the table.

Table 1.5 Bikesharing Systems Funding Sources

System	Capital	Operating
B-Cycle (Boulder)	- Corporate donations - Private foundations - Individual donations - Federal stimulus - State transit funds - Add-on to roadway projects	- User fees - Station sponsorship - State grants
Hubway (Boston)	- Bus and Bus Livability grant - CMAQ grant - State capital grant - Station sponsorship	- Advertising - Public Health Commission grant - CMAQ grant - User fees used to pay contractor
Nice Ride (Minneapolis)	- Corporate foundation - FHWA non-motorized transportation funds - Convention Center - Private and non-profit investors	- User fees - Station sponsorship
Chicago	- CMAQ grant	- User fees - Station sponsorship - Advertising - Possible use of CMAQ grant
New York	- Corporate sponsorship - Private grants	- User fees - Advertising - City funds and bonds - State and federal loans/grants
Paris Vélib'	- Advertising firm with street furniture contract	- Advertising firm with street furniture contract

Capital

Some of the more innovative capital funding ideas include funding from private foundations, use of public health grants, addition of bikeshare stations in the financial plan of larger transit and highway projects, and corporate sponsorship.

For capital funding, Boulder B-Cycle conducted a capital campaign through which the program received individual donations, corporate donations, and grants from private foundations. They have also received some federal stimulus funding and some state transit funding. They plan to fund expansion through another capital campaign, grants, state funding, and also some funds available from costs under runs on an underpass project. Boulder B-Cycle is also hoping to include the capital costs of new stations and bicycles in some larger roadway projects, such as another underpass, as the incremental cost is so low and it would enable people to make better use of the bicycle and pedestrian access features of the projects.

Hubway's projected operating and capital costs for the first three years of operation are budgeted at a total of $5.7 million. Funding for capital is a combination of federal and state grants and revenue from advertising and sponsorship. The City of Boston received a $1.8 million Bus and Bus Livability capital grant, a $850,000 Congestion Mitigation and Air Quality (CMAQ) grant that can be used for capital and operating, and a state capital grant. Station sponsorship costs $50,000, which covers the cost of an average sized station.

For startup capital to purchase the stations and bicycles, Nice Ride used public and privates funds. One-third of the capital costs in both 2010 and 2011 were paid by Blue Cross (they created a fund from their revenues as the primary plaintiff in Big Tobacco litigation). They will continue to pay one-third of the capital costs of the 25 new stations in 2012. The public component in the first year came from Bike/Walk Twin Cities, a program funded through a FHWA bill for non-motorized transportation, which will continue to fund the system. Finally, the Convention Center put in $250,000 in the first year of the project, and in subsequent years other private/non-profit investors have been involved, such as from various foundations focusing on the new light rail line.)

Chicago has obtained CMAQ grants for startup funding which they intend to use for capital expenditures. The CMAQ funds are available for operations, but the City will hold off on committing to using it for operations until it sees how much of the operations are covered by user fees. The city has also applied for a TIGER grant to fund additional capital needs and expansion.

New York has plans to fund all capital expenses through private funding and sponsorships; sponsors have not yet been named, but the process is underway. For Vélib', start-up costs of $140 million were paid by JCDecaux advertising corporation.

Operating

Aside from user fees, the systems reviewed use sponsorships and advertising for funding operating costs. A few utilized grant funding. Stations with more use by casual users generate more revenue, whereas those mainly patronized by annual members often need more subsidy beyond the user fees.

In addition to user fees, Boulder B-Cycle uses sponsorships – not advertisement – for operating expenses, due to the sign code in Boulder. So far, these two sources do not completely cover the operating costs, as the costs are not scalable downward; in other words, the overhead and administration costs are the same now with 15 stations as they would be with more stations. They believe that once they have 25 stations the sponsorships and user fees should cover the full operating costs.

Hubway's operating costs are funded by federal and local sources and revenue from advertisement. The City received $450,000 in operating funding from the Boston Public Health Commission. The $850,000 CMAQ grant is being used for both capital and operating needs, and revenue from advertising is also used for operating expenses. User fees are not considered a part of the system revenue, as they are used toward the payment of Alta. Alta projected that $750,000 in user fees will be generated over a three year period. If user fees come in lower, Alta takes a loss in payment. If user fees come in higher than projected, 75% goes to the city and 25% goes to Alta.

In Nice Ride, the operating costs are paid by the users and through station sponsorships. This program accounted for $230,000 in revenue in 2010. Typical sponsors include large firms, businesses that help Nice Ride on a pro-bono basis, and even small companies. The sponsorship is not an advertisement on the station; it is a framed poster on the station with the company logo that says the company is a "proud sponsor of Nice Ride." In 2011 about 60% of operating costs were paid by user fees; this number was about 70% in 2010. Both numbers are lower than the 80% that they assumed in their original business plan. Nice Ride doesn't have very high usage rates that generate revenue – the 24-hour memberships generate revenue, not the annual memberships, as most trips are less than 30 minutes. They could have a station getting lots of use but is not generating revenue, as the stations that generate revenue are the ones with the 24 hour users. The lower number of casual users in Minneapolis is likely due to lower rates of tourism than in other major cities. The annual subscribers use the system more on weekdays, and the casual users more on weekends and nights. They do track type of user by station, which is a proxy for revenue by station. For example, stations in residential neighborhoods may have a lot of usage but not a lot of revenue.

Chicago plans to use advertising and station sponsorship to fund operating expenses (and some capital), and a separate RFP will be issued shortly for an operator and broker for sponsorship and advertising. Station sponsors will not have the right to dictate station location; the city will first put the stations out there and then allow sponsors to choose a station.

JCDecaux provides ongoing financing of operations in return for the City of Paris signing over the income from a substantial portion of on-street advertising. The City receives all revenue from the program, as well as a fee of about $4.3 million a year. In return, JCDecaux receives exclusive control of over 1,628 city-owned billboards; the city receives about half of that advertising space at no charge for public-interest advertising. Due to an unexpectedly high rate of vandalism, the Paris City Council has agreed to pay replacement costs of $500 per vandalized bicycle, leading to an anticipated cost of us to 2 million euro per year.

Literature

According to Shaheen et al. (2010), the most prominent funding sources for the majority of major bikesharing systems worldwide are municipalities and advertising partnerships (i.e., advertising companies provide bikesharing services in exchange for advertising rights on city street furniture and billboards). In Barcelona, Bicing funds bikesharing through advertising, but it also uses revenue from parking fees (i.e., parking meters) to cover the costs. The New York City 2009 bikesharing feasibility study cites the following sources of potential revenue including: 1) membership and user fees, 2) advertising, 3) city funds and bonds, and 4) private, state, and federal loans and grants.

Most of the world's bikesharing programs are built and run under franchise contracts with street furniture advertising companies. In France, JCDecaux runs Vélib' in Paris, Vélô Toulouse in Toulouse, and Velo'v in Lyon, among others. ClearChannel Adshel, who formerly operated SmartBike DC in Washington DC, runs numerous programs throughout Scandinavia. ClearChannel Adshel's flagship program, Bicing in Barcelona, is operated as a "fee for services" program, independent of advertising. Cemusa runs a small program, nbici, in Pamplona, Spain.[17]

1.8 Marketing

Marketing Strategies

All systems have taken advantage of the free PR during their startup phases. All rely heavily on social media as well as tabling at local events, but most recognize that different marketing approaches are needed to reach out to lower income populations.

Primary Research

Boulder B-Cycle utilized the free PR from the first year of operations, but they also use a lot of social media for marketing, as Boulder is social media savvy town. Staff and volunteers also went to every event possible, doing tabling and providing information. Finally, following on the success of Capital Bikeshare's Living Social deal, Boulder B-Cycle offered a similar deal through the deal site that was "wildly successful."

[17] New York City Department of City Planning, 2009

Marketing of the Hubway system is conducted by Alta. The Hubway system has a website and is active on social media sites, such as Facebook and Twitter. Subsidized membership and free helmets are offered to low-income residents to offset membership and fees and to encourage usage by all income levels. After the system launch, marketing teams were deployed to select stations where they conducted scavenger hunts and offered discounted membership and free helmets.[18] Marketing teams also visited university station locations, where utilization rates were low, and offered students half-priced annual membership and a free safety classes.

Nice Ride has a small marketing budget but does a lot of different things with it. In their first year they got a lot of free PR, but most was directed at comprehension of how the system works. Unfortunately that did not really work for reaching the many different markets that they are trying to reach. In 2011, their second year of operation, the staff attended more than 150 outreach events, such as colleges, employer transportation fairs, and festivals. They think that talking one-on-one with people has helped. They also conducted a spring sale that was advertises on the radio, but data doesn't suggest that had a huge impact, likely because the radio ads reach the larger metropolitan area, not just the areas with bikesharing. They have found that it's not even easy to give the annual memberships away in the areas that wouldn't traditionally attract bikesharing use. In particular they have run into cultural issues in the largely African American areas of the city, as bicycling is not viewed as a choice in those communities but rather something you do if you cannot afford a car or don't have a driver's license.

The City of Chicago is currently working with a Transportation Demand Management (TDM) firm to figure out how to market the system, but the marketing will likely rely heavily on viral marketing and social media, leveraging the publicity the system will receive upon launch. However, the marketing will also need to reach out to lower income communities, and there are different ways to market, such as at community events.

Literature

According to Alta Bicycle Share[19], a recognizable brand is key to any successful product. They regard the identity of each bikesharing system as an opportunity to create a new cultural identity and a story in a city's history. They work upfront with all stakeholders to establish design elements, ranging from logo development, the system's website, public relations, social media, and marketing materials. As part of their approach, the Alta Bicycle Share team executes a full-scale marketing plan to obtain both exposure and membership prior to the system's launch. Each launch event is tailored to the city and system represented. After the bikesharing launch, the group manages on-going membership sales, the marketing strategy, and program development. BIXI also has identified pre-launch marketing as a critical action for success.[20]

[18] http://www.facebook.com/Hubway?sk=pe#!/Hubway?sk=pe
[19] Alta Bicycle Share, undated
[20] Shaheen et al., 2010

1.9 Monitoring

Performance Metrics and Standards

Systems with contracts for operations include many metrics which the contractor must adhere to, however ongoing system performance monitoring is not prevalent in the systems reviewed. All systems track membership rates, number of trips, usage by station and by member, trip distance, and origin-destination information, but they don't have a coordinated program for tracking how the service is doing.

Primary Research

Right now, Boulder B-Cycle tracks the bikes through RFID, which registers drop off and check in time and calculates number of miles via an algorithm of the most likely path that the rider took from pickup point to drop off point. To monitor the performance of the system Boulder B-Cycle has a grid that shows each station and all of the trips to and from the station (by latitude/longitude coordinates). This allows them to see origin-destination (OD) pairs and which stations generate roundtrips; this information has helped them understand where and how they need to grow.

Performance metrics for the Hubway system were included in the contract between the City of Boston and Alta. The metrics involve station capacity over an identified period of time and the percentage of bikes in service. The city has also identified standards to measure the progress and success of the system, which include review of membership levels and usage rates. These standards are used to reassess station location and identify additional marketing needs.

Nice Ride tracks usage by station, the only measurement that could be considered a "performance measure," although they do track annual membership by zip codes and number of trips per member. They don't the term "performance measure" because they do not believe that a low-usage station inherently is bad; all bikeshare systems are going to have some that are higher used and some with lower, but they don't believe that means the lower usage stations are underperforming. They said that the downtown stations won't work if you don't have the lower usage ones surrounding it to support the higher usage stations. Additionally, there are stations that they don't expect to get high usage out of that they have placed to address regional equity concerns.

Bixi Montreal uses three criteria to evaluate the performance of the system: 1) Pressure on a docking point (how many time a docking point is used in 24 hours), 2) Number of transactions per stations, and 3) Number of members using each station. Each of those three criteria is compared with the average for the network to determine how the station is performing with respect to the system as a whole.

In Chicago's RFP, there is a long list of performance metrics which the city will hold the selected vendor to, such as that stations can be neither full nor empty for more than three hours, that a set percentage

of bikes are deployed at any given time, and that the stations and bikes are maintained and cleaned. In addition, the city has requested a web-based dashboard that reports many output and outcome measures, including: station availability, station deployment, bike availability, number of bikes serviced, call center data, ridership by member type, number of rentals, drip duration by user type, miles traveled by user type, station performance by station, and number of members. Beyond the requirements of the contract, the city may measure other things. For example, from an asset management perspective they would like how many times a specific bike was used in a day, and possibly the miles ridden per bike, as this will help provide a sense of useful life and when the bicycles need to be replaced.

Literature

The *Optimising Bikesharing in European Cities* (OBIS) report identifies various indicators of performance for bikesharing systems. They include:

- Number of positive media articles
- Number of negative media articles/broadcasts
- Number of short-time registrations (for tourists)
- Number of users per population
- Number of users/population in bikesharing system area (day and night, i.e., employees and residents)
- Percentage growth in users over time
- Number of bikesharing system rents (per day, month, or year on average)
- Percentage growth of bikesharing system rents
- Number of (daily) bikesharing system rents per docking station slot or bicycle
- Number of bikesharing system rents per total trips to, from, and inside bikesharing system area (city)
- Number of bikesharing system rents per day and night per population in bikesharing system area (city)
- Change in bicycle mode share (work trips, total trips)
- Number of replaced car trips
- Avoided auto mileage in vehicle kilometers (number of replaced car trips times average trip length)
- Reduced mileage and carbon dioxide emissions from traffic redistribution traffic
- Monetary gain of user per bikesharing system rent
- User satisfaction (from user survey)
- Number of bicycle thefts
- Service and administrative costs per bicycle
- Operating costs per bicycle
- Awareness from market research
- Number of contracts in metropolitan area
- Share of contracts in metropolitan area

1.10 Key Lessons Learned

The following are some of the key lessons learned in the research that are applicable to the development of the Arlington Capital Bikeshare Transit Development Plan.

1. Station location determination is largely done by spatial analysis of key bikesharing indicators, similar to how it has been done in DC and Arlington. The analysis is combined with public input and jurisdictional knowledge of the area.

2. Marketing is largely guerilla based, but some innovative ideas for marketing to different segments include corporate membership programs and discounts for low-income residents.

3. Stations in residential areas work as long as the location is tied in with transit availability. Bikesharing at universities has had mixed results.

4. Distances between station placement ranges from about 200 meters to 1,000 meters in downtown area in North America; distances between more residential locations are greater.

5. Use of bikesharing for commutes is prevalent, although no information exists on the use of the mode for reverse commuting in particular.

6. Performance monitoring is not well implemented as yet in any of the existing North American programs, but the literature provides guidance on using performance measurements for constant monitoring and improvement of the system.

7. Many funding sources are used for capital costs, but some of the more innovative capital funding ideas include funding from private foundations, use of public health grants, addition of bikeshare stations in the financial plan of larger transit and highway projects, and corporate sponsorship.

8. There is no accurate assessment for the timing of bicycle replacement and station rehabilitation, so assumptions will have to be made when developing a longer-range plan.

Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018

Arlington County, 2011

Chapter 2: System Overview

November 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES Arlington County Commuter Services | Bike Arlington

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2 OVERVIEW OF THE SYSTEM

2.1 History

Washington, DC was the first jurisdiction in North America to operate a public bikeshare system. In August 2008, SmartBike DC was launched by the District Department of Transportation in a public-private partnership with Clear Channel Outdoor via the award of a 20-year bus shelter advertising contract. Clear Channel Outdoor operates several public bikeshare systems through similar contracts in several European cities. Clear Channel owned the bikes, and was solely responsible for the operation and marketing of the SmartBike DC system. Throughout its 2 years of operation, SmartBike DC attracted only 1,234 active members. An additional 242 members activated their SmartBike DC cards, but never rented the bike, and 220 members never activated their SmartBike DC cards. SmartBike DC offered only annual memberships, and therefore it wasn't able to capture the market for tourist and short-term users. SmartBike DC had only 10 stations and 120 bicycles located in the central core of the District of Columbia, and in large part due to its small size/limited coverage and lack of membership options, SmartBike DC generated on average only about 100 trips per day.[1] While SmartBike DC wasn't successful in generating ridership, it did introduce the concept of bikeshare to Washington, DC region residents. SmartBike DC ceased operations in January 2011, as the system was superseded by the introduction of Capital Bikeshare.

Figure 2.1 SmartBike DC

Today, Capital Bikeshare is one of the largest and longest operating public bikeshare systems in the United States. On September 20th, 2010, Arlington County (Arlington) and the District of Columbia (DC) launched Capital Bikeshare with a ceremonial inaugural bike ride to deploy hundreds of bikes to the first 100 stations in the DC and 14 in Arlington. The launch ceremony took place at the United States Department of Transportation headquarters in Southeast DC, and was attended by national transportation dignitaries, a number of prominent local elected officials as well as more than 300 members of the public. Capital Bikeshare addressed many of the shortcomings of the SmartBike DC

[1] *Rip Smart Bike, Good Riddance.* Washington City Paper. October 2010: http://www.washingtoncitypaper.com/blogs/housingcomplex/2010/09/16/r-i-p-smartbike-good-riddance/ accessed October 2012.

system by providing extensive coverage and multiple membership options. At its launch, Capital Bikeshare had more than 1,000 annual members (SmartBike DC members were each given a free annual membership). The Capital Bikeshare system is operated by a contractor, Alta Bicycle Share, using equipment manufactured by Public Bikeshare System Company Urban Solutions (PBSC Urban Solutions), under the Bixi trade name.

In its first year of operation, Capital Bikeshare attracted more than 17,000 annual members and generated more than one million trips, far exceeding expectations. On October 11, 2011, the City of Alexandria, Virginia City Council voted 7 to 0 to join Capital Bikeshare, with funding in place to implement their first 8 stations with 77 bikes located in the City's historic Old Town and Carlyle neighborhoods.[2] On August 31, 2012, Alexandria opened their first eight Capital Bikeshare stations.

Montgomery County, Maryland plans to introduce Capital Bikeshare in late 2012 or 2013. A federal grant will provide the funds for 20 bikeshare stations and 200 bicycles to be located in the City of Rockville and in the Greater Shady Grove Transportation Management District, including sites at the Rockville and Shady Grove Metro stations, Rockville Town Center, Shady Grove Life Sciences Center, and other key activity nodes throughout those areas.

A state grant will fund additional expansion of the Capital Bikeshare network in lower Montgomery County, providing 29 stations and 204 bikes. The bikeshare stations will extend along the two legs of the Metrorail Red Line from the DC line to the Beltway and will include the communities of Friendship Heights, Bethesda, and Medical Center on the west leg, and Takoma Park and Silver Spring on the east leg.[3]

Other local governments in the Washington, DC region, including Prince George's County, the City of Greenbelt, the City of College Park and the City of Falls Church are exploring the possibility of joining Capital Bikeshare in the next several years.

2.2 Services Provided/ Areas Served

Services Provided

Bikeshare is a service where members have access to bicycles for short-term use. Systems like Capital Bikeshare provide bicycles for short-term use at automated bicycle rental stations. Members may use any bicycle parked at the station, and return the bicycle to any other station within the system. Pricing and dense placement of stations encourages short trips, providing the public a transportation alternative to driving or transit. Systems like Capital Bikeshare aim to utilize bicycles as part of a multi-

[2]Alexandria Local Motion, "Capital Bikeshare in Alexandria": http://ow.ly/eG0gO accessed October 2012.

[3] Mark Berman. "Montgomery County seeks to add Capital Bikeshare stations." The Washington Post. 12/26/2011: http://ow.ly/eFZZX accessed October 2012.

modal transportation network. Capital Bikeshare operates 24 hours a day, 7 days a week, 365 days a year, and only closes during severe weather.

To bring bikeshare to the public, Capital Bikeshare provides a number of secondary services that keep the system running smoothly. Capital Bikeshare maintains a fleet of vehicles that move bicycles from full to empty stations, a process called "rebalancing." Riders have access to 24-hour service and support. Finally Capital Bikeshare has in-house maintenance facilities and staff to keep bicycles in working order.

Areas Served

Capital Bikeshare has plans for 52 stations by the end of Fall 2012, with stations located along the Rosslyn-Ballston and Jefferson Davis (Pentagon City, Crystal City, and Potomac Yard) corridors (Figure 2.2). While Bikeshare stations are concentrated in a geographically finite portion of the County, they serve the densest parts of Arlington. Nearly half of County residents, over 90,000, live within a half-mile of a Capital Bikeshare station. As Arlington continues to expand the system, Capital Bikeshare stations will be introduced into new neighborhoods.

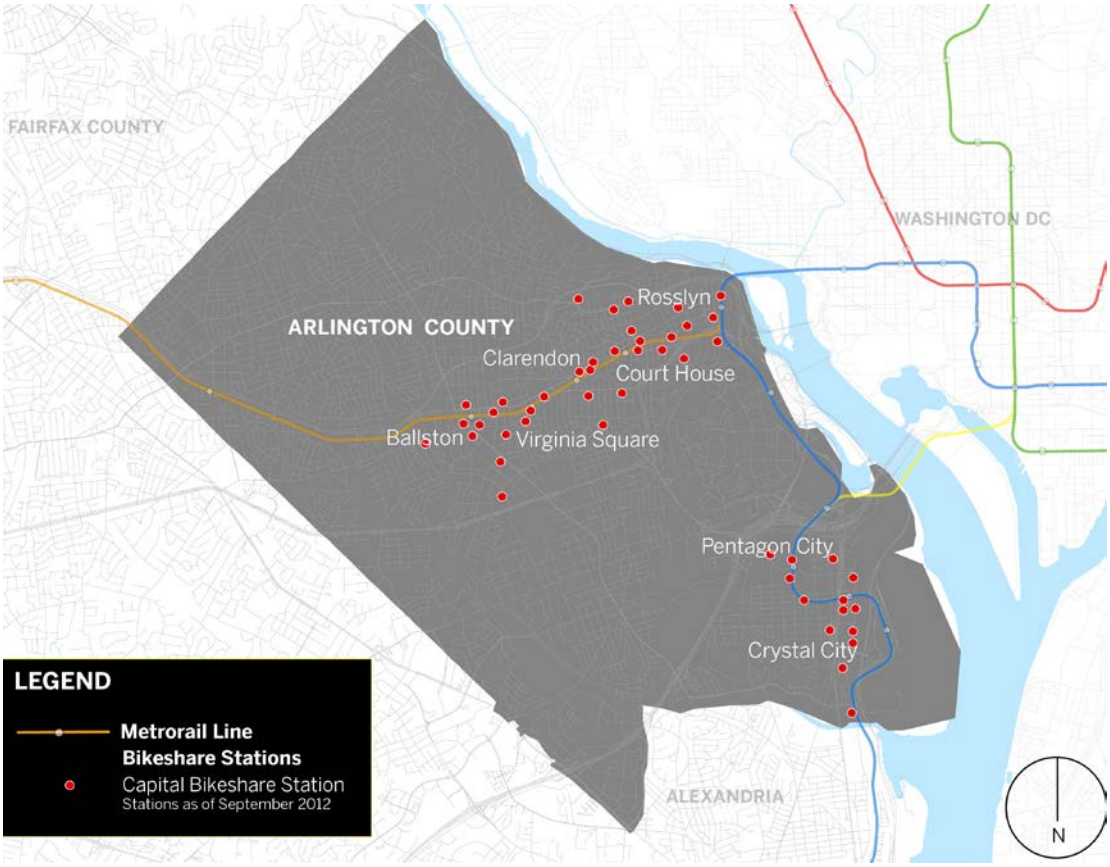
When selecting the physical location of a Capital Bikeshare station, Arlington uses several general criteria. All station locations *must*:

- Receive at least four hours of sunlight each day for recharging of their solar battery.
- Be more than four feet from a fire hydrant and ten feet from a standpipe.
- Be located away from overflow water catchment basins, to avoid any major storm impacts.
- Be situated on the sidewalk in a configuration that will have little to no impact on pedestrian, bicyclist, or motorist sight distance, or create a dangerous situation between cyclists, motorists, and pedestrians.
- Not be sited in any fashion that would limit access to parked vehicles or have an impact on vehicle parking.
- Not be in close proximity to underground utilities.
- Not be sited on a tree well.
- Allow boom truck access for installation.
- Have a minimum 6 foot sidewalk clearance.

Arlington *prefers* to locate stations:

- On minor arterials and lesser streets, where vehicle speeds are lower.
- Within the public right-of-way.
- Adjacent to a cycling facility, in most cases is on the right side of street.
- Within walking distance of Metrorail, Metrobus, and ART stations/stops.
- At or near an intersection corner, where the station is visible from both perpendicular streets, and vehicle speeds are lower than mid-block.
- On streets that are not snow emergency routes.
- On streets where spaces are metered, so as not to interfere with residential parking.

Figure 2.2 Capital Bikeshare Station Locations/Areas Served (End of 2012)



2.3 Governance and Organizational Structure

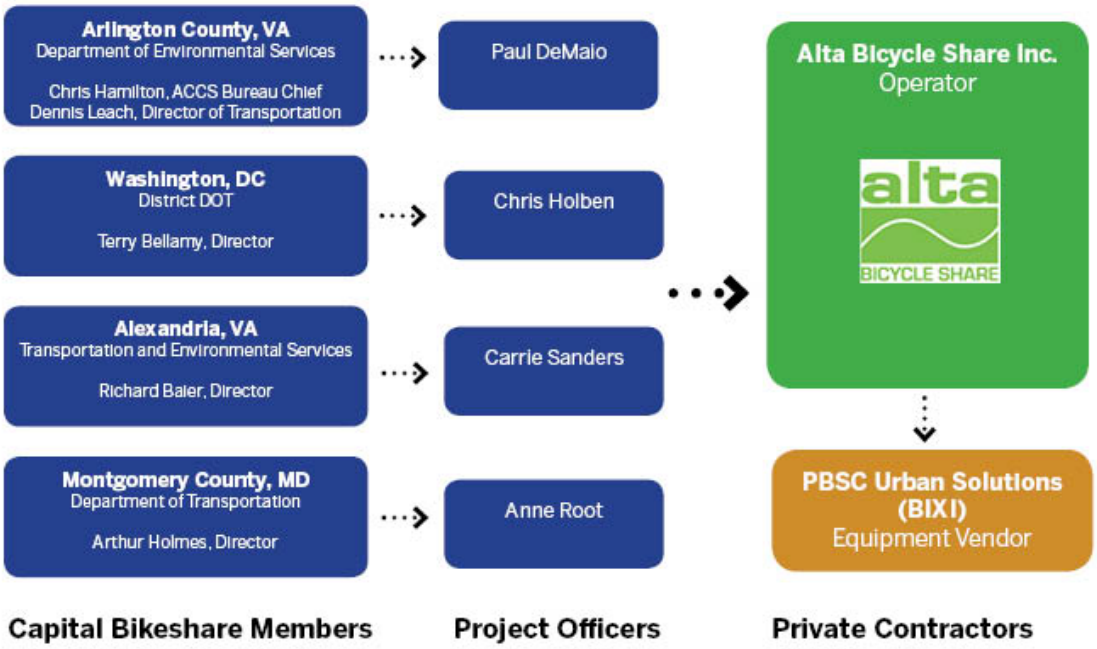
Arlington County issued a six-year contract, renewable on an annual basis, for bikeshare services through which the services of the current contractor, Alta Bicycle Share (Alta), were procured. The contractor is responsible for the daily operations of Capital Bikeshare, installation of new stations,

maintenance, customer support and the provision of detailed monthly reports on system performance. The Capital Bikeshare contract includes a Metropolitan Washington Council of Governments (MWCOG) rider clause that allows all MWCOG jurisdictions to independently procure services of the selected vendor through the existing contract.

To ensure that Capital Bikeshare is operated with uniform service standard and characteristics throughout the system, the contract stipulates a set of *Key Service Standards* for the system:

- Between April and November, at least 90% of bicycles must be available to the public. In the winter months, at least 80% of bicycles must be available to the public.
- Bicycles must have an inspection and tune-up at a minimum of every 30 days.
- Between 6am and midnight, no station may be empty or full for longer than 3 hours.

Figure 2.3 Capital Bikeshare Governing Member Jurisdictions



Capital Bikeshare is managed through an informal working group comprised of a designated Director, or Project Officer, from each of its member jurisdictions. Any issue that involves matters or changes pertaining to the entire service or more than one jurisdiction requires achieving consensus or through a unique voting method.

All member jurisdictions have the same membership and usage fees, collaborate on periodic user surveys, jointly own any intellectual property created for the service, and work together to produce regional marketing materials. In order to ensure a uniform Capital Bikeshare experience throughout the system, all of the member jurisdictions require the contractor to adhere to the *Key Service Standards.*

Although each jurisdiction independently purchases stations and bicycles, individual bicycles are not tethered to any member jurisdiction and can circulate freely throughout the Capital Bikeshare system. Most revenues are split between the member jurisdictions based on prorated percentages calculated on the last day of each month to determine the share of the operational docks owned by each member jurisdiction. Each month, the Capital Bikeshare contractor credits member jurisdictions with membership revenue and usage fees for each new and renewing member residing in their jurisdiction. Membership fees generated from individuals who live outside of any member jurisdictions are prorated based on the portion of operational docks owned by each member jurisdiction. Financial responsibility for a damaged station resides with the member jurisdiction where the station was damaged. Financial responsibility for bicycles that are damaged or stolen resides with the member jurisdiction where the respective bicycle was last rented.

2.4 Fee Structure

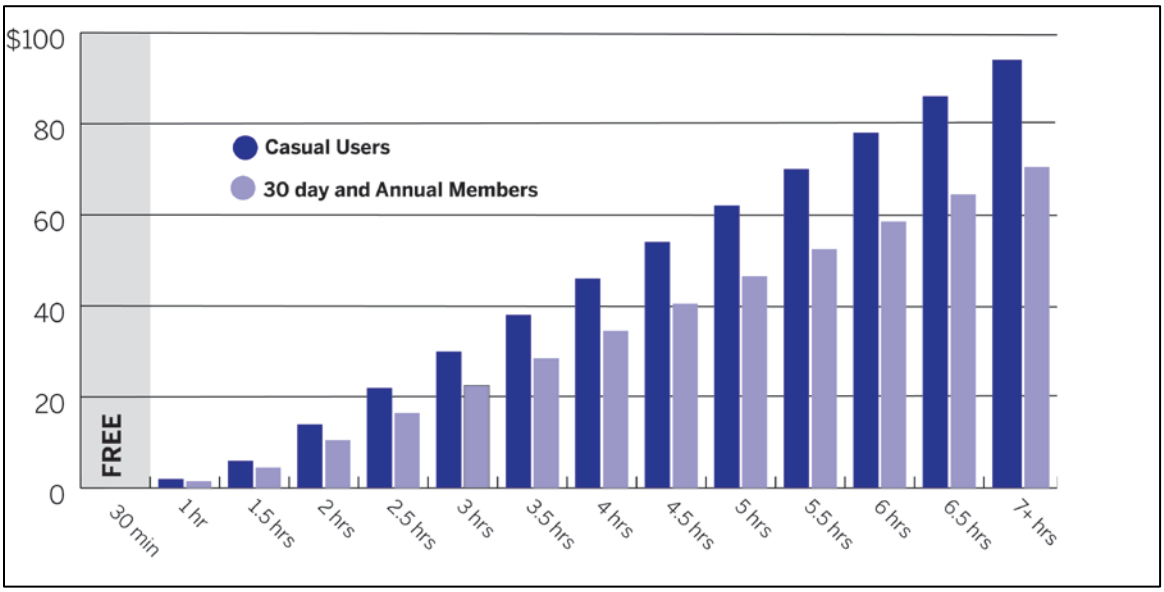
Capital Bikeshare offers two basic types of system membership, an annual membership and casual membership. Two different types of casual membership are offered by membership period: 3 days and 24 hours. The casual membership option allows visitors and other short term users to use the Capital Bikeshare system. Capital Bikeshare members pay both a membership fee (Table 2.1) and a usage fee (Figure 2.4).

Table 2.1 Capital Bikeshare Membership Types and Fees

Membership Type	Membership Fees
24 hours	$7
3 days	$15
30 days	$25
Annual Membership	$75
Annual Membership with Monthly Installments	$84 (12 payments of $7)

All trips completed within a 30-minute time period are free for both annual and casual members. After the first 30 minutes, a fee is charged for each additional 30 minutes that the bicycle is in use through six and half hours. Users are not allowed to rent a bike for a period longer than 24 hours. Any user failing to return a rented bike within 24 hours is charged a bicycle replacement fee of $1,000.

Figure 2.4 Capital Bikeshare Hourly Usage Fees



2.5 Bicycle Fleet

As of November 2012, the entire Capital Bikeshare system has over 1,670 bicycles (at more than 175 stations), while the number of bicycles docked in Arlington is just over 300. Of the entire bicycle fleet, 74 to 81 percent of bicycles were available for use on a daily basis.

2.6 Existing Facilities

Metrorail Station Proximity

As shown in Figure 1.4, of the current Capital Bikeshare stations located in Arlington are in what is known as "Metro Planning Areas," within the Rosslyn-Ballston and Crystal City / Pentagon City corridors. Figures 2.5 through 2.7 show the effective reach of the Capital Bikeshare system in terms of where a user can get by Metrobus and ART bus from the Capital Bikeshare stations.

Figure 2.5 Capital Bikeshare Stations (End of 2012) - Metro Stations Proximity

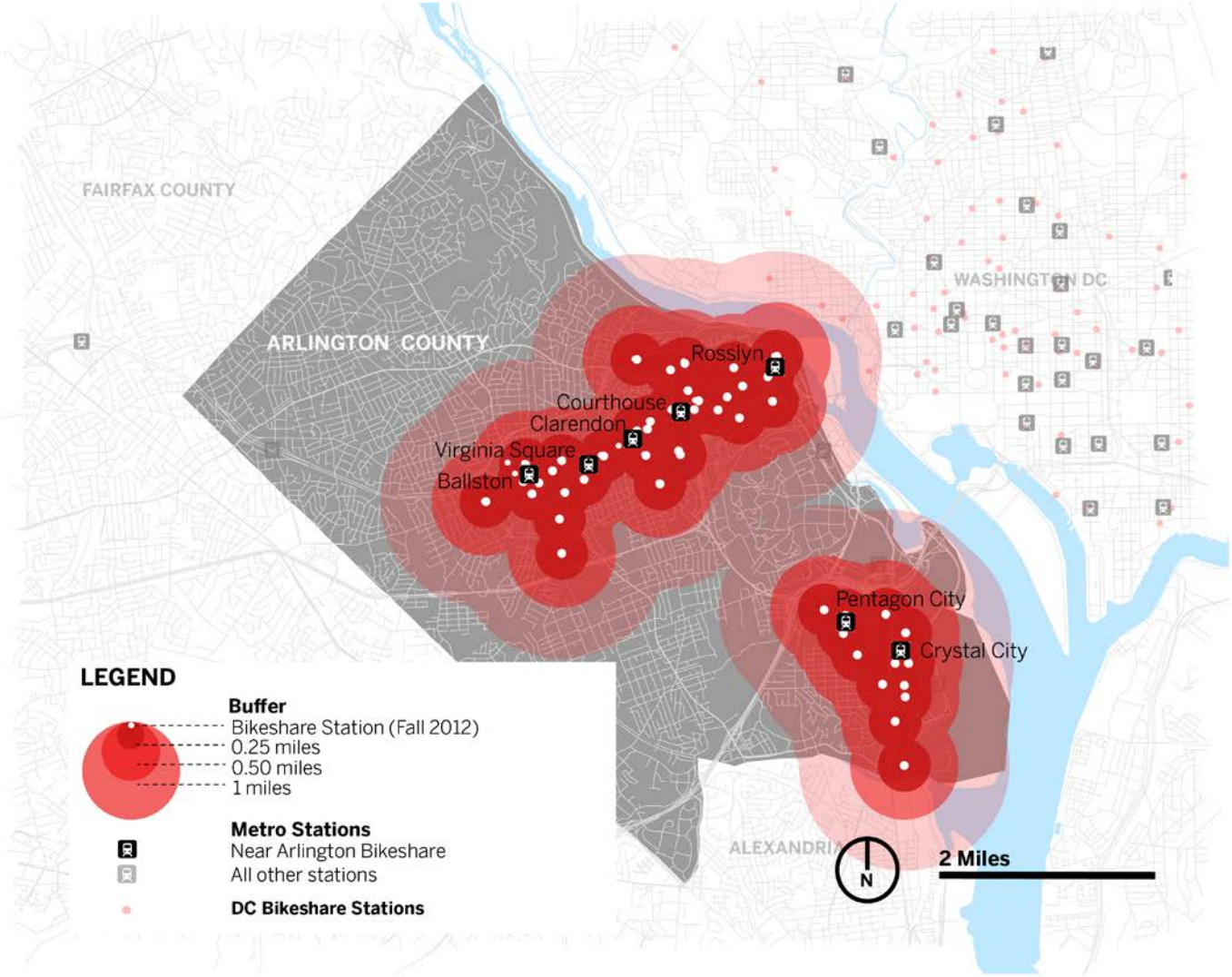


Figure 2.6 Coverage of All ART and Metrobus Routes within ¼ mile of Arlington Capital Bikeshare Stations

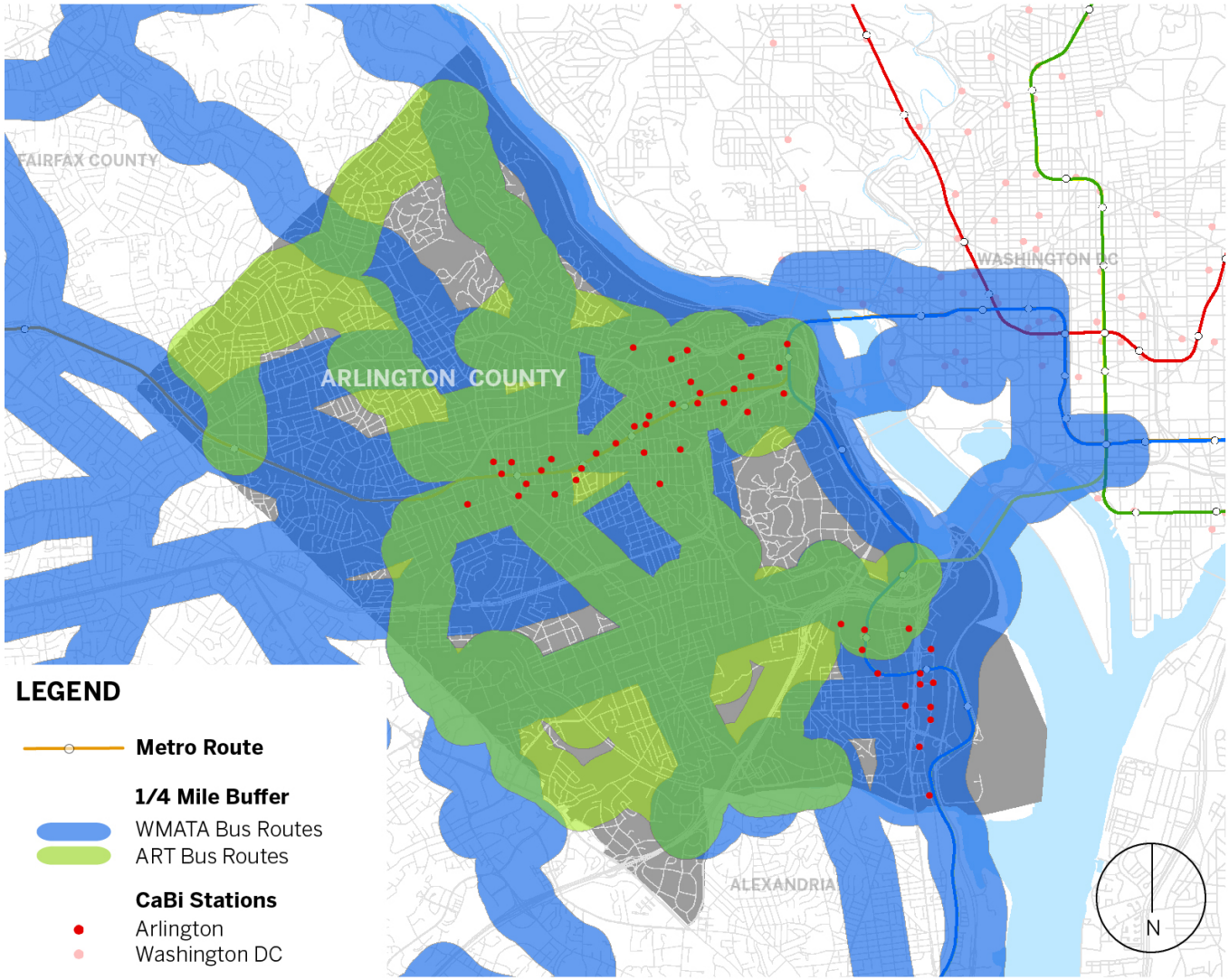
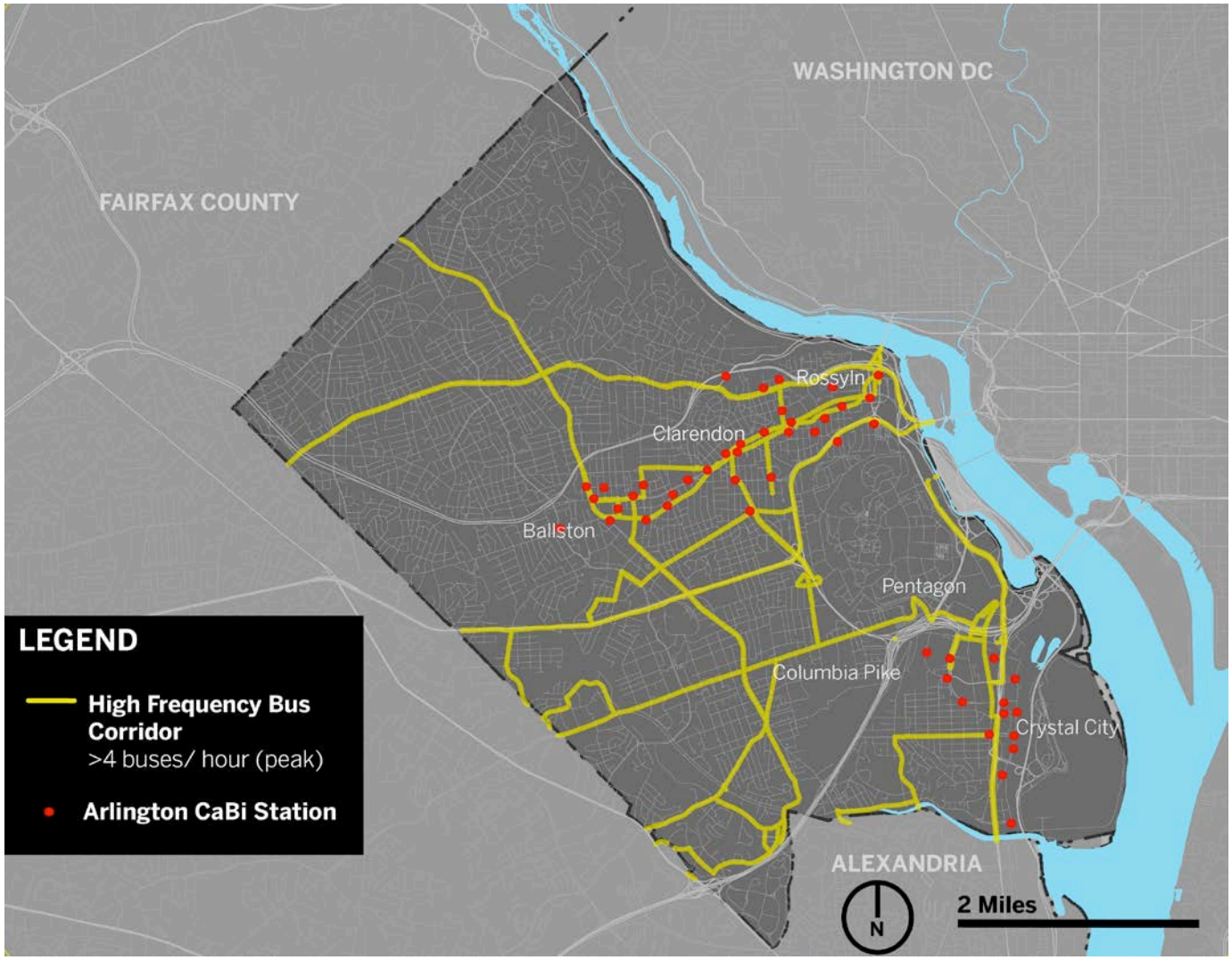


Figure 2.7 Coverage of High Frequency* ART and Metrobus Routes within ¼ mile of Arlington Capital Bikeshare Stations (End of 2012)

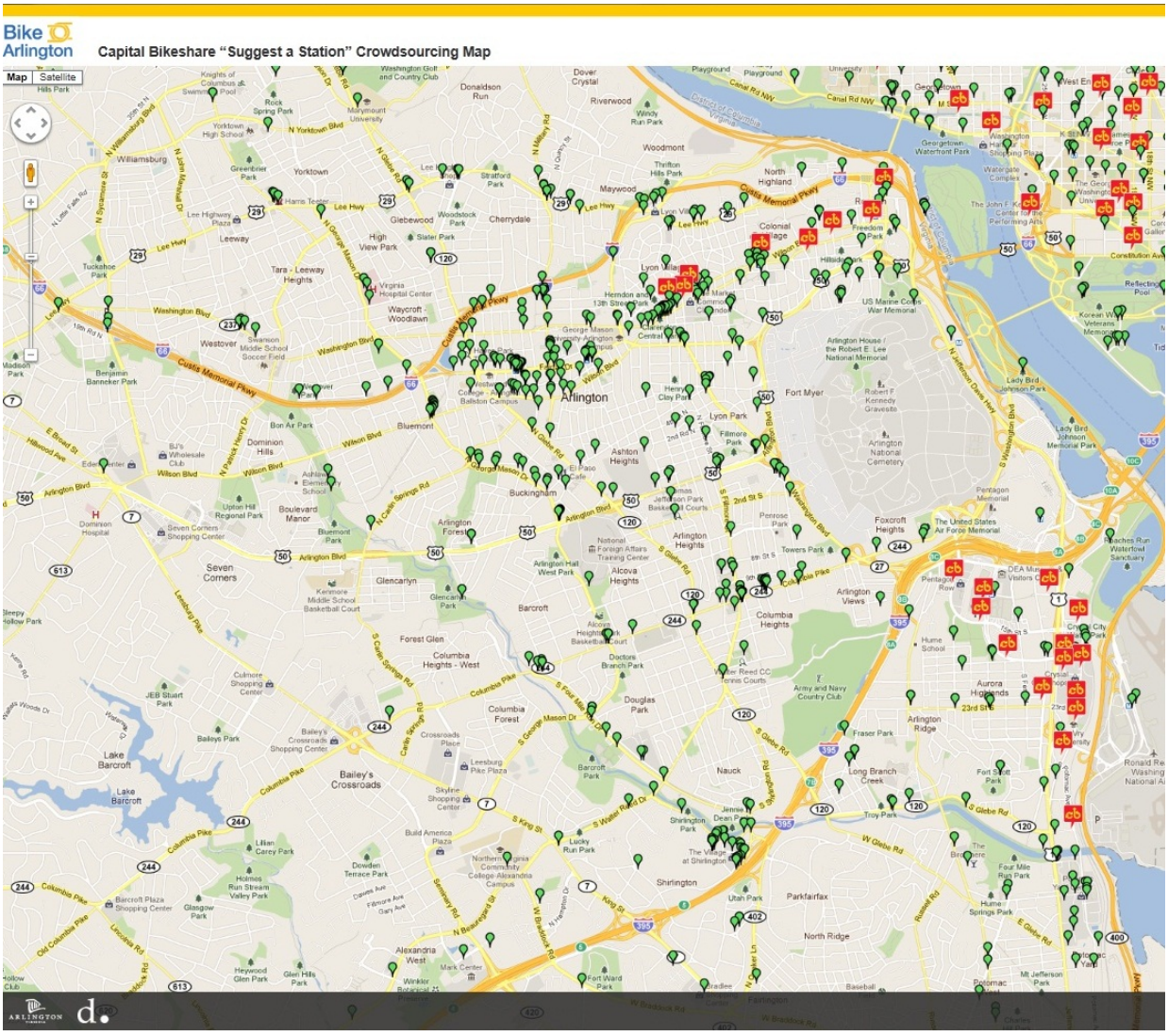


*High Frequency = 15 minute headway or better during peak periods

2.7 Public Outreach

Arlington County has actively sought to involve the public in the development of Capital Bikeshare. Prior to the launch of the service, Arlington created an interactive online map that facilitates crowdsourcing of new station locations by allowing users to suggest new locations, and comment on those suggested by other users and by the County (Figure 2.8). The interactive online map was used to aid in the determination of the initial station locations, and in the determination of station locations for the FY 2012 system expansion. In 2011, the County hosted a public forum to invite the public's input on the system's FY 2012 expansion. Input from the meeting, as well as online comments, were instrumental in finalizing station locations. More than 300 individuals participated in this process.

Figure 2.8 Capital Bikeshare Station Location Crowdsourcing Map



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Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018

Bike Arlington, 2010

Chapter 3: Goals, Objectives, and Performance Measures

November 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES Arlington County Commuter Services | Bike Arlington

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3 VISION, GOALS, OBJECTIVES, AND PERFORMANCE MEASURES

3.1 Introduction

It is critical that any plan start out with a well-defined vision, goals, and measurable objectives, as they are foundational for the entire project. These elements assist in guiding the subsequent tasks and are referred to throughout the project. By obtaining consensus early on as to the region's vision for the Capital Bikeshare program, what the goals are for the program in Arlington, and what objectives the County is trying to achieve, the resulting Transit Development Plan (TDP) will better meet the needs of the stakeholders.

While this task begins with the development of goals and objectives of Capital Bikeshare in Arlington County, it is also important at this stage to identify the associated performance measures. Because objectives are meant to be specific and performance toward those objectives needs to be tracked, it is important to ensure that any objective can actually be measured with either existing or easily obtainable data.

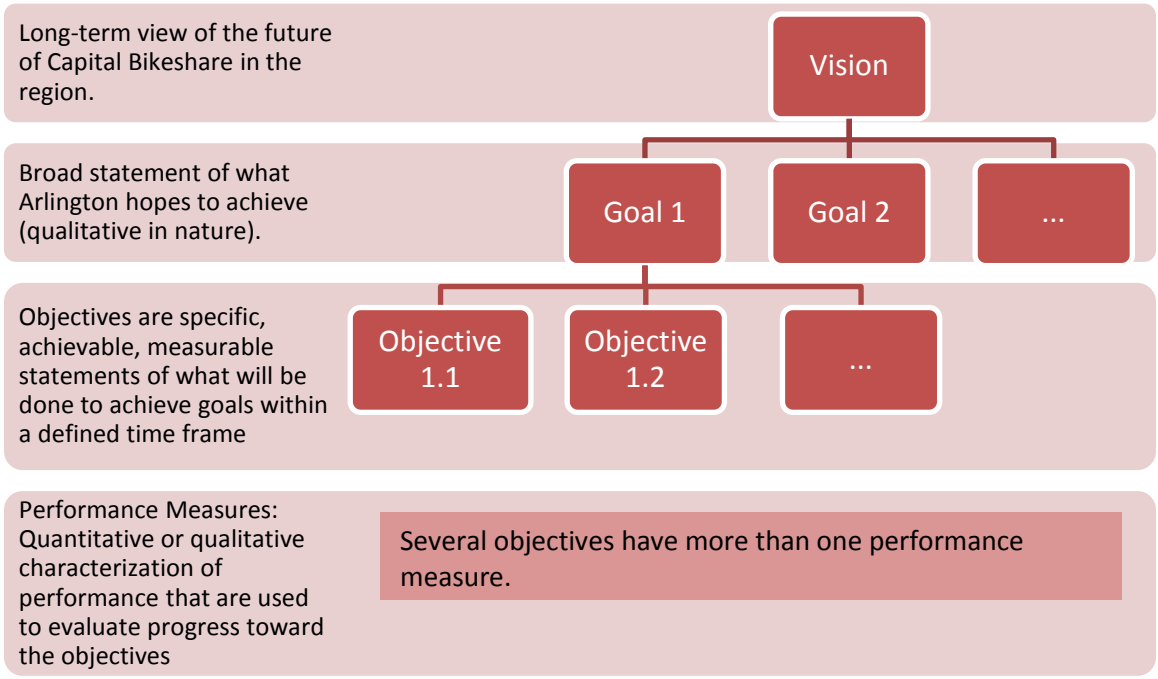
The following working definitions for are used to assist the development of this portion of the Transit Development Plan:

> **Goal:** A goal is a broad statement of what the agency hopes to achieve and is qualitative in nature.
>
> **Objectives:** Objectives are specific, achievable and measurable statements of what will be done to achieve goals within a designated time and are typically achieved through work plans.
>
> **Performance Measures:** Quantitative or qualitative characterization of performance that are used to evaluate progress toward objectives. They quantify the agency's efficiency or effectiveness in conducting business operations.
>
> **Performance Standard:** The level that the performance measure should meet so that the objective is met.

Defining the performance measures that relate to each objective has a dual purpose: first, to help guide the service continuation and expansion plan in Chapter 5, and second, to provide a basis for ongoing measurement of the program's success as it is implemented.

The relationship of the vision, goals, objectives, and performance measures is shown in Figure 3.1.

Figure 3.1 Relationship of Vision, Goals, Objectives, and Performance Measures



The project team followed a top-down approach to developing the goals, objectives, and performance measures. This approach included working with stakeholders and using existing documentation to develop a draft set of vision, goals, and objectives. It was important to achieve widespread buy-in early on in the planning process both to ensure that the plan meets the needs of the broad audience but also as a way to explain later down the line why the plan does or does not include particular strategies, by being able illustrate that they are all based on helping to achieve the goals and objectives. The next section outlines the regionally adopted mission and vision, and the sections following that document the process by which the goals and objectives were developed. Finally, the goals, objectives, and performance measures are presented.

3.2 Regionally Adopted Mission and Vision

On September 9, 2011, numerous stakeholders from Arlington County, the District of Columbia, the two jurisdictions with Capital Bikeshare at the time, and Alta convened to develop a regionally adopted vision and mission statement for the program. The resulting vision and mission are included here in the Arlington County Capital Bikeshare TDP.

Vision
Life connected by pedal strokes.

Mission
The mission of Capital Bikeshare is to transform our community by providing a high quality, convenient and affordable bicycle transit system that will connect people to more places where they live, work, and play in the region.

3.3 Document Review and Research

In order to develop general ideas for the program goals and objectives, the goals and objectives of several existing plans were reviewed. The documents reviewed were:

- Arlington County Master Transportation Plan (MTP) (November 2007)
  - Overall MTP
  - MTP Bicycle Policies
  - MTP TDM/TSM Policies
- Arlington County Transportation Demand Management Plan (May 2010)

The goals and objectives in these plans were compiled into a document and standardized into the following themes:

- Sustainability: environment, economic growth, equity
- Mobility and accessibility
- Transportation alternatives/options that are convenient, increase the mode share of non-SOV travel, and fun.
- Operations, efficiency/Return on investment (ROI), regional coordination

Using these themes, the core project team held a facilitated meeting where goals and objectives were shaped around these themes.

3.4 Goals and Objectives

The Arlington Capital Bikeshare goals and objectives were formulated based on the regional vision and mission statements and the four themes that came through in review of existing County plans. The goal and objective development centered around the concept of establishing objectives that are specific, achievable, and measurable.

Sustainability

<u>Goal 1: Reduce the negative impacts of automobile travel on community and environmental resources, including air and water quality while increasing energy efficiency and improving personal health.</u>

Objective 1.1: Divert vehicle miles traveled from automobile to bicycle.
Objective 1.2: Foster improved public health by increasing bicycle vehicle miles traveled.

Goal 2: Support economic sustainability and growth.

Objective 2.1: Support regional and local economic development in transit-oriented, mixed-use communities.
Objective 2.2: Attract a wide variety of users including by age, race, income, and gender.

Mobility and Accessibility

Goal 3: Increase accessibility to jobs, recreation, and other locations, enhancing the quality of life.

Objective 3.1: Increase the reach of other transportation modes that complement bicycle use, particularly transit and walking.
Objective 3.2: Provide mobility through bicycle and transit connections to Arlington residents, employees, and visitors to and between Regional Activity Centers and mixed-use corridors.

Transportation Alternatives

Goal 4: Create a community culture that embraces bicycle use as a convenient and safe travel choice.

Objective 4.1: Increase bicycle and transit mode share for a variety of trip types, contributing to the County objective of an annual one-half percent SOV mode share reduction.
Objective 4.2: Reduce bikesharing crashes and encourage a culture of safety among users.

Operations/Efficiency/Regional Coordination

Goal 5: Fund, manage, and operate the regional system in an efficient and cost-effective manner.

Objective 5.1: Minimize operating costs while providing an effective service at the regional and local levels.
Objective 5.2: Provide cost-competitive transportation for individual users.

3.5 Measures of Effectiveness and Performance Measures

Performance measures are designed to address both the efficiency and effectiveness of the Capital Bikeshare program and should be specific, measurable, and quantitative where feasible. The performance measures that were devised for the Arlington Capital Bikeshare program to track are shown in Table 3.1.

The performance monitoring and evaluation plan subsequently outlined in Table 3.2 provides detail on the data sources for measuring the system performance and provides standards against which to measure the system.

Table 3.1 Goals, Objectives, and Performance Measures

Goals	Objectives	Performance Measures
1: Reduce the negative impacts of travel on community and environmental resources, including air and water quality, and increase energy efficiency.	1.1: Divert vehicle miles traveled from automobile to bicycle.	A: Ratio of Arlington bikeshare miles traveled to total vehicle miles travelled (VMT)
	1.2: Foster improved public health by increasing bicycle vehicle miles traveled.	B: Total calories burned and average calories burned per trip
2: Support economic sustainability and growth.	2.1: Support regional and local economic development, especially in transit-oriented, mixed-use communities.	C: Combined number of bikeshare trips for shopping, errands, eating-out, and socializing D: Average money saved per bikeshare user and total annual savings among all Arlington Capital Bikeshare users
	2.2: Attract a wide variety of users, including by age, race, income, and gender.	E: Percentage of members by age bracket, race, household income bracket, and gender
3: Increase accessibility to jobs, recreation and other locations, enhancing the quality of life.	3.1: Increase the reach of other transportation modes that complement bicycle use, particularly transit and walking.	F: Percent of bikeshare trips that link to another mode (broken down by mode)
	3.2: Provide mobility through bicycle and transit connections to Arlington residents, employees, and visitors to and between Regional Activity Centers and mixed-use corridors.	G: Absolute number and percent of Arlington jobs and population within a quarter mile of a bikeshare station H. Percentage of hotel rooms in Arlington within a quarter mile of a Capital Bikeshare station

Goals	Objectives	Performance Measures
4: Create a community culture that embraces bicycle use as a convenient and safe travel choice.	4.1: Increase bicycle mode share for a variety of trip types, contributing to the County objective of an annual one-half percent SOV mode share reduction.	I: Bicycle commute mode share J: Public opinion on bicycling as a legitimate transportation option
	4.2: Reduce bikesharing crashes and encourage a culture of safety among users.	K: Helmet use among bikeshare users L: Crash rate among bikeshare users
5: Fund, manage, and operate the regional system in an efficient and cost-effective manner.	5.1: Minimize operating costs while providing an effective service at the regional and local levels.	M: Cost recovery ratio
	5.2: Provide cost-competitive transportation for individual users.	N: Average cost per trip for bikeshare users

Table 3.2 Summary of Performance Measures, Data Sources, and Collection Schedule

Measure	Relevant Objective	Source	Calculation	Data Availability	Reporting Frequency
A. Ratio of Arlington County Bikeshare miles traveled to Arlington vehicle miles traveled (VMT)	1.1	Annual VMT for Arlington County published by Virginia Department of Transportation. Bikeshare miles traveled available from the Alta monthly report. For inter-jurisdictional trips, only trips beginning in Arlington will be counted toward the County bikeshare mileage total.	Bikeshare Miles Traveled / Vehicle Miles Traveled	VMT data published annually in August for the previous year. Bicycle mile data available monthly from Alta reports	Annually
B. Total calories burned and average calories burned per trip	1.2	Annual Arlington bikeshare miles traveled available from Alta monthly report. Average trip length available from Alta monthly report.	38 calories [1] x total Arlington bicycle miles 38 calories x average Arlington bikeshare trip length	Bicycle mile data available monthly from Alta reports.	Annually
C. Combined number of bikeshare trips for shopping, errands, eating-out, and socializing	2.1	Capital Bikeshare Annual User Survey, Arlington respondents.	Combined percentage of Arlington respondents who took their last trip for socializing, eating out, shopping, or running errands	User survey data available on an annual basis.	Annually
D. Average money saved per bikeshare user and total annual savings among all Arlington Capital Bikeshare users.	2.2	Capital Bikeshare Annual User Survey, Arlington respondents.	Average money saved per user can be taken directly from survey results. Total savings calculated by multiplying average savings by total number of Arlington Capital Bikeshare members.	User survey data available on an annual basis.	Annually

[1] 38 calories per mile based on calorie burn rate for the average 155 pound adult, cycling at a light pace. Figure taken from Zabel, Martin *Calories Burned Biking One Mile,* Livingstrong.com.

Measure	Relevant Objective	Source	Calculation	Data Availability	Reporting Frequency
E. Percentage of users by age, race, gender, and income bracket.	2.2	Capital Bikeshare Annual User Survey, Arlington respondents.	Figures taken directly from survey	User survey data available on an annual basis.	Annually
F. Percent of total bikeshare trips that are linked with another mode - results broken down by mode	3.1	Data is currently not being collected. Proposed question to add to next year's user survey.	Figures taken directly from survey	User survey data available on an annual basis.	Annually
G. Absolute number and percent of Arlington jobs and population within a quarter mile of a bikeshare station	3.2	Arlington County population and employment estimates by census block.	Sum of population and employment for all census blocks with centroids that fall within a quarter mile of a Capital Bikeshare station.	County population and employment figures are updated every six months. Base figures on the most recent estimate available.	Annually
H. Percentage of hotel rooms in Arlington within a quarter mile of a Capital Bikeshare station	3.2	Privately provided hotel database or County internal database on hotel location and number of rooms	Total number of hotel rooms for all hotels that fall within a quarter mile of a Capital Bikeshare station (GIS analysis).	Hotel data is regularly updated.	Annually
I. Bicycle commute mode share	4.1	American Community Survey (ACS) 3-Year counts for Arlington County – percentage of residents who commute to work by bicycle	Figures taken directly from ACS (U.S. Census Bureau). Cross-check census results with Arlington County State of Commute Survey	ACS estimates released annually, however three-year and five-year estimates are more accurate.	Triennially

Measure	Relevant Objective	Source	Calculation	Data Availability	Reporting Frequency
J. Public opinion on bicycling as a legitimate transportation option	4.1	This is currently is not being collected in any Arlington County Surveys. A question gauging the public's acceptance of bicycling as a form of transportation should be added to existing surveys conducted by ACCS	Figure taken directly from survey	Survey conducted annually	Annually
K. Helmet use among bikeshare users	4.2	Capital Bikeshare User Survey – Arlington respondents	Figures taken directly from survey	Survey conducted annually	Annually
L. Crash rate among bikeshare users	4.2	Alta Monthly Report – Arlington respondents	Number of crashes per year/ total number of Arlington bikeshare trips	Trip data is available monthly. Crash reports involving a bikeshare bike are published monthly.	Annually
M. Cost recovery ratio	5.1	Alta Monthly Report – Arlington revenues Arlington Capital Bikeshare Operating Budget (includes operating, administrative, and marketing costs)	Annual operating revenue / annual operating costs	Operating revenue and costs are updated on a monthly basis.	Annually
N. Average cost per trip for bikeshare users[2]	5.2	Total revenue for Arlington based users (membership fee) and Arlington based trips (over 30 minute fees) and total number of trips	Annual Arlington-based revenue / total Arlington-based trips	Revenue and trip data available monthly from Alta report	Annually

[2] This measure can be separated by cost per trip for casual and registered users, but additional analysis would be required. The measure as currently defined is an average across all users in Arlington.

Schedule for Performance Monitoring

The performance monitoring measures listed in Table 3.2 can be tracked at differing schedules depending on the measure. To simplify the performance monitoring process, all measures will be updated annually. The performance measurement analysis should be conducted in January of each year for the previous calendar year, when at least two of the data points that are only available annually will be relatively new, thereby avoiding the need to conduct more than one update each year. The one measure based on Census data will be updated when new estimates are released, on a triennial basis.

Collecting Performance Measure Data

The majority of measures listed in Table 3.2 are available from the Alta Monthly report, internal Arlington bikeshare budget, County surveys, or readily available external sources like the U.S. Census. Of the 14 measures, two are not presently collected and would have to be added to existing County surveys: Measure F, percent of bikeshare trips linked to another mode, and Measure J, public opinion of bicycling as a legitimate transportation option. Measure F can be easily incorporated into the annual Capital Bikeshare survey, while Measure J can be added to future surveys conducted by Arlington County Commuter Services.

Benchmarks to Measure Performance

The measures in the plan fall into three general categories for how performance should be gauged over time; Table 3.3 provides a full list of how each performance measure is benchmarked. The three categories are:

- Improvement over previous year: For some measures progress will be defined as improvement over previous years. For these measures, the first round of performance data from 2012 will be used as the baseline to track progress. Performance measures targeted for constant improvement include figures that measures things like financial performance, system efficiency, and safety.

- Comparison to a set target: For a few of the characteristics being measured, progress will be measured by how closely the measure reaches a fixed target. An example of such a measure would be the demographic characteristics of riders.

- Descriptive measures: Finally a few measures serve a purely descriptive purpose and do not gauge the progress of the system. Such measures are included to quantify the externalities of bikeshare but have neither a clear definition for improvement or benchmark for gauging progress.

Table 3.3 Benchmarking Performance Measures

Measure	Benchmark Type	Baseline/Target
A. Ratio of Arlington County Bikeshare miles traveled to Arlington vehicle miles traveled (VMT)	Improvement over previous year	Baseline: 2010 VMT and 2011 bikeshare miles
B. Total calories burned and average calories burned per trip	Improvement over previous year	Baseline: 2011
C. Combined number of bikeshare trips for shopping, errands, eating-out, and socializing	Descriptive measure	n/a
D. Average money saved per bikeshare user and total annual savings among all Arlington Capital Bikeshare users.	Descriptive measure	n/a
E. Percentage of users by age, race, gender and income bracket	Comparison to a set target	Target: User parity with Arlington County demographic profile
F. Percent of total bikeshare trips that are linked with another mode - results broken down by mode	Descriptive measure	n/a
G. Absolute number and percent of Arlington jobs and population within a quarter mile of a bikeshare station	Improvement over previous year	Baseline: 2011 stations and MWCOG Round 8.1 population and employment
H. Percentage of hotel rooms in Arlington within a quarter mile of a Capital Bikeshare station	Descriptive measure	n/a
I. Bicycle commute mode share	Improvement over previous year (for which data is available (new mode share data released every three years)	Baseline: 2010 American Community Survey- Bicycle commute mode share for all of Arlington County
J. Public opinion on bicycling as a legitimate transportation option	Improvement over previous year	As there is no existing Arlington survey gauging the public's opinion on cycling, there is no current baseline
K. Helmet use among bikeshare users	Improvement over previous year	Baseline: 2011 results of the Arlington Capital Bikeshare User Survey
L. Crash rate among bikeshare users	Improvement over previous year	Baseline: 2011 crash data
M. Cost recovery ratio	Improvement over previous year	Baseline: 2011 average
N. Average cost per trip for bikeshare users	Descriptive measure	n/a

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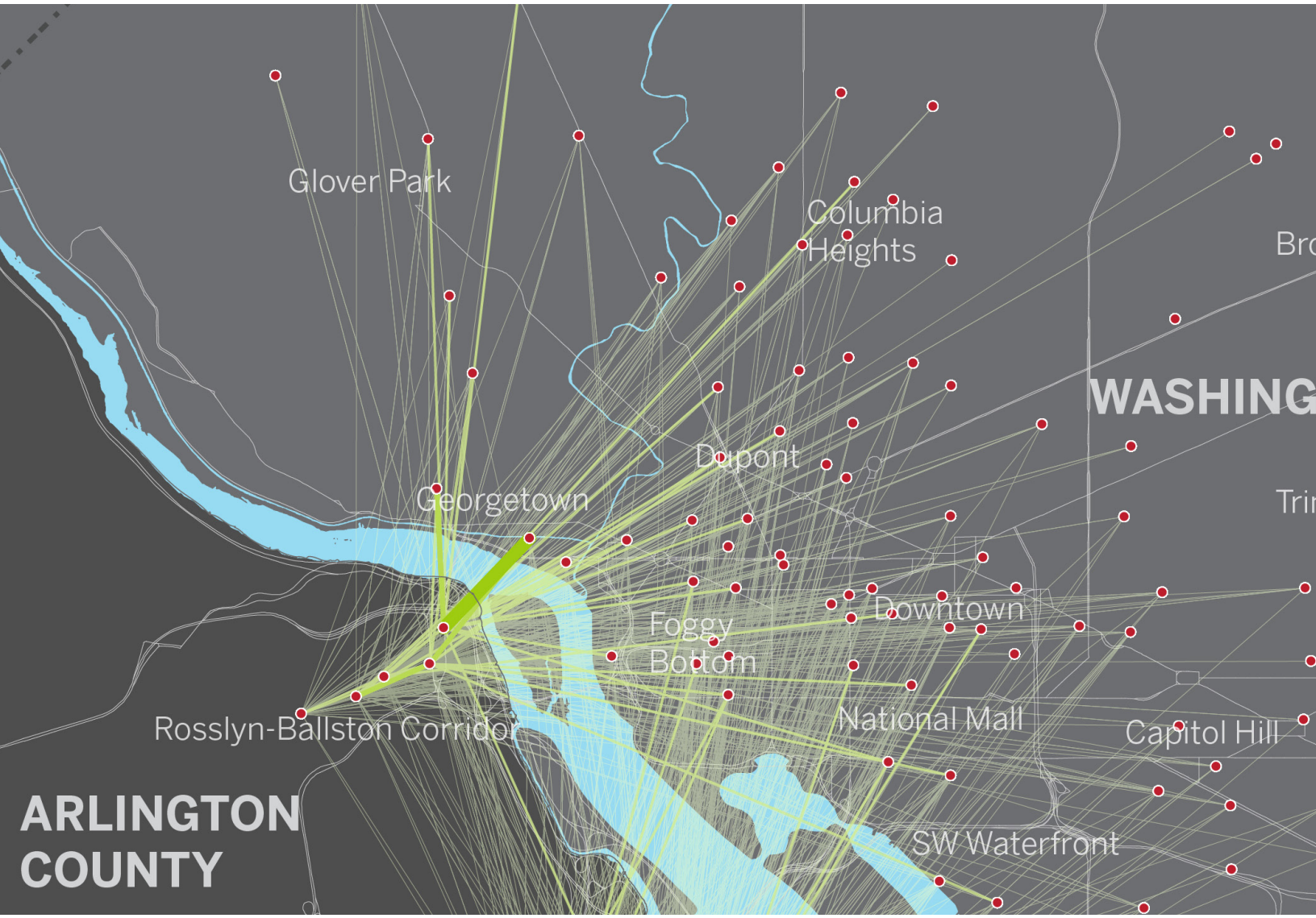
Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018



Chapter 4: System and Service Evaluation

November 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES Arlington County Commuter Services | Bike Arlington

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4 SYSTEM EVALUATION

4.1 Introduction

This system evaluation was conducted in January and February 2012 using Capital Bikeshare system data from calendar year 2011. At the end of calendar year 2011 there were only 23 Capital Bikeshare stations in Arlington, with 14 of these stations in the Crystal City / Pentagon City corridor. Of the nine stations in the Rosslyn-Ballston corridor in 2011, only four were installed before November of that year, with five more installed in the final months of the year. The data presented in this section is a snapshot of the system's performance in 2011, prior to the significant expansion in the Rosslyn-Ballston corridor that took place throughout 2012. As of September 4, 2012, the Capital Bikeshare system in Arlington was comprised of number of 44 stations, with 568 docks, and 306 bicycles.

4.2 Membership

Membership by Month (Annual Memberships)

Table 4.1 lists the annual memberships, by jurisdiction of residence, added each month during 2011. In 2011 there were a total of 14,912 annual memberships purchased by users across all jurisdictions. Of these, 992 (7 percent) were purchased by Arlington residents, 12,119 (81 percent) were purchased by DC residents, and 1,801 (12 percent) were purchased by residents of other jurisdictions. From a low of 272 memberships purchased in January 2011, the peak month of annual membership purchases was April 2011 with 5,580 memberships purchased. During April, Capital Bikeshare ran a half-price promotion for annual memberships through the deal website Living Social, prompting a tremendous uptick in memberships in April and the following months. October, when the purchased deal had to be redeemed by, saw another increase in the number of annual memberships purchased. The purchases in April represent 27 percent of the total purchases for 2011; Arlington County residents also purchased the most memberships that month, with 41 percent of annual members in Arlington joining in April. The second highest month of purchases was May 2011 with 1,733, or 9 percent of the total purchases in 2011; 13 percent of Arlington residents joined in May.

Figure 4.1 graphically depicts the annual memberships purchased by month by jurisdiction. From the peak in April, strong membership growth was maintained between May and November, with an average of 1,085 memberships purchased during those months, before dropping to 594 sold during December. Figure 4.2 graphically depicts the percentage of annual memberships purchased in each jurisdiction.

Capital Bikeshare currently does not have data on how many members renew their annual memberships, however net membership gains or losses can be calculated by finding the difference between the present month sales and that month the previous year. Since the first annual membership began to expire in August 2011, Capital Bikeshare has seen a slight net decrease of new memberships over the previous year. In the last two month of 2011 net memberships began to increase once again, possibly due to the mild winter weather.

Figure 4.1 2011 Annual Memberships by Month by Jurisdiction

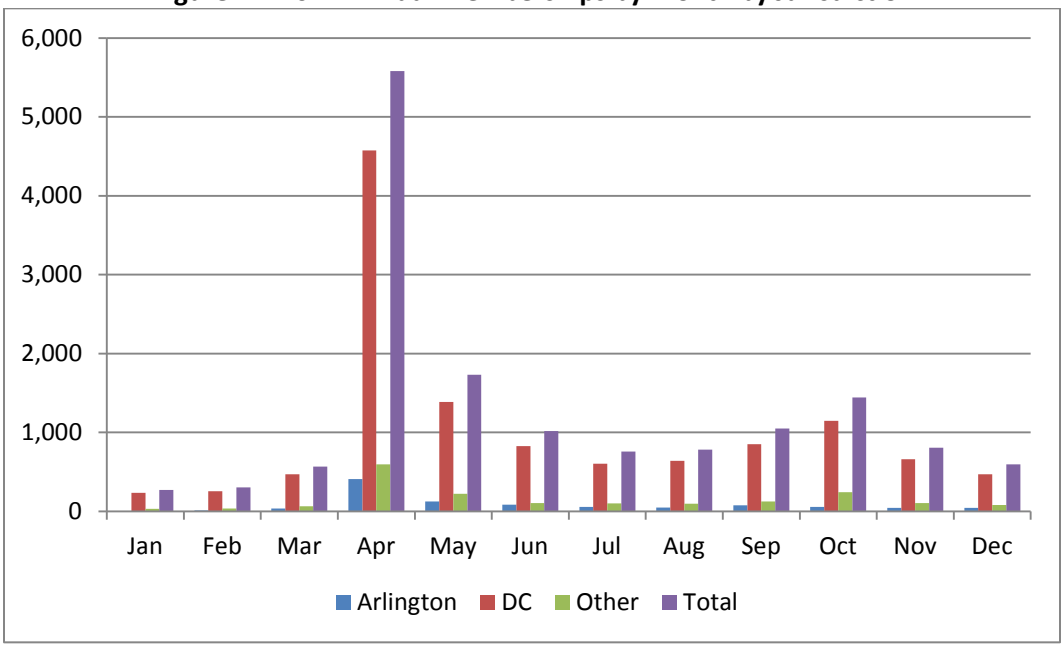


Table 4.1 2011 Annual Membership by Month by Jurisdiction

Month	Arlington	DC	Other	Total	*Number of Arlington Docks*
January	5	236	31	272	*172*
February	12	253	37	302	*172*
March	34	468	64	566	*172*
April	409	4,576	595	5,580	*228*
May	125	1,385	223	1,733	*228*
June	86	828	104	1,018	*228*
July	54	603	102	759	*228*
August	46	641	97	784	*228*
September	76	852	123	1,051	*228*
October	57	1,147	241	1,445	*243*
November	44	660	104	808	*312*
December	44	470	80	594	*312*
Totals	**992**	**12,119**	**1,801**	**14,912**	
Percentage	7%	81%	12%		

Figure 4.2 2011 Net Annual Memberships by Jurisdiction

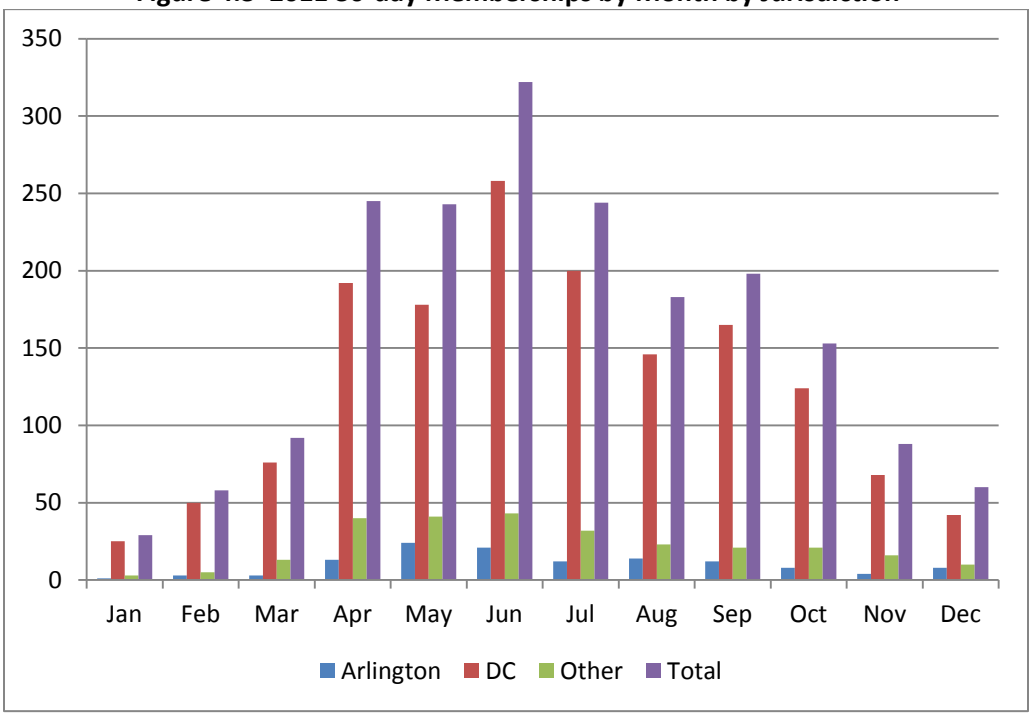
Membership by Month, 30-day Memberships

Table 4.2 lists the 30-day memberships added each month by jurisdiction. In 2011 there were a total of 1,915 month memberships purchased by users across all jurisdictions. Of these, 123 (6 percent) were purchased in Arlington, 1,524 (80 percent) were purchased in DC, and 268 (14 percent) were purchased in other jurisdictions. From a low of one purchased in January 2011, the peak month of monthly membership purchases in Arlington was May, with 24 memberships purchased (20 percent of 2011 purchases). While the Living Social deal offered in April also provided for half price monthly membership, that deal's impact on membership was not nearly as pronounced as the annual membership sale. An increase in membership growth was observed between April and October, with an average of 227 memberships system wide and 15 for Arlington County residents purchased during those months. Figure 4.3 graphically depicts the 30-day memberships purchased by month by jurisdiction.

Table 4.2 2011 30-day Memberships by Month by Jurisdiction

Month	Arlington	DC	Other	Total	*Total Number of Arlington Docks*
January	1	25	3	29	*172*
February	3	50	5	58	*172*
March	3	76	13	92	*172*
April	13	192	40	245	*228*
May	24	178	41	243	*228*
June	21	258	43	322	*228*
July	12	200	32	244	*228*
August	14	146	23	183	*228*
September	12	165	21	198	*228*
October	8	124	21	153	*243*
November	4	68	16	88	*312*
December	8	42	10	60	*312*
Totals	**123**	**1,524**	**268**	**1,915**	
Percentage	6%	80%	14%		

Figure 4.3 2011 30-day Memberships by Month by Jurisdiction

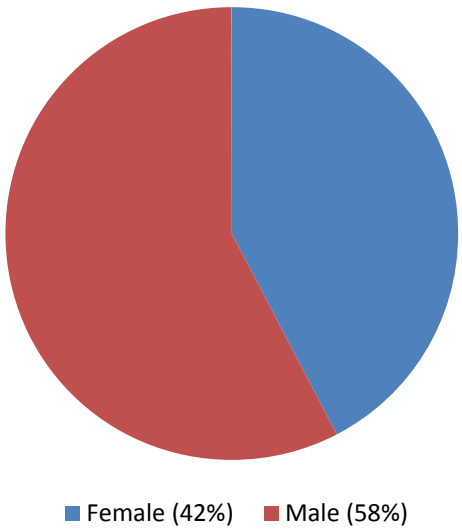


Membership by Gender and Age

Capital Bikeshare has a more even gender balance than the general bicyclist population. Women make up 42 percent of all Capital Bikeshare riders (see Figure 4.4) compared to 38 percent of bicyclists region wide and 26 percent nationwide.[1] As shown in Figure 4.5, Capital Bikeshare riders are predominately between 20 and 40 years old. The average age of a female rider trends younger than for men, with female ridership peaking between 20 and 30 years old.

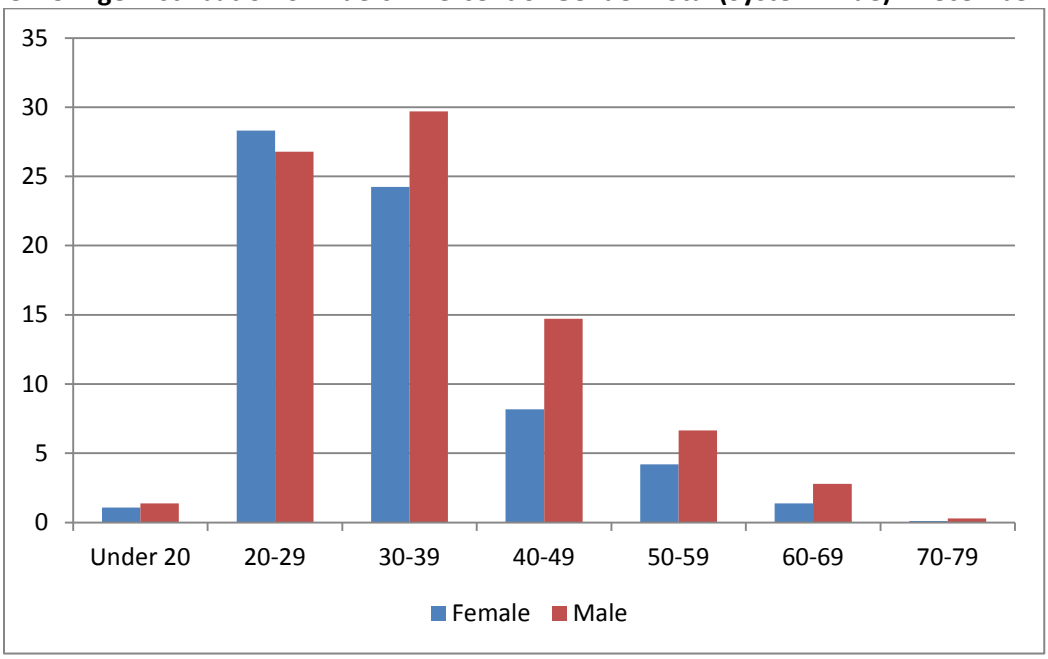
Gender balance and age distribution is often used as a proxy indicator of the general population's perception of the safety and viability of bicycling as a way to get around. Efforts at increasing female participation in cycling can plan an important role promoting acceptance of biking as a mode of transportation within the general population. In communities with higher bicycle rates, gender and age tend to reach a more even distribution. While Capital Bikeshare's gender split is relatively balanced, people over 40 are underrepresented among riders. This may be due to the fact that the ages of residents in the Rosslyn-Ballston and Jefferson-Davis corridors in which Capital Bikeshare stations are located is skewed towards the 18 to 35 year old range.

Figure 4.4 Gender Breakdown of Capital Bikeshare Riders (System wide) - December 2011



[1]Northrop, Kory. Analysis based on the U.S. Census Bureau's American Community Survey as submitted to the U.S. Department of Transportation Data Visualization Student Challenge, "Bicycle Commuting Trends in the United States," available online at: http://dataviz.challenge.gov/submissions/5199-bicycle-commuting-trends-in-the-united-states, as of February 15, 2012.

Figure 4.5 Age Distribution of Riders – Percent of Gender Total (System wide) - December 2011



4.3 Demographics of Service Area

Table 4.3 Demographic Characteristics of the Arlington Capital Bikeshare Service Area*

	Pop. Density (/sq mile)	Employment Density (/sq mile)	Median Age	Median Income	Bike & Walk Share	Non-White Population
Crystal City / Pentagon City	6,136	15,626	34	$98,529	8.8%	33.1%
Rosslyn-Ballston Corridor	14,772	25,451	31	$94,289	9.0%	27.4%
System wide Catchment Area	15,811	N/A	34	$72,176	20.3%	48.8%
Arlington County	8,140	7,988	35	$99,029	6.0%	36.0%

*Catchment defined as all census tracts that overlap with a particular corridor's Capital Bikeshare stations. Catchment area includes all existing and planned stations as of January 2012.

Capital Bikeshare currently serves the main employment and population centers of Arlington County, the Rosslyn-Ballston Corridor and the Crystal City / Pentagon City Corridor. The Capital Bikeshare catchment area, defined as the area within ½ a mile of a bikeshare station, contains approximately 94,000 residents and 172,000 jobs. Compared to the region wide Capital Bikeshare system, Arlington Capital Bikeshare stations are situated in wealthier, slightly less dense and less diverse census tracts. Notably, bicycle and walking trips make up a much smaller share of total commuter trips compared to the regional Capital Bikeshare catchment area.

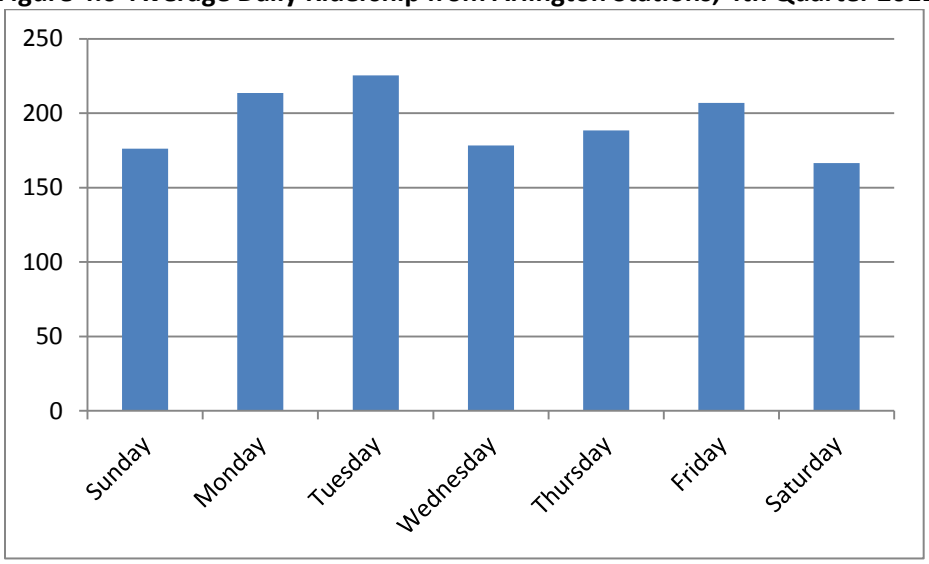
Arlington County as a whole is less densely developed than the Arlington Capital Bikeshare catchment area. A few high density portions of the country are presently not served by the system, most notably the Columbia Pike corridor and Shirlington; these two neighborhoods have the largest concentration of zero car households outside the existing catchment area.

4.4 Overall Ridership/Usage

Ridership by Day

As Figure 4.6 indicates, Capital Bikeshare ridership from Arlington stations remains consistent between the weekday and weekends. The distribution of trips from Arlington Capital Bikeshare stations across the days of the week mirrors system wide averages. Compared to Arlington's ART bus system, Capital Bikeshare ridership is much more evenly distributed. Average daily ridership aboard ART ranges from 7,484 on the weekday to 2,043 on the weekend.[2]

Figure 4.6 Average Daily Ridership from Arlington Stations, 4th Quarter 2011



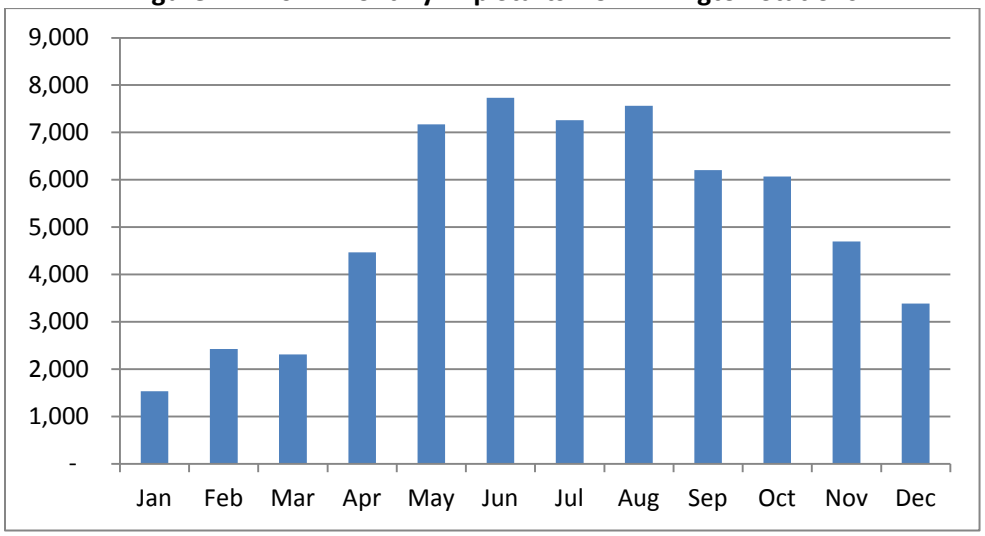
[2] ART Transit Development Plan, 2010 Ridership Averages.

Trips by Month

The monthly trips taken from stations by jurisdiction listed in Table 4.4 and depicted graphically in Figure 4.7 show a pattern consistent with seasonal increases associated with weather and tourism. In 2011, from a low of just over 38,000 trips taken system wide in January, the system ridership peaked at over 143,000 trips in the month of June. An increase in trips was observed in Arlington through the spring and summer before dropping slightly in September and October and then to levels half that of June by December. In DC a similar pattern is seen, but with a drop in ridership observed one month earlier when compared to Arlington (in August). In DC the ridership only dipped slightly in September and October before drops of approximately 10,000 trips in both November and December. In Arlington ridership in January was 1,536 but grew to a peak of 7,733 in June, an increase of 403 percent. In DC ridership in January was 36,653 and grew to a peak of 135,779 in June, an increase of 270 percent. The difference in trips observed between Arlington and DC is consistent with the differences in the number of stations between jurisdictions (23 stations in Arlington, 118 in DC) and the higher population and employment in DC. However, Arlington stations are surrounded by population and employment density similar to or even higher than many parts of DC. System wide ridership ranged from 38,189 in January to a seasonal peak of 143,512 in June, a difference of 276 percent overall.

The large monthly variations can be explained largely by weather. During the warmer spring and summer months, bicycle trips increase overall. Monthly variations in Capital Bikeshare ridership mirror variations in general bicycling trips. Counts at Arlington's Custis-Rosslyn Trail have a similar pattern of usage to Capital Bikeshare (see Figure 4.8).[3]

Figure 4.7 2011 Monthly Trip Starts from Arlington Stations



[3] The Custis Trail is the only location in Arlington with one year of bicycle count data. Bicycle counters are presently deployed at additional locations across the County.

Table 4.4 2011 Monthly Trips by Origin Jurisdiction

Month	Arlington	DC	Total	*Total Number of Arlington Docks*
January	1,536	36,653	38,189	*172*
February	2,425	45,790	48,215	*172*
March	2,313	61,732	64,045	*172*
April	4,464	90,406	94,870	*228*
May	7,173	128,648	135,821	*228*
June	7,733	135,779	143,512	*228*
July	7,256	134,085	141,341	*228*
August	7,561	129,130	136,691	*228*
September	6,206	121,212	127,418	*228*
October	6,072	117,439	123,511	*243*
November	4,700	97,467	102,167	*312*
December	3,383	87,323	90,706	*312*
Totals	**66,843**	**1,297,592**	**1,364,435**	

Usage by Station

Table 4.5 shows usage by station for Capital Bikeshare stations located in Arlington County for the most recent quarter with data available. The station with the highest usage has 52 percent more usage than the second highest station, and the second highest station had 55 percent more trips starting from there as the third highest. Overall, the top six stations account for more than 50 percent of the trips. Some of the lowest usage stations average just one or fewer trips per day.

Table 4.5 Ridership by Station, 4th Quarter 2011

Station	Casual	Members	Total	Date Station Installed
Crystal City Metro / 18th & Bell St	**269**	**2,088**	**2,357**	**9/20/2010**
Lynn & 19th St North	352	1,197	1,549	4/16/2011
27th & Crystal Dr	170	828	998	9/20/2010
Rosslyn Metro / Wilson Blvd & Ft Myer Dr	**231**	**678**	**909**	**4/16/2011**
23rd & Crystal Dr	114	710	824	9/20/2010
15th & Crystal Dr	196	592	788	9/20/2010
S Glebe & Potomac Ave	158	608	766	9/20/2010
Pentagon City Metro / 12th & Hayes St	**135**	**619**	**754**	**9/20/2010**
N Rhodes & 16th St N	170	488	658	4/16/2011
20th & Crystal Dr	162	398	560	9/20/2010
S Joyce & Army Navy Dr	139	412	551	9/20/2010
23rd & Eads	86	430	516	9/20/2010
Clarendon Blvd & Pierce St	167	325	492	4/16/2011
26th & Crystal Dr	19	436	455	9/20/2010
12th & Army Navy Dr	53	351	404	9/20/2010
18th & Hayes St	46	287	333	9/20/2010
Courthouse Metro / Wilson Blvd & N Uhle St	**55**	**263**	**318**	**11/10/2011**
15th & Hayes St	114	201	315	9/20/2010
20th & Bell St	53	121	174	9/20/2010
Wilson Blvd & N Edgewood St	25	131	156	11/11/2011
N Highland St & Wilson Blvd	16	102	118	11/23/2011
Wilson Blvd & Franklin Rd	17	70	87	12/1/2011
N Fillmore St & Clarendon Blvd	17	56	73	11/23/2011

Note: Stations located within 100 feet of a Metrorail station entrance are bolded.

4.5 Trip Behavior

Bicycle Miles

Table 4.6 lists the bicycle miles traveled by jurisdiction for each month in 2011; the mileage by month in Arlington is shown graphically in Figure 4.8.[4] In 2011 there were more than 1.4 million bicycle miles ridden across all jurisdictions. Of these, 59,373 (4 percent) were ridden starting at stations in Arlington, and 1,351,543 (96 percent) were ridden starting at stations in DC. From a low of 39,924 miles in January 2011, the peak month of miles ridden was June 2011 with 165,252 miles system wide and 7,644 in Arlington County; the average monthly miles ridden in 2011 were 4,948 for Arlington, 112,629 miles for DC, and 117,576 miles overall. In both Arlington and DC, the miles ridden exceeded the jurisdiction's annual average during the six month period between May and October, confirming the correlation between weather, tourism, and usage. On average, trips using Capital Bikeshare were just over one mile in length, both for trips originating in Arlington and DC, with slightly longer trip lengths in DC. As shown in Table 4.7, user type also impacted the distance of bicycle trips. In Arlington, casual users traveled over a half a mile further on average than member users. Casual members were also five times likelier to make a trip with the same origin and destination station.

Table 4.6 2011 Monthly Bicycle Miles by Jurisdiction

Month	Miles from Trips Starting in Arlington	Average Mileage per Trip (Arlington)	Miles from Trips Starting in DC	Average Mileage per Trip (DC)	Total Miles	Total Trips	*Total Number of Arlington Docks*
January	1,112	0.7	38,812	1.1	39,924	36,538	*172*
February	1,584	0.7	49,261	1.1	50,845	45,876	*172*
March	2,414	1.1	77,954	1.3	80,368	63,319	*172*
April	4,102	1.1	103,325	1.2	107,427	87,734	*228*
May	7,493	1.0	153,706	1.2	161,199	135,821	*228*
June	7,644	1.1	157,608	1.2	165,252	135,303	*228*
July	6,937	1.1	149,680	1.2	156,617	132,070	*228*
August	7,819	1.1	147,984	1.2	155,803	128,920	*228*
September	6,291	1.1	137,732	1.2	144,023	120,311	*228*
October	6,088	1.1	134,314	1.2	140,402	117,057	*243*
November	4,510	1.1	109,474	1.2	113,984	95,866	*312*
December	3,379	1.1	91,693	1.1	95,072	84,439	*312*
Total	**59,373**		**1,351,543**		**1,410,916**	**1,183,254**	
Average	**4,948**		**112,629**		**117,576**	**98,604**	
Percentage	4%		96%				

[4] Distance traveled was calculated as the straight-line distance between the origination and destination stations for every rental. This measure differs from passenger miles traveled, typically reported by transit agencies, which is measure of the actually number of miles traveled per passenger.

Figure 4.8 2011 Monthly Bicycle Miles for Arlington

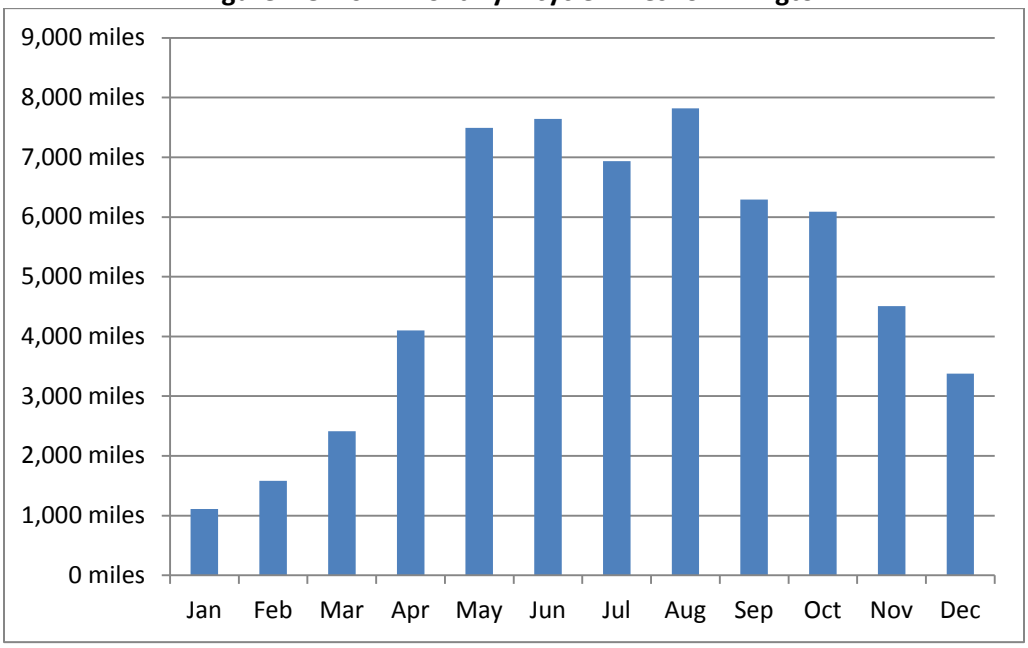


Table 4.7 Average Trip Bicycle Miles by User Type in Arlington- 4th Quarter 2011

	Casual	Registered	Combined
Average Trip Distance	1.8 miles	1.2 miles	1.3 miles
Share Same Start/End Station Trips	17.9%	3.2%	6.1%

Note: Trips with the same origin and destination station not included in distance average.

Average Daily Hours of Utilization per Bicycle

Arlington

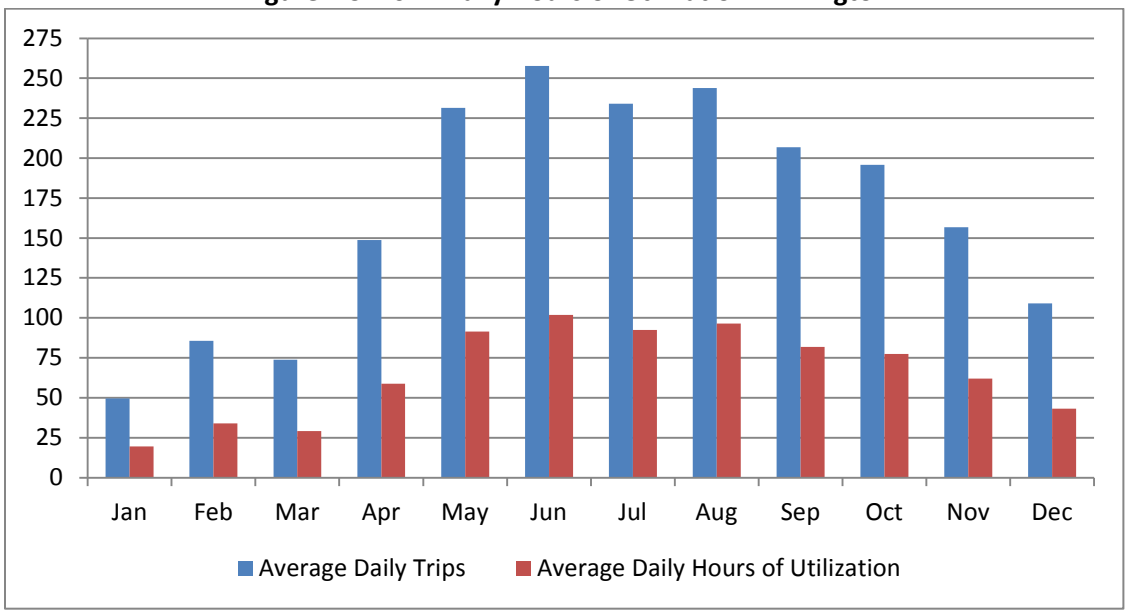
Table 4.8 lists the average daily trips and average daily hours of utilization for Arlington by month for 2011. The average daily hours of utilization is calculated by multiplying the average number of daily trips by the average trip duration for trips made to or from Arlington.[5] Overall in 2011, Arlington averaged 166 trips daily with an average duration of 23 minutes and 43 seconds. This resulted in an average of 66 monthly hours of utilization. The lowest month in all three categories was January, consistent with other usage metrics in this section. Likewise June was the highest month, with nearly 260 trips made daily resulting in 101.9 hours of utilization. Again the correlation between weather and tourism is evident, with the use exceeding the average during the six-month time period of May to October. Figure 4.9 depicts the daily trips and daily hours of utilization for Arlington.

[5] 23:43 average duration over fourth quarter 2011 for Arlington.

Table 4.8 2011 Daily Hours of Utilization and Trips - Arlington

Month	Average Daily Hours of Utilization	Average Daily Trips	*Average Daily Temperature (°F)*[6]
January	20	50	*34*
February	34	86	*44*
March	29	74	*44*
April	59	149	*59*
May	92	231	*69*
June	102	258	*79*
July	93	234	*85*
August	96	244	*80*
September	82	207	*71*
October	77	196	*58*
November	62	157	*52*
December	43	109	*53*
Annual Average	66	166	

Figure 4.9 2011 Daily Hours of Utilization – Arlington



[6] National Weather Service, 2011 Arlington County Average Temperature Data, available online at: http://www.erh.noaa.gov/lwx/climate/dca/dcatemps.txt, as of February 15, 2012

System Wide

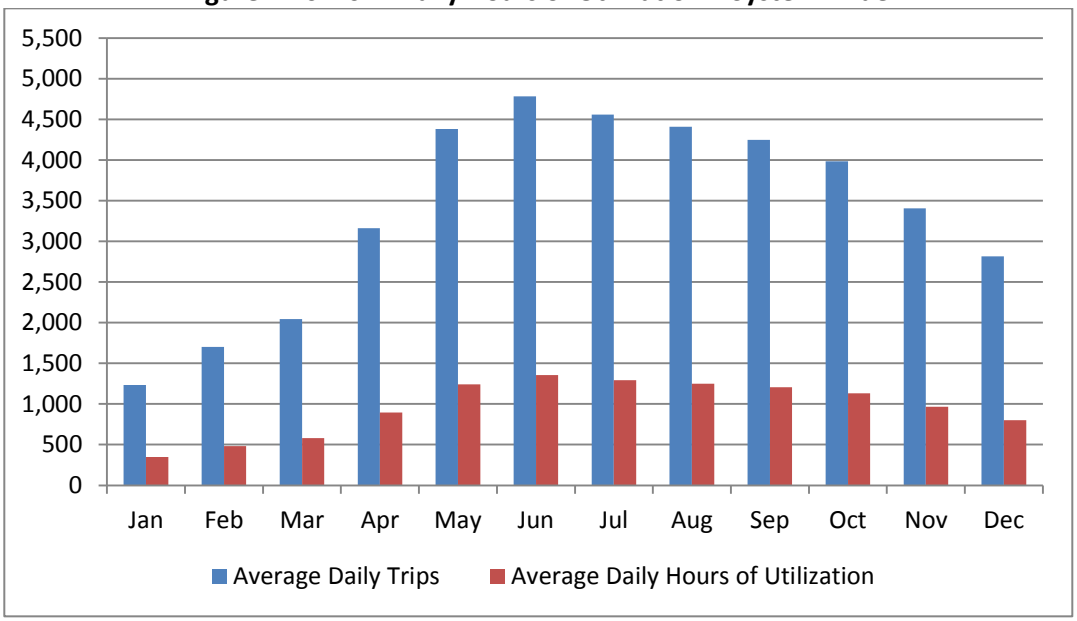
Table 4.9 lists the average daily trips and average daily hours of utilization for the system by month for 2011. The average daily hours of utilization was calculated by multiplying the average daily trips by the average trip duration for trips made system wide.[7] Overall in 2011, the system averaged 3,394 trips daily with an average duration of sixteen minutes and twenty seconds. This resulted in an average of 963 monthly hours of utilization. The lowest month in all three categories was January whereas June was the highest month. June had nearly 4,784 trips made daily resulting in 1,357 hours of utilization. Figure 4.10 depicts the daily trips and daily hours of utilization for the entire system.

Table 4.9 2011 Daily Hours of Utilization - System Wide

Month	Average Daily Hours of Utilization	Average Daily Trips
January	349	1,232
February	483	1,701
March	579	2,043
April	897	3,162
May	1,243	4,381
June	1,357	4,784
July	1,293	4,559
August	1,251	4,409
September	1,205	4,247
October	1,130	3,984
November	966	3,406
December	799	2,817
Annual Average	963	3,394

[7] 17:01 system average duration over fourth quarter 2011

Figure 4.10 2011 Daily Hours of Utilization – System Wide



Trip Time Duration

The average duration of an Arlington Capital Bikeshare trip in the 4th quarter of 2011 was 22 minutes. Trips are clustered around two durations, 4 minutes and 22 minutes. The distribution of Capital Bikeshare trips around four minutes has at least two possible explanations: Capital Bikeshare riders may use the trip largely for short journeys that are competitive with walking or riders may be taking longer trips but breaking up the journeys into multiple legs to avoid usage fees. The second cluster of trips ending around 22 minutes illustrates the incentive to keep journeys below 30 minutes.

Over 6 percent of Capital Bikeshare trips are over 60 minutes long. A small number of very long trips skew the average Capital Bikeshare travel time significantly. If trips over 60 minutes are excluded, the average Capital Bikeshare trip is only 13 minutes long (as compared to 22 minutes if all trips are included). The majority of trips greater than 30 minutes are by casual users, indicating a tendency by casual usesr to use bicycles in more of a tourist capacity than for quick trips. The high travel times of some other trips may be attributed to lost or incorrectly docked bicycles.

Figure 4.11 Frequency of Capital Bikeshare Trips by Duration – 4th Quarter 2011 (Only Trips Under 60 minutes)

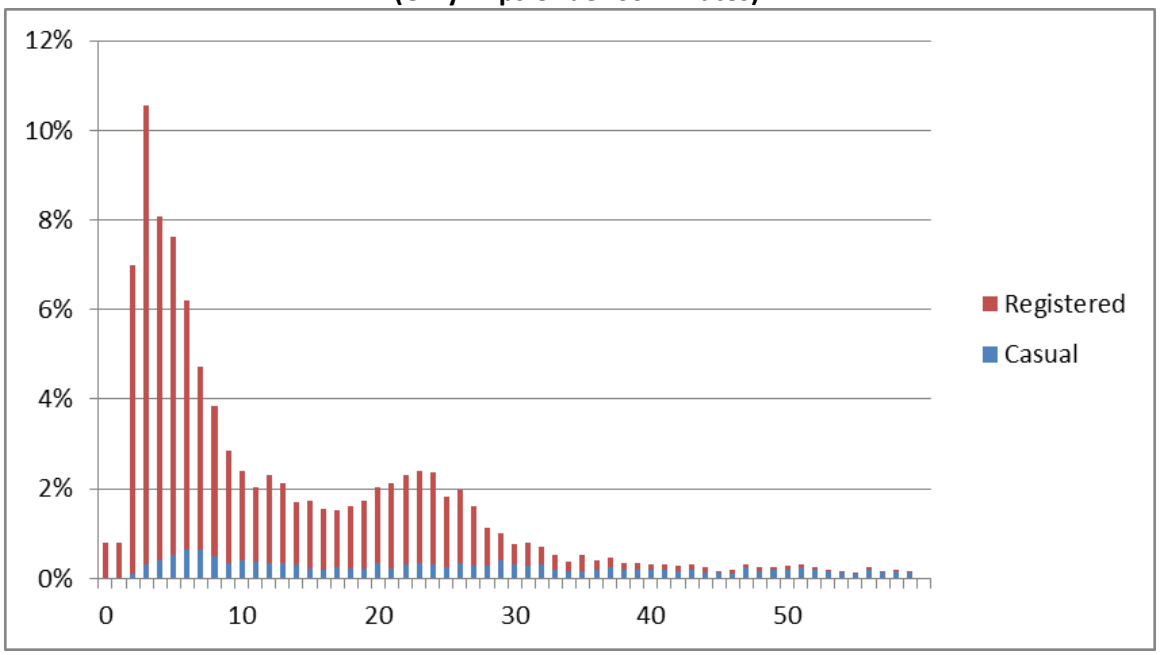


Table 4.10 Capital Bikeshare Trip Times - 4th Quarter 2011

	Average Duration		Distribution of Trip Times by User Type		Standard Deviation
	All Trips	1-60 minutes	<1 minute	> 60 minutes	
All Trips	21:43	13:46	0.7%	6.7%	4:48
Casual Users	58:42	25:10	0.0%	30.7%	4:48
Registered Users	12:21	11:44	1.0%	0.7%	2:24

Trip Patterns

Figure 4.12 illustrates all bikeshare trips starting or ending in Arlington over the fourth quarter of 2011 (October to December). From Arlington, bikeshare trips extend over much of Washington DC, including a concentration of trips between Arlington and Georgetown, Dupont Circle, Downtown, Southwest, and Foggy Bottom.

Examining trip behavior to and from Arlington reveals a number of facts about Capital Bikeshare usage in the County. While the majority of bikeshare trips are contained within the Rosslyn-Ballston Corridor[8] or Crystal City / Pentagon City corridor, a sizable share of trips begin or end in Washington DC. Capital

[8] There were only four Capital Bikeshare stations in the Rosslyn-Ballston corridor throughout the entirety of the fourth quarter of 2011; five more were added in November and December, 2011.

Bikeshare's time of day usage profile mirrors that of transit, however unlike transit, bikeshare exhibits relatively level usage between weekdays and weekends. Finally Capital Bikeshare usage concentrates around transit stations, with two of the top five stations in Arlington located at a Metrorail stop.

While bikeshare trips extend over much of the Capital Bikeshare system, the majority of trips occur between a small number of stations. Table 4.11 lists the 10 highest frequency origin-destination pairs within the Arlington system, i.e., any trip that started or ended in Arlington County. While there are 1,566 trip combinations from Arlington Capital Bikeshare stations over the 4th Quarter of 2011, 10 trip pairs account for over 20 percent of all trips; no DC stations made it into the top ten list. Five of the top 10 pairs include a station within 100 feet of a Metro station entrance.

Figure 4.12 Capital Bikeshare Trips Originating and Ending in Arlington - 4th Quarter 2011

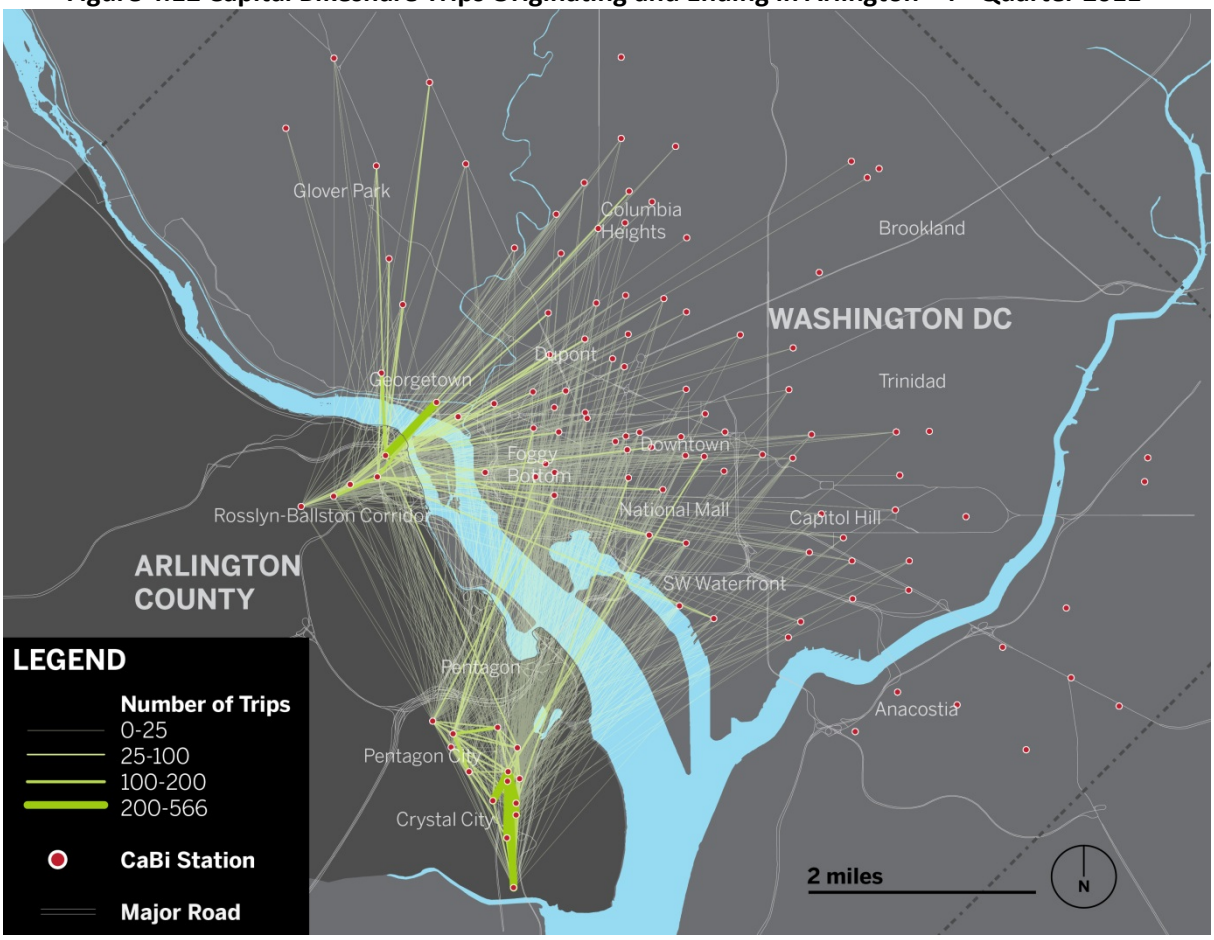


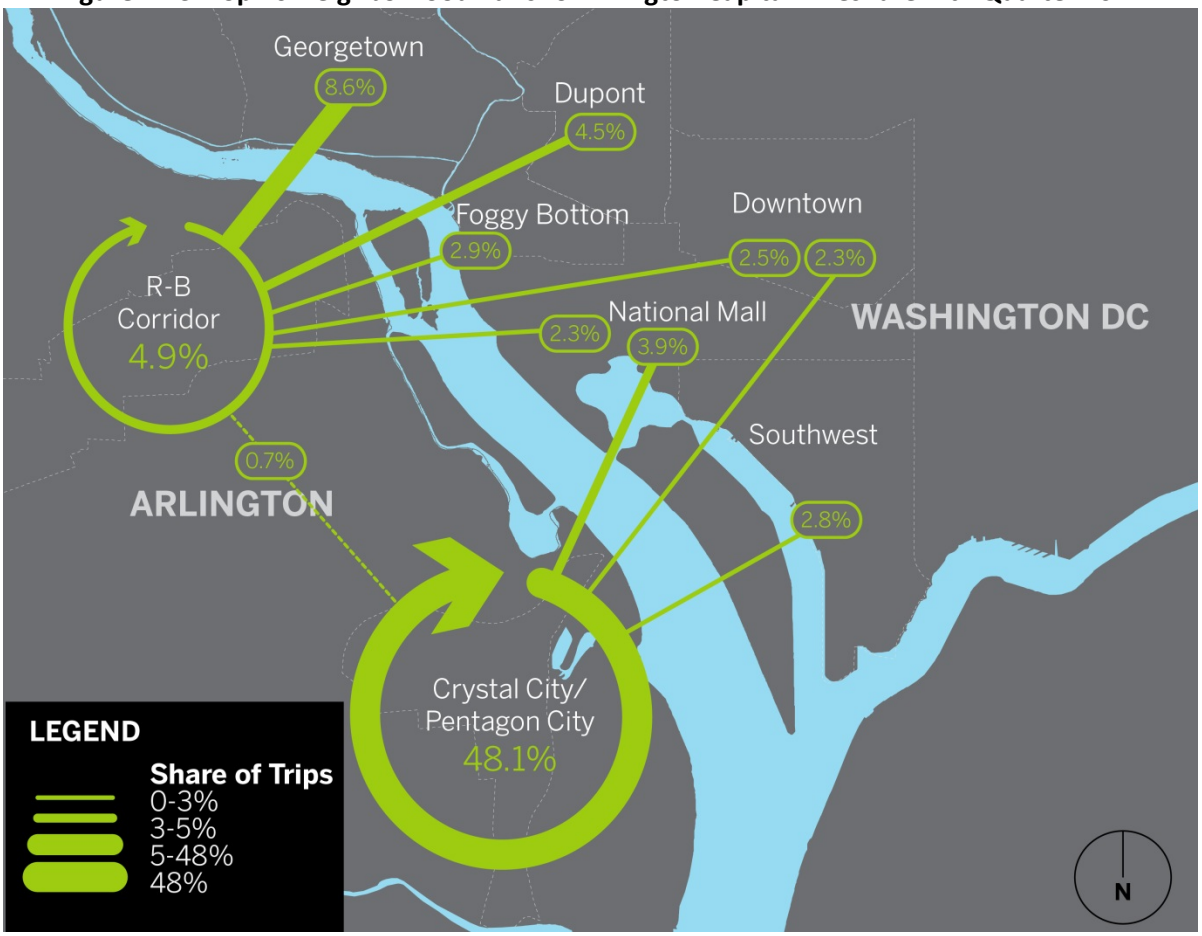
Table 4.11 Top Origin-Destination Pairs - 4th Quarter 2011

Rank	Station Pairs (Station IDs)	Trips	% Total	Station 1	Station 2
1	31007-31009	946	5.3%	**Crystal City Metro / 18th & Bell St**	27th & Crystal Dr
2	31007-31011	901	5.1%	**Crystal City Metro / 18th & Bell St**	23rd & Crystal Dr
3	31013-31007	398	2.2%	23rd & Eads	18th & Bell St
4	31007-31010	393	2.2%	**Crystal City Metro / 18th & Bell St**	S Glebe & Potomac Ave
5	31010-31009	296	1.7%	S Glebe & Potomac Ave	27th & Crystal Dr
6	31001-31004	216	1.2%	**Pentagon City Metro / 12th & Hayes St**	18th & Hayes St
7	31018-31015	126	0.7%	N Rhodes & 16th St N	**Rosslyn Metro / Wilson Blvd & Ft Myer Dr**
8	31001-31008	191	1.1%	**Pentagon City Metro / 12th & Hayes St**	12th & Army Navy Dr
9	31010-31011	190	1.1%	S Glebe & Potomac Ave	23rd & Crystal Dr
10	31010-31010	101	0.6%	S Glebe & Potomac Ave	S Glebe & Potomac Ave
Total		3,758	21.1%		

Notes: Stations located located within 100 feet of a Metrorail entrances are bolded. There were only four Capital Bikeshare stations in the Rosslyn-Ballston corridor throughout the entirety of the fourth quarter of 2011; five more were added in November and December, 2011.

Another way to examine trip behavior is to look at Capital Bikeshare trips between neighborhoods. Using the boundaries of Washington DC's designated neighborhood clusters, the Rosslyn-Ballston corridor and the Crystal City / Pentagon City corridor, trips were ranked by neighborhood pairs. As shown in Figure 4.13, the data reveal a large quantity of trips between Arlington and Georgetown, Dupont Circle, Downtown DC, Foggy Bottom, Southwest and the National Mall. Over eight percent of Arlington Capital Bikeshare trips either begin or end in Georgetown; Capital Bikeshare may provide a way of connecting between Rosslyn's Metro station and Georgetown, a neighborhood notably lacking a Metrorail station.

Figure 4.13 Top 10 Neighborhood Pairs for Arlington Capital Bikeshare -4th Quarter 2011



Note: There were only four Capital Bikeshare stations in the Rosslyn-Ballston corridor throughout the entirety of the fourth quarter of 2011; five more were added in November and December, 2011.

Table 4.12 indicates that 64 percent of Arlington Capital Bikeshare trips either end or begin in the Crystal City / Pentagon City corridor. Compared to DC Capital Bikeshare stations, ridership per station is lower in Arlington than the system as a whole. Arlington's rates of station utilization largely reflect the lower station density and limited coverage of bikeshare in Arlington, as well as the lower population and employment density than in much of DC.

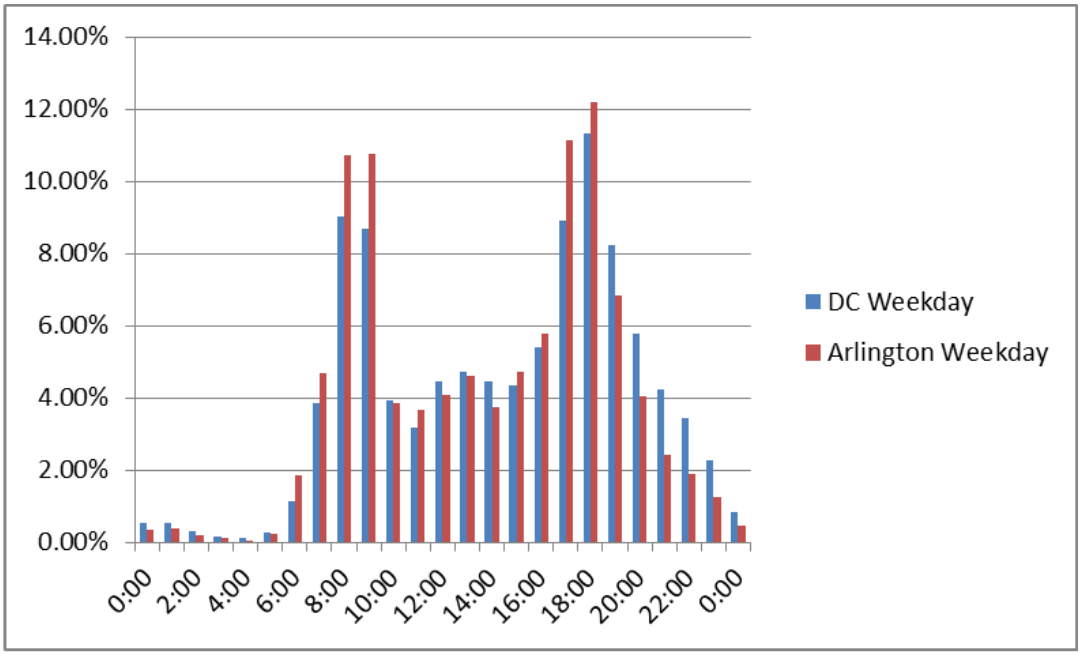
Table 4.12 Trips by Corridor - 4th Quarter 2011

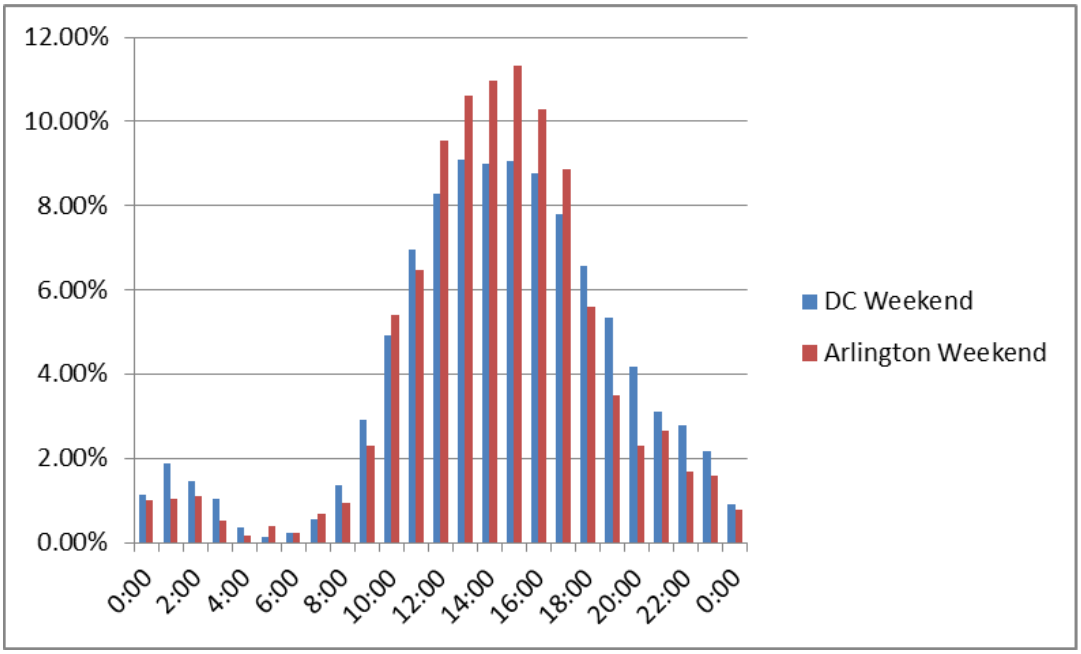
Corridor	Total Trips	% of Trips	Avg Weekday	Avg Weekend	Stations	Trips per Station	
						Weekday	Weekend
Trips Between Both Arlington Corridors	114	1%	1	2	-	-	-
Crystal City / Pentagon City	11,129	64%	132	94	14	9	7
Rosslyn-Ballston Corridor	6,075	35%	67	64	5	13	13
Arlington Total	**17,318**	100%	200	160	19	11	8
System Total	295,192		3,221	3,432	99	33	35

Time of Day and Day of Week Profile

Capital Bikeshare trips during the weekday mirror the distribution of trips on public transit, with trips concentrated around an AM Peak of 6:00-9:00am and the PM Peak of 3:00-7:00pm. The weekday morning peak accounts for 25 percent, and the evening peak 36 percent, of all Capital Bikeshare weekday trips. Highly peaked travel suggests that riders utilize Capital Bikeshare for work trips during the weekdays. Capital Bikeshare's trip distribution reveals two interesting facts about the system: trips during the midday and evening remain relatively high, and weekend ridership (Figure 4.14) roughly matches weekday ridership. High midday weekday and weekend ridership suggests that Capital Bikeshare is used extensively for non-work trips as well, a segment traditionally underserved by public transportation. DC and Arlington have a similar time of day profile, with peak travel slightly more pronounced in Arlington. Capital Bikeshare ridership experiences a small increase during the late evenings, a time when other transit service is greatly reduced or nonexistent. Six percent of all weekend trips occur between 11pm and 4am.

Figure 4.14 Weekday and Weekend Distribution of Bikeshare Trips: Arlington and DC – 4th Quarter 2011





Direction of Travel and Station Pair Trip Balance

As shown in Figure 4.15, Capital Bikeshare exhibits a net loss of bicycles from Arlington to Washington DC during the morning and a net gain of bicycles in the afternoon. On average, the system nets four fewer weekday trips and three fewer weekend trips to Arlington than from Arlington, a negligible amount each day but nevertheless would add up over time without system rebalancing.

Figure 4.15 Net Trips to Arlington by Time of Day: Weekday - 4th Quarter 2011

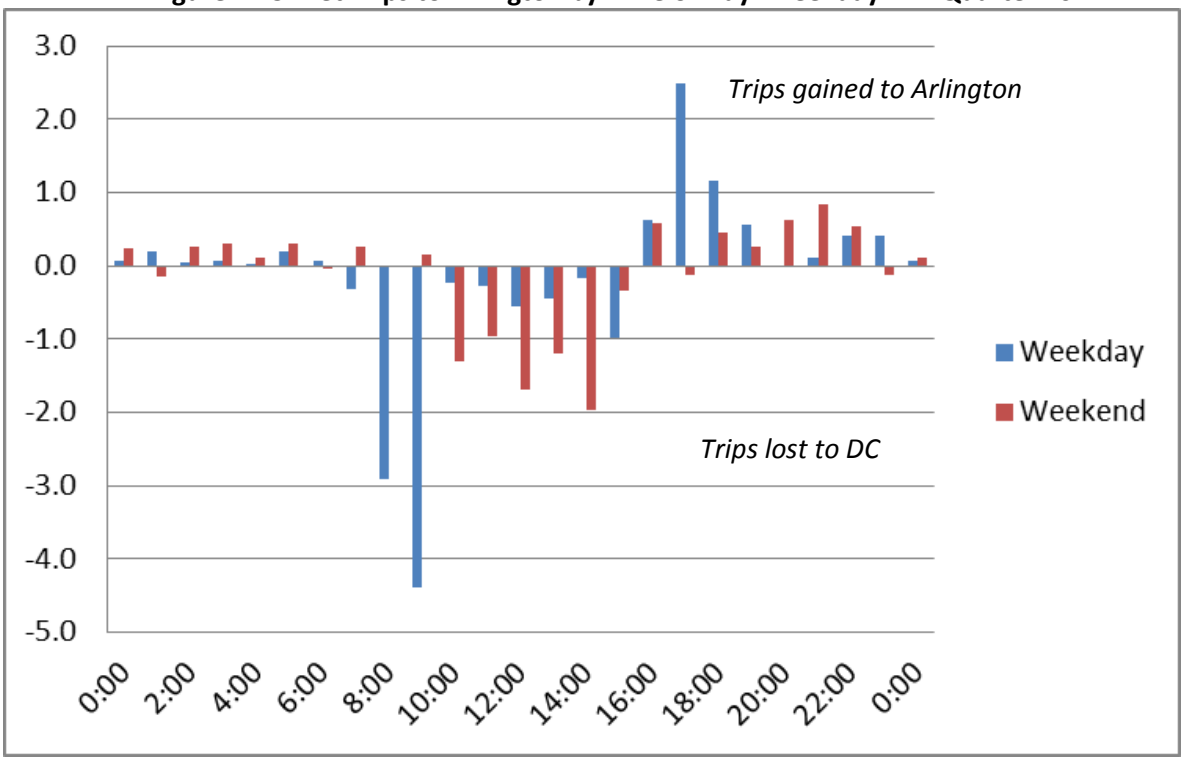


Table 4.13 shows the trip pairs with the greatest imbalance between bikeshare demand and supply. Overall, Arlington bikeshare stations do not need a lot of rebalancing; most of the station pairs that start and/or end in Arlington result in a net change in bicycles of less than one per day. Among the top 10 trip pairs with the greatest imbalance, five pairs have a bikeshare station that is located within 100 feet of a Metrorail station, suggesting riders are making one way trips to access transit during the morning or evening. Many of the trip pairs with high imbalance have changes in elevation between the two stations. An analysis of system wide Capital Bikeshare trips found that elevation changes relate to the frequency of one-way trips; the average change in elevation for the entire Capital Bikeshare system is -1.94 meters.[9]

[9] Greater Greater Washington, *Capital Bikeshare Data Yields Interesting Facts*, 01/13/2012. available online at http://greatergreaterwashington.org/post/13351/capital-bikeshare-data-already-yields-interesting-facts/

Table 4.13 Trip Pairs with the Greatest Imbalance – 4th Quarter 2011

Rank	Station Pairs (Station IDs)	Net Trips to End Station	Start	End
1	31007-31011	2.4	**Crystal City Metro / 18th & Bell St**	23rd & Crystal Dr
2	31007-31010	1.7	**Crystal City Metro / 18th & Bell St**	S Glebe & Potomac Ave
3	31007-31009	1.5	**Crystal City Metro / 18th & Bell St**	27th & Crystal Dr
4	31018-31015	0.9	N Rhodes & 16th St N	**Rosslyn Metro / Wilson Blvd & Ft Myer Dr**
5	31016-31015	0.6	Clarendon Blvd & Pierce St	**Rosslyn Metro / Wilson Blvd & Ft Myer Dr**
6	31226-31014	0.6	34th St & Wisconsin Ave NW	Lynn & 19th St North
7	31014-31225	0.6	Lynn & 19th St North	C & O Canal & Wisconsin Ave NW
8	31001-31004	0.5	**12th & Hayes St**	18th & Hayes St
9	31001-31008	0.5	**12th & Hayes St**	12th & Army Navy Dr
10	31018-31225	0.4	N Rhodes & 16th St N	C & O Canal & Wisconsin Ave NW

Notes: Stations located within 100 feet of a Metrorail entrances bolded. There were only four Capital Bikeshare stations in the Rosslyn-Ballston corridor throughout the entirety of the fourth quarter of 2011; five more were added in November and December, 2011.

Casual vs. Registered Users

Casual users made up 20 percent of all Arlington Capital Bikeshare trips during the final quarter of 2011, compared to 15 percent of all Washington Capital Bikeshare trips. The large concentration of hotel rooms in the Rosslyn-Ballston and Crystal City / Pentagon City corridor, coupled with the presence of the scenic, dedicated, Mount Vernon Trail, may help explain the popularity of short term Capital Bikeshare membership. Casual users have trip patterns distinct from registered users, as shown in Table 4.14. While the majority of Capital Bikeshare trips for both groups occurs within Crystal City / Pentagon City, the Rosslyn-Ballston Corridor, or Georgetown, casual users are a third more likely to bike to the National Mall, twice as likely to bike to Southwest DC (which includes a number of Smithsonian museums), and four times as likely to travel between the Rosslyn-Ballston Corridor and Crystal City / Pentagon City.

Table 4.14 Most Popular Neighborhood Pairs Among Casual Users- 4th Quarter 2011

Rank	Neighborhood Pair	% of Casual Trips	% of Registered Trips
1	Within Crystal City / Pentagon City	35.7%	51.2%
2	Georgetown and Rosslyn-Ballston	9.4%	8.4%
3	Within Rosslyn-Ballston Corridor	8.0%	4.1%
4	Crystal City/ Pentagon and National Mall	5.3%	3.5%
5	Southwest and Crystal City / Pentagon City	5.3%	2.8%
6	Rosslyn-Ballston and Crystal City	4.0%	0.9%

4.6 Connectivity to Other Modes

Capital Bikeshare stations have excellent connectivity to other forms of transit, including Metrorail, WMATA buses, and ART buses. Only four Capital Bikeshare stations (at summer 2011 system size) are not directly adjacent to a WMATA or ART bus route. Nearly all Arlington Capital Bikeshare stations are under half a mile from a Metro station.

Every Capital Bikeshare station is within half a mile of existing bike lanes and trails, however Arlington Capital Bikeshare stations have poorer access to bicycle infrastructure compared to the system as a whole; within ½ a mile of Arlington Capital Bikeshare stations there are 3.5 miles of bike lanes, 1.1 fewer miles than the region wide Capital Bikeshare average.

Figure 4.16 Arlington Corridors with Peak Bus Frequency of Four Buses per Hour or Greater

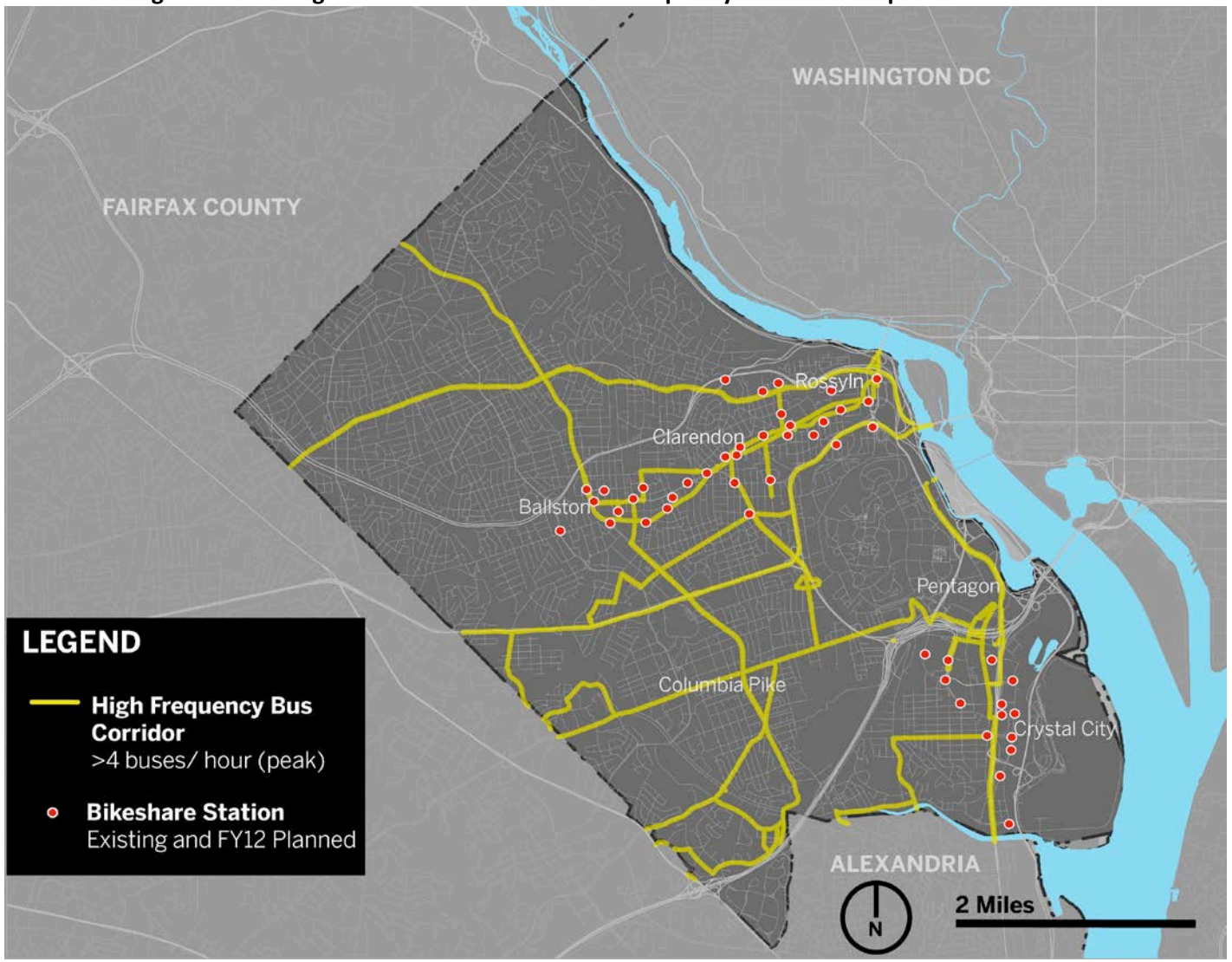
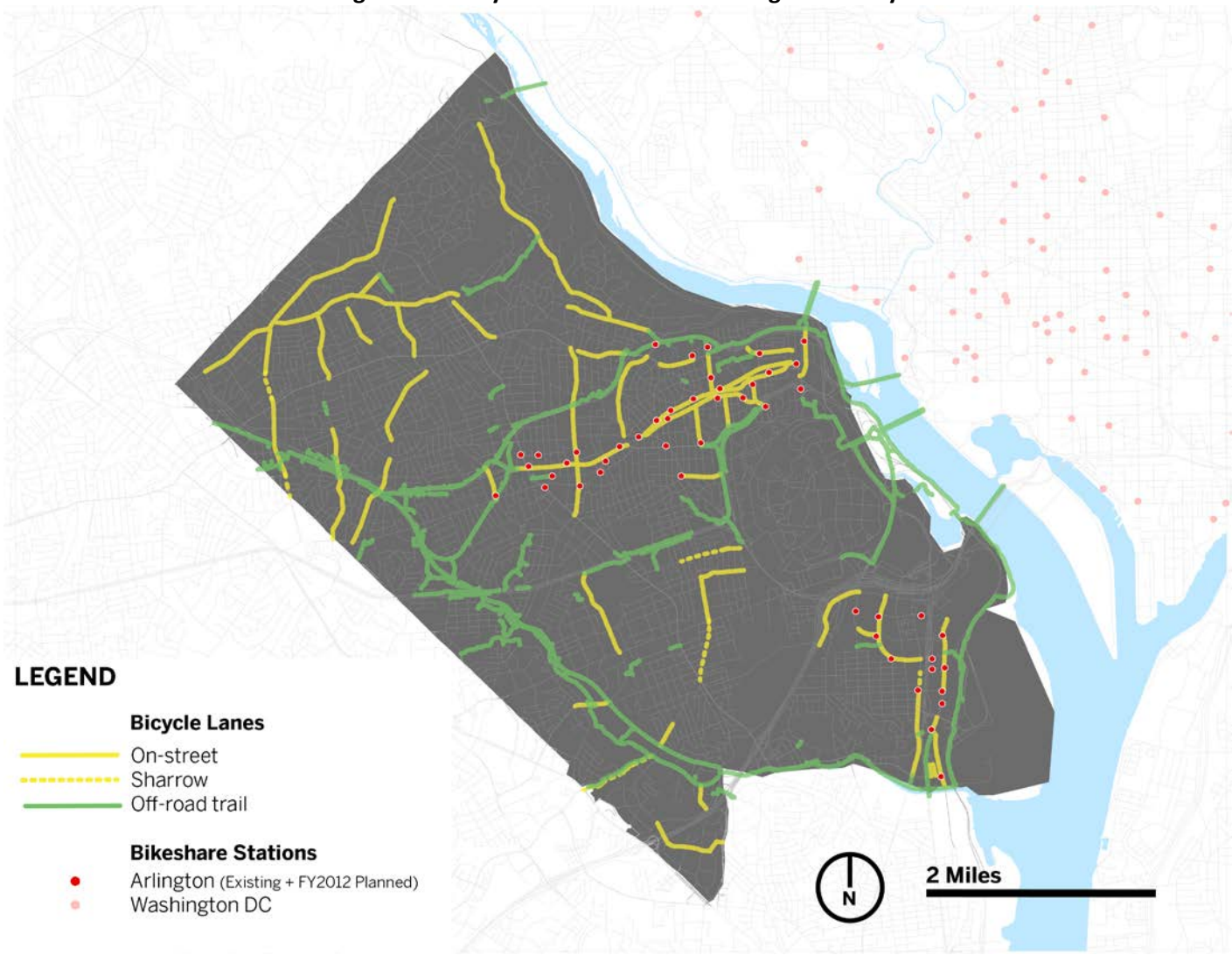


Figure 4.17 Bicycle Infrastructure in Arlington County



4.7 2011 Capital Bikeshare Member Survey Results

In Fall 2011, Capital Bikeshare conducted its annual member survey. Out of the 5,464 survey respondents, 335 (6 percent) of the respondents were residents of Arlington, closely mirroring the percentage of total Capital Bikeshare members that are Arlington residents (7 percent). Five percent (229) of survey respondents were employed in Arlington.

The demographics of the Capital Bikeshare Annual Member Survey respondents closely mirrors that of the population of Arlington County as well as the demographics of the Rosslyn-Ballston and Crystal City / Pentagon City corridors. The gender split for those that responded to the annual member survey is exactly analogous to that of the Capital Bikeshare's membership as a whole.

Table 4.15 Arlington County and Capital Bikeshare Member Gender Ratios

Gender	Arlington County	Capital Bikeshare Members	Arlington County Resident Respondents
Male	50%	58%	58%
Female	50%	42%	42%

Like Arlington County as a whole and the Rosslyn-Ballston corridor and Crystal City / Pentagon City, Arlington County Capital Bikeshare members tend to have higher incomes, with nearly half of the members responding to the survey having a household income of $100,000 or more.

Table 4.16 Arlington County and Arlington Resident Member Survey Respondents Income

Annual Household Income	Arlington County	Arlington County Resident Respondents	Arlington County Rosslyn-Ballston Corridor	Arlington County Crystal City / Pentagon City
Less than $10,000	4%	2%	4%	6%
$10,000 to $14,999	2%	1%	2%	2%
$15,000 to $24,999	4%	1%	4%	3%
$25,000 to $34,999	4%	3%	4%	3%
$35,000 to $49,999	7%	12%	6%	7%
$50,000 to $74,999	16%	18%	17%	16%
$75,000 to $99,999	14%	13%	17%	20%
$100,000 to $124,999	12%	13%	15%	13%
$125,000 to $149,999	9%	9%	8%	12%
$150,000 to $199,999	11%	11%	12%	11%
$200,000 or more	15%	17%	12%	8%

Arlington County Data Source: 2006-2010 American Community Survey, Arlington, Virginia, prepared by the U.S. Census Bureau, 2011. Rosslyn-Ballston and Crystal City / Pentagon City corridor data, Arlington County Planning Research and Analysis Team: Arlington County Major Planning Corridors Demographic Trends. Totals may not sum to 100 percent due to rounding.

Overall, Arlington County Capital Bikeshare member racial characteristics also match closely with those of Arlington County as a whole. However, there is a notable gap between the percentage of African-American and Hispanic Capital Bikeshare members in Arlington and the presence of these communities

in Arlington, the Rosslyn-Ballston corridor and Crystal City / Pentagon City. The U.S. Census doesn't consider "Hispanic" as a race, but instead an ethnicity that is independent of race (a Hispanic person must report their race as Caucasian, Asian, Black or Other). In the 2010 Decennial Census, 15 percent of Arlington residents reported that they were "Hispanic or Latino."

Table 4.17 Arlington County Capital Bikeshare Members Racial Composition

Race	Arlington County	Arlington County Resident Survey Respondents	Rosslyn-Ballston Corridor	Crystal City / Pentagon City Corridor
Caucasian / Non-Hispanic	72%	79%	70%	69%
Asian/Pacific Islander	10%	12%	14%	12%
Black/African-American	9%	2%	5%	9%
Hispanic	n/a	4%	9%	7%
Other/Multi-Racial	10%	4%	2%	3%

Arlington County Data Source: 2010 Census Redistricting Data (Public Law 94-171), Summary File 1 (Arlington, Virginia), prepared by the U.S. Census Bureau, 2011. Rosslyn-Ballston and Crystal City / Pentagon City corridor data, Arlington County Planning Research and Analysis Team: Arlington County Major Planning Corridors Demographic Trends.

The proportion of Arlington County Capital Bikeshare members that are in the 25 to 34 year old age group is far higher than the proportion of this group in Arlington County as a whole, but this could be the result of several factors. The age distribution of residents in the Rosslyn-Ballston and Crystal City / Pentagon City corridors where Capital Bikeshare is currently located is more concentrated in the 25 to 34 years old age group than in the County as a whole.

Table 4.18 Arlington County Capital Bikeshare Members Age Distribution

Age	Arlington County	Arlington County Resident Survey Respondents	Rosslyn-Ballston Corridor	Crystal City / Pentagon City Corridor
16 – 17 years old	1%	0%	n/a	n/a
18 – 24 years	10%	12%	12%[10]	11%[11]
25 – 34 years	28%	53%	42%	35%
35 – 44 years	16%	19%	15%	15%
45 – 54 years	12%	11%	9%	12%
55 – 64 years	10%	5%	7%	10%
65 years or older	7%	1%	6%	9%

Arlington County Data Source: 2010 Census Redistricting Data (Public Law 94-171), Summary File 1 (Arlington, Virginia), prepared by the U.S. Census Bureau, 2011. Rosslyn-Ballston and Crystal City / Pentagon City corridor data, special tabulation of 2006-2010 American Community Survey Data.

[10] Ages 19-24 years.
[11] Ibid.

Educational attainment among Arlington County Capital Bikeshare members is higher than that of Arlington County residents as a whole, with 50 percent of Arlington Capital Bikeshare members having a graduate or professional degree, compared with 37 percent of Arlington County residents. While 95 percent of Arlington County resident respondents have a Bachelor's degree or higher, a lower proportion of Rosslyn-Ballston corridor (82 percent) and Crystal City / Pentagon City (78 percent) residents have at least a Bachelor's degree. Arlington has the highest proportion of residents with a Bachelor's degree or higher in the Washington, DC metropolitan region, and it has among the highest levels of educational attainment in the entire nation.

Table 4.19 Arlington Capital Bikeshare Member Educational Attainment

Educational Attainment	Arlington County[12]	Arlington County Resident Survey Respondents	Rosslyn-Ballston Corridor	Crystal City / Pentagon City Corridor
Less than High School	8%	0%	2%	4%
High school graduate (includes equivalency)	9%	0%	6%	8%
Some college, no degree	9%	3%	6%	7%
Associate's degree	4%	1%	4%	3%
Bachelor's degree	34%	45%	36%	35%
Graduate or professional degree/ Doctorate	37%	50%	46%	43%

Arlington County Data Source: 2006-2010 American Community Survey, Arlington, Virginia/prepared by the U.S. Census Bureau, 2011. Rosslyn-Ballston and Crystal City / Pentagon City corridor data, Arlington County Planning Research and Analysis Team: Arlington County Major Planning Corridors Demographic Trends.

Member Survey respondents were asked to identify the purpose of their **most** recent Capital Bikeshare trip, shown in Table 4.20. A third of all trips taken by Arlington County Capital Bikeshare members were work related, just over a quarter of trips were taken for social or dining purposes, and 20 percent were to complete daily errands or household shopping. Notably, only 12 percent of trips were taken for exercise or recreational purposes.

Table 4.20 Arlington Capital Bikeshare Member – Most Recent Trip Purpose

Most Recent Trip Purpose	% of Trips
Exercise, recreation	12%
Go from work	16%
Go to a meeting	5%
Go to work	12%
Restaurant, meal	9%
Run errands	16%
Shopping	4%
Social / entertainment / visit friends	17%
Other	9%

[12] American Community Survey, 5-year data, 2005-2009.

The survey respondents' most recent trip purpose was also examined by age, race, and income. There were no major differences in use of Capital Bikeshare by Arlington members in different income categories. The only major difference in use of Capital Bikeshare by race was that Asian members used Capital Bikeshare for recreational purposes at a much higher rate than other groups (32 percent of trips). Otherwise, trip purposes did not vary greatly among different racial categories. By age, the only difference was that members in the ages 18 to 24 years old group used Capital Bikeshare at a higher shares for social and entertainment purposes (28 percent of trips).

As shown in Tbale 4.21, in the absence of Capital Bikeshare, 14 percent of Arlington Capital Bikeshare members reported that they would have made their most recent trip by auto (taxi or personal vehicle). The choice of an alternative transportation mode in the absence of Capital Bikeshare did not differ greatly among members of different gender, race, income or age.

Table 4.21 Arlington Capital Bikeshare Members – Alternative Mode Choice

Alternative Mode Choice	% of Arlington Members
Bus or Metrorail	42%
Walk	30%
Drive or ride in a personal vehicle	9%
Would not have made this trip	6%
Personal bike	5%
Taxi	4%

Overall, 45 percent of Arlington resident respondents reported that their daily travel behavior changed as a result of using Capital Bikeshare. A quarter of respondents reported that they now use traditional transit more frequently than they did prior to becoming Capital Bikeshare members, while five percent reported that they now use their personal bicycles more often. Fifty percent of Arlington Capital Bikeshare members reported that as a result of bikeshare they now bicycle more often than they previously did. Eighteen percent of respondents said that bikesharing was a "major" or the "main" factor that contributed to their reduction in driving, while 19 percent reported that bikesharing was a "minor" factor contributing to the reduction in their driving.

Large variations in helmet use by Arlington Capital Bikeshare members were reported between males and females (Table 4.22) and among members of differing age groups (Table 4.23). Female members are far more likely than males to report "always" using a helmet, while males are far more likely than females to report "never" using a helmet. More than half of Arlington Capital Bikeshare members in the 18-24 year old age group responded that they never use a helmet when using the system.

Table 4.22 Arlington Capital Bikeshare Members – Helmet Use by Gender

Helmet Use	% of Arlington Members	Male Arlington Members	Female Arlington Members
Always	19%	14%	28%
Most of the time	17%	17%	17%
Some of the time	21%	22%	20%
Never	42%	47%	35%

Table 4.23 Arlington Capital Bikeshare Members – Helmet Use by Age

Helmet Use	% of Arlington Members	18-24 years	25-34 years	35-44 years	45-54 years
Always	19%	15%	19%	19%	26%
Most of the time	17%	13%	19%	16%	11%
Some of the time	21%	18%	20%	27%	17%
Never	42%	54%	41%	38%	46%

4.8 Fleet Composition and Asset Maintenance

Bicycles in Service

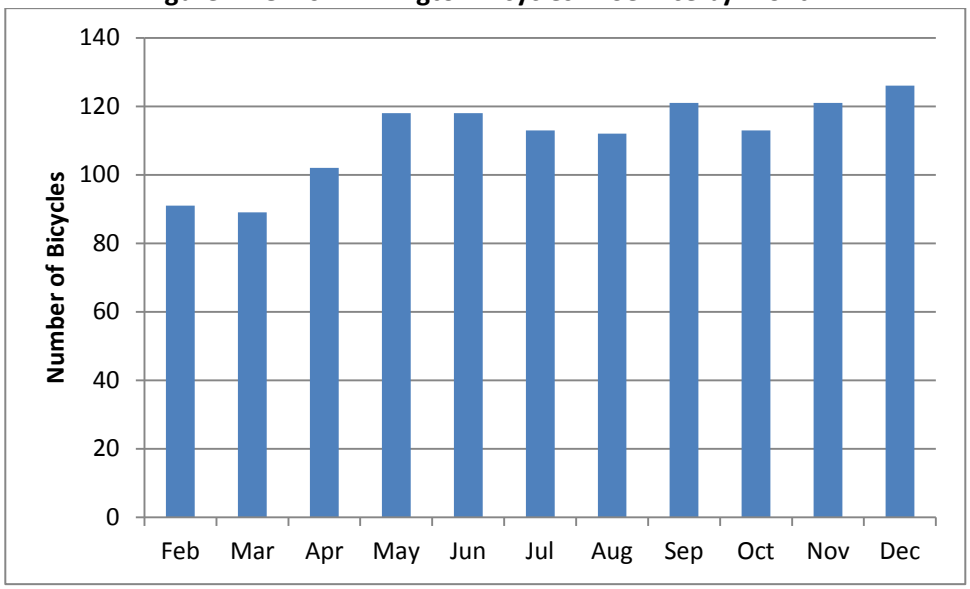
Table 4.24 lists the bicycles in service in Arlington, those in storage, and the percent available by month. On average every month there were 111 bikes in service in Arlington. This equates to 10 percent of the fleet being available in Arlington on a typical day. The number of bicycles available in Arlington ranged from a low of 89 in March to a high of 126 in December. Figure 4.18 illustrates the number of bicycles in service in Arlington by month.

Table 4.24 2011 Bicycles in Service

Month	Arlington	Warehouse	System Total	Percent Available in Arlington
January	NA	241	1,021	NA[13]
February	91	242	1,035	9%
March	89	200	1,046	9%
April	102	185	1,046	10%
May	118	127	1,060	11%
June	118	127	1,071	11%
July	113	168	1,070	11%
August	112	199	1,090	10%
September	121	210	1,094	11%
October	113	230	1,100	10%
November	121	196	1,128	11%
December	126	144	1,264	10%
Annual Average	111	184	1,091	10%

[13] System wide 76% of bicycles were available in January. The number available in Arlington was not available.

Figure 4.18 2011 Arlington Bicycles in Service by Month

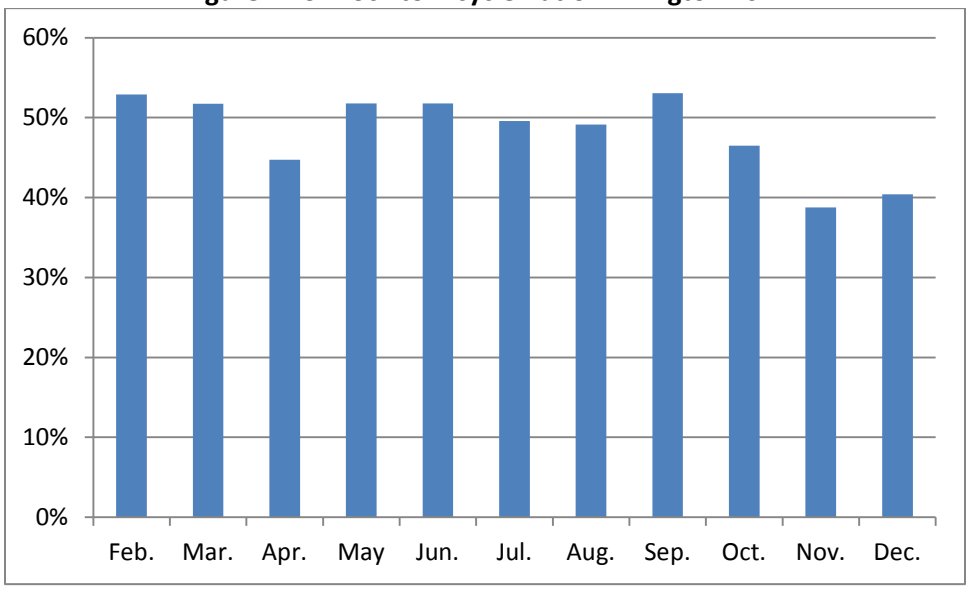


Note: Jurisdiction level data unavailable for January 2011.

Dock Utilization

Capital Bikeshare tries to maintain a 50 percent dock to bicycle ratio. Providing suitable dock capacity decreases the need to rebalance and ensures docks to not fill up too quickly. Over the last year, Capital Bikeshare has maintained its stations at close to 50 percent capacity; the ratio in Arlington is shown in Figure 4.19.

Figure 4.19 Dock to Bicycle Ratio - Arlington 2011



Note: Data unavailable for January 2011

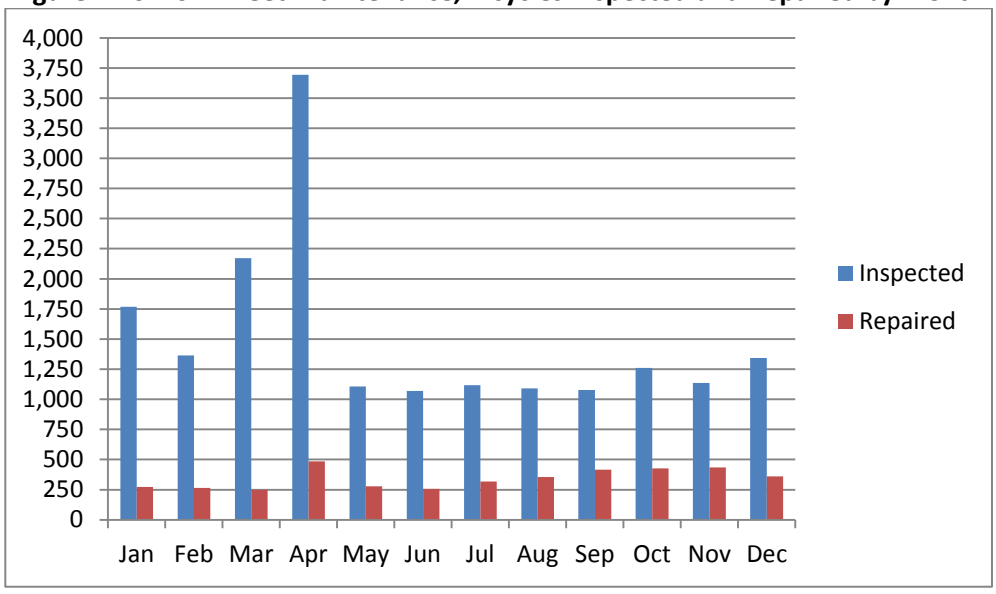
Fleet Maintenance

Table 4.25 lists the number of bicycles inspected and repaired for each month in 2011. On average 1,517 bicycles were inspected each month and 343 were repaired. This equates to a ratio of approximately one bike repaired for every four inspections. In April 2011 there were 3,694 inspections and 484 repaired. The ratio of inspections to repairs in April was approximately 10 to 1, or one bike repaired for every 10 inspected. After April 2011, the requirement that the bikes be inspected every two weeks was modified to once a month, causing the large reduction in inspections per month shown in Figure 4.20 which depicts the number of bicycle inspections and repairs by month for 2011.

Table 4.25 2011 Fleet Maintenance, Bicycles Inspected and Repaired by Month

Month	Inspected	Repaired	% Repaired
January	1,767	274	16%
February	1,365	265	19%
March	2,172	248	11%
April	3,694	484	13%
May	1,108	278	25%
June	1,070	257	24%
July	1,118	319	29%
August	1,091	355	33%
September	1,077	415	39%
October	1,261	427	34%
November	1,136	434	38%
December	1,342	360	27%
Annual Average	1,517	343	23%

Figure 4.20 2011 Fleet Maintenance, Bicycles Inspected and Repaired by Month



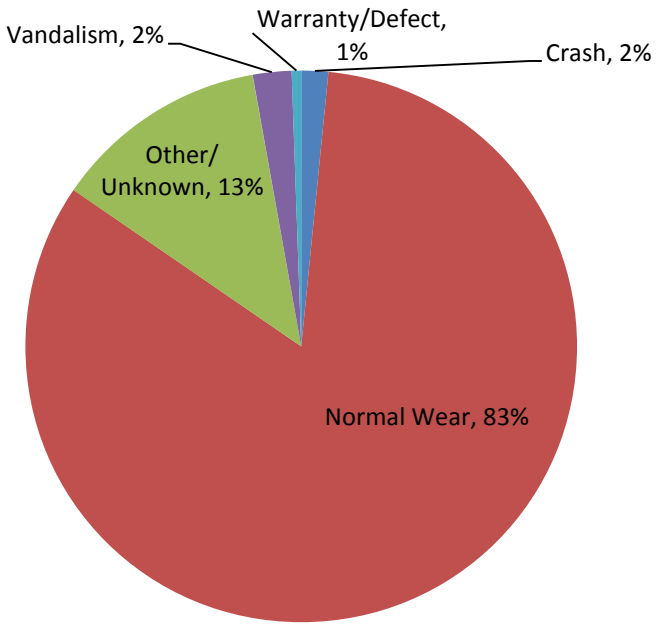
Bicycles Damaged by Cause

Table 4.26 lists the bicycle damage by cause by month for 2011. The causes recorded include crashes, normal wear, other/unknown, vandalism, and warranty/defect. For August 2011, the breakdown of causes was not reported. In addition, the warranty/defect cause was not a category until September 2011. Every month on average five bicycles are damaged as a result of a crash, 247 require normal repair, seven are vandalized, and two are found defective. In addition, on average 37 bikes require repair each month for an uncategorized problem (other/unknown). The highest months in terms of required repairs were October and November 2011, with 427 and 434 respectively, due to sharp increases in normal wear related repairs and vandalism. Figure 4.21 illustrates the annual monthly percentage of damage by cause. Both clearly show that normal wear was the leading cause of repairs in 2011.

Table 4.26 2011 Monthly Bicycle Damage by Cause

Month	Crash	Normal Wear	Other/ Unknown	Vandalism	Warranty/ Defect	Total
January	9	209	50	6	0	274
February	0	227	56	0	0	283
March	0	210	38	0	0	248
April	0	199	31	12	0	242
May	4	265	33	4	0	306
June	4	248	2	3	0	257
July	4	289	23	5	0	321
August	NA	NA	NA	NA	NA	355
September	5	216	177	12	5	415
October	17	380	10	15	5	427
November	7	396	10	17	4	434
December	6	322	19	7	6	360
Annual Average	**5**	**247**	**37**	**7**	**2**	**327**

Figure 4.21 Percent of Repairs by Cause, 2011 Annual Average



Mean Usage (Distance) between Failure

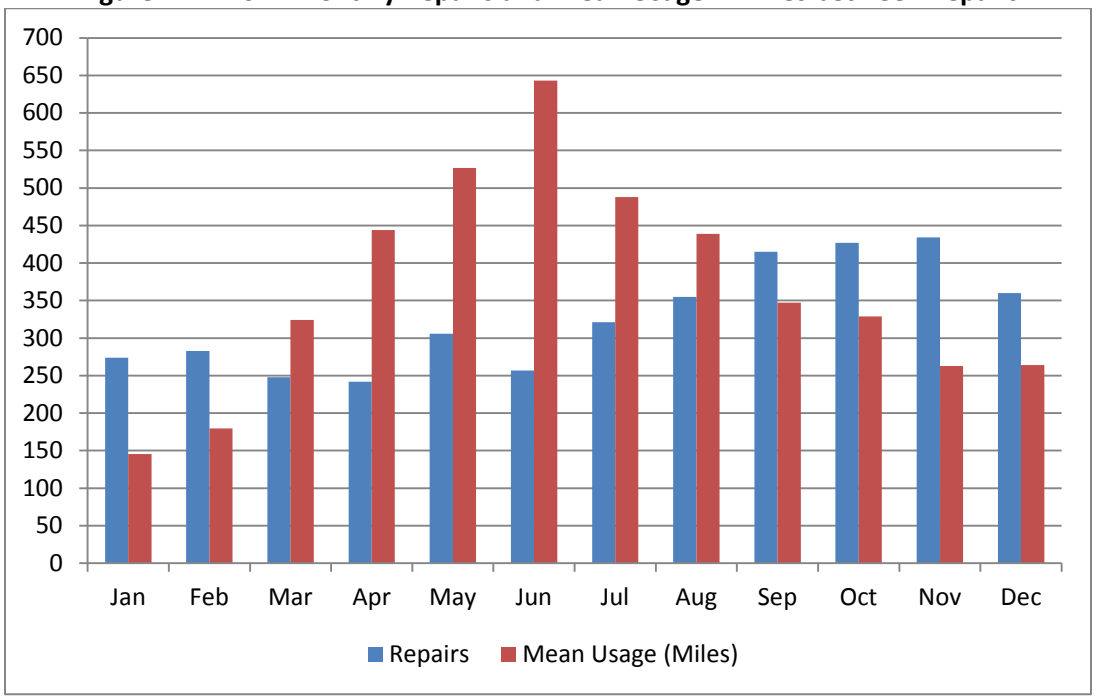
Table 4.27 lists the bicycle miles by jurisdiction, the total number of repairs, and provides the calculated mean usage between repairs in miles (total monthly system mileage divided by the total number of monthly repairs). On average system wide, a bicycle will travel 366 miles between repairs. The lowest mileage between repairs was in January, with 146 miles, the highest in June with 643 miles. The number of repairs in June was below the annual average while the total miles were the highest of any month in 2011, resulting in the calculated high usage between failures.

The higher number of repairs in the fall could have a direct correlation to the higher usage during the summer. There were also slightly more inspections in October and December 2011 compared to other months, as shown in Table 4.25. Figure 4.22 shows the monthly repairs and monthly mean usage in miles for 2011. The increase in use and in usage between repairs is clearly seen during the summer months. In the fall months the repairs increase and the mean usage between repairs decreases, also tracking with the decrease in use the post-tourism and good weather season. On average, bicycles in Arlington traveled 4,948 miles per month, or 4 percent of the total system wide mileage (117,576). Correlating the miles to the number of repairs, we can estimate that the 4,948 miles of use per month in Arlington translates into an average of 13 repairs per month, or 4 percent of the 327 average monthly repairs system wide.

Table 4.27 2011 Mean Usage in Miles between Repairs

Month-Year	Arlington Miles	DC Miles	Total Miles	Repairs	Mean Usage (Miles)
January	1,112	38,812	39,924	274	146
February	1,584	49,261	50,845	283	180
March	2,414	77,954	80,368	248	324
April	4,102	103,325	107,427	242	444
May	7,493	153,706	161,199	306	527
June	7,644	157,608	165,252	257	643
July	6,937	149,680	156,617	321	488
August	7,819	147,984	155,803	355	439
September	6,291	137,732	144,023	415	347
October	6,088	134,314	140,402	427	329
November	4,510	109,474	113,984	434	263
December	3,379	91,693	95,072	360	264
Annual Average	4,948	112,629	117,576	327	366

Figure 4.22 2011 Monthly Repairs and Mean Usage in Miles between Repairs



4.9 Operational Efficiency

Rebalancing Analysis - Percentage of Bicycles that are Redistributed Daily

Table 4.28 lists the average monthly percentage of bicycles that were redistributed daily by month for 2011. The percentage of bicycles redistributed daily is calculated by dividing the average available bicycles by the average number of bicycles rebalanced. In January, the average percentage of bicycles redistributed was 21 percent. This was 90 percent below the annual average of 40 percent. The peak month of redistribution in 2011 was October with 54 percent, or 35 percent above the annual average. The percentage of bicycles redistributed steadily grew from 21 percent in January to 54 percent in October before dropping slightly to 52 percent in November and 49 percent in December. The exceptions to this progression were the months of July and August where the percentage dropped temporarily to 42 percent. Rebalancing activity is a significant driver of the system's operating costs.

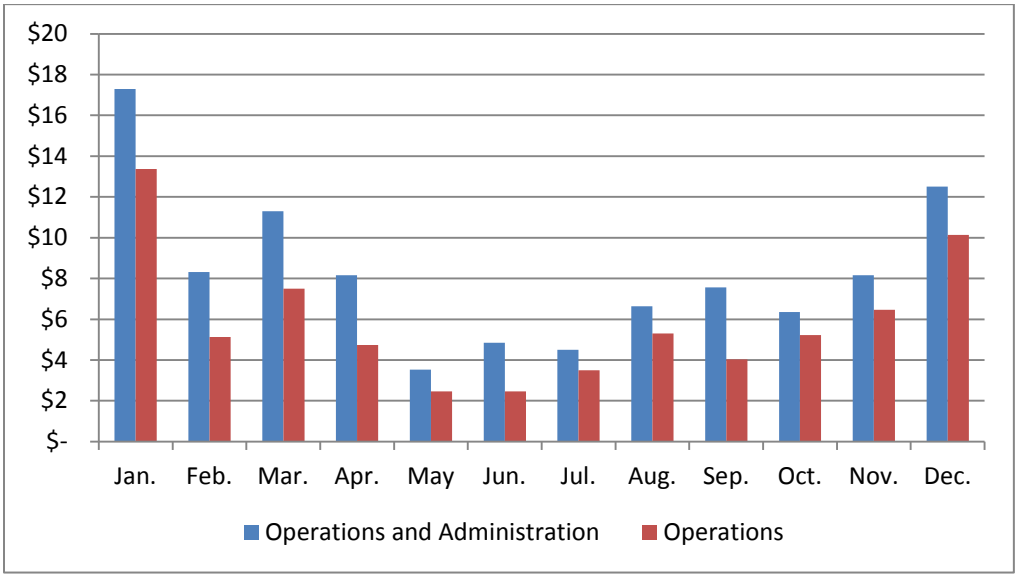
Table 4.28 System wide Percentage of Bicycles Redistributed Daily (2011 Monthly Average)

Month	Percentage Redistributed
January	21%
February	28%
March	32%
April	31%
May	35%
June	45%
July	42%
August	42%
September	49%
October	54%
November	52%
December	49%
Annual Average	40%

Operating Costs per Trip

Capital Bikeshare costs per trip vary widely between months, reflecting the relatively high fixed costs of operating the bikeshare system. Arlington County has a contract with Alta Bicycle Share to operate the system, with the contract fees set on a per dock operating cost basis. In months with high ridership, each dock generates a greater number of trips, generating additional revenue to the system and reducing the cost to the system to Arlington County. In 2011, Capital Bikeshare operating costs for Arlington County averaged $8.18 per trip.

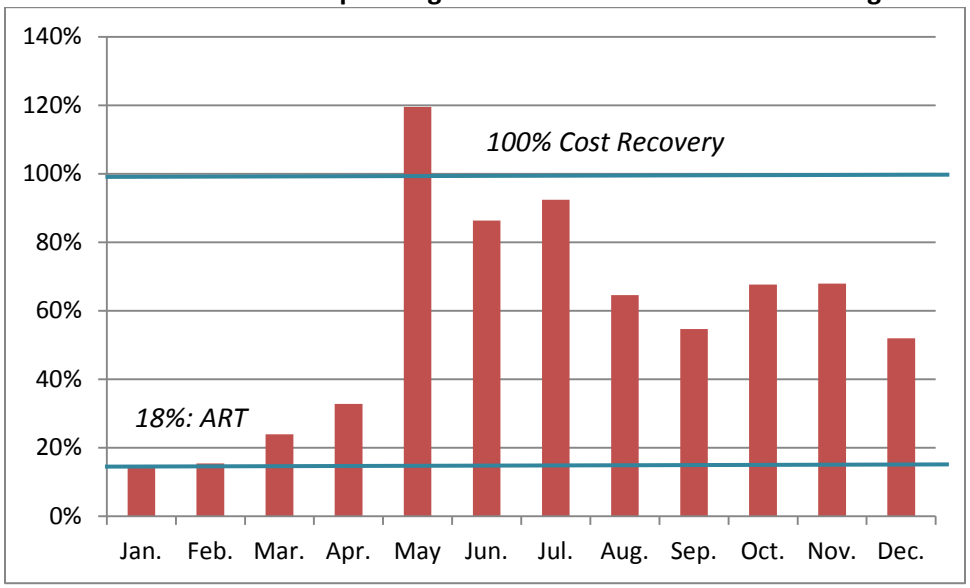
Figure 4.23 2011 Operating Costs per Trip



Farebox Recovery

Farebox recovery, much like operating costs, varies widely by month as the system had relatively fixed operating costs, but variable revenues based on seasonal patterns of usage. During the first quarter of 2011, farebox recovery remained below 30 percent, however during the late spring and summer, recovery rates ranged from 80-120 percent. In the unseasonably warm fall and winter of 2011, Capital Bikeshare farebox recovery performed better than the preceding year. By comparison, in 2010 Arlington Transit's ART bus service achieved an 18 percent farebox recovery ratio.

Figure 4.24 Percent of Total Operating and Admin Costs Recovered Through Revenue



Breakdown of Revenue by Source

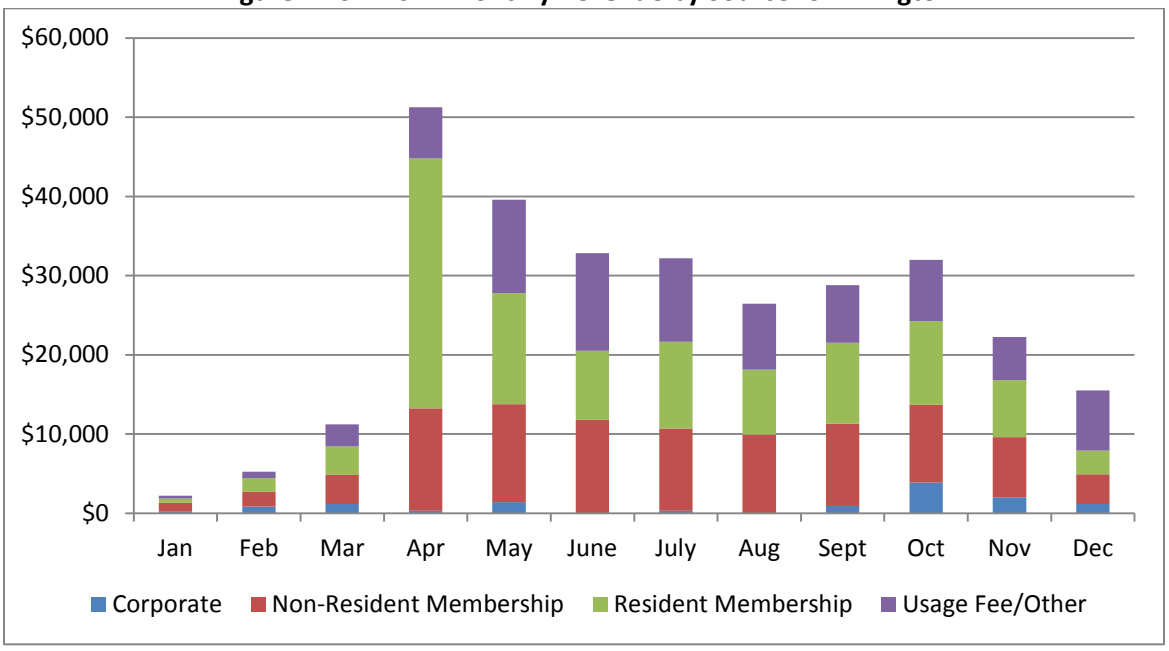
Table 4.29 lists the revenue by source for 2011 by month and by jurisdiction. Throughout the year, resident and non-resident membership account for at least 50 percent of the revenue in DC and system wide, and a larger portion, typically 60 percent or more, in Arlington. A spike of over 80 percent of revenue from these categories is observed in April when a membership discount promotion was run. At the end of the year the percentage of revenue from membership was consistently over 60 percent across all jurisdictions. Usage fees were consistently higher in DC when compared to Arlington and reached their peak contribution in the summer months between June and August, consistent with increases associated with weather and tourism. Not including April, usage fees consistently made up 25 to 35 percent of the revenue during the spring and fall months. Figure 4.25 graphically depicts the revenue by source for Arlington in 2011.

Table 4.29 2011 Monthly Revenue by Source by Jurisdiction

Month	Revenue Source	Arlington	%	DC	%	Total Revenue	%
JAN	Resident Membership	$545	25%	$18,815	47%	$19,360	46%
	Non-Resident Membership	$1,101	50%	$10,004	25%	$11,105	26%
	Usage Fee/Other	$350	16%	$10,410	26%	$10,760	25%
	Corporate	$220	10%	$805	2%	$1,025	2%
	Totals	$2,216		$40,034		$42,250	
FEB	Resident Membership	$1,755	33%	$24,010	33%	$25,765	33%
	Non-Resident Membership	$1,830	35%	$16,635	23%	$18,465	24%
	Usage Fee/Other	$810	15%	$22,355	31%	$23,165	30%
	Corporate	$864	16%	$9,086	13%	$9,950	13%
	Totals	$5,259		$72,086		$77,345	
MAR	Resident Membership	$3,560	32%	$45,480	31%	$49,040	31%
	Non-Resident Membership	$3,701	33%	$33,649	23%	$37,350	23%
	Usage Fee/Other	$2,818	25%	$51,324	34%	$54,142	34%
	Corporate	$1,164	10%	$18,581	12%	$19,745	12%
	Totals	$11,243		$149,034		$160,277	
APR	Resident Membership	$31,565	62%	$333,555	60%	$365,120	60%
	Non-Resident Membership	$12,933	25%	$117,567	21%	$130,500	21%
	Usage Fee/Other	$6,467	13%	$102,030	18%	$108,497	18%
	Corporate	$306	1%	$6,169	1%	$6,475	1%
	Totals	$51,271		$559,321		$610,592	
MAY	Resident Membership	$14,020	35%	$120,720	35%	$134,740	35%
	Non-Resident Membership	$12,360	31%	$81,345	24%	$93,705	24%
	Usage Fee/Other	$11,790	30%	$137,690	40%	$149,480	39%
	Corporate	$1,428	4%	$3,272	1%	$4,700	1%
	Totals	$39,598		$343,027		$382,625	

Month	Revenue Source	Arlington	%	DC	%	Total Revenue	%
JUN	Resident Membership	$10,940	34%	$78,835	30%	$89,775	30%
	Non-Resident Membership	$10,383	32%	$69,917	27%	$80,300	27%
	Usage Fee/Other	$10,547	33%	$111,858	43%	$122,405	41%
	Corporate	$333	1%	$2,452	1%	$2,785	1%
	Totals	$32,203		$263,062		$295,265	
JUL	Resident Membership	$8,705	27%	$67,235	23%	$75,940	24%
	Non-Resident Membership	$11,801	36%	$79,824	28%	$91,625	29%
	Usage Fee/Other	$12,321	38%	$139,964	49%	$152,285	47%
	Corporate	-	0%	$1,350	0%	$1,350	0%
	Totals	$32,827		$288,373		$321,200	
AUG	Resident Membership	$8,210	31%	$68,890	27%	$77,100	28%
	Non-Resident Membership	$9,905	37%	$66,995	27%	$76,900	28%
	Usage Fee/Other	$8,313	31%	$114,342	45%	$122,655	44%
	Corporate	$26	0%	$1,779	1%	$1,805	1%
	Totals	$26,454		$252,006		$278,460	
SEP	Resident Membership	$10,235	36%	$96,805	34%	$107,040	34%
	Non-Resident Membership	$10,354	36%	$70,031	25%	$80,385	26%
	Usage Fee/Other	$7,267	25%	$93,182	33%	$100,449	32%
	Corporate	$939	3%	$22,236	8%	$23,175	7%
	Totals	$28,795		$282,254		$311,049	
OCT	Resident Membership	$10,590	33%	$97,745	39%	$108,335	38%
	Non-Resident Membership	$9,803	31%	$66,132	26%	$75,935	27%
	Usage Fee/Other	$7,690	24%	$85,720	34%	$93,410	33%
	Corporate	$3,888	12%	$397	0%	$4,285	2%
	Totals	$31,971		$249,994		$281,965	
NOV	Resident Membership	$7,188	32%	$57,940	34%	$65,128	34%
	Non-Resident Membership	$7,604	34%	$46,671	28%	$54,275	28%
	Usage Fee/Other	$5,439	24%	$61,007	36%	$66,446	35%
	Corporate	$2,015	9%	$3,553	2%	$5,568	3%
	Totals	$22,246		$169,171		$191,417	
DEC	Resident Membership	$3,008	19%	N/A		N/A	
	Non-Resident Membership	$3,760	24%	N/A		N/A	
	Usage Fee/Other	$7,578	49%	N/A		N/A	
	Corporate	$1,156	7%	N/A		N/A	
	Totals	$15,503		N/A		N/A	

Figure 4.25 – 2011 Monthly Revenue by Source for Arlington



Total Revenue Generated by Trips Over 30 minutes

Table 4.30 describes the usage fees generated by month for Arlington and the system overall. The fees grew from a low of $344 in January to a high of $12,321 in July. The highest usage fees were observed between May and July with a monthly average during those three months of $11,553. As a percentage of system wide usage fees, the Arlington usage fees ranged between three and nine percent, with the lowest percentages observed during the winter months, and higher percentages observed from the spring through to the fall. Overall the Arlington trips generated over $74,000 in usage fees and system wide over one million dollars in usage fee revenue was generated by trips over 30 minutes.

Table 4.30 – 2011 Monthly Usage Fees for Arlington

Month	Arlington Usage Fees	Arlington Percent of Total	System wide Usage Fees
January	$350	3%	$10,760
February	$810	3%	$23,165
March	$2,818	5%	$54,142
April	$6,467	6%	$108,497
May	$11,790	8%	$149,480
June	$10,547	9%	$122,405
July	$12,321	8%	$152,285
August	$8,313	7%	$122,655
September	$7,267	7%	$100,449
October	$7,690	8%	$93,410
November	$5,439	8%	$66,446
December	$7,578	NA	NA
Total/Average	$74,156	7%	$1,013,442

NA = Not Available at the time the report was created

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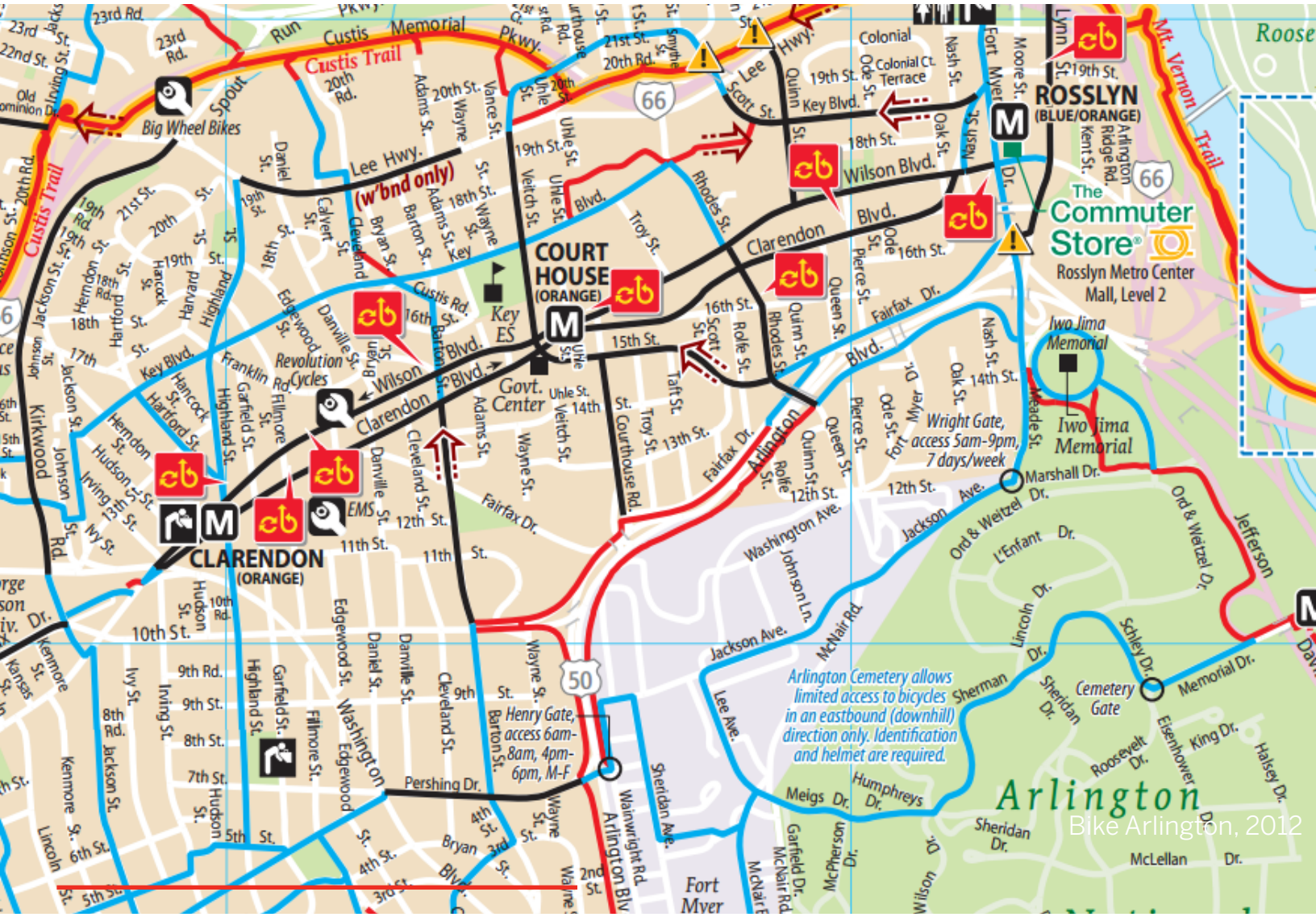
Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018



Chapter 5: Service Continuation and Expansion

November 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES Arlington County Commuter Services | Bike Arlington

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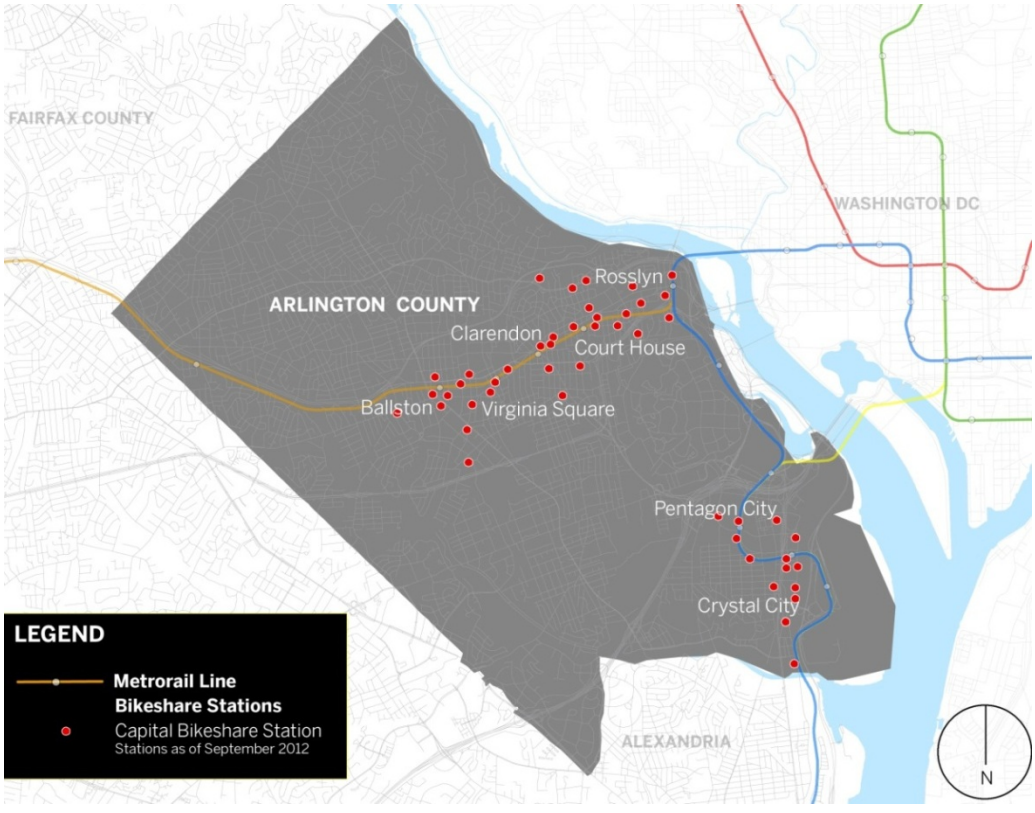
5 SERVICE CONTINUATION AND EXPANSION PLAN

5.1 Introduction

The Service Continuation and Expansion chapter of the Arlington County Capital Bikeshare Plan (TDP) outlines the growth and expansion of Capital Bikeshare across Arlington County during the six-year planning period, fiscal year (FY) 2013 to FY2018. The final expansion plan reflects the results of an extensive public and stakeholder outreach process, system analysis, and study of bikeshare demand. This plan outlines, at the strategic level the growth strategy for bikeshare in Arlington County. This TDP does not identify specific locations for bikeshare, but instead provides a strategy for a phased expansion of the system by individual neighborhoods and corridors in Arlington. As station siting depends on a site evaluation and the availability of open space, actual station locations will be selected during the implementation phase.

Capital Bikeshare is a continually evolving system and during the planning process for this TDP, Arlington completed a major expansion of the system within the Rosslyn-Ballston corridor. The current ongoing expansion will result in Arlington having 50 stations by the end of 2012. While some of these stations will be installed during FY2013, for planning purposes they are considered FY2012 stations, and have been fully funded before the expansion discussed in the Capital Bikeshare Plan begins. Figure 5.1 shows the extent of Arlington's bikeshare system as of the end of calendar year 2012.

Figure 5.1 Arlington's Capital Bikeshare System (End of 2012)



5.2 Expansion Strategy Development

The approach to developing an expansion plan for Capital Bikeshare in Arlington involved the creation of several alternative growth scenarios for stakeholders and the public to consider. The objective was to develop scenarios that were based on existing system usage, demographics and land use of the County, and some key expansion principles. A bikeshare demand map was developed based upon the relationship between existing station-level ridership and a number of physical and demographic factors. The bikeshare demand map and expansion principles led to the development of four alternative system growth strategies that helped guide the conversation on bikeshare expansion and played key roles in informing the public outreach process and final plan.

Bikeshare Demand Map

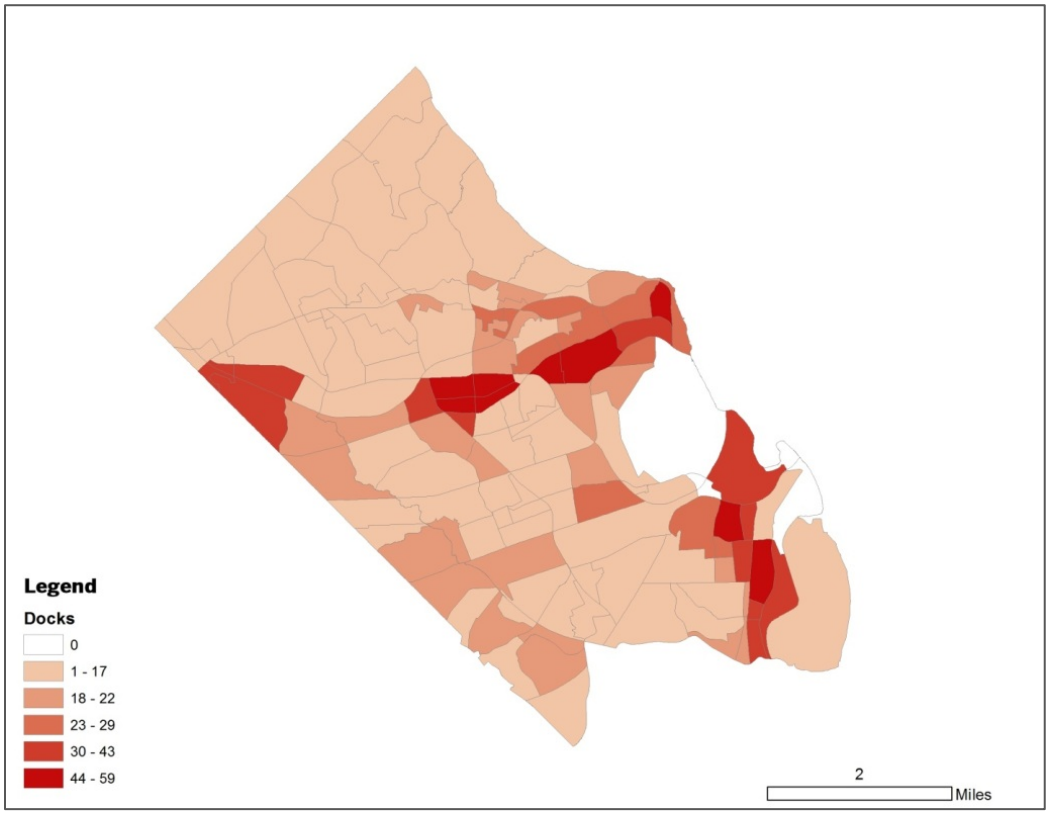
To better predict relative demand for bikeshare in Arlington, an analysis of bikeshare demand by neighborhood was completed. [1] Using station usage data for the fourth quarter of 2011 for the entire Capital Bikeshare network, ridership by neighborhood was analyzed against a series of demographic and physical variables. Three factors were found to be statistically significant: Metro station proximity, the combined bicycle and walk commute mode share, and miles of bicycle lanes within the neighborhood. A baseline number of bikeshare trips was estimated for each neighborhood based on the combined population and employment density. For a more detailed description of the bikeshare demand map methodology, please see Appendix B.

The predicted bikeshare ridership was translated into an estimated number of bicycle docking points (bikeshare docks) in demand by neighborhood. This was accomplished by applying the average number of trips per dock in 2011 to every Arlington neighborhood. The final analysis predicted demand for nearly 2,900 bikeshare docks in Arlington County, which is likely overstatement for the reasons discussed below. The map in Figure 5.2 shows the distribution of bikeshare demand in Arlington.

The final demand analysis, while helpful to show relative demand for bikeshare across the County, is flawed as a predictor of absolute demand of bikeshare stations. The analysis is based on neighborhoods in Arlington and Washington, DC currently served by bikeshare; since these neighborhoods are at a higher average population density than Arlington County, the model can often over predict baseline demand. Moreover, a number of factors that are difficult to quantify are not accounted for in this analysis. Within the existing Capital Bikeshare system many of the busiest stations in the system have high ridership explained for reasons other than population density, Metro access, or availability of bicycle infrastructure. The variables of population and employment density, Metro station access, bike lane infrastructure, density, and walk/bike mode share only account for 40% of variance in Capital Bikeshare station ridership.[2]

[1] Neighborhood boundaries for the purposes of the Plan were defined by Traffic Analysis Zone (TAZ). The TAZ geography is frequently used in transportation planning, and was employed as the geographic level of analysis throughout the TDP expansion plan development process.
[2] See Appendix B: Bikeshare Demand Map for additional detail on this analysis.

Figure 5.2 Bikeshare Demand in Arlington County



Expansion Principles

Using the system goals and objectives (Chapter 3) and system evaluation (Chapter 4) as a guide, a list of expansion principles was developed. These seven principles were created to apply to any future expansion of the Capital Bikeshare system in Arlington, and set the parameters by which any additional stations should be added.

1. New stations should be within a half mile maximum of another station, and preferably within a half mile of an existing station.

   This will ensure that all new stations added will have nearby stations for users to go to, and be more integrated within the existing Capital Bikeshare system network. Any station located beyond a half-mile from an existing Capital Bikeshare station is unlikely to be well-used; most Capital Bikeshare trips are around a mile in length. Any station located beyond a half-mile from the existing system could result in higher operating costs.

2. New stations should serve a variety of trip purposes for a wide variety of users (age, race, income, and gender).

3. Arlington's Capital Bikeshare expansion should serve the needs of Arlington residents, employees, and visitors.

4. New stations should be placed such that operating costs are minimized.

   Rebalancing the bikes comprises a good percentage of operating costs, and these costs are lessened by dense station placement and appropriate station sizing. The greater the geographic dispersion of Arlington's Capital Bikeshare stations throughout the County and through lower density neighborhoods, the more it will cost to operate the system.

5. Capital Bikeshare expansion should utilize existing bicycle facilities (on-street bike lane, sharrows and off-street trails) to the greatest extent possible, in concurrence with Arlington County's established station location preferences.

6. New stations should be located such that bikeshare increases the reach of other modes, particularly transit and walking.

7. New stations should be placed to expand the access to destinations located outside the County, particularly as neighboring jurisdictions place Capital Bikeshare stations in activity centers within biking distance of Arlington.

Expansion Scenarios

To help frame the discussion on how to expand bikeshare in Arlington, BikeArlington staff and other Arlington County staff members and key stakeholders convened to develop a set of draft expansion scenarios. The group ultimately developed four unique draft expansion scenarios, each envisioned to reflect a different fundamental strategy for growing the Capital Bikeshare system.

The expansion scenarios were created to serve as a general guide for expansion in the six-year period. It was not anticipated that any one of these draft expansion scenarios would be selected and adopted strictly as described, but that elements of all of the scenarios would likely be present in the final expansion plan. The expansion scenarios were created primarily to provide a basis for discussion of the expansion strategy and prioritization of system growth.

In Figures 5.3 through 5.6, which consist of maps of the four scenarios, the yellow shading indicates the general areas in which bikeshare stations would be added in that expansion concept. Darker shades of yellow indicate a greater density of stations. Tables 5.1 through 5.4 list several pros and cons, not intended to be all-inclusive, of each scenario for stakeholders and the public to consider as they analyzed each one.

Scenario One: Existing Deployment Expansion

In Scenario One, bikeshare expansion will continue to focus on adding stations in the two existing core service areas: the Rosslyn-Ballston corridor and the Pentagon City / Crystal City corridor.

Scenario Description

First, add all of the remaining stations that can feasibly be added to the Rosslyn-Ballston and Crystal City / Pentagon City 1 corridors, and expand the number of docks at existing stations as needed. After these stations have been added, start generally expanding out from the existing corridors into adjacent neighborhoods, but do so in a gradual and dense manner. There would be no connection of the two corridors, or to North and South Arlington, in the near term. In this scenario bikeshare would serve as a complement to existing transit, providing additional connectivity to Metro corridors for the neighborhoods 3-4 blocks from the corridor, and then to those neighborhoods beyond walking distance.

Figure 5.3 Scenario One Map: Existing Deployment Expansion

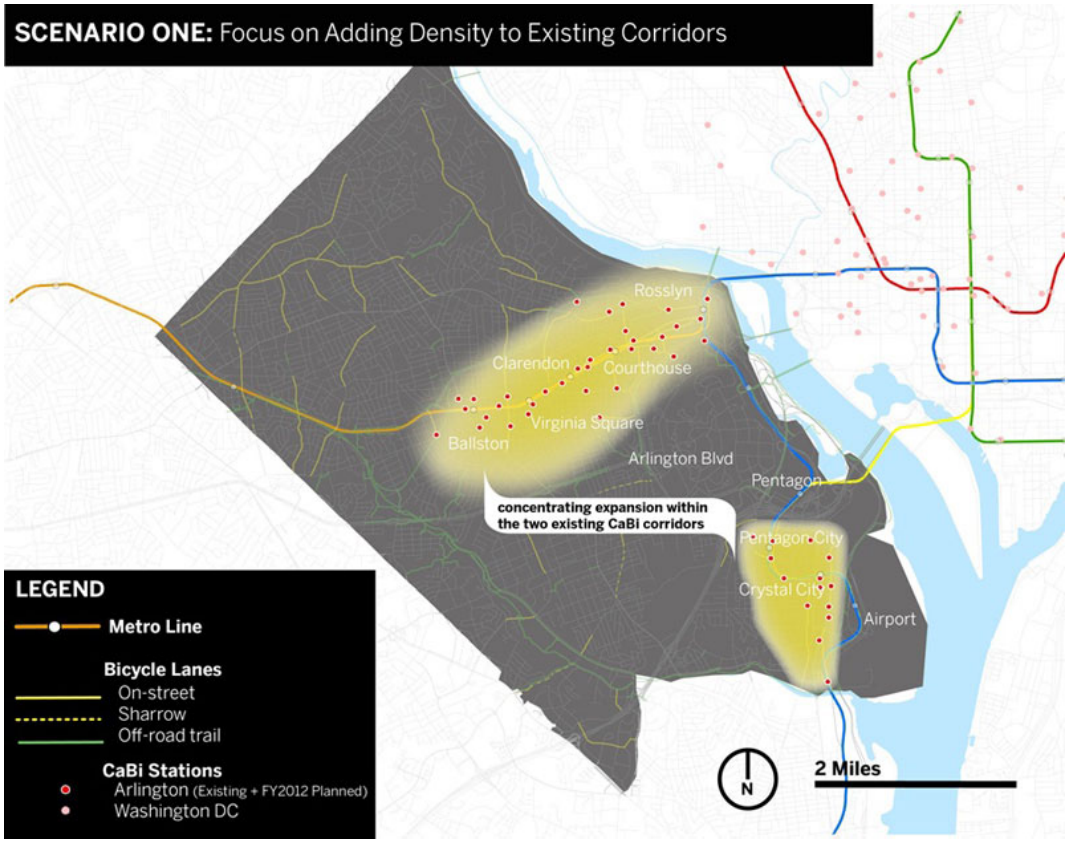


Table 5.1: Scenario One Pros and Cons

Pros	Cons
• Lower operating costs/less rebalancing • Provides high quality Bikeshare to the majority of the population • Easier for users to find a station or empty dock	• Poor geographic coverage with a lack of demographic diversity • Placing more stations in areas where they already exist

Scenario Two: Connecting Through the Neighborhoods

Scenario Two focuses on connecting the existing Capital Bikeshare corridors of Rosslyn-Ballston and Crystal City-Pentagon City with Shirlington by creating a north/south "inner loop" of Capital Bikeshare stations in central Arlington, while adhering to the principle that no new station can be more than a half-mile from an existing station.

Scenario Description

This strategy would allow Capital Bikeshare to reach a number of new neighborhoods in Central Arlington, but would do so by adding stations in a lightly spaced fashion to accomplish connecting the existing corridors and Shirlington as quickly as possible. This would be accomplished via expansion along the Four Mile Run trail from Crystal City to Shirlington, and the planned Route 110 trail as well as the George Washington Parkway trail from Crystal City to Rosslyn, and expansion along other roads with designated bike lanes, bike boulevards, or sharrows to connect the Rosslyn-Ballston corridor with the Crystal City / Pentagon City corridor by crossing the Arlington Boulevard (Route 50) and Columbia Pike corridors. In keeping with the principle of stations being no more than one-half mile apart, this scenario would start by expanding from the existing corridors into neighborhoods that are just beyond walking distance of Metro to provide station access.

Figure 5.4 Scenario Two Map: Connecting Through the Neighborhoods

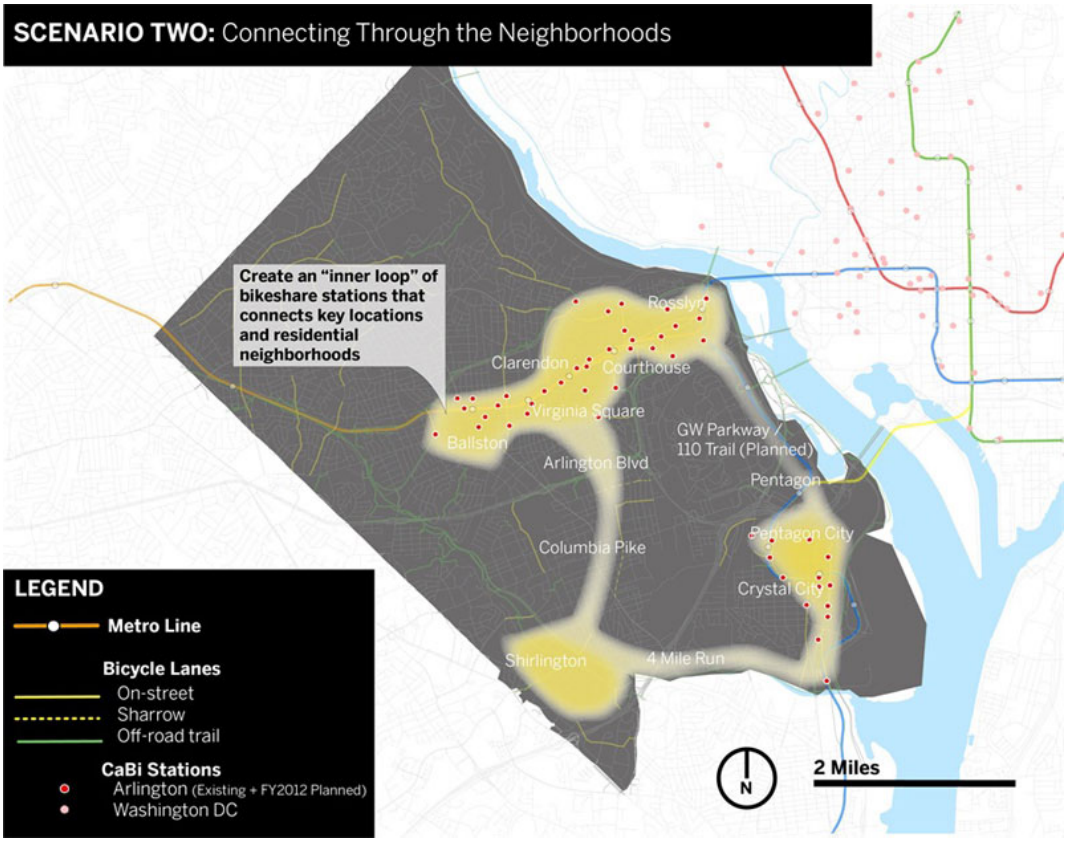


Table 5.2 Scenario Two Pros and Cons

Pros	Cons
• Connects North and South Arlington • Connects Shirlington, Route 50, Columbia Pike and mid-to-high density neighborhoods in between • Serves Columbia Pike • Continues to add stations in existing corridors • Better demographic diversity	• Difficult to cross Route 50 by bicycle • Not leveraging existing bicycle infrastructure • Higher operating costs/more rebalancing compared to Scenario 1

Scenario Three: New Corridors Expansion

Scenario Three concentrates expansion in new corridors, Columbia Pike (along cross streets and parallel streets in the near-term), or Lee Highway.

Scenario Description

While the expansion would take place along these new corridors, the expansion on these corridors would connect to the existing Capital Bikeshare corridors. The connection to Columbia Pike would be made under I-395 at Pentagon City. The expansion along Lee Highway would extend from the existing Capital Bikeshare stations that are located near Lee Highway in Rosslyn. Each corridor would be substantially developed to allow Capital Bikeshare to be used extensively for internal trips, as well as for connection to the existing Capital Bikeshare corridors. The expansion along Lee Highway would connect to the East Falls Church Metrorail station, giving users in North Arlington neighborhoods and at key destinations along Lee Highway a new way to access the station. The expansion along Columbia Pike would provide easy access to the Rosslyn-Ballston corridor and the Crystal City / Pentagon City corridor for users along Columbia Pike.

Figure 5.5 Scenario Three Map: New Corridors Expansion

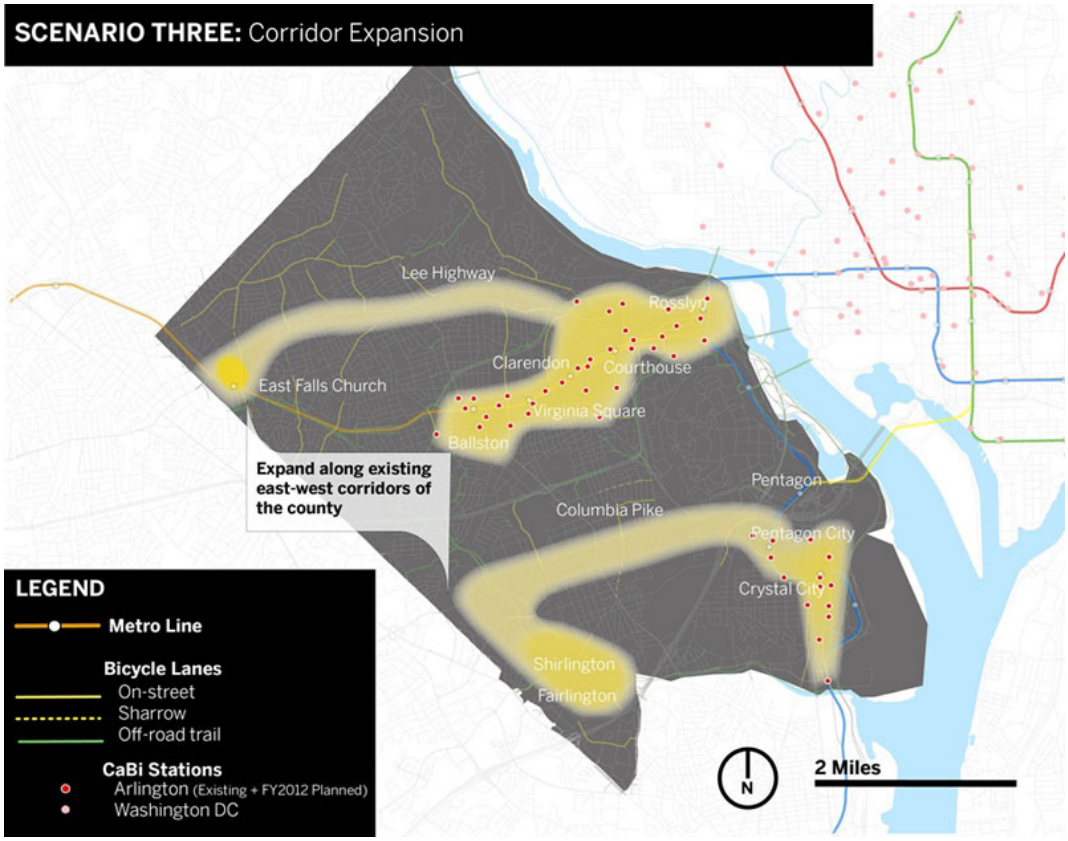


Table 5.3 Scenario Three Pros and Cons

Pros	Cons
• Leverages existing high frequency bus service • Provides service in North Arlington • Access to East Falls Church Metro • Better geographic coverage and demographic diversity	• Not well connected to the trail network • Not well connected to existing Capital Bikeshare network • Challenging environment for bicyclists • Higher operating costs/more rebalancing compared to Scenario 1 • Not well connected to the trail network

Scenario Four: Trail-Focused Expansion

Scenario Four focuses expansion efforts along existing off-street bicycle trails. The Washington & Old Dominion (W&OD) and Four Mile Run Trails would be used to connect Shirlington to the Rosslyn-Ballston and Crystal City / Pentagon City corridors and cross Columbia Pike and Arlington Boulevard (Route 50) in the western part of the County.

Scenario Description

The East Falls Church Metrorail Station and the Lee Highway corridor would be connected via the Custis and W&OD Trails. The Washington Boulevard trail would connect the Rosslyn-Ballston corridor with Arlington Boulevard, and eventually connect with the Crystal City / Pentagon Citycorridor when the trail's extension into Pentagon City is complete. Placing stations along the Mt. Vernon Trail and the future Route 110 trail would directly connect the Rosslyn-Ballston and Crystal City / Pentagon City corridors, and provide a scenic route that may attract tourists.

Figure 5.6 Scenario Four Map: Trail-Focused Expansion

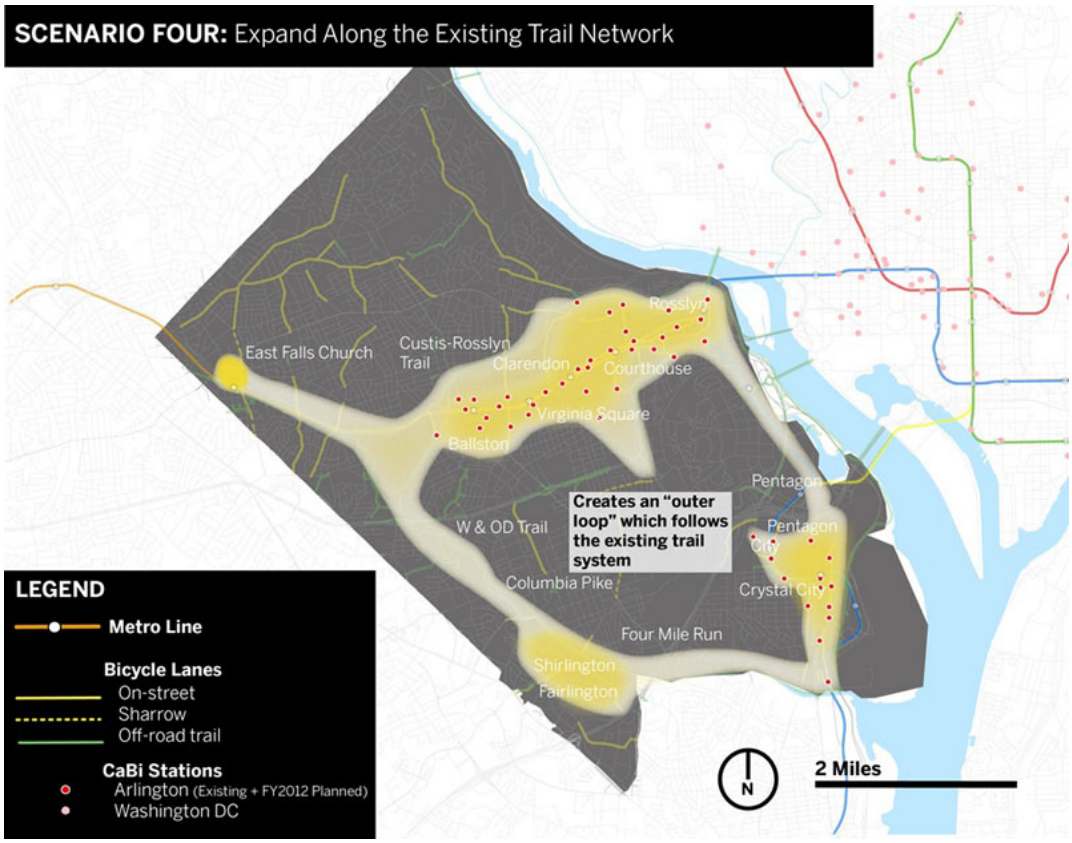


Table 5.4 Scenario Four Pros and Cons

Pros	Cons
• Significant number of destinations along the W&OD Trail (schools, recreation centers, etc.) • Attracts new users not comfortable cycling in traffic • Connects medium- to high-density garden apartment neighborhoods at the western end of Columbia Pike to system • Access to East Falls Church Metro	• Not well lit at night along trails • Short-term deployment will not directly connect two existing corridors • Lack of geographic coverage (particularly central Arlington) • Higher operating costs/more rebalancing compared to Scenario 1

5.3 Public Outreach Process

A significant effort was made to reach a diverse array of citizens and stakeholders from all areas of Arlington County, including Arlington residents that were both members and non-members of Capital Bikeshare, individuals working in Arlington, Arlington employers, retailers, and hotels. A targeted effort was made to advertise the opportunity for public comment to members of minority and low-income communities. Two to three meetings were held with each relevant Arlington County citizen commission or committee. The general public was offered the option of commenting at an in-person general public meeting, or online at a dedicated online comment forum. Public outreach and input was integral to the development of Arlington's Capital Bikeshare TDP expansion plan.

Outreach Strategy and Schedule

Throughout an initial public outreach period for the Arlington Capital Bikeshare Plan (February-April 2012), public input was sought through a series of meetings with system stakeholder, and citizen, business and County commissions (see Table 5.5). Each of these meetings included information on the draft plan and expansion scenarios, as well as information on additional public involvement and comment opportunities in a presentation tailored for each type of group.

- **General Public**: During the initial public outreach period, a general public meeting was held on the evening of March 29th, 2012, and an online comment forum hosted on the crowdsourcing site (http://arlingtoncabi.uservoice.com/) was available from March 12, 2012 to April 13, 2012 to provide the general public with the opportunity to comment on the draft plan and expansion scenarios.
- **County Commissions and Committees**: An overview of the draft plan's contents and the public outreach schedule was provided in a presentation to all relevant official County citizen commissions, including the Planning Commission, Transportation Commission, Transit Advisory Committee, and the Bicycle Advisory Committee.
- **Business and Resident Representatives**: To obtain input on the TDP and the system's draft expansion scenarios, a Community Advisory Panel meeting and an Arlington Business, Tourism and Retailers Breakfast Meeting were held, thereby gaining insight from representatives of a broad array of citizen groups and the business community. A short presentation of the plan was also made at Arlington's Latino Roundtable.
- **System Stakeholders**: Two meetings were held with the partner agencies operating Capital Bikeshare (District Department of Transportation, City of Alexandria, Montgomery County), other regional partners (Washington Metropolitan Area Transit Authority, Metropolitan Washington Council of Governments), Washington Area Bicyclists Association (WABA), Crystal City Business Improvement District, Arlington County Department of Parks and Recreation, and the Capital Bikeshare contractor, Alta Bicycle Share, to gather feedback on the draft plan and how Arlington's Capital Bikeshare expansion relates to the regional Capital Bikeshare system.

Following the initial public comment period, a draft plan was published on the BikeArlington website on June 25th. A second public outreach period was then opened to solicit feedback on the complete draft plan. The online comment forum was re-opened for comments from June 25th to July 27th. A second

general public meeting was held on the evening of July 11, 2012 to provide the public with an opportunity to review and comment on the results of the draft final plan.

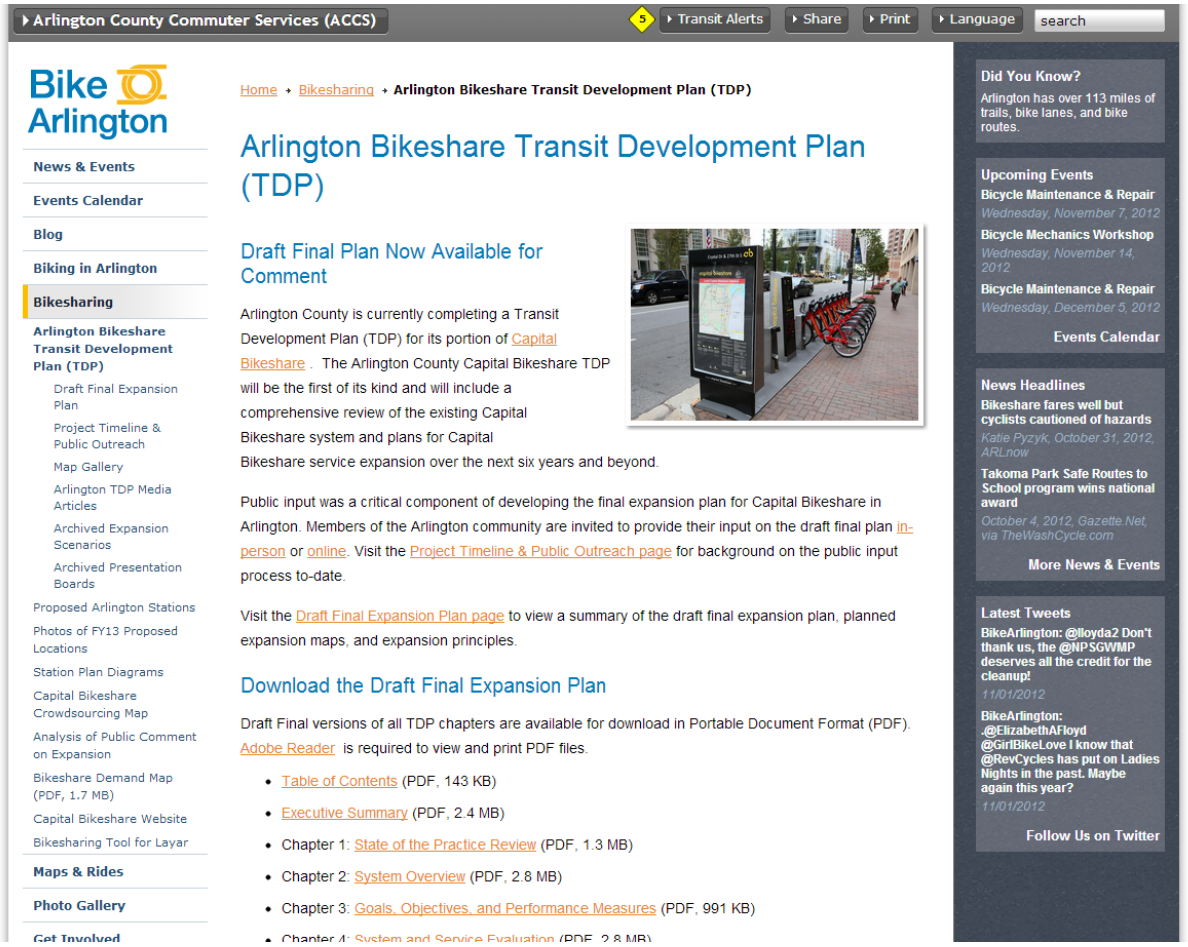
Table 5.5 Arlington County Capital Bikeshare Public Involvement Meetings

Meeting	Date and Time
Transit Advisory Committee	2/21/12, 7:00 pm
Transportation Commission	2/23/12, 7:30 pm
Planning Commission	2/27/12, 7:00 pm
Bicycle Advisory Committee	3/5/12, 7:00 pm
Capital Bikeshare System Stakeholders	2/29/12, 1:00 – 4:00 pm
Business, Tourism, and Retail Representatives	3/14/12, 8:00 – 9:30 am
Crowdsourcing Site/Online Comment Period	3/12/12 – 4/13/12
Community Advisory Panel (Interactive Exercise)	3/21/12, 7:00 – 9:00 pm
General Public Meeting	3/29/12, 7:00 – 9:00 pm
Capital Bikeshare System Stakeholders	5/16/12, 2:00 – 3:00 pm
Transportation Commission (Interactive Exercise)	4/5/12, 7:00 pm
Latino Roundtable Presentation	4/16/12, 7:00 pm
General Public Meeting (Draft Plan Presentation)	7/11/12, 7:00 pm

Information Available Online

While the crowdsourcing site provided a place for stakeholders to provide comments or agree with other participants' comments, information about the TDP and all of the documents were also posted online. A special subset of the BikeArlington website, BikeArlington.com/TDP, was created to provide a home for all of the information related to the TDP (see Figure 5.7). The BikeArlington.com/TDP site included a home page with information on what the TDP is, why it was done, and the documents completed for the draft plan as well as a PowerPoint overview presentation on the TDP. The BikeArlington TDP site also includes sub-pages on the project timeline and public outreach process for the plan; a sub-page that provides an overview of all of the opportunities for public comment; a page on the draft expansion principles; a description and map of each of the four expansion scenarios; a "map gallery" that contains all of the maps developed for the TDP; a page with portable document file (pdf) versions of the boards used for the general public meeting; and a page including all of the media articles on the TDP process.

Figure 5.7 BikeArlington.com TDP Homepage



A multi-faceted effort was made to advertise the availability of the draft plan on BikeArlington.com TDP and the opportunities to provide comment:

- **Earned Media**: A press release that was sent to a number of media outlets (radio, television, blogging community) generated coverage in the Washington Post's Dr. Gridlock column, Arlington NOW, Ballston-Virginia Square Patch, Arlington Mercury, TBD.com, and Greater Greater Washington.
- **Print Media**: Flyers advertising the plan and the general public meeting in English and Spanish (Figure 5.8) were displayed at community facilities, including libraries, recreation centers, the Arlington Department of Human Services headquarters and community centers, and the Commuter Stores.
- **County Websites**: A banner on the TDP was placed on the County's Commuter Page/Commuter Page Blog and BikeArlington websites. Information on the TDP was also placed into posts on the Washington Area Bike Forum (an online discussion forum for cyclists organized by Bike Arlington, goDCgo, and WABA), and the Car Free Diet Blog.

- **County Listservs/Capital Bikeshare Members**: An article on the TDP and how to provide feedback was included in the Capital Bikeshare Monthly e-newsletter that all annual Capital Bikeshare members receive. This information was also distributed via other Arlington Transportation Partners managed listservs.
- **Social Media**: During the public comment period, TDP information was continually transmitted via a number of County social media accounts, including Facebook (Capital Bikeshare, BikeArlington, goDCgo, Arlington Transportation Partners), Twitter (@bikearlington, @bikeshare, @CommuteArlVA) and via five YouTube videos. All of the YouTube videos collectively were viewed nearly 400 times.

Figure 5.8 Spanish Flyer Advertising the Capital Bikeshare TDP General Public Meeting

Business, Tourism and Retailers Meeting

On the morning of March 14th 2012, a breakfast meeting was held at George Mason University's Arlington Campus that attracted 16 business, tourism and retailer representatives from across Arlington County. Invitations to this meeting were sent to all of the firms in the Arlington Transportation Partners

(ATP) employers and hotels databases, to all of the retailers in the ATP retailers database (including all Arlington bicycle retailers). A short presentation on the work done on the TDP to-date, the draft expansion scenarios and expansion principles, as well as upcoming opportunities for the general public to comment on the plan was given, followed by a question and comment period.

Community Advisory Panel (CAP)

All Arlington County Civic Federation Members, condominium, homeowner, and tenant associations listed on the Arlington County website, all of Arlington's Business Improvement Districts (BIDs), and 27 other community groups representing bicycling advocates, civic involvement groups, affordable housing and workforce development advocates, and a diverse array of Arlington ethnic community groups were invited to participate in a Community Advisory Panel for the TDP public involvement process. Each invited community group was asked to send a single representative to the CAP, which was held on March 21st at George Mason University's Arlington Campus.

The 19 representatives of Arlington community groups who attended the CAP were given a short presentation on the work done on Arlington's Capital Bikeshare TDP to-date. Participants were then assigned to one of three groups. Each group was designed to include members representing a diverse array of interests and geographic areas of Arlington. The participants were first asked to complete an individual exercise to rank their top three expansion principles by order of importance to them. Group facilitators then tallied the number of times each principle was ranked in the top three. Groups were then asked to complete an interactive exercise to create their own scenario for the expansion of Capital Bikeshare in Arlington, using a table-top large map and small dot stickers color coded by expansion year. Groups were asked not to place stations at specific locations, but to place future stations in the neighborhoods that they collectively felt were the priority areas for Capital Bikeshare expansion in Arlington.

Following completion of the interactive group scenario development exercises, a short presentation on the draft expansion scenarios created by the TDP team was provided. CAP attendees were encouraged to take information on Arlington's Capital Bikeshare TDP with them to distribute in their neighborhoods and to their community groups.

Online Comment Forum (Crowdsourcing Site)

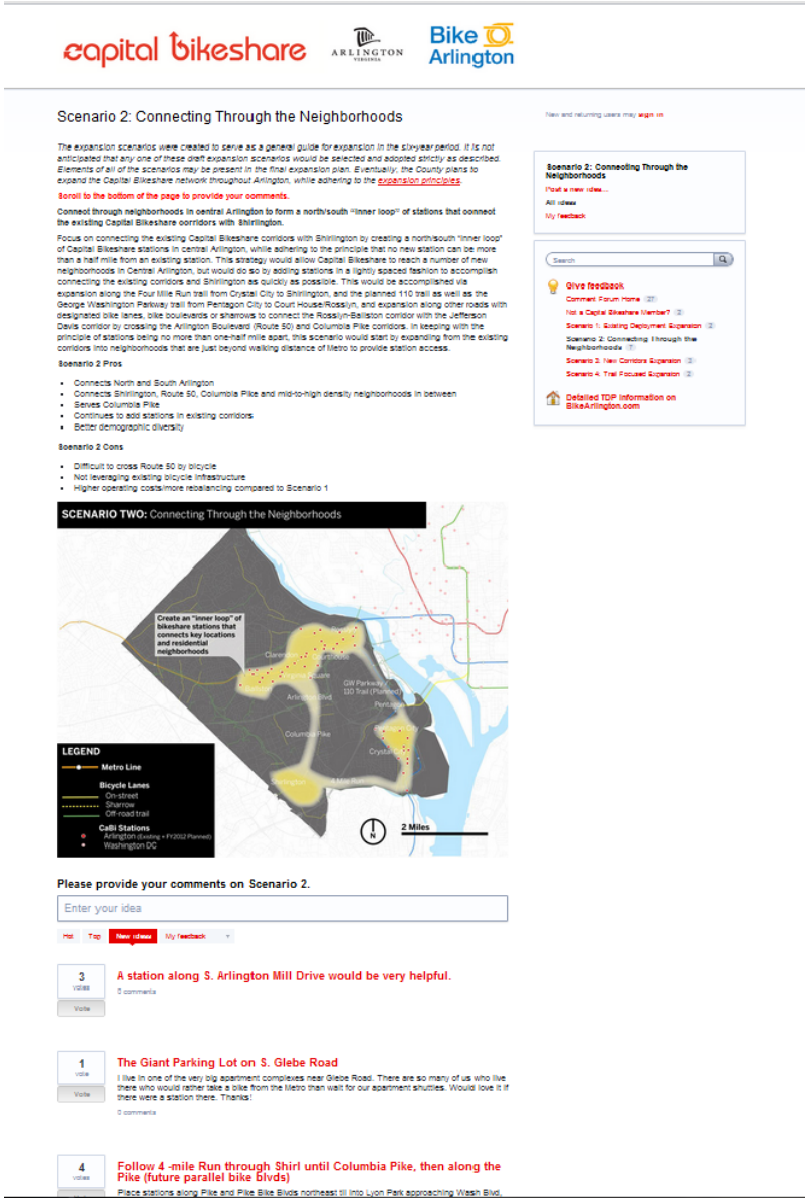
Crowdsourcing, the practice of developing ideas or products through interactions online among interested individuals, was employed to gather online input on Arlington's Capital Bikeshare TDP. The TDP's crowdsourcing site, arlingtoncabi.uservoice.com, was available to the public from March 12th to April 13th. During this time, the site received 254 visits in total (not unique visits), and 67 individuals made suggestions or commented on suggestions on the crowdsourcing site. Figure 5.9 shows a screenshot of one of the pages on the site.

The crowdsourcing site was organized into six pages: a main "Comment Forum Home" page which included an explanation of the TDP and links to access information and draft plan documents on the BikeArlington.com TDP home page; a comment page for each of the four draft expansion scenarios; and a "Not a Capital Bikeshare Member" page that was used to solicit input from Arlington residents and individuals that work in Arlington who are not currently using the system. Each expansion scenario page

included a description of the scenario, a listing of its pros and cons, and the scenario map. Every page on the crowdsourcing site featured a link to the BikeArlington.com/TDP homepage for more information.

Visitors to the crowdsourcing site were given the opportunity to both provide their own comments, and to "vote" on the comments of others to indicate their agreement. Each user was allowed to cast up to three votes per individual page on the online comment forum.

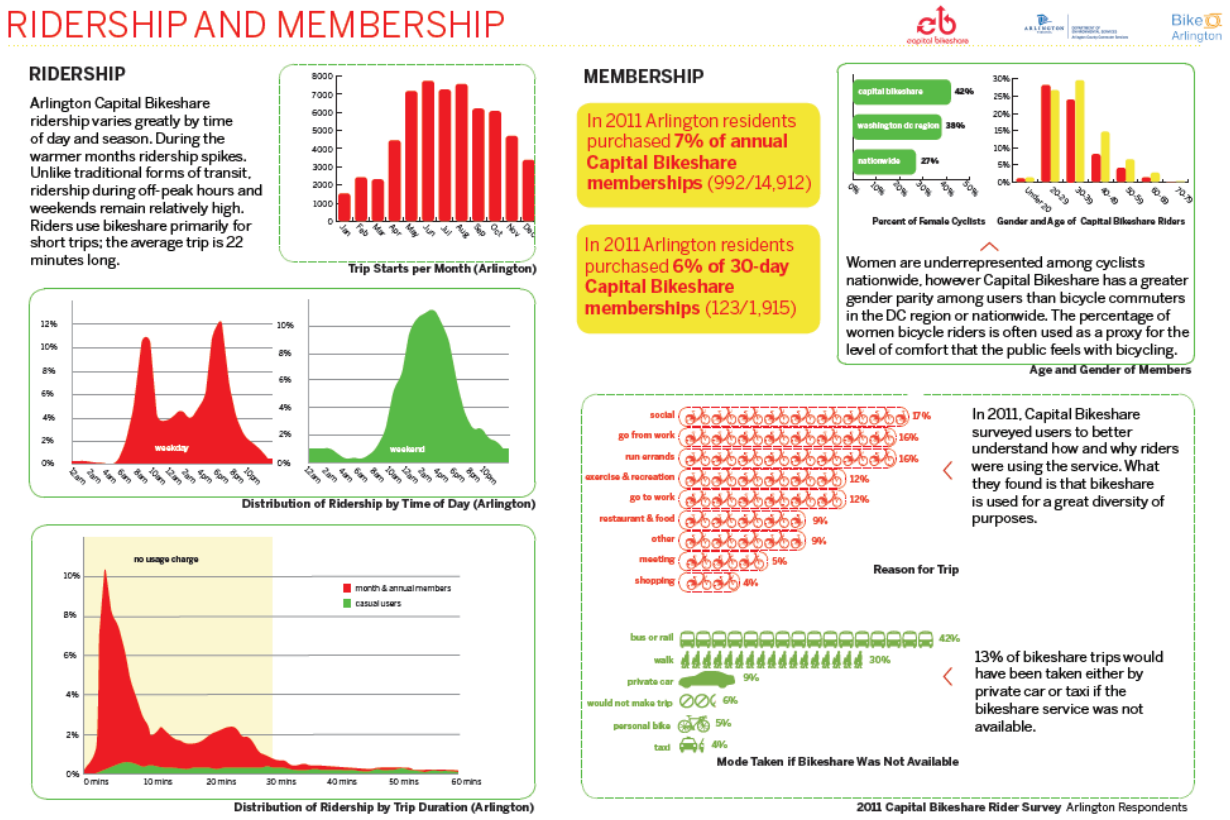
Figure 5.9 Online Comment Forum Screenshot



General Public Meeting

A general public meeting to gather input on the Capital Bikeshare TDP was held on March 29, 2012. The general public meeting was an "open house" style meeting, with 15 presentation boards covering all aspects of work completed on the TDP to-date, and three exercises for the public to participate in. Arlington County staff and consultants were present to answer any questions that members of the public had on the presentation boards and the analysis of Arlington's Capital Bikeshare system that was completed for the TDP, and to explain the three exercises. Figure 5.10 shows an example of a display board; all display boards are shown in Appendix C.

Figure 5.10 Example General Public Meeting Presentation Board



After members of the public finished viewing the presentation boards, they were invited to participate in the exercises. When they signed in, meeting participants were given instructions and materials to complete the exercises. The first exercise asked participants to select the top three trip types for which they currently use or would use Capital Bikeshare. The trip type choices provided included using Capital Bikeshare for to access work, school, shopping, exercise, recreation and entertainment, public facilities (such as libraries), or run errands. The second exercise asked participants to select three expansion principles most important to them. For both exercises participants placed dot stickers on large posters.

Figure 5.11 General Public Meeting Attendees Completing Exercises

After completing the trip type and principle selection exercises, attendees were invited to use dot stickers, color-coded by implementation period, to indicate which areas of Arlington they wished to see future bikeshare stations. By using dot stickers color coded by implementation period, the attendees were able to provide their prioritization of the suggested new neighborhoods for Capital Bikeshare service.

A presentation and open question and comment period also took place at the General Public Meeting. Arlington County Commuter Services Bureau Chief Chris Hamilton welcomed the attendees and provided them with background on the growth of Capital Bikeshare in Arlington, and the importance of creating a Capital Bikeshare Transit Development Plan to provide the County with a strategic framework for the growth of the system going forward.

Latino Roundtable

A short presentation on Capital Bikeshare was made at Arlington's Latino Roundtable on April 19th, at the Arlington Career Center. The presentation was given in Spanish, and a comment card in Spanish was provided to meeting attendees.

Arlington County Commissions and Committees

The Planning Commission, Transportation Commission, Transit Advisory Committee and Bicycle Advisory Committee were all given a 30-60 minute briefing on the Capital Bikeshare TDP. The Transportation Commission requested that BikeArlington staff visit them at a second meeting so that they could

complete an interactive table-top expansion scenario exercise similar to the exercises that took place at the CAP and the general public meeting.

Figure 5.12 Transportation Commission Interactive Scenario Development Exercise

5.4 Results of the Public Feedback

The public outreach process provided feedback that was critical to the development of the selected expansion scenario for the Arlington County Capital Bikeshare TDP. Input received at many of these meetings and on the crowdsourcing website indicated overwhelming support for expanding Capital Bikeshare to new neighborhoods, particularly in South Arlington along Columbia Pike and Shirlington and in North Arlington at East Falls Church and Cherrydale. The following section summarizes the input received through the various public meetings, online TDP public comment forum crowdsourcing page, and Capital Bikeshare's Station Location Crowdsourcing Map.

Online Comment Forum

Appendix D contains all of the comments received on the online comment forum. The list below ranks the top ten comments by the number of user votes that they each received. Many of the comments referenced individual station locations (i.e., Penrose Square, Lee Heights Shopping Center). While this TDP is not suggesting specific locations for new Capital Bikeshare stations, comments and votes indicating a preference for a specific location were considered as a demonstration of the desire for a station in that neighborhood.

The top ten comments on the online comment forum, ranked by the number of concurring votes received, are as follows:

1. Locate a station at Penrose Square on Columbia Pike (41 votes)
2. Go to Shirlington (41 votes)
3. Place stations along Arlington Boulevard including at 10th, Pershing, Glebe, George Mason, Park and Colin Spring (29 votes)
4. Provide helmet rentals (18 votes)
5. The bikes need better gears for hills because of Arlington's topography (15 votes)
6. Connect Crystal City to Shirlington (14 votes)
7. Implement Scenario 3 [expand along Lee Highway and Columbia Pike] (14 votes)
8. Locate a station at the Lyon Village Shopping Center along Lee Highway (14 votes)
9. Locate a station at the Lee Heights Shopping Center (14 votes)
10. Take the best of Scenario 2, 3 and 4: Add stations along the Lee Highway and Columbia Pike, while placing stations along S Washington Boulevard to connect the RB-Corridor with South Arlington (11 votes).

A ranking of the total number of comments made on the online comment forum in support of Capital Bikeshare system expansion in individual neighborhoods or corridors revealed that the Columbia Pike Corridor and Shirlington were, by a large margin, the first and second most popular locations respectively for expansion. Comments suggesting expansion in Cherrydale/North Arlington, the Arlington Boulevard Corridor, and the Lyon Park neighborhood also received strong support in terms of concurring votes. Support for Scenario 4: Trail Based Expansion, was also notable among the online comment forum users. Table 5.6 lists the neighborhoods, corridors, and ideas discussed on the comment forum.

Table 5.6 Online Comment Forum Neighborhoods Suggested by Number of Comments

Neighborhood/Corridor	Comments (Number)	Concurring Votes (Number)	Total Supporters (Number)[3]
Columbia Pike	14	139	65
Shirlington	11	124	59
Trail-Focused	4	24	12
Cherrydale/North Arlington	3	32	15
Arlington Boulevard	2	36	17
Arlington Ridge / Long Branch Creek	2	12	6
Lyon Park	2	25	12
Rosslyn-Ballston Corridor	2	6	3
Buckingham	1	7	3
Jefferson-Davis Corridor	1	15	5

[3] Note that while there were 67 individuals in total who provided input via the online comment forum, all individuals could provide up to three votes per individual page on the site, so the number of total supporters does not indicate a total of 65 unique individuals. For example, a single individual may have cast a concurring vote for more than one comment that voiced support for expansion along Columbia Pike.

Online Comments by Draft Expansion Scenario

Scenario One: Existing Deployment Expansion

Scenario One received the least positive feedback among all of the draft scenarios. Participants noted that the scenario did not serve Arlington County outside the Rosslyn-Ballston Corridor, Crystal City, and Pentagon City, limiting the usefulness of the system for residents. One commenter called it "short sighted" and lacking in "demographic or destination diversity."

Scenario One Online Comment Forum Selected Input

"Does not open the system to (m)any new users, duplicates the transit routes, does little to connect users in South Arlington to North Arlington and vice versa, does little to connect any new users to transit."

"The reason that I joined Capital Bikeshare as a resident in Ballston is the ability for me to get to places not only all over the district but all over Arlington as well. This plan cuts off Shirlington completely and leads me to believe it's the worst of three options."

Scenario Two: Connecting Through the Neighborhoods

This scenario received more favorable reviews than Scenario One. Participants wanted to see greater access to the Columbia Pike corridor. There were also concerns that the hilly terrain along Walter Reed drive would pose a challenge to connecting through the neighborhoods, and alternate points of connection between Shirlington and Columbia Pike were suggested.

Scenario Two Online Comment Forum Selected Input

"As a Columbia Pike resident and Capital Bikeshare member (I use it in DC mostly) I support this plan, and generally any plan that includes stations on Columbia Pike."

"I am a Capital Bikeshare rider in favor of stations along Columbia Pike. In addition, we need bike lanes for the route to and from Pentagon/Pentagon City. The route from Columbia Pike to Clarendon along Fillmore and Walter Reed is bicycle friendly."

"I like the idea of stations connecting Shirlington to Potomac Yard and southern Crystal City, not Shirlington to Clarendon (because of the Walter Reed Drive hill). I would also like to see better connections between Pentagon City and Clarendon and Ballston, without having to detour on the Mt. Vernon Trail over to Rosslyn first. Stations at the east end of Columbia Pike would help to connect the Pentagon City and Clarendon/Court House groups."

"I live in one of the very big apartment complexes near Glebe Road. There are so many of us who live there who would rather take a bike from the Metro than wait for our apartment shuttles. I would love it if there were a station there."

Scenario Three: New Corridors Expansion

Scenario Three received the highest number of concurring votes of any of the scenarios. Participants liked that the plan provided service along major activity corridors not currently served by bikeshare.

Scenario Three Online Comment Forum Selected Input

"The Columbia Pike corridor, long neglected by County services, has the density to support Capital Bikeshare. It would allow alternatives to Metrobus/ART to/from the Orange Line corridor and Pentagon City. And it would service areas of Arlington that are less affluent than the current area. Do the right thing, bring Capital Bikeshare to the Pike."

"This is the perfect plan as it brings Bikeshare to two of the most requested areas (Columbia Pike and Shirlington), and connects Bikeshare to all Arlington Metro stops (East Falls Church). I would use Bikeshare at all three of these new areas."

Scenario Four: Trail Focused Expansion

Scenario Four was the second most popular scenario on the crowdsourcing website. A number of commenters pointed out the value of connecting along existing bicycle facilities.

Scenario Four Online Comment Forum Selected Input

"I think this is the best scenario to choose from since it allows for recreational use of the W&O trail and Four Mile Run. As a resident of Ballston that works in Tysons Corner, I am only looking for recreational use and the ability to run errands and this provides the best options for that. I also believe it provides the safest means for getting to and from Shirlington along Four Mile Run; I would hate to see no access to Shirlington being provided by Capital Bikeshare as I already travel there quite often as a resident in Arlington."

"The appeal of 4 is safety focusing Capital Bikeshare use on existing trails and paths: but I think some neighborhood integration is needed. I would like to see more focus on Capital Bikeshare kiosks being located close to transportation points such as Zipcar spots and ART stops. Why not a major kiosk at the Shirlington transit station?

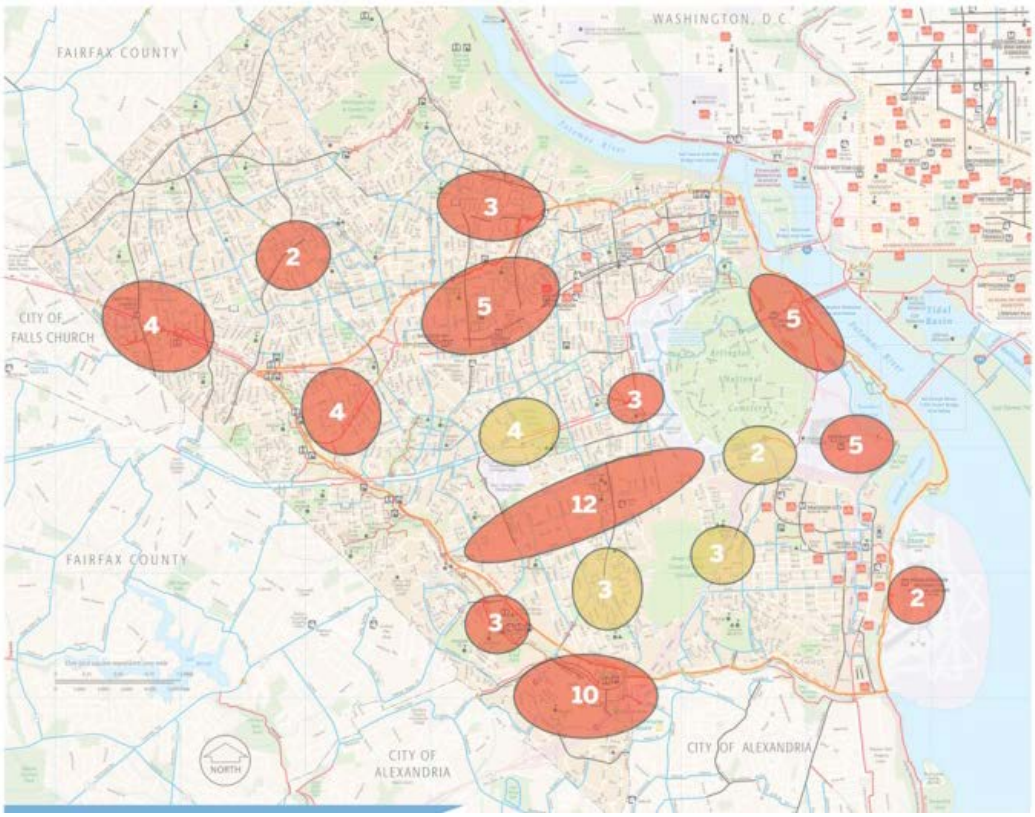
Mapping Exercise Preferred Locations

General Public Meeting and Transportation Commission

Figure 5.13 aggregates the results of the interactive mapping exercise conducted at the general public meeting and Transportation Commission. In this exercise, participants were asked to place dot stickers in the locations they most wanted to see future bikeshare stations. The dot stickers were color coded by implementation phase. The map illustrates the results of this exercise by highlighting neighborhoods and corridors which were selected two or more times. Clusters where at least half the desired stations were allocated for Phase One are colored red. In instances where fewer than half of the desired stations

in a cluster were assigned to Phase One, the clusters are colored gold. The number inside each circle displays the total number of dot stickers, i.e., desired station locations, placed in the cluster.

Figure 5.13 General Public Meeting and Transportation Commission Scenario Development Summary



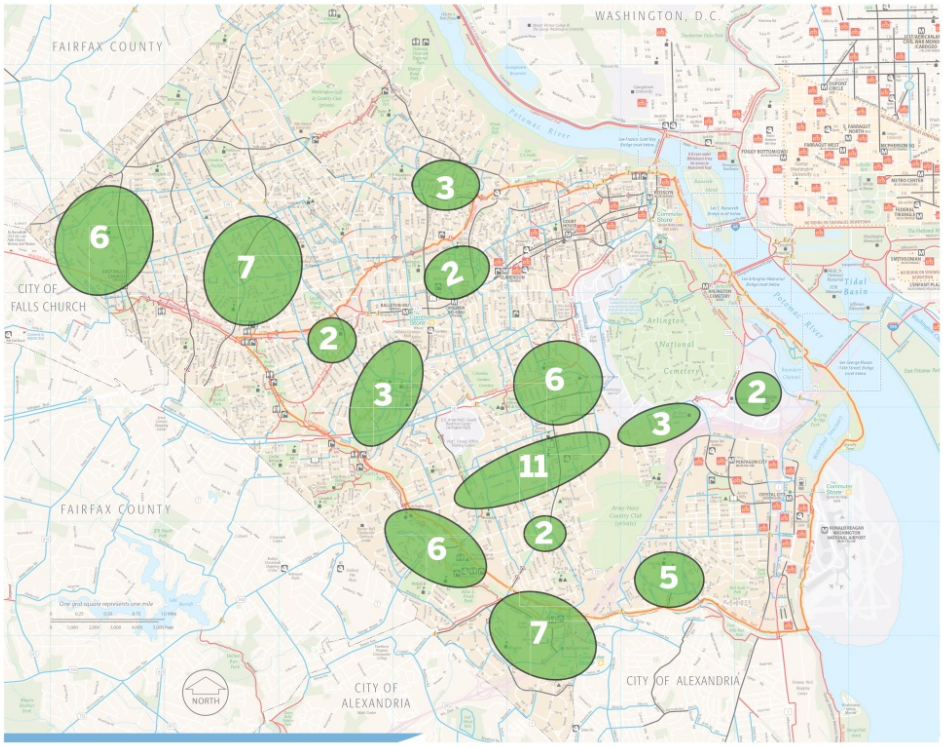
Columbia Pike and Shirlington had the greatest support for future bikeshare stations. Other popular locations in South Arlington included Glebe Road and along Route 50 at Walter Reed Drive and the Barcroft Community Center. Participants supported adding stations in North Arlington near East Falls Church Station, along Lee Highway in Cherrydale, and by the Westover library on North Washington Boulevard, as well as in Lyon Park. Within the existing bikeshare service area, participants requested mores stations around Virginia Square (more stations are coming in the Summer of 2012) and at the Pentagon. Three locations identified by the general public and the Transportation Commission that were not suggested at other meetings during the TDP public input process included at Arlington Cemetery, Reagan National Airport, and along the Bluemont Junction trail.

Community Advisory Panel (CAP)

The CAP meeting interactive mapping exercise was performed differently from the exercise administered during the public and Transportation Commission meetings. Participants were asked to allocate stations by individual neighborhoods or corridor segments using a set of dot stickers that each represented two stations and were color coded to represent an approximate number of stations available by fiscal year (FY13-FY18). The CAP meeting participants worked in small groups of 6 to 7

individuals to come to a consensus on their preferred scenario for Capital Bikeshare expansion in Arlington. The CAP exercise yielded similar results to the public meeting, with support for Shirlington and Columbia Pike, the Pentagon, East Falls Church, and Cherrydale. Figure 5.14 aggregates the results of the CAP exercise by highlighting clusters that received more than one vote. The number inside each circle displays the total number votes for each neighborhood or corridor.

Figure 5.14 CAP Interactive Scenario Development Exercise Summary Map

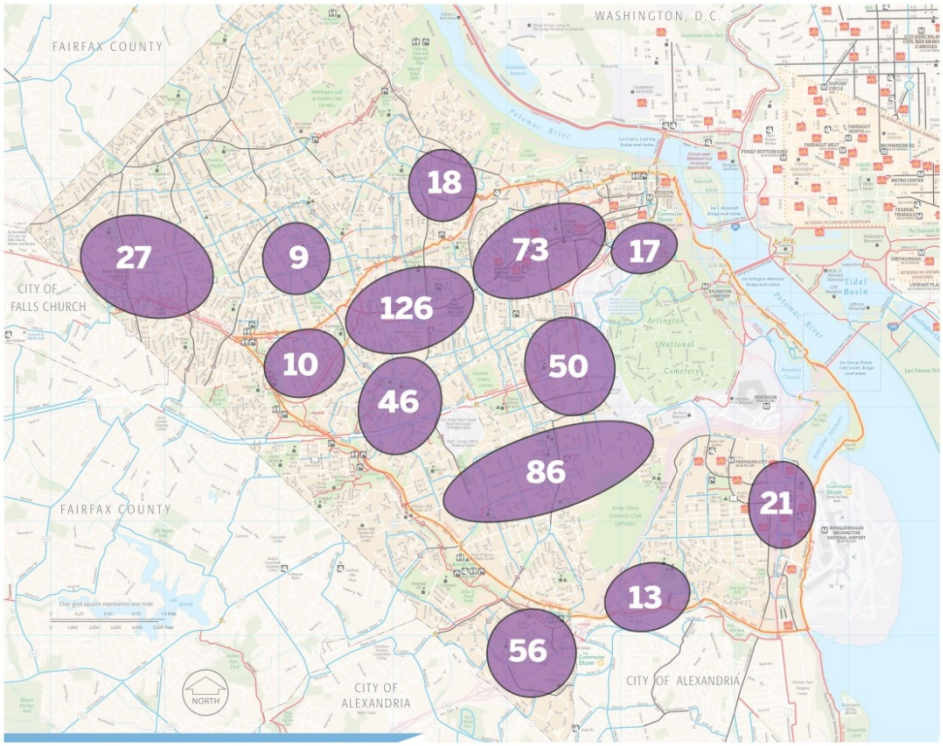


Capital Bikeshare "Suggest a Station" Crowdsourcing Map

In June 2011 Bike Arlington launched an online crowdsourcing map[4] to collect the public's feedback on existing and future station locations. For the purposes of input to the TDP, all station suggestions between June 2011 and April 2012 were aggregated by neighborhood or corridor. Figure 5.15 summarizes the findings of the aggregated map by highlighting those areas of Arlington that received 9 or more suggested station placements. The "Suggest a Station" crowdsourcing map results conform quite well with the desired expansion areas for bikeshare in Arlington that emerged from the Community Advisory Panel, Online Comment Forum, and at the general public meeting. A large portion of suggested station sites are within Courthouse, Clarendon, Virginia Square and Ballston. These areas did not have bikeshare stations at the launch of the "Suggest a Station" map; however, bikeshare stations have now been deployed across the Rosslyn-Ballston corridor.

[4] The Capital Bikeshare "Suggest a Station" Crowdsourcing Map can be viewed online at: http://mobilitylab.org/bikearlington/crowdsourcing/sharemap.php,

Figure 5.15 "Suggest a Station" Crowdsourcing Map Input Summary



Trip Type Exercise

At the general public meeting, participants were also asked to select the three types of trips they were most likely to take using Capital Bikeshare. As shown in Table 5.7, participants expressed a preference for using bikeshare to run errands, commute to work, and access public facilities. These trip preferences are reinforced by some common station suggestions along the mixed-use development in Shirlington, neighborhood-serving retail and community facilities along Columbia Pike, and at County facilities such as community centers or the Department of Human Services.

Table 5.7 Bikeshare Trip Purpose

Rank	Trip Purpose	Votes
1	Running errands	13
2	Commuting to work	8
3	Visiting public facilities	6
4	Eating Out	6
5	Recreation	5
6	Shopping	3
7	Entertainment	3
8	Exercise	2
9	Socializing	2
10	Traveling to School	0

Principle Ranking Exercise

At the general public meeting and at the community advisory panel, participants were asked to choose the three expansion principles they think are most important. At the public meeting, attendees were asked to pick their top three principles, in no specific order. CAP meeting attendees were asked to pick their top three principles, and rank them. Participants at both meetings favored developing a dense system that took advantage of multi-modal connections and existing trails and bicycle lanes. Tables 5.8 and 5.9 show the prioritization of the principles from the general public meeting and CAP meeting, respectively.

Table 5.8 General Public Meeting Expansion Principles Ranked by Popularity

Rank	Principle
1	Locate new stations no more than ½ a mile from another station.
2	Incorporate bikeshare as part of a multi-modal transit network.
3	Locate stations to take advantage of existing bicycle infrastructure
4	Locate bikeshare to serve residents, visitors and workers in Arlington.
5	Locate stations to connect with neighboring the network in neighboring jurisdictions.
6	New stations should serve a variety of trips.
7	Stations should be located to minimize operating costs.

Table 5.9 Community Advisory Panel Expansion Principles by Number of Times Ranked Most Important

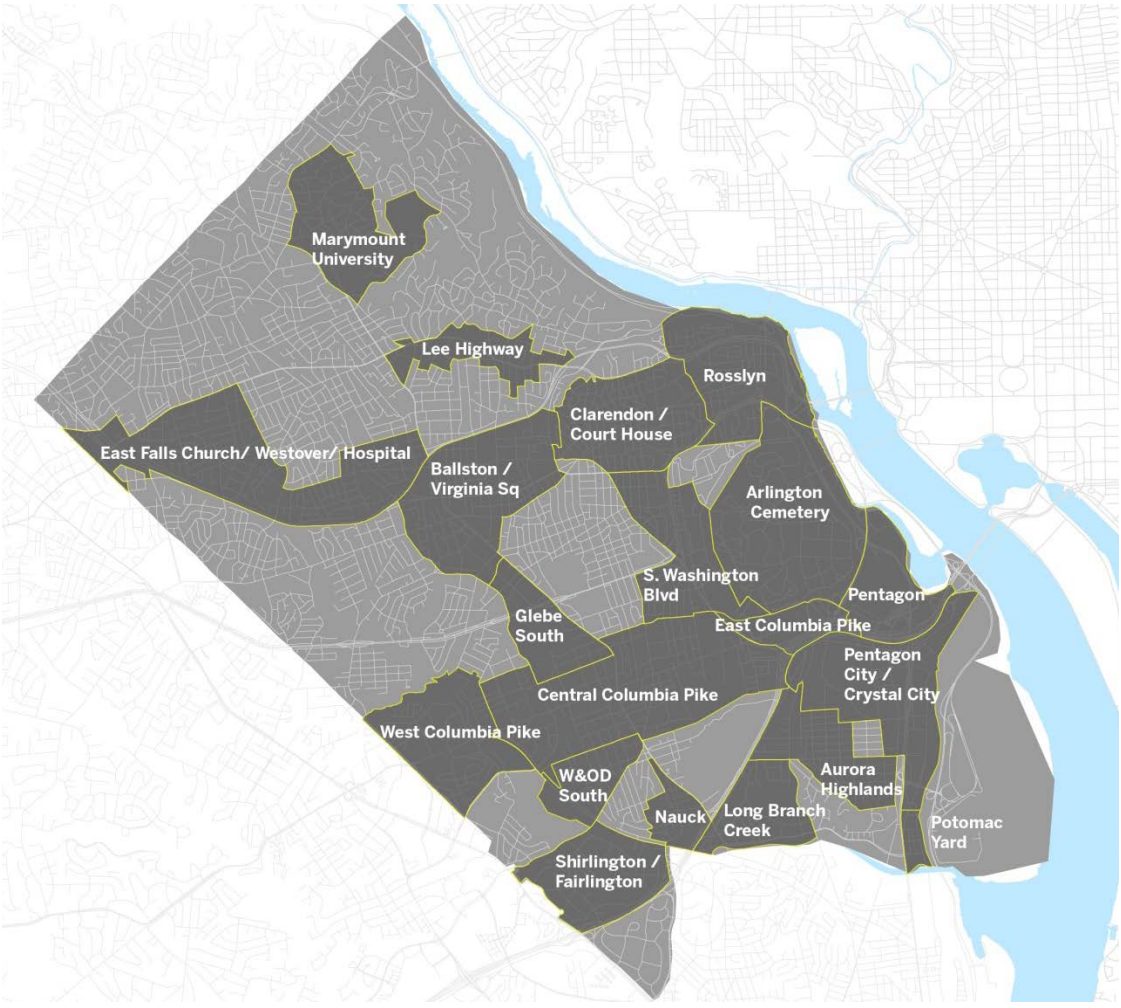
Rank	Principle
1	Incorporate bikeshare as part of a multi-modal transit network.
2	Locate new stations no more than ½ a mile from another station.
3	Locate stations to take advantage of existing bicycle infrastructure
4	New stations should serve a variety of trips.
5	Locate stations to connect with neighboring the network in neighboring jurisdictions.
6	Locate bikeshare to serve residents, visitors and workers in Arlington.
7	Stations should be located to minimize operating costs.

5.5 Estimating Bikeshare Expansion Demand

Identifying Corridors for Capital Bikeshare Expansion

The first step in developing Arlington's final expansion plan was to identify logical locations for bikeshare expansion in Arlington. Based on the public feedback, existing land use, and location of important destinations, the plan identifies 20 expansion corridors or areas. The boundary of the expansion corridors are an aggregation of MWCOG traffic analysis zones (TAZs) to facilitate side by side comparisons to the bikeshare demand map (see section 5.2) and population / employment figures. While there may be additional opportunities for bikeshare beyond the corridors shown in Figure 5.16, expansion within the timeframe of the plan should focus on build-out within these 20 areas.

Figure 5.16 Bikeshare Expansion Areas



Estimating System-Size at Build Out

To better quantify the unconstrained needs of the Arlington Capital Bikeshare system within the timeframe of the plan, two analyses of bikeshare station needs were conducted: one estimate derived from the bikeshare demand map (see section 5.2) and one estimate derived from a spot analysis of potential locations for bikeshare stations

Bikeshare Demand Map

To fully serve the 20 bikeshare areas, the bikeshare demand map estimates a need for 106 11-dock bike share stations. The demand map gives preference to locations near Metro stations and bicycle infrastructure, and projected the strongest demand for bikeshare along the Rosslyn-Ballston corridor and in East Falls Church (see Table 5.10). As mentioned in section 5.2, however, the demand map likely overestimates the demand for bikeshare, as the baseline demand is derived from existing station usage. As much of Arlington is at a lower population and employment density than the Capital Bikeshare service area, demand in low density neighborhoods is an overstatement of real needs. In reality, there are a number of other variables that are hard to quantify in a regression-based analysis impact ridership.

Bikeshare Spot Analysis

A second demand analysis was conducted to capture the qualitative variables overlooked by the bikeshare demand map. This "spot analysis" made use of satellite images of Arlington to identify all potential destinations that could be served by bikeshare. Retail centers, major community facilities, dense residential development, and employment centers were all identified as ideal locations. Stations were placed so that, with the exception of the Marymount University area, all stations are at least ½ a mile from one another.

The estimates from the spot analysis indicates demand for 67 additional 11 dock bikeshare stations, less than the bikeshare demand map. Some of the largest gaps between the demand map estimates and spot analysis estimates occur in the corridors with existing bikeshare stations. The spot analysis looked at all *locations* that could support bikeshare. In places like Rosslyn, while there is projected demand for additional bicycle docks, there are few locations suitably far enough from existing stations to warrant a new station.

In some areas the spot analysis estimates a greater demand for bikeshare than the demand map. For example the demand map estimates a need for four stations in the Shirlington/Fairlington area. This estimate however, does not take into account Shirlington's importance as a retail and transit hub. The spot survey found eight destinations in reasonable distance of one another that seemed like logical locations for bikeshare.

The locations of bikeshare stations in the spot analysis will not determine final station placement, as all results in the analysis have been aggregated to the neighborhood level and do not take into account neighborhood input, permitting, and easement requirements. Final station placement will be decided during the implementation phase.

Figure 5.17 Spot Analysis Results Aggregated By Area

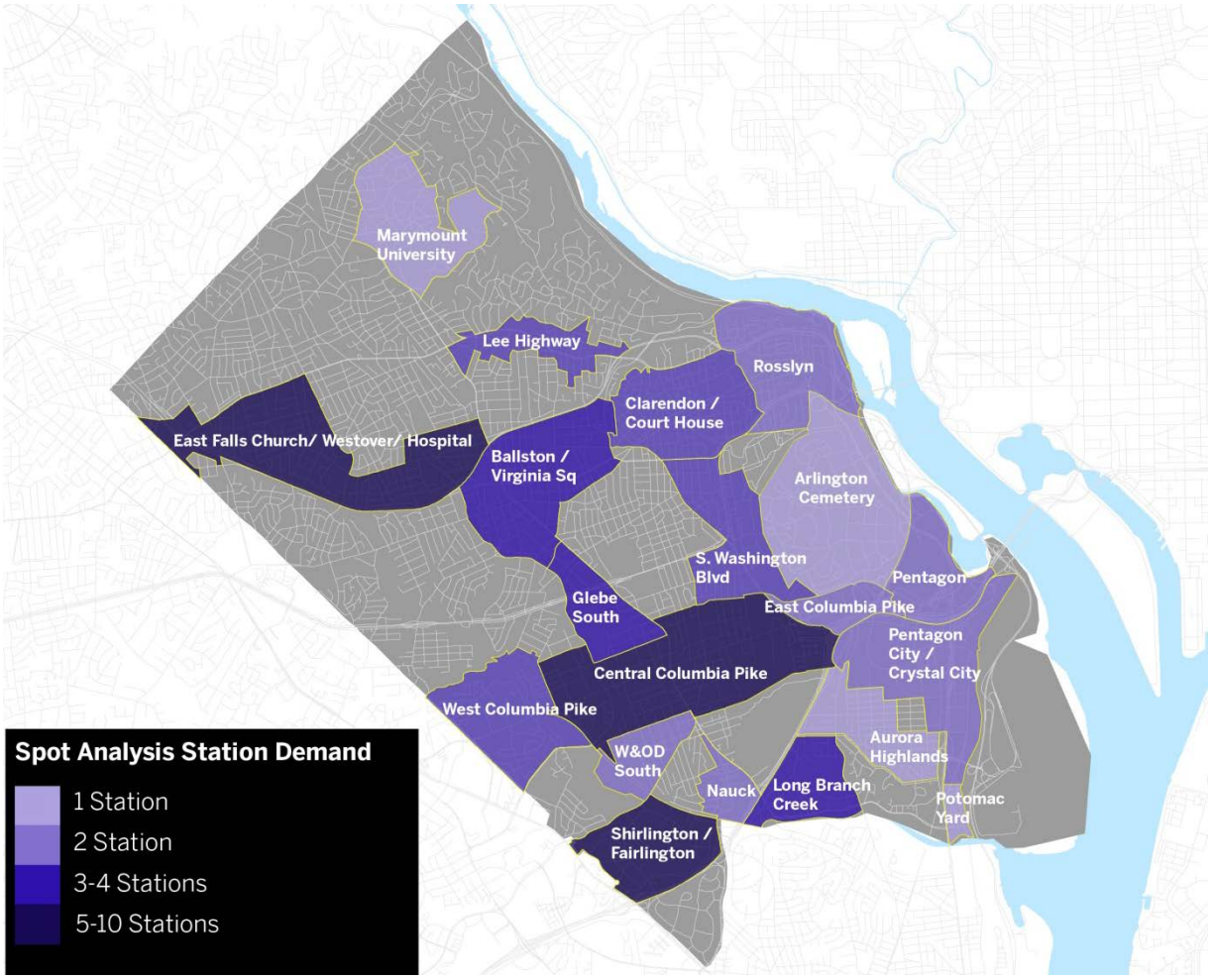


Table 5.10 Results of the Spot Analysis and Bikeshare Demand Map

Area	Spot Survey	Station Demand Map
Clarendon / Courthouse	3	1
Ballston / Virginia Square	4	12
Glebe Corridor	4	6
Columbia Pike Central	10	9
Columbia Pike East	2	3
S. Washington Boulevard	3	3
Arlington National Cemetery	2	0
Nauck	2	2
W&OD South	2	2
Shirlington / Fairlington	8	4
Long Branch Creek	4	1
Aurora Highlands	1	2
Potomac Yard	1	3
Columbia Pike West	3	4
Pentagon	2	4
Rosslyn	2	8
Crystal City / Pentagon City	2	10
East Falls Church	5	17
Lee Highway	3	11
Marymount University	1	1
TOTAL	**67**	**106**

Final Estimate of System at Build-Out

The spot analysis and bikeshare demand map discussed above provide two sets of estimates of the system size at build-out. Instead of relying on one of the two estimates in its entirety, the lower and higher of the two figures for each area was taken to create a final low and high estimate of system size at full, unconstrained build-out (Table 5.11). These two estimates are the basis for the unconstrained expansion plan and help frame the funding needs of Capital Bikeshare.

Table 5.11 Low and High Estimates of Bikeshare Demand

Area	Low Estimate	High Estimate
Clarendon / Courthouse	1	3
Ballston / Virginia Square	4	12
Glebe Corridor	4	6
Columbia Pike Central	9	10
Columbia Pike East	2	3
S. Washington Boulevard	3	3
Arlington National Cemetery	0	2
Nauck	2	2
W&OD South	2	2
Shirlington / Fairlington	4	8
Long Branch Creek	1	4
Aurora Highlands	1	2
Potomac Yards	1	3
Columbia Pike West	3	4
Pentagon	2	4
Rosslyn	2	8
Crystal City / Pentagon City	2	10
East Falls Church	5	17
Lee Highway	3	11
Marymount University	1	1
Total	**55**	**118**

5.6 Final Constrained Expansion Plan

TDP Financial Assumptions

The Financial Plan (Chapter 8 of the TDP) outlines the capital funding sources that can be used toward the purchase of new bikeshare stations and station extensions (known as four dock extensions are known as B-Plates, 2-dock extension as 180-degree plates, and 1-dock extensions as 90-degree Plates) over the six-year plan period. While Arlington County has a dedicated source of annual capital funding ($200,000 from the Vehicle Decal Fee), the projected capital costs for maintaining the current system, that is, repairing bicycles and equipment and replacing bicycles and station terminals as they reach the end of their estimated useful life, exceeds available capital funding in FY2016 – FY2018. Therefore, funding for system expansion, i.e., new stations and station extensions, is only currently available in the FY2013 – FY2015 period.

The TDP assumes all future stations will be sized to include 11 bicycle docking points (docks), with the exception of the station planned for Arlington Cemetery, which will be 19 docks. Two 15-dock stations will be installed in FY2013, but this station was funded and sited in FY2012, as were 7 other 11-dock stations now slated for installation in FY2013. Arlington County prefers to purchase smaller stations and then expand stations on an individual basis as the need is demonstrated; in FY2013 Arlington County plans to purchase 9 B-Plates, 1 180-degree plate, and 1 90-degree plate to add to any station within the

system as needed. Four B-Plates and one 90-degree plate will be installed in FY2014, and four B-Plates and one 180-degree plate be installed in FY2015. The Arlington Mill Community Center renovation project included funding for one 11-dock station, which is included in the total stations planned for FY2014.

Arlington's Capital Bikeshare six-year expansion strategy is based on the input received from citizens that live or work in Arlington, as well as other key system stakeholders. Due to constraints in Arlington's Capital Bikeshare capital budget, system expansion based on current fiscal constraints will be limited to the first three years of the TDP (see Table 5.12).

Table 5.12 New Stations and Station Extensions by Fiscal Year

	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
11-Docks Stations	39	4	2	-	-	-
15-Docks Stations	-	-	-	-	-	-
19-Docks Stations						
B-Plates (four dock station extension)	12	4	4	-	-	-
180-Degree Plate (two dock station extension)	1	0	1	-	-	-
90-Degree Plate (one dock station extension)	1	1	-	-	-	-

Between FY2016 and FY2018, the capital budget will need to focus on state of good repair investments to maintain the quality and reliability of the system's equipment. During this time over 80 percent of Arlington's Capital Bikeshare bicycle fleet will reach the end of its useful life and require replacement. There will also be a sharp increase in bicycle fleet maintenance and repair due to the increase in the bicycle fleet associated with the large FY2013 – FY2014 system expansion and aging of the bicycles. An in-depth analysis of capital funding is provided in *Chapter 7: Capital Improvement Plan* and *Chapter 8: Financial Plan*.

Due to the lack of available capital funding for system expansion beyond FY2015, Arlington will be unable to meet the current demand for bikeshare stations. As a result, two alternative expansion plans have been developed. The first is the constrained plan, which provides a framework for system expansion within the available capital funding. The unconstrained expansion plan demonstrates the demand for bikeshare stations throughout Arlington. The unconstrained expansion plan is strategically phased to correspond with the new areas where service is desired based on the comments received during the public outreach period.

Constrained Expansion Plan

Under the constrained plan, nearly all of the system growth will occur in FY 2013, the first year of the six-year plan (due to availability of grant funding in FY 2013). Expansion will focus on building out the system on South Arlington, especially along Columbia Pike east of the Washington & Old Dominion trail

and in Shirlington. Stations will also be placed at Arlington National Cemetery and at the Pentagon pending approval by the National Park Service and Department of Defense respectively.

Outside the major destination clusters of South Arlington, stations will be placed at a lower density along key connecting corridors, while still adhering to the one-half mile maximum distance between stations. In addition to the connecting corridors of the Four Mile Run and Washington & Old Dominion trails, Washington Boulevard and Glebe Road will form two connections between the Rosslyn-Ballston corridor and Columbia Pike, while stations in Long Branch Creek and Aurora Highlands will help complete the connection between Crystal City and Shirlington.

Figure 5.18 shows an illustrative of the constrained plan, with orange indicating areas of higher station density than yellow. Table 5.13 and Figure 5.19 show the location placement by year for the constrained system.

Table 5.13 Number of Stations and Phasing Year

Area	Number of Stations	Year
Clarendon / Courthouse	1	2013
Ballston / Virginia Square	3	2013
Glebe Corridor	1	2013
Columbia Pike Central	9	2013
Columbia Pike East	1	2013
S. Washington Boulevard	2	2013
Arlington National Cemetery	1	2013
Nauck	2	2013
W&OD South	2	2013
Shirlington / Fairlington	6	2013
Long Branch Creek	3	2013
Aurora Highlands	1	2013
Potomac Yards	2	2013
Columbia Pike West	1	2014
Mini Station Pilot	3	2014
Pentagon	2	2015
Rosslyn	0	-
Crystal City / Pentagon City	0	-
East Falls Church	0	-
Lee Highway	0	-
Marymount University	0	-
TOTALS	40	

Mini-Station Pilot

Many parts of Arlington have significantly different land use patterns from the existing bikeshare service area, and may not support the larger stations currently used by Capital Bikeshare. The funding equivalent of three 11-dock stations will be reserved for a mini-station pilot. These mini-stations are presently untested, however the County is interested in acquiring smaller, pared-down stations that would be cost-effective to serve neighborhood centers that cannot support larger stations. The constrained plan budgets to fund such a pilot in FY 2014. If Capital Bikeshare finds such a pilot infeasible, the funding can be reallocated toward fulfilling the unconstrained plan needs.

B-Plates

All stations in the plan are assumed to have 11 docks. As part of the expansion plan, Arlington will purchase 4 dock expansion plates known as B-Plates. These expansion plates will be distributed across the system to increase station size where needed.

Figure 5.18 Illustrative Map of Constrained Plan

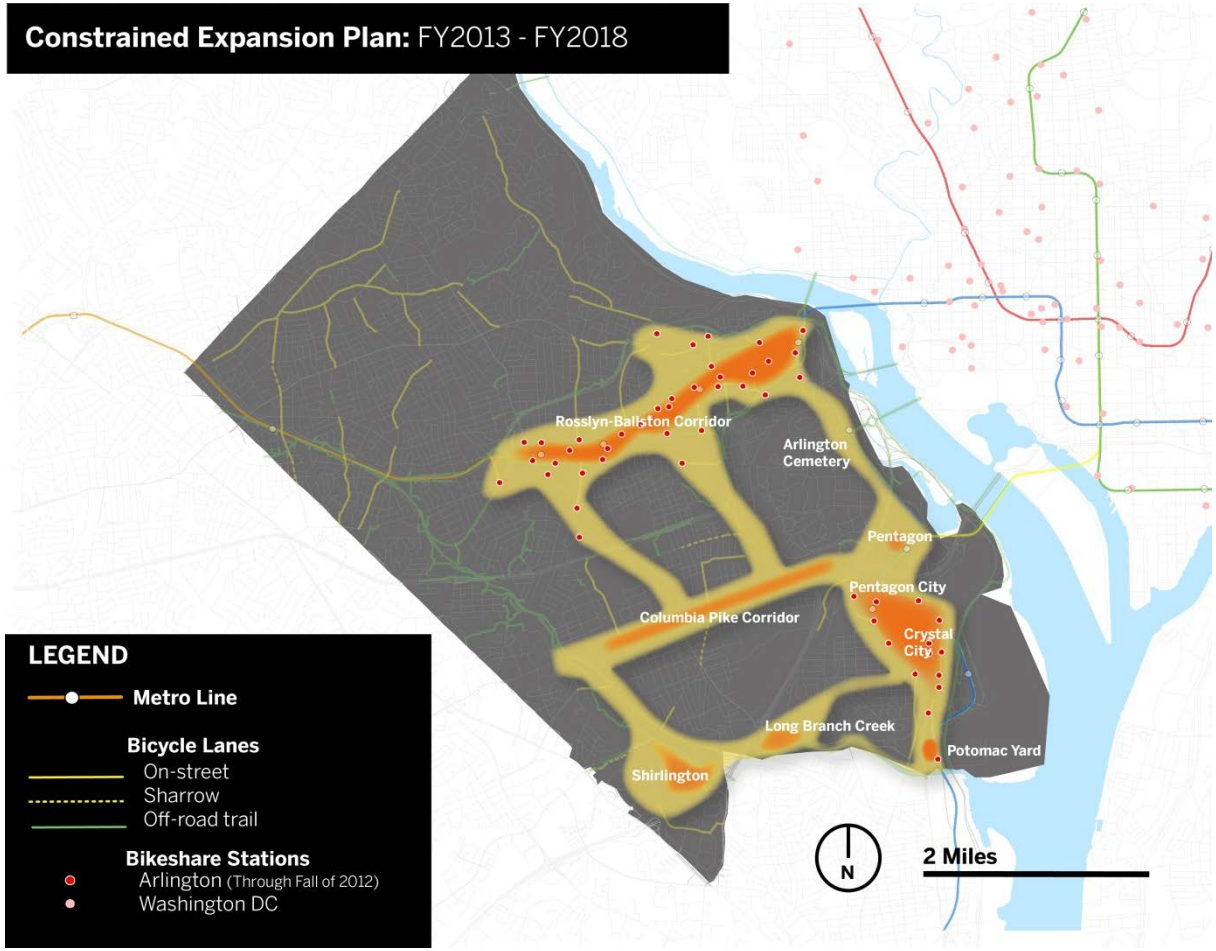
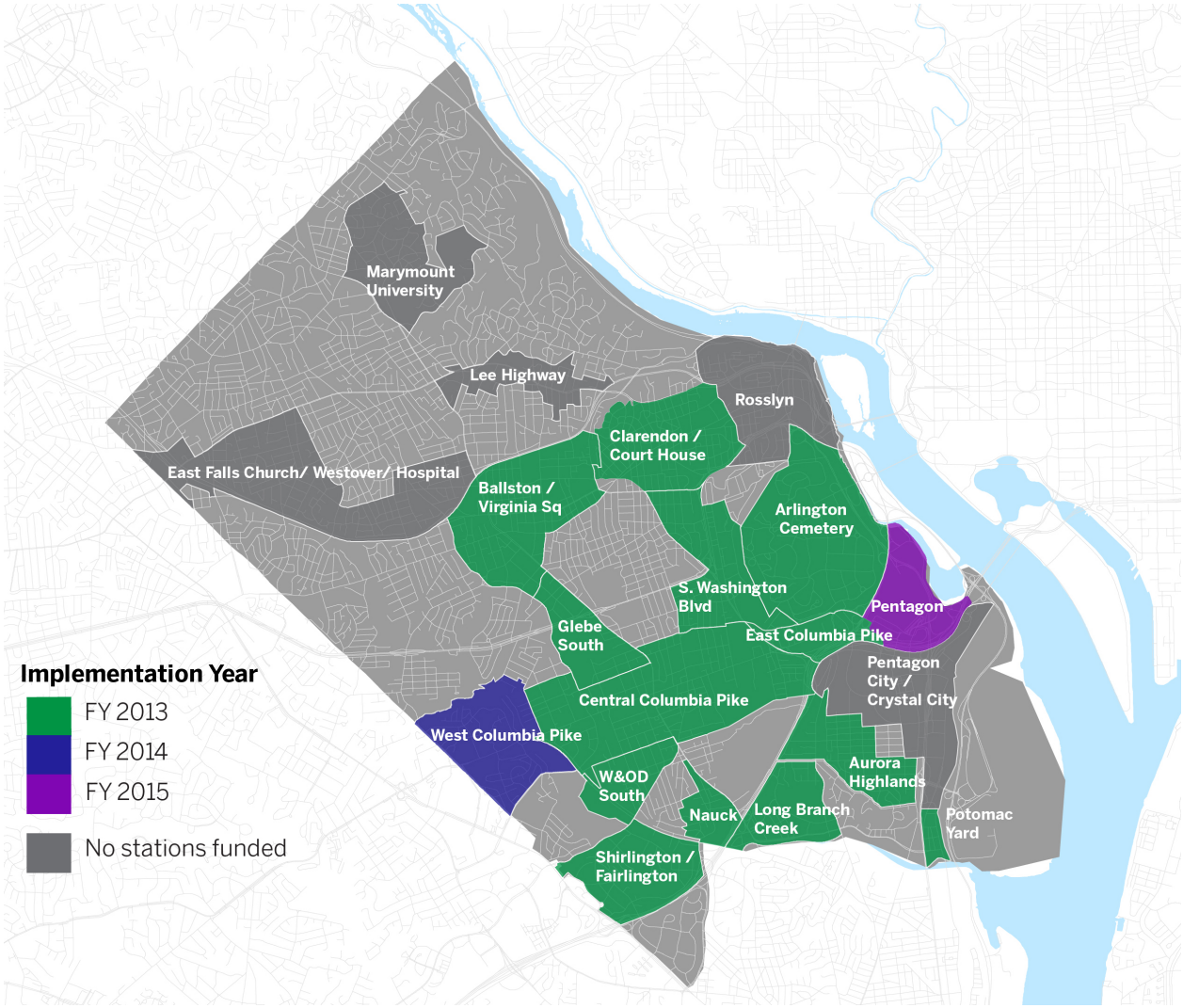


Figure 5.19 Phasing of Constrained Plan



Public Input on Constrained Expansion Plan

Online Comment Forum

Nearly all of the comments received during the draft final plan comment period advocated for the installation of bikeshare stations at specific areas within the selected corridors or in the neighborhoods and at community-serving facilities outside of the Rosslyn-Ballston and Crystal City / Pentagon City corridors.

As shown in Table 5.14, two of the top three comments (measured by concurring votes and total supporters) asked for bikeshare stations to connect the neighborhoods with the Metro corridors and provide better access to transit and public facilities. The top comment requested a station specifically at the popular Thomas Jefferson Community Center. In total, 18 individual comments were received via the Online Comment Forum for the Draft Final Plan.

Draft Final Plan Selected Input – Online Forum

"Thomas Jefferson is a destination for many Arlingtonians due to the theater, the gym and the park. Commuters could pick up bikes at TJ and ride to the metro and those wanting to use the facility at TJ would bring the bikes back all along the Irving Corridor. In addition, TJ is a perfect staging point for commuting by bike downtown (through the Ft. Meyer) and then returning via Metro from Clarendon or Ballston."

"The map has the greatest bikeshare density along the public transit lines (e.g., Orange line), but does not provide available bikes to bring residents from their neighborhoods to the public transit lines."

"This [Lee Highway corridor] is a growing community where we are so close to being able to navigate Arlington and commute into DC, but with bus service being relatively limited and walking out of the question (too far), having a bikeshare to quickly get to the Orange Line corridor when we need to would significantly increase the value of this neighborhood!"

"Arlington has several neighborhoods that are nearly devoid of transit options. It seems to me that we should have an emphasis on providing bikeshare especially in these areas. For example, the region of South Arlington that is south of the Pike and north of Four Mile Run is in *dire* need of more connectivity. Please place a few stations along South Walter Reed drive to connect this transit desert with the major transit corridor on the [Columbia] Pike."

"There are numerous commuters and families that live between Ballston and East Falls Church along the Westover / Virginia Hospital Center /East Falls Church sections that border the Custis Trail, Four Mile Run Trail, and the Washington & Old Dominion trail system. It would increase usage for these individuals and families to use the bikeshare system instead of driving. "

Table 5.14 Online Comment Forum Neighborhoods/Corridors/Facilities Suggested – Draft Final Plan Comment Period

Neighborhood/Corridor/Facility Comment Themes	Concurring Votes (Number)	Total Supporters (Number)[5]	Comments (Number)
Thomas Jefferson Community Center	50	26	4
Lee Highway / Westover /East Falls Church	23	11	1
Expand Bikeshare into the neighborhoods, "transit deserts," and to county recreation centers	13	7	2
WO&D Trail (Columbia Pike, Bluemont Junction)	11	6	3
Ballston Metro Station	7	4	1
Do not install bikeshare in Arlington County Parks	2	2	3
Fort Scott Park	1	1	1
Pentagon	1	1	0

General Public Meeting and Other Input Received

The July 11, 2012 general public meeting provided an overview of the draft final plan and gave residents an opportunity to provide their feedback on the draft final plan, presenting for the first time the expansion plan as well as the financial plan. The information provided to attendees on presentation display boards is shown in Appendix C. In addition to the input received at the general public meeting, several residents also provided comments via email.

The general public meeting input and other input received was generally similar to the public input received on the Online Comment Forum. Residents expressed a desire to have Capital Bikeshare expand to key community facilities, particularly community centers, and to serve as supplements or to provide access to transit.

Draft Final Plan Selected Input – E-Mail Comment

"I think Bikeshare makes the most sense as an extension of the car-free options connecting residential and commercial neighborhoods. This would be especially good for connecting to Metrorail where bus routes don't exist or bus timetables are not convenient. I would love to be able to get off a Metro train at Virginia Square and pick up a bike to ride home to Lee Highway (Lee Heights / Cherrydale). I would purchase a Bikeshare membership and use Metro a lot more if this were an option for me."

[5] Note, that while there were 67 individuals in total who provided input via the online comment forum, all individuals could provide up to three votes per individual page on the site, so the number of total supporters does not indicate a total of 65 unique individuals. For example, a single individual may have cast a concurring vote for more than one comment that voiced support for expansion along Columbia Pike.

Justification of the Constrained Expansion Plan Strategy

The decision to focus first on South Arlington in the constrained expansion plan comes directly from the feedback received in public meetings, at stakeholder meetings, and online. Repeatedly, residents and stakeholders voiced a strong desire to see stations in Columbia Pike and Shirlington, and the alternative expansion plan seeks to focus on creating a new Capital Bikeshare spine in the Columbia Pike corridor. Additionally, the results of the demand map and availability of bicycle infrastructure supported the decision to connect Columbia Pike and Shirlington to one another and the rest of the system through the Four Mile Run Trail and Washington Boulevard. While expansion in South Arlington will occur at a lower density than the existing bikeshare system in Arlington, stations would continue to be no more than one-half mile from one another.

The limited extent of proposed bikeshare system expansion in North Arlington is due to a number of constraints. While there was notable support for stations in East Falls Church, Westover, the Virginia Hospital Center, Cherrydale, and throughout the Lee Highway Corridor, the destinations in North Arlington are located further apart from one another than in other areas of the County. The lower population density in North Arlington also reduces the total number of potential bikeshare trips generated.

Expanding bikeshare across the County will give more Arlingtonians access to sustainable transportation options. The constrained expansion plan would allow for wider coverage of bikeshare to better connect residents to jobs, education, and recreational opportunities, and future stations will be located at important transit hubs, such as Shirlington Transit Center, increasing the multimodal connections to bikeshare. Columbia Pike residents would enjoy both east-west and north-south mobility, filling in a major gap in Arlington's transportations system.

5.7 Final Unconstrained Expansion Plan

The unconstrained expansion plan seeks to build out Capital Bikeshare in all of the 20 identified bikeshare areas. Under the unconstrained plan, bikeshare will expand within both North and South Arlington. In addition to the areas served by the constrained plan, the unconstrained plan will include stations along Lee Highway, Westover, Virginia Hospital Center, and East Falls Church. If the City of Falls Church chooses to join the Capital Bikeshare system, stations at East Falls Church will provide a convenient connection between the Falls Church and the Metro Blue and Silver lines.

The demand analysis provides two scenarios for the unconstrained plan based on the low and high estimates of bikeshare needs. The constrained plan only meets between 32 and 69 percent of expansion needs, but identifying additional capital and operating funding for the system to achieve its optimal capacity will be needed. With the current funding, Capital Bikeshare will not be unable to expand into North Arlington, nor will the system be able to meet future needs for increased capacity within the Rosslyn-Ballston Corridor, Pentagon City, and Crystal City. Figure 5.20 and the maps in Figures 5.21 and 5.22 outline the range and location of needs by area of the County.

In addition to unmet needs in North Arlington, while the constrained plan allocates enough stations to achieve at least minimum build-out of bikeshare in new areas, there remain significant unmet needs in many of the South Arlington areas receiving stations in 2013 and 2014.

Figure 5.20 Range of Unmet Needs by Area

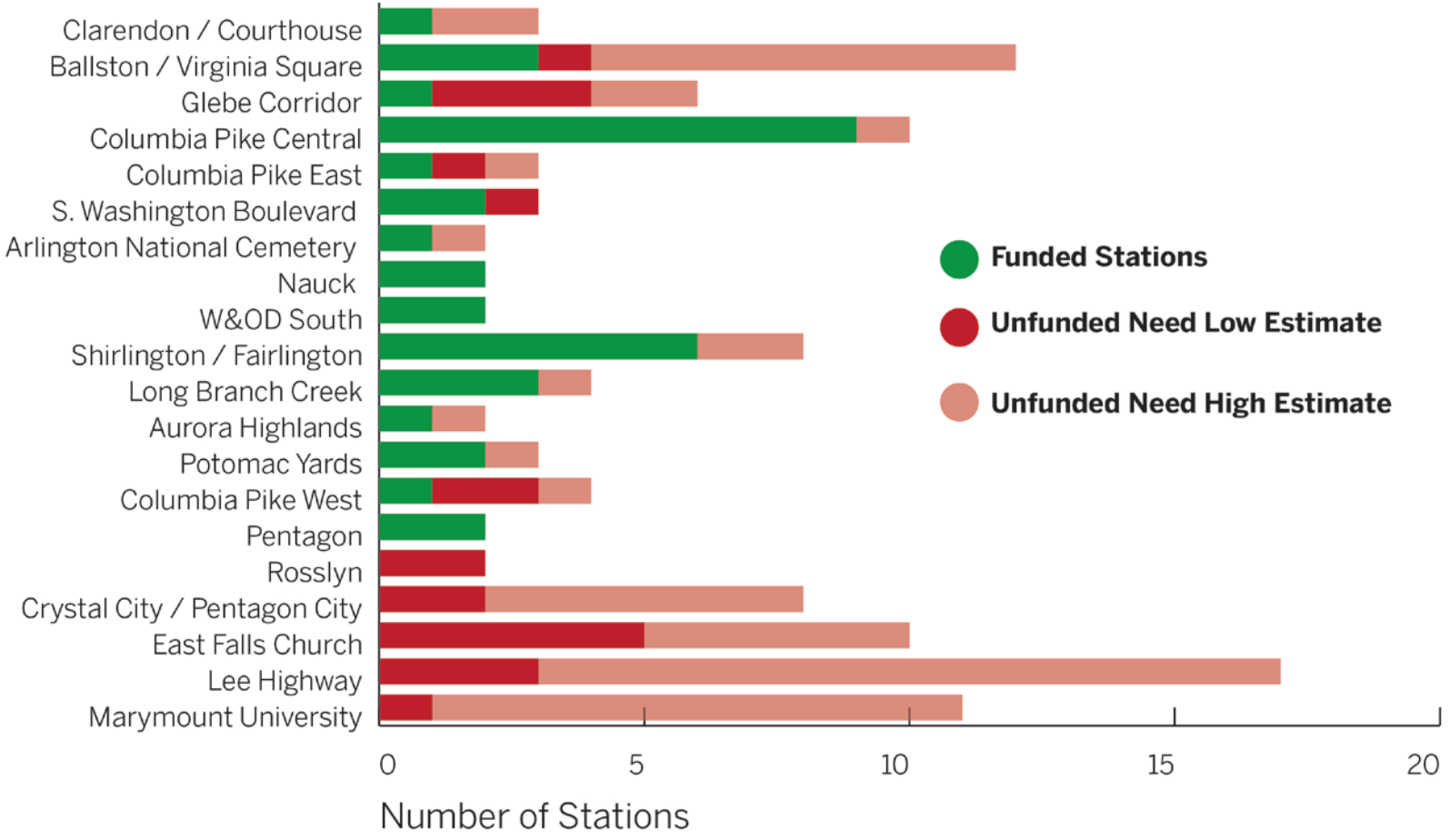


Figure 5.21 Unconstrained Plan – Low Scenario

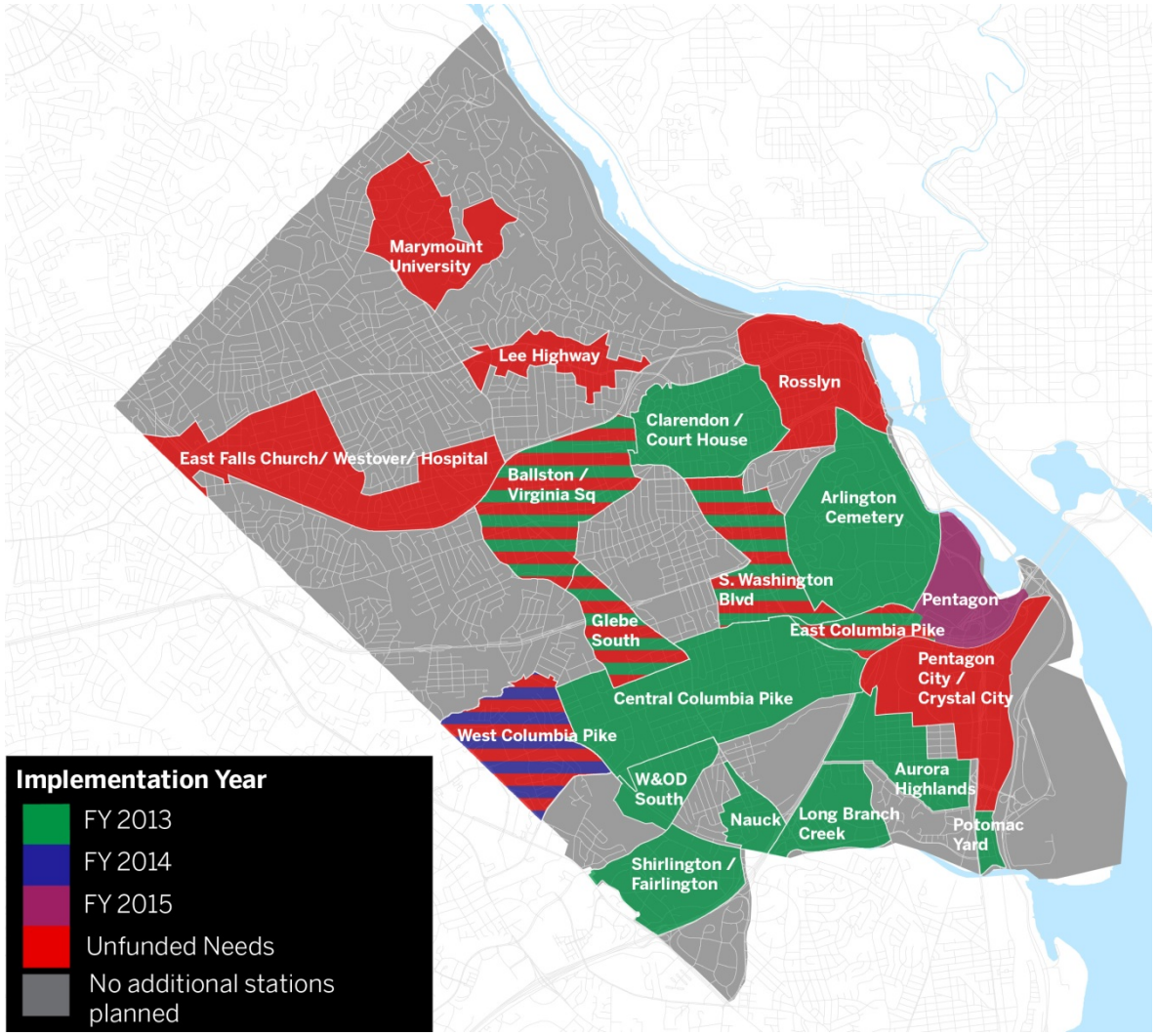
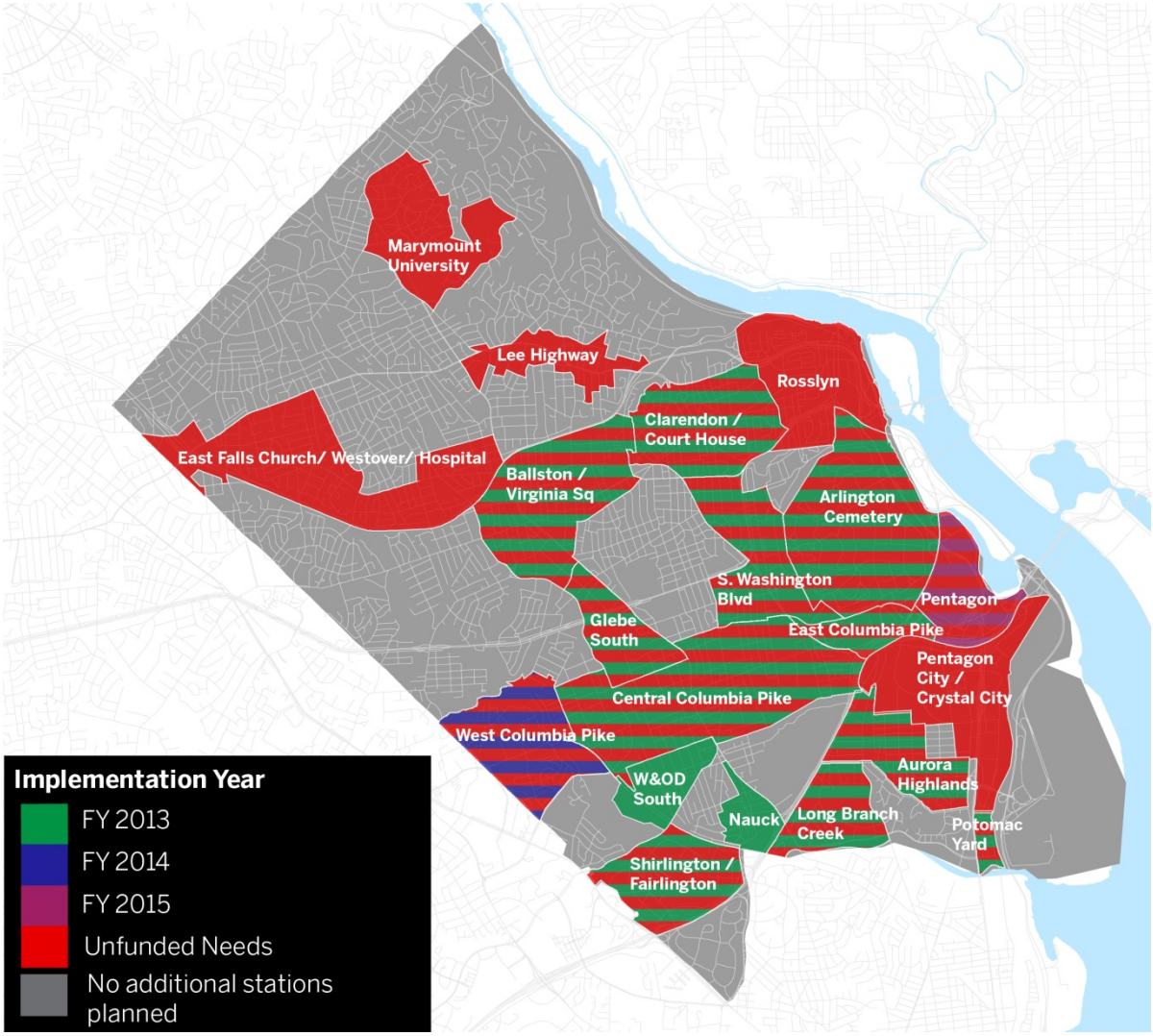


Figure 5.22 Unconstrained Plan – High Scenario



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Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018

EuanFisk/ Flickr, 2012

Chapter 6: Operating Plan

November 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES Arlington County Commuter Services | Bike Arlington

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6 OPERATIONS PLAN

This operations plan provides a detailed analysis of the expenses associated with the daily operation and administration of Capital Bikeshare in Arlington. The constrained expansion plan described in Chapter 5 is based on the known available capital funding for new stations, but funding must also be available for operating the new *and* existing Capital Bikeshare stations in Arlington on an ongoing basis.

6.1 Projected Operating Budget Overview

Table 6.1 provides an overview of the operating budget for Arlington's portion of Capital Bikeshare for the six-year period, including both anticipated expenses and known revenues. A detailed operating expenses budget, including information on the methodology used to derive these projections, is in Chapter 8: Financial Plan.

Table 6.1 Projected Operating Budget Overview, FY 2013-FY 2018

Fiscal Year	2013	2014	2015	2016	2017	2018
OPERATING EXPENSES						
Contract Operations	$880,725	$1,336,141	$1,457,335	$1,546,383	$1,600,507	$1,656,524
Administration and Marketing	$180,044	$186,346	$192,868	$199,618	$206,605	$213,836
TOTAL	**$1,060,769**	**$1,522,487**	**$1,650,203**	**$1,746,001**	**$1,807,111**	**$1,870,360**
OPERATING REVENUES						
Station Sponsorships	$84,155	$67,656	$69,209	$70,817	$72,481	$50,924
Advertising	-	-	-	-	-	-
Arlington County Commuter Services Revenues	$180,044	$186,346	$192,868	$199,618	$206,605	$213,836
Farebox Revenue Projection	$530,384	$761,243	$825,101	$873,001	$903,556	$935,180
TOTAL	**$832,755**	**$1,029,894**	**$1,102,340**	**$1,159,127**	**$1,198,882**	**$1,216,749**
OPERATING DEFICIT	***$(304,356)***	***$(521,891)***	***$(578,186)***	***$(618,258)***	***$(640,712)***	***$(687,230)***

An operating deficit is projected for each year in the FY2013-FY2018 period. Arlington County is committed to identifying new funding sources and strategies that will close the projected operating deficit. Once a new station is installed, Arlington must begin paying a fixed operating cost per dock for it; ***the new stations outlined in the constrained expansion plan will not be installed until adequate funding for their operation has been identified.***

Since the inception of the Capital Bikeshare system in Arlington, the system's operating costs have been met through revenue generated by the system and through Arlington County Commuter Services revenue generated through external contracts. While Arlington County Commuter Services will continue to fund the system's administration and marketing activities, Arlington's goal is to continue to maximize the amount of revenue that the Capital Bikeshare system can generate to support its own operations. The addition of new advertising revenue is key to bridging the projected operating revenue gaps. Many bikeshare systems around the world generate significant revenue through the sale of advertising on bikeshare station panels. Arlington County currently doesn't allow on-street advertising. Arlington County Board action authorizing on-street advertising on stations is critical to allow these sources of revenue to support Capital Bikeshare in Arlington.

6.2 Operational Costs and Revenues Analysis

Review of Current Operating Revenue Sources

The revenue sources for operating expenses for Capital Bikeshare in Arlington are currently limited to two sources: farebox revenue and station sponsorships.

Farebox Revenue

Farebox revenue for Capital Bikeshare is comprised of both membership fees and usage fees. In Arlington, these fees covered 53 percent in FY11 and 66 percent in FY12 of the total program cost (which includes the cost per dock paid to the contractor to operate the system, and the cost for Arlington to administer and market the system).

Of the farebox revenue collected, membership fees (including residents and Arlington's portion of non-resident memberships) account for 70 percent and usage fees (generated by trips over 30 minutes) account for 26 percent of Arlington's Capital Bikeshare farebox revenue. Corporate memberships account for the remaining four percent of total farebox revenue. Changes to the Capital Bikeshare fare structure are not anticipated at this time, and any change in the Capital Bikeshare fare structure would have to be agreed upon by all system regional partners.

Station Sponsorships

As of the beginning of FY2013, there are five currently sponsored stations in Arlington's Capital Bikeshare system.[1] FAST for Potomac Yard (a transportation management association) sponsors the capital and annual operating cost for the 11-dock station at South Glebe Road and Potomac Avenue on an ongoing basis and will sponsor the operating costs of two additional stations to be installed in FY2013; the Ballston Business Improvement District is sponsoring the FY2013 operating cost for the new station at North Stuart Street and 9th Street North (at the Ballston Metrorail Station); and George Mason University has committed to a five-year sponsorship of a portion of the amortized capital costs and operating costs for a new station located at the Arlington Campus for the FY2013-FY2017 period. Additionally, the Crystal City Business Improvement District made an initial matching contribution toward the initial capital costs of nine stations in FY11.

Review of Current Operating Costs

There are two types of operating costs for Capital Bikeshare in Arlington: contractor operating costs that cover the day-to-day operations and maintenance of the system and administrative operating costs that cover the management and marketing of the system.

Contractor Operating Costs

Contractor costs comprise over 80 percent of the operating costs each year in the FY2013-FY2018 planning period. Arlington County is charged a flat operating cost for each operational dock on a monthly basis. As new stations are implemented throughout the year, operating costs will rise accordingly with the number of additional docks installed. The monthly operating cost per dock for FY2013 is $107.22.

[1] The monetary value of each individual station sponsorship is listed in Chapter 8: Financial Plan.

Administrative Operating Costs

Administrative operating costs for Capital Bikeshare in Arlington include the day-to-day administration and management of the system by contractor MetroBike, LLC, and the marketing and oversight of the system by BikeArlington staff. MetroBike is responsible for all aspects of managing the implementation of Capital Bikeshare in Arlington, including individual station siting, permitting and installation, recruiting individual station sponsors, working with regional partners to manage the system on an ongoing basis, and addressing any other day-to-day issues that the system encounters. The BikeArlington team has the lead role in developing and implementing the marketing of Capital Bikeshare in Arlington, and the BikeArlington Program Manager and ACCS leadership provide ongoing system oversight.

Administration expenses for Capital Bikeshare comprise less than 20 percent of the total program cost. Between FY2014 and FY2018, following the large planned expansion of the system in FY2013, administration costs are anticipated to comprise just 12 percent of the total operating budget for Arlington's Capital Bikeshare system.

Long-Term Operating Cost Environment

Arlington's contract with Alta Bicycle Share, its current Capital Bikeshare operator, stipulates that the County and the contractor can negotiate the annual operating cost per dock on an annual basis, but that the rate of increase cannot exceed the lower of either the U.S. Department of Labor (USDOL) non-seasonally adjusted Employment Cost Index for Total Compensation for All Workers, or five percent per year. While the rate of increase for FY13 is 2 percent over FY12, for the remaining fiscal years for the period of the plan it is assumed that the annual rate of operating cost increases would be 3.5 percent. The 3.5 percent rate is a more conservative estimate, but equivalent to the general USDOL Consumer Price Index.

In the Capital Bikeshare system, the main factor in determining system operating costs is the cost of rebalancing the bikes between stations. Rebalancing occurs when stations are either full or empty, and involves the use of a van that transports bikes from full to empty stations. The need for rebalancing in Arlington may grow as the Capital Bikeshare system expands, particularly if stations are placed in heavily residential areas where the bikes may be used for peak-period uni-directional commuting. An increase in the contractor's rebalancing activity *may* in turn be passed along to Arlington in the form of a higher operating cost per dock in future fiscal years. The expansion plan detailed in Chapter 5 seeks to reduce potential rebalancing activity associated with system expansion by seeking to maintain a dense station placement throughout the new neighborhoods in which the system expansion is occurring.

Casual users of the Capital Bikeshare system take 71 percent of trips over 30 minutes that generate usage fee revenue for the system. Casual users, of whom 66 percent are non-local tourists, are a key source of revenue for the Capital Bikeshare system.[2] Continuing to locate Capital Bikeshare stations where tourists are likely to use the system, and effectively marketing the system to tourists and other casual users, is an important component of ensuring future operating revenues.

[2] Virginia Tech Capital Bikeshare Study: *A Closer Look at Casual Users and Operations* http://ralphbu.files.wordpress.com/2012/01/vt-bike-share-study-final3.pdf, accessed October 2012

Potential New/Enhanced Operating Revenue Sources

In addition to taking steps to maximize farebox revenue, Arlington must also seek to identify and pursue new potential sources of operating revenue for Capital Bikeshare. As discussed in *Chapter 1: State of the Practice Review*, bikeshare systems around the world use a variety of sources to support their systems' operating expenses. Arlington and Capital Bikeshare can learn from these other systems about how to pursue additional funding sources. Additional funding should not be limited to just entirely new sources, but also include enhancements of existing revenue sources, such as an increased focus and attention on gaining operating sponsorships from local businesses or business groups.

System Title Sponsorship

Many other bikeshare systems in the United States have a system title sponsor. In May 2012, the New York City DOT announced that Citibank agreed to sponsor their bikeshare system, "Citi Bike," with a $41 million, 5-year contract. MasterCard is also contributing $6.5 million worth of capital to Citi Bike.[3] New Balance is the title sponsor for the Boston portion of the region's service, Hubway, providing the system with $600,000 over the first three years of its existence. While the potential value of a Capital Bikeshare system title sponsorship is unknown, it is certain that Arlington's participation in any future title sponsorship would provide an important additional source of operating revenue.

Advertising

Advertising on Arlington's Capital Bikeshare station map panels is currently not allowed due to County prohibitions on outdoor advertising. If Arlington were allowed to place advertisements inside the map panels at Capital Bikeshare stations, the additional revenue could be used to support the system's operations and future capital replacement needs. In Europe, many bikeshare systems, including Paris' Vélib', are operated by outdoor advertising firms via municipal street furniture advertising contracts. While it is *not* suggested that the County have an advertising firm operate Capital Bikeshare, it is important to recognize and try to capitalize on the value of the advertising space associated with the system; in many cities it is high enough that the advertising firms that operate them are willing to completely fund all of the associated system operating and capital expenditures.[4] ***It is difficult to foresee how Arlington can close the operating deficit projected for future years that is necessary to implement the expansion plan as outlined in Chapter 5 without Arlington County Board action that would allow the system to solicit advertising.***

Station Sponsorship

Soliciting new sponsors that will cover station operating expenses on an ongoing basis will be a priority for Arlington over the FY2013-FY2018 period. At stations that are currently sponsored, the station sponsor is only denoted by a small organization logo located on the map panel. New strategies are needed for making station sponsorship (particularly operating sponsorship) attractive to a wide variety of companies and organizations in Arlington. These strategies can include both consideration of a more prominently displayed or larger logo on the map panel, station naming rights (currently prohibited by County regulations as it would be a form of advertising), allocating future advertising space to station sponsors at a reduced rate or included within their sponsorship (if the Arlington County Board takes

[3] NYC Press Release, May 7, 2012: Mayor Bloomberg, Transportation Commissioner Sadik-Kahn, and Citi CEO Vikran Pandit Announce Citi will sponsor New York City's new bikeshare program – Citi Bike.

[4] While outsourcing the operation of a bikeshare system to an advertising firm is attractive to some cities, this model has limitations, as these systems tend to expand in only in areas where revenue can be generated, instead of where transportation needs exist.

action to permit on-street advertising), and reallocating existing resources to increase the focus on obtaining station sponsorships.

Developer-Funded Stations

A number of neighborhoods throughout Arlington are continuing to experience a rapid pace of redevelopment that brings the addition of new commercial and residential buildings. Encouraging developers to add Capital Bikeshare stations to their properties will allow the system to expand more rapidly than it otherwise would have been possible. To do this, Arlington County Commuter Services can seek to add capital and operating sponsorship of a Capital Bikeshare station to its 1990 Transportation Demand Management (TDM) Policy *base* matrix of voluntary TDM strategies. This TDM Policy matrix is used to identify appropriate TDM measures for new developments as they are going through the site plan process. Each developer selects TDM strategies from the matrix for their site's required Transportation Management Plan. Currently, only developers that are seeking reduced parking requirements for their developments are allowed to fund the capital for a Capital Bikeshare station on-site, but funding the operating is not an option currently available.

Private Foundations

Many of the non-profit bikeshare systems around the nation use private foundation funding to support their operations. Foundations focused on health and exercise are common contributors to bikeshare systems. As Capital Bikeshare is currently operated as a public enterprise and not a non-profit, it is unknown how receptive private foundations would be to supporting the continued development of Capital Bikeshare. However, it is an opportunity that should be pursued.

Corporate, Hotel, and Visitor Services Memberships

Arlington currently markets discounted bulk casual memberships to hotels, but corporate memberships (sold to hotels and large employers) only account for five percent of all memberships sold. Working with employers who have relationships with Arlington Transportation Partners and Arlington Economic Development's Visitor Services, BikeArlington can find strategies to increase the number of corporate memberships sold.

Regional, State, and Federal Transportation Funding Sources

Given the fact that modern bikeshare systems only emerged in the United States in 2008 with SmartBike DC, there are no regional, State, or Federal transportation funding sources available for bikeshare system operating expenses. Working with regional transportation partners to include Capital Bikeshare expansion in long-range transportation planning documents as a part of an integrated multi-modal network and reaching out to state-level stakeholders may increase the number of traditional transportation and transit funding sources available for bikeshare operations.

6.3 Contingency Planning

Vendor Reliance

Currently, the Capital Bikeshare system is operated using proprietary technology associated with the system's contractor. Any external event that causes the contractor to have difficulty producing, maintaining, or operating the system has the potential to disrupt Capital Bikeshare service. The back-end software that supports the day-to-day operations of the system is owned by a third-party vendor. If this third-party software vendor were to cease operations, Arlington would need to acquire the rights to the software to ensure a seemless continuity of operations. The proprietary nature of the equipment in use also serves as a significant disincentive for Arlington to select a different contract when the Capital Bikeshare contract is re-bid. This is an issue that Arlington needs to continue to explore, along with its regional partners, over the six-year period and beyond.

6.4 Additional Marketing Opportunities

Arlington's Capital Bikeshare marketing budget currently funds the creation and distribution of an array of marketing materials. BikeArlington provides some marketing materials to specific audiences; for example, program staff do targeted outreach to hotels to market short-term memberships for guests and provide visitor-oriented information, but the majority of marketing efforts are currently oriented to a general audience.

As Capital Bikeshare expands into new neighborhoods in Arlington, more targeted marketing efforts may greatly increase the number of new members and system users in these areas. This section details several concepts for targeted marketing to the new communities that will be served by Capital Bikeshare over the six-year period.

BikeArlington's Capital Bikeshare marketing budget is included in the administration line item in the Arlington Capital Bikeshare budget. In FY2013, the existing marketing budget and resources will need to be re-oriented to allow for the targeted marketing to new communities discussed in this section. It is possible that the outreach to specific groups could occur in conjunction with other targeted outreach efforts planned by Arlington County Commuter Services for FY2013. Once funding to close the current projected operating deficit for the system in Arlington is identified, BikeArlington may wish to seek additional funding to dedicate to these new marketing efforts on an ongoing basis.

Marketing to New Communities

Two broad groups have been identified for targeted marketing for the six-year period, with an emphasis on marketing to these groups in FY2013 and FY2014 as the new expansion stations are installed and Arlington begins to see usage build in the expansion areas. The two groups identified at this time are new neighborhoods and Environmental Justice communities.

New Neighborhoods Outreach

Marketing Capital Bikeshare directly to the residents and those who work in the new neighborhoods that will be served over the six-year period will be an important component of implementing the expansion plan. This outreach can include:

- Targeted membership drives, including participation in relevant community fairs and events in the new neighborhoods;
- Placing membership and system expansion information in community facilities such as libraries and community centers in expansion neighborhood; and
- Directly marketing Capital Bikeshare to the variety of neighborhood-based citizens groups in these new areas.

Environmental Justice Communities

Marketing to environmental justice (EJ) communities, which includes minority and low-income communities, is a priority for Capital Bikeshare in Arlington over the six-year period. The constrained expansion plan is focused on communities in South Arlington, where most of Arlington's environmental justice communities are present. These are also the areas that have the highest rates of zero car households and transit commuting outside the Rosslyn-Ballston and Crystal City / Pentagon City corridors. Marketing to these communities may require new materials in languages other than English, continuing to work with established stakeholder groups such as the Latino Roundtable and others, and continuing to work with the Department of Human Services and their community centers.

In response to the fact that many members of EJ communities lack access to credit cards, Capital Bikeshare initiated a partnership with the Bank on DC program to offer $50 annual memberships to unbanked individuals who establish a checking account and associated credit or debit card accounts with United Bank or the District Government Employees Federal Credit Union. In 2012, Capital Bikeshare also began allowing individuals to purchase annual memberships with a monthly installment of $7. Arlington can build on this initial effort to reach EJ communities by aggressively marketing the Bank on DC partnership as well as the monthly installment option for an annual membership. Many members of EJ communities also lack access to the Internet; Arlington may wish to consider working with the libraries or other community centers to hold Capital Bikeshare membership days, where staff at these facilities can explain and help community members sign up for Capital Bikeshare membership using public computers.

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Arlington County Capital Bikeshare
TRANSIT DEVELOPMENT PLAN
Fiscal Years 2013 to 2018

Chapter 7: Capital Improvement Plan

November 2012

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7 CAPITAL IMPROVEMENT PROGRAM

7.1 Capital Improvement Plan Cash Flow Analysis

Table 7.1 shows the annual cash flow for the costs and revenues for new capital facilities and replacement assets. A more detailed capital budget, along with the operating budget, is available in *Chapter 8: Financial Plan*.

Capital Expenditures
Capital expenditures include the purchase of new stations (which include bicycles), new station extensions, bicycles for station extensions, the construction of concrete or pervious pads for stations as needed, and the cost of replacement capital for stations and bicycles that have reached the end of their useful life.

Capital Revenues
Currently, there is only one dedicated funding source for Capital Bikeshare capital expenses in Arlington, a flat $200,000 coming from the Arlington County vehicle decal fee. In FY2013 and in the prior fiscal years, Arlington has used Federal grant funding from a program known as Congestion Mitigation and Air Quality (CMAQ) for the system's implementation. However, there has been no additional CMAQ funding identified for Capital Bikeshare beyond FY 2013, and the future of the CMAQ program in general, is unclear.[1]

Table 7.1 Projected Capital Budget Overview, FY 2013 – FY2018

Fiscal Year	2013	2014	2015	2016	2017	2018
CAPITAL EXPENDITURES						
New Capital Equipment and Installation	$1,333,732	$161,838	$142,248	-	-	-
New Station Site Planning and Pad Construction	$66,274	$6,430	$5,848	-	-	-
Replacement Bicycles[2]	$12,039	$30,706	$52,161	$222,688	$343,991	$492,877
TOTAL	**$1,412,046**	**$198,974**	**$200,256**	**$222,688**	**$343,991**	**$492,877**
CAPITAL REVENUES						
Decal Fee	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
CMAQ	$1,236,000	-	-	-	-	-
TOTAL	**$1,436,000**	**$200,000**	**$200,000**	**$200,000**	**$200,000**	**$200,000**
CAPITAL PLAN BALANCE	***$23,954***	***$1,026***	***($256)***	***($22,688)***	***($143,991)***	***($292,877)***

[1] The CMAQ program is authorized at the federal level through Federal Fiscal Year 2013 (September 2014), but it is unknown whether this grant program will continue beyond that timeframe.
[2] Replacement bicycles, but not replacement stations, are required within the six-year period. *Chapter 8: Financial Plan*, Table 8.5, presents the mid-term replacement schedule costs and captures the cost of the station replacements in the system. The highest costs for station replacement begin in 2021, when the oldest stations reach the end of their useful life.

7.2 New Capital Facilities

While the Arlington County Capital Bikeshare Transit Development Plan covers the FY2013 – FY2018 six-year period, capital funding is only available for adding new facilities in the FY2013-FY2015 period. After FY2015, the amount of dedicated annual capital funding for Capital Bikeshare is exceeded by the projected costs of scheduled capital asset replacements.

Six-Year Constrained Station Implementation Plan

Most of the capital funding is provided through the County's decal fee and federal CMAQ grants. In addition, in FY2013, FAST for Potomac Yard is providing capital funding for two additional stations in the Potomac Yard neighborhood, and one station in FY2014 will be funded as a part of the Arlington Mill Community Center reconstruction capital project. The number of stations available for installation in the six-year constrained implementation plan was determined based on the amount of available capital funding, minus the amount of capital funding required each year for replacing existing capital assets. Table 7.2 shows the number of new stations for the six-year period by implementation year.

Approximately 28 of the 32 new stations that are funded in FY2013 will be implemented in Spring 2013. The exact location of these stations will be determined through an extensive BikeArlington public outreach process that will take place in Fall 2012.

Table 7.2 Six-Year Constrained Plan Station Implementation, FY2013 – FY2018

Fiscal Year	New Stations	Externally Funded New Stations	Total
2013	32	2	34
2014	3	1	4
2015	2	-	2
2016	-	-	-
2017	-	-	-
2018	-	-	-
TOTAL FY2013 – FY2018	**37**	**3**	**40**

Other Capital Facilities

Given the planned system expansion for South Arlington, the addition of neighboring Alexandria, Virginia and Montgomery County, Maryland to the system, and the fact that other neighboring jurisdictions are considering joining the Capital Bikeshare system, it may make sense for contractor Alta Bicycle Share to establish a secondary system warehouse in Virginia. If this were to become necessary, the direct cost of the warehouse would be borne by Alta Bicycle Share, but the increased costs of operating and maintaining a secondary warehouse may be passed along to Arlington in the form of a higher operating cost per dock.

7.3 Equipment Replacement Schedule

Planning for system capital replacement to maintain a *state of good repair* is of critical importance for transportation systems. By understanding the need for capital replacement in future years, Arlington can pursue funding opportunities to replace Capital Bikeshare capital equipment as needed, maintaining the quality of the system.

Vandalism, Bicycle Loss, Theft Rates, and Replacements

The loss and theft rates for Capital Bikeshare are very low; less than one percent of all bicycles system-wide have failed to return to a dock following check out. No bicycles in Arlington have been permanently stolen or lost. Arlington's current contract with Alta Bicycle Share stipulates that the County is responsible for the replacement of stolen bikes, unless in incidents where the replacement cost of equipment is greater than $5,000. Vandalism of stations has occurred fewer than three times and has not occurred on bicycles to date in Arlington. In the capital plan, an attrition rate of 1% per year was included to cover the costs of replacing these lost or stolen bicycles.

Equipment Useful Life

Only two other modern North American bikeshare systems that use PBSC-manufactured equipment pre-date Capital Bikeshare. Montreal's BIXI began operating in 2009, while the Nice Ride Minnesota system opened in 2011, just months before Capital Bikeshare. The limited experience of operating modern bikeshare equipment makes it difficult to understand the exact asset useful life, or the period of time that each asset can be expected to withstand normal wear and tear and function normally. The manufacturer of the Capital Bikeshare equipment, PBSC, estimates that the bicycles will have a useful life of 5 years, while stations will last 10 years. These estimates may be conservative, and if the equipment actually lasts longer, Arlington may be able to better distribute costs of replacement over time. It is also possible that as equipment begins to wear, that individual components of a bicycle or station could be replaced as needed, as opposed to replacing the entire asset. *If* this is possible, it will extend the life of each asset and reduce the replacement costs in the near and mid-term. Regardless of the bicycle and station durability, it can be anticipated that as technology improvements are made over time, the Capital Bikeshare system may desire additional functionality that can only be gained by replacing the equipment.

Table 7.3 shows the actual number of stations and bicycles that, using the PBSC-provided useful life assumptions, will need to be replaced through FY2025; FY2011 and FY2012 are actual numbers, the remaining years are estimates. This replacement schedule was calculated through FY2025 to capture the bicycle and station replacements that will need to take place as a result of the system expansion planned for the FY2013 – FY2015 period.

Table 7.3 Arlington Capital Bikeshare Capital Replacement Schedule to Fiscal Year 2025

Fiscal Year	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25
Bicycles (End of FY)	93	264	549	584	607	607	607	607	607	607	607	607	607	607	607
Bicycles Replaced	**0**	**0**	**0**	**0**	**0**	**105**	**180**	**276**	**37**	**25**	**5**	**86**	**136**	**229**	**54**
Stations (End of FY)	18	41	80	84	86	86	86	86	86	86	86	86	86	86	86
New Stations	18	23	39	4	2	0	0	0	0	0	0	0	0	0	0
Stations Replaced	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18**	**23**	**39**	**4**	**2**

Arlington County Capital Bikeshare
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BikeArlington, 2012

Chapter 8: Financial Plan

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8 FINANCIAL PLAN

8.1 Introduction

Along with the final expansion plan, the financial plan is the centerpiece of the transit development planning process. A financial plan allows a transportation organization to appropriately budget and plan for known expenses in future years, ensuring the continued viability of service. For Arlington County, the realization of the magnitude of the potential shortfalls in operating revenues associated with the planned expansion has led to the development of the strategies discussed in Chapter 6 for securing additional sources of operating revenue. This financial plan also represents the first known exercise in state of good repair planning for a bikeshare system. The scale of the funding required for replacement capital just in the six-year period demonstrates the need for this type of planning.

Table 8.1 outlines the assumptions that were made in the development of the financial plan for the Arlington County Capital Bikeshare system.

Table 8.1 Financial Plan Assumptions

Financial Plan Assumptions	Rate/Years	Notes
CAPITAL COST ASSUMPTIONS		
FY2013 Confirmed Capital Cost Growth Rate	3.5%	Confirmed cost per contract.
Capital Cost Growth Rate	5.0%	Capital costs assume 5% increase per contract year, but in reality will be based on the CPI and exchange rate (each up to 5% increase each).
Concrete or Pervious Pad Installation	33.0%	Approximately one-third of all stations installed in Arlington will require a pad.
Annual Bicycle Fleet Parts Replacement Rate	25.0%	It is estimated that each fiscal year 25% of the fleet will require minor bicycle parts replacement.
Bicycle Useful Life	5 Years	
Terminal Useful Life	10 Years	
OPERATING COST ASSUMPTIONS		
FY2013 Confirmed Cost per Dock Growth Rate	2.0%	Confirmed cost per contract.
Operating Cost per Dock Growth Rate	3.5%	General CPI-U[1]
Administrative Costs Inflation Rate	3.5%	General CPI-U
OPERATING REVENUE ASSUMPTIONS		
Station Sponsorship Rate Increase	3.5%	General CPI-U not applied to all sponsorship agreements.[2]
Farebox Recovery	50.0%	Covering system operating costs only.

[1] CPI-U is the Consumer Price Index for all Urban Consumers, developed by the U.S. Bureau of Labor Statistics.
[2] Some station sponsorship agreements are for a flat rate over the specified time frame, while others use this general rate of increase.

8.2 Six-Year Financial Plan Detail

Tables 8.2 and 8.3 provide a detailed six-year operating and capital budget, and the points below provide some additional specifics regarding the budget assumptions.

Capital Budget Overview

- Arlington plans to order only 11-dock stations in the coming years. After installing 11-dock stations, if demand for a larger size station is demonstrated, additional extension plates in 4-dock (B-Plates), 2-dock (180 degree-plates), and 1-dock (90 degree-plates) will be added.
- Unlike when purchasing a complete station, additional bicycles must be ordered for extension plates (2 bikes per B-plate, 1 bike per 180 degree-plate, no additional bikes are needed for 90 degree-plates).
- Concrete or pervious pads must be installed to support Capital Bikeshare stations in locations where no suitable available paved surface exists. Based on past installation experience in Arlington, approximately one-third of all stations will require a pad.
- Each station requires a survey and station plan design during the station siting process.

Operating Budget Overview

- The cost per dock for additional (expansion) docks added to the system is prorated by the number of operational months for the year in which they are installed.
- Arlington County Commuter Services revenues generated from commissions on the sale of transit fare media will be used to cover the system's administration expenses.
- Arlington County Board action would be required to allow for the on-station and on-bicycle advertising that is needed to provide the revenues to allow the system to expand throughout the County.
- Farebox recovery may be higher or lower than the 50 percent projection. Arlington's Capital Bikeshare system is currently at 53 percent cost recovery, representing the amount of the contractor's cost and the administration (management and marketing) costs for the system that are covered by user fees. How this cost recovery ratio changes over the six-year period will depend upon the success of the expansion into new neighborhoods in attracting new members and system users, as well as the level of system usage by casual members who generate more revenue per trip than registered users.

Table 8.4 provides detail on the capital replacement expenditures for the FY2013 - FY2018 period. Table 8.5 provides detail on capital replacement expenditures for the FY2019 - FY2025 period and captures the first period of station replacement.

Replacement Schedule Overview

- Bicycle replacement begins in FY2016 when the bicycles that began service in FY11 hit their five-year useful life. The first year in which stations need to be replaced is FY2022, 10 years after the first station were installed, and station replacement costs are thus not included in Table 8-4.

- Bicycle parts replacement costs do not necessarily increase each fiscal year. A multiplier is applied to the bicycle parts replacement cost to reflect the increased failure of parts on older bicycles. As bicycles are replaced, the average age of the bicycle fleet will decrease, causing the bicycle parts replacement costs to decrease in some years.
- It is projected that less than one percent of bicycles will need to be replaced each year due to vandalism or theft. System contractor Alta Bicycle Share is currently responsible for providing replacements at no charge for bicycles that are stolen or vandalized, but in the future this responsibility may shift to Arlington County.

Table 8.2 Projected Operating Budget Detail, FY 2013 – FY2018 – Committed Revenues Only

Fiscal Year	2013	2014	2015	2016	2017	2018
OPERATING EXPENSES						
TOTAL Contactor Expenses	**$957,067**	**$1,365,439**	**$1,487,658**	**$1,577,767**	**$1,632,989**	**$1,690,144**
Monthly Operating Cost Per Dock	$107	$111	$115	$119	$123	$127
Start of the Year Number of Docks	518	1,005	1,066	1,106	1,106	1,106
Number of Additional Docks	487	61	40	-	-	-
TOTAL Administration Expenses	**$180,044**	**$186,346**	**$192,868**	**$199,618**	**$206,605**	**$213,836**
MetroBike LLC (Management Contract)	$87,344	$90,401	$93,565	$96,840	$100,229	$103,737
BikeArlington Marketing	$92,700	$95,945	$99,303	$102,778	$106,375	$110,099
TOTAL OPERATING EXPENSES	**$1,137,111**	**$1,551,784**	**$1,680,525**	**$1,777,385**	**$1,839,594**	**$1,903,980**
OPERATING REVENUES						
TOTAL Station Sponsorship Revenues	**$84,155**	**$67,656**	**$69,209**	**$70,817**	**$72,481**	**$50,924**
George Mason University	$23,279	$23,279	$23,279	$23,279	$23,279	-
Potomac Yard FAST TMA	$42,876	$44,377	$45,930	$47,538	$49,202	$50,924
Ballston BID	$18,000	-	-	-	-	-
TOTAL Advertising Revenues	**-**	**-**	**-**	**-**	**-**	**-**
On Station Advertising	-	-	-	-	-	-
On Bike Advertising	-	-	-	-	-	-
Arlington County Commuter Services Revenues	$180,044	$186,346	$192,868	$199,618	$206,605	$213,836
TOTAL Farebox Revenues Projection	**$568,556**	**$775,892**	**$840,263**	**$888,693**	**$919,797**	**$951,990**
TOTAL OPERATING REVENUES	**$832,755**	**$1,029,894**	**$1,102,340**	**$1,159,127**	**$1,198,882**	**$1,216,749**
NET OPERATING COST	***($304,356)***	***($521,891)***	***($578,186)***	***($618,258)***	***($640,712)***	***($687,230)***

Table 8.3 Capital Budget Detail, FY2013 – FY2018

Fiscal Year	2013	2014	2015	2016	2017	2018
CAPITAL EXPENSES						
New Capital Equipment Expenses						
Stations (Includes Bicycles)	$1,163,757	$118,050	$96,475	-	-	-
Station Installation	$96,000	$9,450	$6,615	-	-	-
B-Plates	$45,160	$21,561	$22,639	-	-	-
B-Plate Bicycles	$21,275	$10,157	$10,665	-	-	-
180 degree-plate	$3,962	-	$4,521	-	-	-
180 degree-plate Bicycles	$1,168	-	$1,333	-	-	-
90 degree-plate	$2,411	$2,620	-	-	-	-
Replacement / Station Planning and Installation Expenses						
Replacement Expenditures	$12,039	$30,706	$52,161	$222,688	$343,991	$492,877
Concrete or Pervious Pad Construction	$39,778	$3,797	$3,987	-	-	-
Survey and Station Plan Design	$26,496	$2,633	$1,861	-	-	-
TOTAL CAPITAL EXPENDITURES	**$1,412,046**	**$198,974**	**$200,256**	**$222,688**	**$343,991**	**$492,877**
CAPITAL REVENUES						
Decal Fee	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Congestion Mitigation and Air Quality	$1,236,000	-	-	-	-	-
TOTAL CAPITAL REVENUES	**$1,436,000**	**$200,000**	**$200,000**	**$200,000**	**$200,000**	**$200,000**
NET CAPITAL EXPENSES	**$23,954**	**$1,026**	**($256)**	**($22,688)**	**($143,991)**	**($292,877)**

Table 8.4 Arlington Capital Bikeshare Capital Replacement Expenses, FY2013 – FY2018

Fiscal Year	2013	2014	2015	2016	2017	2018
Replacement Bicycles	-	-	-	$146,429	$264,172	$426,329
Bicycle Parts Replacement	$12,039	$30,706	$52,161	$76,259	$79,820	$66,549
Station Replacement	-	-	-	-	-	-
TOTAL	**$12,039**	**$30,706**	**$52,161**	**$222,688**	**$343,991**	**$492,877**

Table 8.5 Arlington Capital Bikeshare Capital Replacement Expenses, FY2019 – FY2025

Fiscal Year	2019	2020	2021	2022	2023	2024	2025
Replacement Bicycles	$59,756	$42,406	$8,828	$160,475	$268,587	$474,573	$116,812
Bicycle Parts Replacement	$27,556	$44,518	$65,065	$91,558	$96,813	$87,780	$50,547
Station Replacement	-	-	$1,158,124	$1,167,907	$2,464,585	$293,499	$178,844
TOTAL	**$87,312**	**$86,924**	**$1,232,017**	**$1,419,939**	**$2,829,985**	**$855,851**	**$346,203**

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APPENDIX A: STATE OF THE PRACTICE REVIEW QUESTIONS AND REFERENCES

Questions for Interviews

System Overview

- Program name
- Oversight agency (e.g., City DOT)
- Contractor implementing and maintaining the system (if applicable)
- Date of program start
- Type of bicycles
- Type of stations
- Number of stations
- Number of bicycles
- Number of trips on an average weekday
- Number of trips per month since service inception
- Number of annual members
- Funding Sources

Customers and Trips

- What is the demographic profile of your customer base?
    - Men/women
    - Income
    - Race
    - Age
- Have you able to attract non-traditional users (i.e. minority, women, low-income)? If so, what steps did you take to attract these users?
- Do you know if bike share been utilized for job access or reverse commutes by lower income populations? This could be part of a formal program or any anecdotal or survey information that you might have.

Marketing

- What type of marketing strategies have you used for your bikeshare system?
- Have any of your strategies been particularly innovative, targeted non-traditional users, or produced a higher than average return on investment?

Monitoring

- What performance measures and standards do you have in place for measuring the program's performance?
- How do you use the information gleaned from tracking performance?

Station Location and Size

- What decisions go into locating stations? What criteria are applied and how, i.e., do certain criteria weigh more than others?
- How do you determine bike share station size? Do you have policies for ensuring that more space is available if they want to expand? What is the maximum station size – at what point do you just place a new station nearby instead of increasing the size of an existing station?
- Do you site stations in residential areas? How far do you assume someone will walk to a station?

Operations

- What is your operating model, e.g., fixed stations, dispersed bikes not at standard stations?
- How do you rebalance bicycles to meet peak usage directions? Have you figured out ways to do this effectively?
- What is the replacement age of the bicycles if they don't have any major problems? How long do they typically last before needing replacement due to extensive damage or being stolen?

Management and Funding

- How is the program managed, i.e., is there a public agency that oversees a contractor, a non-profit, etc. What are the pros and cons of this arrangement?
- What revenue sources do you use for capital and operations?
- What is your fare structure and rates?

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APPENDIX B: BICYCLE SHARE DEMAND MAP METHODOLOGY

Regression Analysis

Using trip data from the fourth quarter of 2011, a series of regressions were run to identify which variables had a statistically significant effect on Capital Bikeshare ridership. The analysis was based on MWCOG's Round 8 Traffic Analysis Zones (TAZ). Each TAZ was coded with demographic, population, employment and physical characteristics. Capital bikeshare trips over the fourth quarter were aggregated by the TAZ of the trip start station.

The regression used Capital Bikeshare ridership as the dependent variable and the following as the independent variables:

- Median household income
- Race and ethnicity
- Median age
- Commute mode split of transit, walking and cycling
- Bikeshare stations per square mile (Station density)
- Density of bicycle infrastructure
- Metro station within 0.15 miles
- Population density
- Employment density
- Combined population and employment density

The initial regression was inconclusive due to the high correlation between many of the variables and the effect of outlier stations with very high or low ridership. The regression was rerun looking at combined density, age, bicycle infrastructure density, combined walk/bike mode share and Metro station access. Capital Bikeshare stations in Anacostia and Northeast DCwith the terminal codes 317## or 318## were excluded from the analysis, as these stations had the lowest ridership in the system, likely due to their isolation to the core of the Capital Bikeshare network. The four highest ridership stations at 17th and Corcoran NW, 15th and P NW, Dupont Circle, and 8th Street and H NW were also excluded due to disproportionately high ridership.

The second regression showed a stronger relationship between bicycle infrastructure, modal split and Metro station access compared to the initial analysis, however the impact of population and employment density remain statistically inconclusive.

While the variables of the second regression are strongly correlated with station ridership, together they account for only 40% of the variation among Capital Bikeshare ridership by station. Below are the summary statistics of the regression:

Regression Statistics	
Multiple R	0.68
R Square	0.43
Adjusted R Square	0.40
Standard Error	2145.83
Observations	83

Developing the Demand Map

The regression provided statistically significant coefficients to measure the effect of station access, existing walk/bike mode split and availability of bicycle lanes on Capital Bikeshare ridership; however it was inconclusive on the relationship between density and Capital Bikeshare ridership. To better predict how density relates to ridership, the average Capital Bikeshare ridership by Traffic Analysis Zone (TAZ) was calculated by combined population and employment quartile. Population and employment figures are derived from the MWCOG Round 8.0 TAZ estimates for 2015.

The average ridership by quartile provides a baseline to predict minimum Capital Bikeshare ridership by TAZ. The three additional coefficients (Metro station access, existing walk/bike mode split, and availability of bicycle lanes) are than used to calculate additional trips over the baseline prediction. For TAZs with no population or employment, demand was assumed to be zero.

The final demand map was calculated based on the population and employment density and the other three coefficients using the following variables:

Pop/Employment Density	Baseline Capital Bikeshare Trips
1 - 24,560	1,782.77
24,561 - 53,483	2,796.20
53,484 - 108,887	4,622.88
108,886 +	4,828.71

Variable	Trip Coefficient
Miles of Bike Lane	919
Bike Mode Split (100%)	11,283
Metro Station	3,536

Regression Output

The regression predicts a final demand for 2,893 docks in Arlington County, as shown in Figure 2 of Chapter 5. This number was derived from taking the total demand for trips and dividing it by system wide average number of trips per bicycle. We assume two docks for every one bicycle. It's important to note that the regression is based on trip demand across the Capital Bikeshare system. As currently Capital Bikeshare is largely available in dense urban areas, it is a challenge to accurately predict bikeshare demand in lower density residential neighborhoods.

	Regression Estimate
Total Quarterly Trips	555,068
Bicycles Demanded	1,446
Docks Demanded	2,893

Raw Data (shown graphically in Figure 5.2)

TAZ	Trips	Bicycles	Docks
1508	6630.1	21.6	43.3
1437	1937.8	6.0	12.1
1440	4028.6	7.7	15.3
1442	2826.6	7.2	14.4
1444	2784.9	7.2	14.4
1443	3316.6	7.5	15.0
1423	2354.9	7.1	14.2
1433	2016.2	7.2	14.4
1447	2664.3	6.8	13.6
1405	8006.1	17.3	34.5
1432	6605.1	16.5	33.0
1430	2428.6	7.1	14.2
1473	5324.2	13.6	27.1
1471	4727.0	11.8	23.5
1468	2791.3	7.2	14.4
1475	7098.7	19.8	39.6
1520	2713.6	7.2	14.3
1491	2683.1	7.1	14.2
1478	12359.9	29.3	58.7

TAZ	Trips	Bicycles	Docks
1499	2847.6	7.5	14.9
1500	5755.0	16.7	33.5
1502	6035.6	17.8	35.6
1506	2977.9	9.9	19.9
1513	2621.5	7.0	14.1
1476	3701.6	8.7	17.5
1472	10197.1	28.4	56.9
1498	3613.1	0.0	0.0
1497	3083.0	0.0	0.0
1504	4374.9	13.7	27.5
1507	5780.4	19.1	38.1
1510	6390.4	16.1	32.2
1496	8136.5	19.6	39.3
1522	2883.5	7.7	15.4
1523	2263.4	6.6	13.2
1521	2234.2	6.5	12.9
1544	2934.1	7.8	15.6
1529	2141.7	7.2	14.4
1531	2151.1	6.4	12.7

TAZ	Trips	Bicycles	Docks
1441	3556.0	7.8	15.6
1477	5012.2	13.2	26.4
1528	2518.5	7.1	14.2
1532	2431.8	7.3	14.6
1490	4214.7	11.2	22.4
1484	3435.1	8.0	16.1
1480	9919.2	28.2	56.5
1460	4337.9	12.1	24.1
1455	3561.8	10.6	21.2
1418	2739.2	7.4	14.7
1458	9637.4	27.9	55.8
1534	2652.4	7.2	14.4
1415	9703.9	27.4	54.9
1411	3477.5	7.6	15.2
1414	9847.8	27.1	54.1
1419	3997.8	8.4	16.8
1431	2384.4	7.1	14.3
1406	4435.8	9.2	18.4
1409	3571.0	8.8	17.5
1408	4543.4	8.8	17.5
1410	4142.1	8.5	17.0
1537	2864.4	8.1	16.2
1463	2859.9	7.6	15.2
1413	5732.3	17.1	34.2
1482	2667.1	7.1	14.2
1511	3858.3	8.0	16.0
1509	3198.7	11.0	21.9
1535	2884.2	7.9	15.9
1445	3170.1	7.5	15.1
1539	2631.4	7.3	14.5
1479	4078.4	9.5	19.0
1526	2120.6	6.4	12.7
1446	3839.8	7.6	15.3
1464	2988.2	9.1	18.1
1457	9817.7	27.5	55.0

TAZ	Trips	Bicycles	Docks
1538	3153.4	7.7	15.3
1541	3136.2	9.8	19.5
1540	4052.9	10.6	21.2
1542	2784.7	8.1	16.3
1407	3611.9	8.4	16.8
1487	7154.7	0.0	0.0
1494	2369.4	0.0	0.0
1486	3011.3	7.6	15.1
1489	3013.1	7.6	15.2
1524	2141.5	6.3	12.7
1525	2644.9	6.7	13.4
1438	1937.8	6.0	12.1
1439	3602.9	7.1	14.1
1429	2285.4	6.4	12.8
1435	5588.4	16.3	32.6
1436	2137.3	7.8	15.6
1434	6867.9	21.2	42.4
1426	2097.7	6.4	12.7
1425	3312.2	7.8	15.6
1424	4098.4	8.1	16.2
1428	2067.1	6.2	12.5
1449	4200.7	7.8	15.5
1448	3500.3	10.1	20.3
1420	2651.0	7.1	14.1
1427	2067.1	6.2	12.5
1421	2375.1	6.7	13.3
1422	2361.0	6.7	13.5
1452	3918.5	13.0	26.0
1462	3144.6	9.8	19.7
1454	3739.2	8.1	16.3
1451	2607.1	7.7	15.4
1467	3002.1	9.0	18.1
1450	2514.6	8.8	17.7
1453	2615.5	7.2	14.4
1461	3125.9	12.0	24.0

TAZ	Trips	Bicycles	Docks
1456	3372.0	8.6	17.1
1417	2917.9	7.8	15.7
1416	6613.8	19.4	38.8
1412	3631.8	10.3	20.7
1536	3514.1	10.3	20.5
1474	4780.3	12.4	24.8
1470	4149.2	9.5	18.9
1530	2070.8	6.5	12.9
1533	3238.8	8.1	16.2
1485	3816.8	9.2	18.4
1543	4132.5	10.9	21.9
1527	3978.6	10.5	21.0
1501	9776.8	26.6	53.2
1505	3019.0	7.6	15.3
1503	3881.6	10.7	21.4
1492	4873.0	12.0	24.0
1493	9723.9	26.3	52.6

TAZ	Trips	Bicycles	Docks
1466	2913.7	10.6	21.2
1465	5044.9	14.3	28.5
1519	2379.6	7.9	15.7
1469	2503.6	6.9	13.7
1481	2655.2	7.1	14.2
1483	2609.4	7.0	14.0
1518	2771.6	9.1	18.2
1459	2747.7	8.0	16.0
1495	2368.2	0.0	0.0
1488	3497.2	8.3	16.6
1516	2434.9	7.0	14.0
1545	3727.7	8.8	17.5
1514	3629.3	7.7	15.5
1517	3340.5	9.8	19.6
1515	2532.2	6.7	13.5
1512	3278.8	10.2	20.5

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APPENDIX C – PUBLIC MEETING PRESENTATION BOARDS

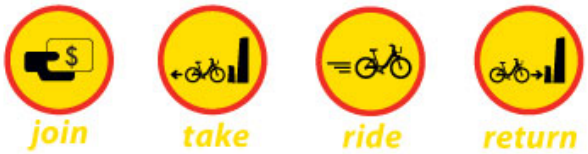
March 29, 2012 Public Meeting Presentation Boards

ABOUT BIKESHARE

WHAT IS BIKESHARE?

Bicycle Transit. Short-term use public bicycles...

Bikes are available 24 hours a day at automated stations...



Users can return bikes to any other station within the system...

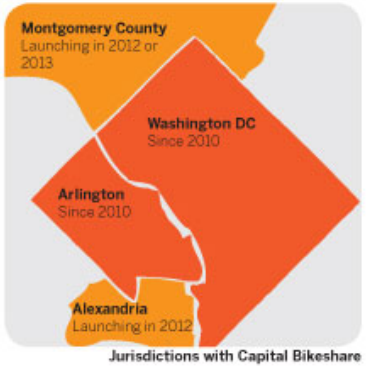
HOW TO USE CAPITAL BIKESHARE

With a valid credit or debit card users can purchase the following memberships. Trips under 30 minutes incur no additional fees.

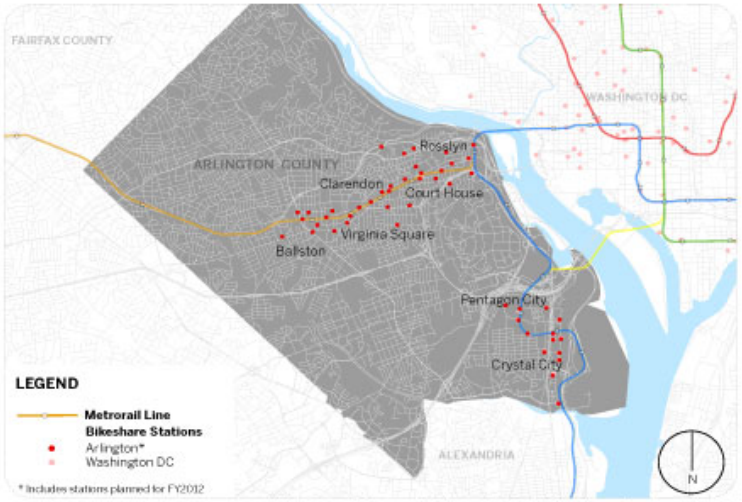
membership and pricing	
24-hour	$7
3-day	$15
30-day	$25
Annual	$75

WHERE IS CAPITAL BIKESHARE?

Capital Bikeshare is a **regional bikeshare** system that is jointly managed by each member jurisdiction and operated by Alta Bicycle Share. Members can pick up and return bikes throughout the system regardless of where they purchased their membership.



Jurisdictions with Capital Bikeshare



Existing and Planned Arlington Capital Bikeshare System: FY 2012

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES
Arlington County Commuter Services

Bike Arlington

PROJECT OVERVIEW

PROJECT PURPOSE

Develop a six year strategic growth plan for Capital Bikeshare in Arlington

Project capital and operating costs to develop funding needs which support adequate budgeting and identify funding sources

Raise awareness of bikesharing as a form of transit at the state and federal levels

"The Arlington County Transit Development Plan (TDP) for Capital Bikeshare **will be the first of its kind**, including a comprehensive review of the existing and planned bikeshare service and plans for the next six years."

PROJECT SCOPE

Six-year development plan modeled on state-mandated transit development plans

Financially constrained and non-constrained plans will guide program growth

Measures of effectiveness will be developed to track the performance and success of bikeshare

The Arlington County Transit Development Plan (TDP) **sees bikeshare as a form of public transportation that complements traditional modes** like bus and rail.

PROJECT TIMELINE

October 2011
State of the practice research
System Overview
Goals and Objectives
Service and System Evaluation

February 2012
Public outreach period

April 2012
Operations plan
Capital improvement program
Financial plan
Monitoring and evaluation plan
Expansion strategy
Draft final plan

May 2012
Plan presented to county Commissions
Final Plan Public Meeting
Final Plan posted to Bike Arlington website
Presented for approval to County Board

July 2012

Upcoming Dates

- Final Draft Plan posted to BikeArlington.com - End of May
- General Public Meeting for Final Plan - June 27 at Central Library
- Final Plan posted to BikeArlington.com - Early July
- Presented to County Board - July 19

STATE OF PRACTICE REVIEW

	Arlington Capital Bikeshare	Boulder B-Cycle	Boston Hubway	Minneapolis Nice Ride	Montréal Bixi	New York City NYC Bike Share	Paris Vélib'
							
Launch Date	September 2010	May 2011	July 2011	June 2010	May 2009	Summer 2012	July 2011
System Size	111 bikes 1,200 bikes systemwide	130 bikes	600 bikes	1,200 bikes	5,000 bikes	10,000 bikes	20,000 bikes
Annual Members	1,200 14,900 systemwide	1,200	3,650	4,000	29,700	n/a	unknown
Station Spacing	200-800 meters	no standard metric	200-800 meters	up to 2000 meters	500 meters	unknown	250 - 350 meters

PLAN GOALS AND OBJECTIVES

The regional mission of Capital Bikeshare is to transform our community by providing a high quality, convenient, and affordable bicycle transit system that will connect people to more places where they live, work, and play in the region.

Goals Intentions for bikeshare in Arlington	Objectives How we plan to meet those goals
 **1: Reduce the negative impacts of travel on community and environmental resources, including air and water quality, and increase energy efficiency.**	1.1: Divert vehicle miles traveled from automobile to bicycle. 1.2: Foster improved public health by increasing bicycle vehicle miles traveled.
 **2: Support economic sustainability and growth.**	2.1: Support regional and local economic development, especially in transit-oriented, mixed-use communities. 2.2: Support access to all areas of the County through transfers to bike paths and bus service.
 **3: Increase accessibility to jobs, recreation and other locations, enhancing the quality of life.**	3.1: Increase the reach of other transportation modes that complement bicycle use, particularly transit and walking. 3.2: Provide mobility through bicycle and transit connections to Arlington residents, employees, and visitors to and between Regional Activity Centers and mixed-use corridors.
 **4: Create a community culture that embraces bicycle use as a convenient and safe travel choice.**	4.1: Increase bicycle mode share for a variety of trip types, contributing to the County objective of an annual one-half percent SOV mode share reduction. 4.2: Reduce bikesharing crashes and encourage a culture of safety among users.
 **5: Fund, manage, and operate the regional system in an efficient and cost-effective manner.**	5.1: Minimize operating costs while providing an effective service at the regional and local levels. 5.2: Provide cost-competitive transportation for individual users.

ARLINGTON VIRGINIA | DEPARTMENT OF ENVIRONMENTAL SERVICES
Arlington County Commuter Services
Bike Arlington

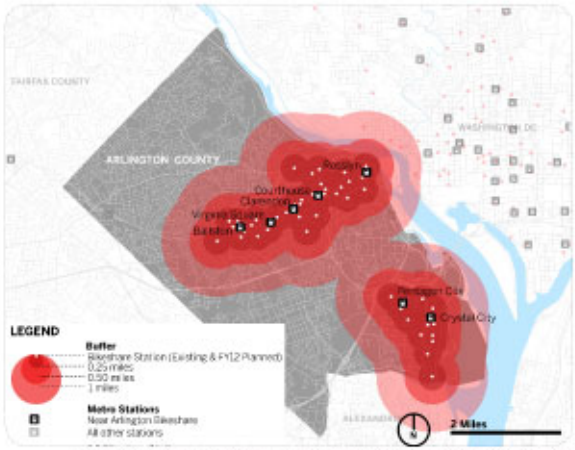
MULTI-MODAL CONNECTIONS

Capital Bikeshare is **part of a multimodal transportation system** that includes walking, bus, rail, and private car. Bikeshare connects people to multiple modes and enhances the public's mobility and accessibility.

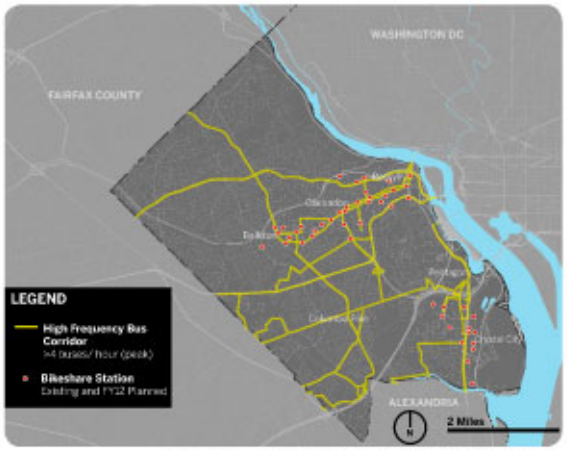
Station	Adjacent Bus Routes	Adjacent Metro Station	Miles of Bike Lane Within 1/2 Mile Buffer
12th & Army Navy	None		2.0
12th & Hayes	WMATA: 16H, 16G, 16P ART: 84, 74	Pentagon City	1.9
15th & Crystal	WMATA: 9S, 23A, 23C		2.2
15th & Hayes	WMATA: 10A, 16H		1.9
16th & Rhodes	WMATA: 4B, 4E, 38B ART: 61, 45		5.6
18th & Bell	WMATA: 23A, 23C, 9S	Crystal City	2.7
18th & Hayes	WMATA: 16H		2.0
20th & Bell	WMATA: 23A, 23C, 9S		2.8
20th & Crystal	WMATA: 23A, 23C, 9S		2.7
23rd & Crystal	WMATA: 23A, 23C ART: -		3.2
23rd & Eads	WMATA: 10A, 23A, 23C		3.1
26th & Crystal	WMATA: 9S		3.4
27th & Crystal	WMATA: 9S		3.5
Ft. Myer & Wilson	WMATA: 4A, 4B, 4H, 38B ART: 61B, 61A, 45	Rosslyn	4.7
Joyce & Army Navy	WMATA: 10A		2.0
Lynn & 19th	WMATA: 5A, 3A, 3B, 3E, 4A, 4H, 15K, 38B	Rosslyn	3.9
Pierce & Clarendon	WMATA: 4B, 4E, 38B		5.1
Potomac & Glebe	WMATA: 9S		3.3
Wilson & Edgewood	WMATA: 38B ART: 77, 41		3.9
Wilson & Uhle	WMATA: 4B, 38B, 4E ART: 61, 45, 77, 61 , 62, 41		6.4
15th & Scott	None		5.8
Adams & Lee	WMATA: 3Y, 3A, 3B, 3E, 15C		4.5
Fillmore & Clarendon	WMATA: 38B ART: 77, 41		3.3
Highland & Wilson	WMATA: 38B ART: 77, 41, 42	Clarendon	2.9

Station	Adjacent Bus Routes	Adjacent Metro Station	Miles of Bike Lane Within 1/2 Mile Buffer
Key & Quinn	None		5.1
Meade & Arlington	WMATA: 4A, 4H ART: 61		3.9
Stuart & 9th	WMATA: 25A, 25B ART: 51, 52	Ballston	2.7
Veitch & Key	ART: 62, 61A, 61B		6.1
Wilson & Franklin	WMATA: 38B ART: 77, 41, 45		5.1
7th & Washington	WMATA: 4B, 4E ART: 77, 42		2.6
Barton & 10th	WMATA: 4B, 4E ART: 45		4.5
George Mason & Wilson	WMATA: 1A, 1B, 1C, 1F, 1Z ART: 75		3.4
Fairfax & Wilson	WMATA: 38B ART: 42, 41	Clarendon	2.0
Queen & Arlington	WMATA: 4A ART: 51		4.5
Quincy & 10th	WMATA: - ART: 53, 52		3.0
Wilson & Oakland	WMATA: - ART: 75, 42, 41		1.9
Veitch & 20th	WMATA: - ART: 61		4.5
15th & Veitch	WMATA: - ART: 77, 62, 41	Courthouse	6.3
Fairfax & Glebe	WMATA: 2A, 2B, 2C, 2G, 38B, 25A, 23A, 23C, 25A, 25B ART: 51		3.9
Fairfax & Kenmore	None		2.5
Fairfax & Randolph	WMATA: 1A, 1B, 1E, 1F, 1Z, 10B, 22A, 23A, 23C ART: 75, 42, 62, 53, 52		2.7
Glebe & 11th	WMATA: 2A, 2B, 2C, 2G, 38B, 23A, 23C, 2A, 2B, 2C, 2G, 38B, 1A, 1B, 1E, 1F, 1Z ART: 51		3.6
Glebe & Wilson	WMATA: 23B, 25A ART: 75		3.0
Monroe & 9th	ART: 75	Virginia Square	2.1
Spout Run & Lee	ART: 62		3.3
Washington & 10th	ART: 77, 42		2.9

Multimodal Connections to Existing and Planned Capital Bikeshare Stations (Arlington)



Metro Stations within Walking Distance of a Bikeshare Station
(Includes bikeshare stations planned for FY2012)

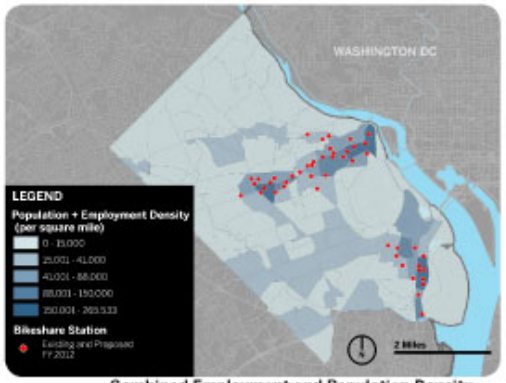


High Frequency Bus Corridors in Arlington County
(Includes bikeshare stations planned for FY2012)

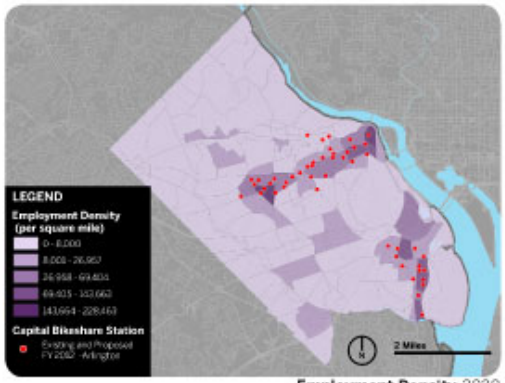
Location of Bicycle Lanes and Trails
(Includes bikeshare stations planned for FY2012)

DEMOGRAPHICS

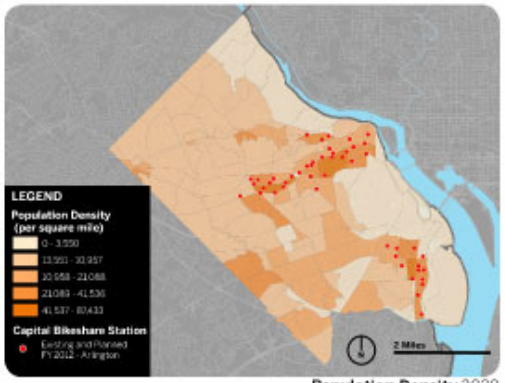
Within a half-mile of existing and planned Arlington bikeshare stations are **91,000 residents and 171,000 jobs**. This equates to nearly half of the County's population and the majority of jobs. Compared to the County as a whole, the residents of the areas served by bikeshare are younger and more likely to walk and bike to work.



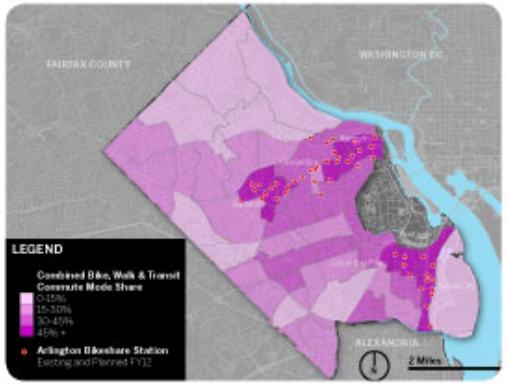
Combined Employment and Population Density



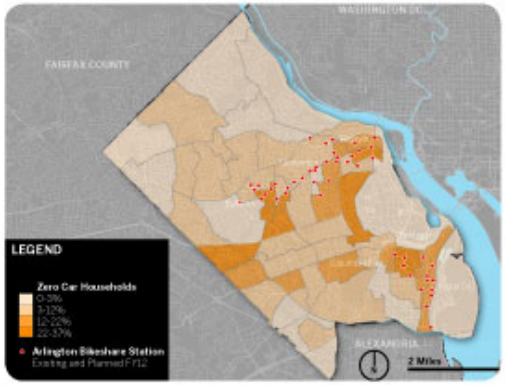
Employment Density 2020



Population Density 2020



Combined Walk, Bike, and Transit Commute Mode Share 2010



Zero-Car Households 2010

Arlington has one of the highest rates of transit usage in the country, as well as walk and bicycle rates that surpass the national average. The highest concentrations of residents who walk, bike or take transit to work are along the County's two Metrorail corridors and Columbia Pike; zero-car households cluster in many of the same areas.

TRIP BEHAVIOR

CASUAL USERS VS. REGISTERED MEMBERS

Casual users (24-hour and 3-day memberships) use bikeshare differently than registered members (30-day and annual memberships). Both groups use bikeshare primarily for short trips, however casual users ride bikes slightly farther and longer in duration.

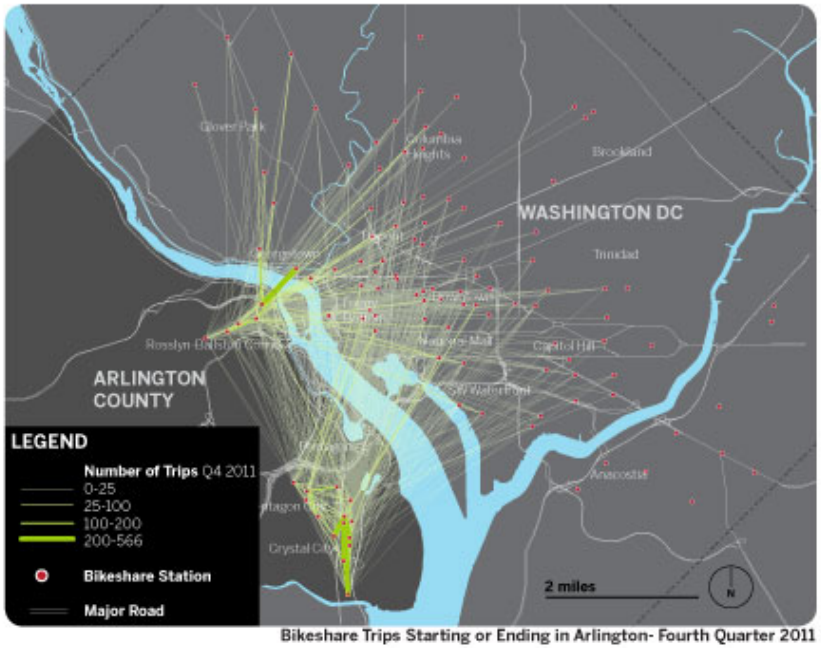
As many casual users are tourists, a higher proportion of trips are to tourist and recreation destinations like the National Mall and Southwest Waterfront in DC. Casual users are also many times more likely to bike between the two corridors in Arlington than are registered users.

Capital Bikeshare is primarily used for short trips. **The average bikeshare trip is only 1.3 miles long.** Registered users travel even shorter distances at an average of 1.2 miles, but casual users take longer trips at an average of 1.8 miles.

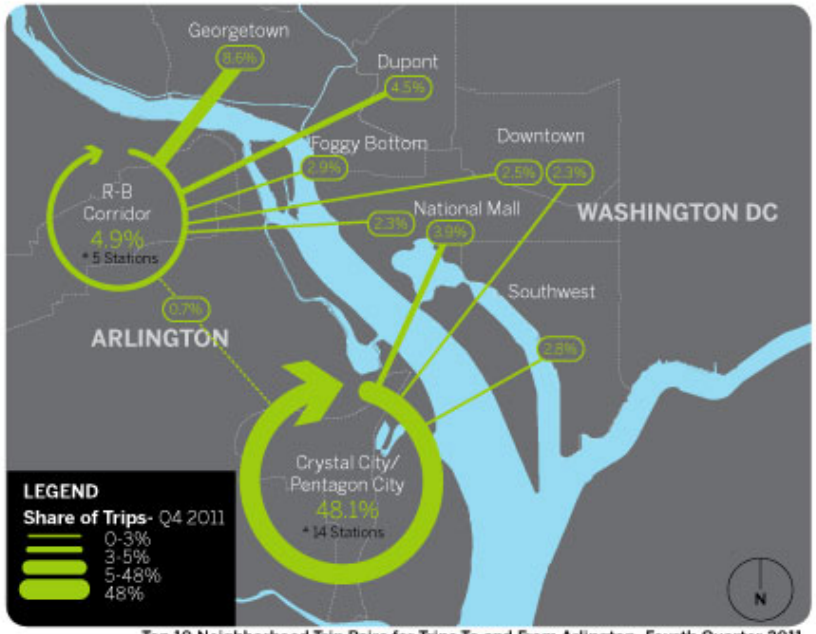
ORIGINS AND DESTINATIONS

People use Capital Bikeshare to access a diverse set of destinations. Just over half of all bikeshare trips between September and December 2011 stayed within either the Rosslyn-Ballston corridor or the Crystal City / Pentagon City area. These short trips serve purposes like connecting office workers to the Metro or residents to shops.

The other half of trips extend across nearly the entire Capital Bikeshare network. Riders are using bikeshare for a diverse set of destinations, like Downtown DC or the National Mall. Notably, many of the busiest stations in the system are at Metro stops, suggesting a high rate of connection to other transit.



Bikeshare Trips Starting or Ending in Arlington- Fourth Quarter 2011



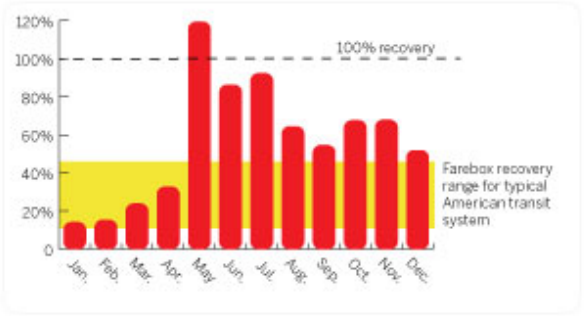
Top 10 Neighborhood Trip Pairs for Trips To and From Arlington- Fourth Quarter 2011

OPERATING & CAPITAL COSTS

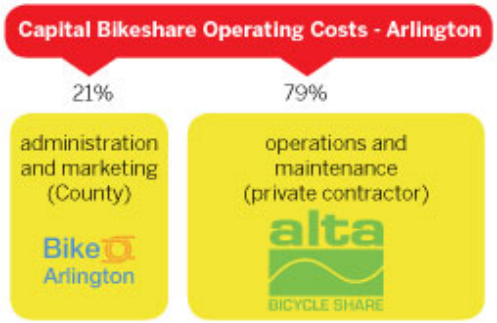
OPERATING COSTS AND REVENUE

In 2011, Capital Bikeshare's Arlington operations achieved a 53% farebox recovery. Farebox recovery, a common measure of financial performance in transit, equals the percentage of operating and administrative costs covered by fare revenue. Farebox recovery for most transit systems in the U.S. is between 15% and 45%.

Farebox recovery rates fluctuate significantly per month. Operating expenses are largely fixed but revenue varies depending on ridership.

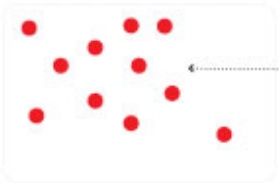


Farebox Recovery for Capital Bikeshare's Arlington Operations



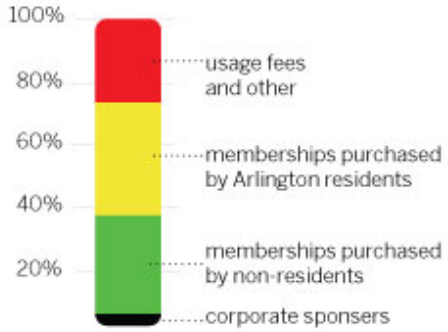
DENSE VS. SPRAWLED SYSTEM

Far distances between stations increase the amount of time it takes to service stations / rebalance bikes (i.e., having system employees move bicycles around to ensure no station is full or empty).



A dense network of stations requires less manual rebalancing and allows maintenance vehicles to quickly service multiple sites.

REVENUE BREAKDOWN



*Revenue breakdown for only the Arlington portion of the system.

CAPITAL COSTS

New bicycles cost around $1,000. The bikes are designed to endure significant wear and tear and last up to 7 years.

Station costs vary depending on the number of docks. The smallest stations available, 11 docks, cost $36,000 to purchase while the largest stations, at 19 docks, cost $52,000.

*Current capital costs. Future station and bicycle costs will vary depending on inflation and exchange rates.

EXPANSION SCENARIOS

Scenarios: Strategies for Future Growth

The following four expansion scenarios were developed to illustrate four distinct strategies for growing the Capital Bikeshare system in Arlington. **Should future bikeshare expansion...**

1  ...add more stations to areas already served by bikeshare?

2  ...focus expansion on dense, mixed-use areas?

3  ...expand out along major County corridors?

4  ...locate along off-road trails and bike lanes?

Expansion Principles

- New stations should be within a half-mile maximum of another station, and preferably within a half mile of an existing station.

  This will ensure that all new stations added will have nearby stations for users to go to, and be more integrated within the existing Capital Bikeshare system network. Any station located beyond a half-mile from an existing Capital Bikeshare station is unlikely to be well used; most Capital Bikeshare trips are around a mile in length. Any station located beyond a half-mile from the existing system could result in higher operating costs.

- New stations should serve a variety of trips purposes for a wide variety of users (age, race, income, gender).
- Arlington's Capital Bikeshare expansion should serve the needs of Arlington residents, employees, and visitors.
- New stations should be placed such that operating costs are minimized.

  Rebalancing bikes comprises a good percentage of operating costs, and these costs are lessened by dense station placement and appropriate station sizing. The greater the geographic dispersion of Arlington's Capital Bikeshare stations throughout the County and through lower density neighborhoods, the more it will cost to operate the system.

- Capital Bikeshare expansion should utilize existing bicycle facilities (on-street bike lane, sharrows, and off-street trails) to the greatest extent possible, in concurrence with Arlington County's established station location preferences.
- New stations should be located such that bikeshare increases the reach of other modes, particularly transit and walking.
- New stations should be placed to expand the access to destinations located outside the County, particularly as neighboring jurisdictions place Capital Bikeshare stations in activity centers within biking distance of Arlington.

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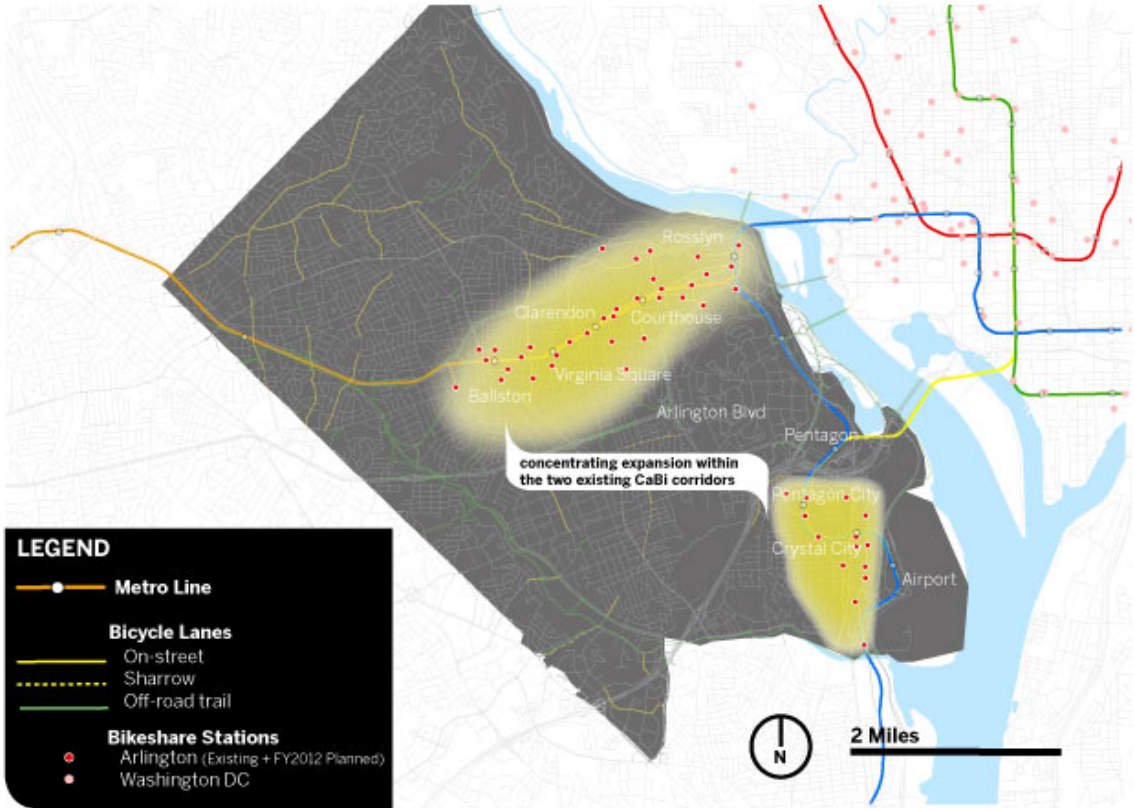
SCENARIO ONE: existing deployment expansion

Expanding to Improve Service in the Existing Bikeshare Service Area

The existing service area for bikeshare is home to half the County's population and the majority of jobs. While bikeshare is already deployed over much of the Rosslyn-Ballston Corridor, Pentagon City, and Crystal City, adding new stations in these areas will improve service reliability and accessibility.



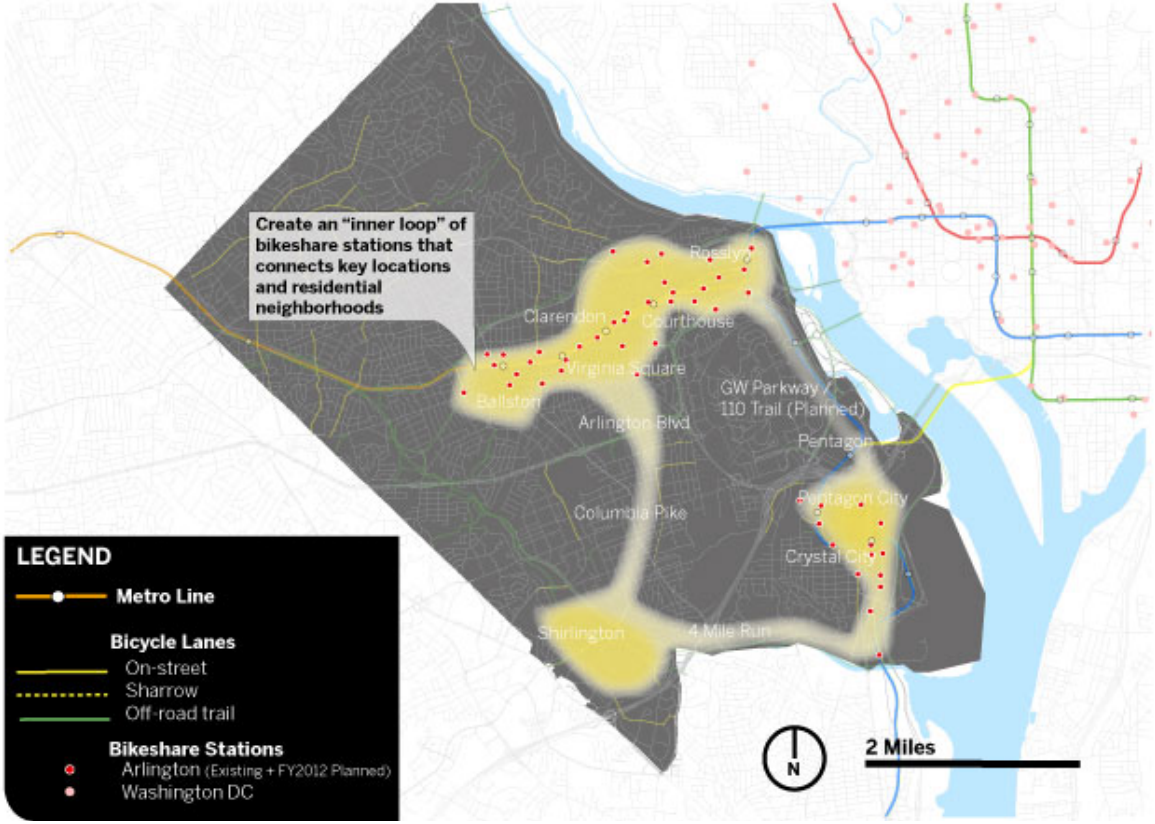
Pros
- Provides high quality bikeshare to the majority of the population
- Lower operating costs / less rebalancing
- Easier for users to find a station or empty dock

Cons
- Poor geographic coverage with a lack of demographic diversity
- Placing more stations in areas where they already exist

SCENARIO TWO: connecting through the neighborhoods

Connect Through Neighborhoods to Form a North-South Inner Loop of Bikeshare Stations

Focus on connecting the existing Capital Bikeshare corridors with Shirlington by creating a North/South "inner loop" of Capital Bikeshare stations in Central Arlington, while adhering to the principle that no new station can be more than a half mile from an existing station. This strategy would allow Capital Bikeshare to reach a number of new neighborhoods in Central Arlington, but would do so by adding stations in a lightly spaced fashion to accomplish connecting the existing corridors and Shirlington as quickly as possible.



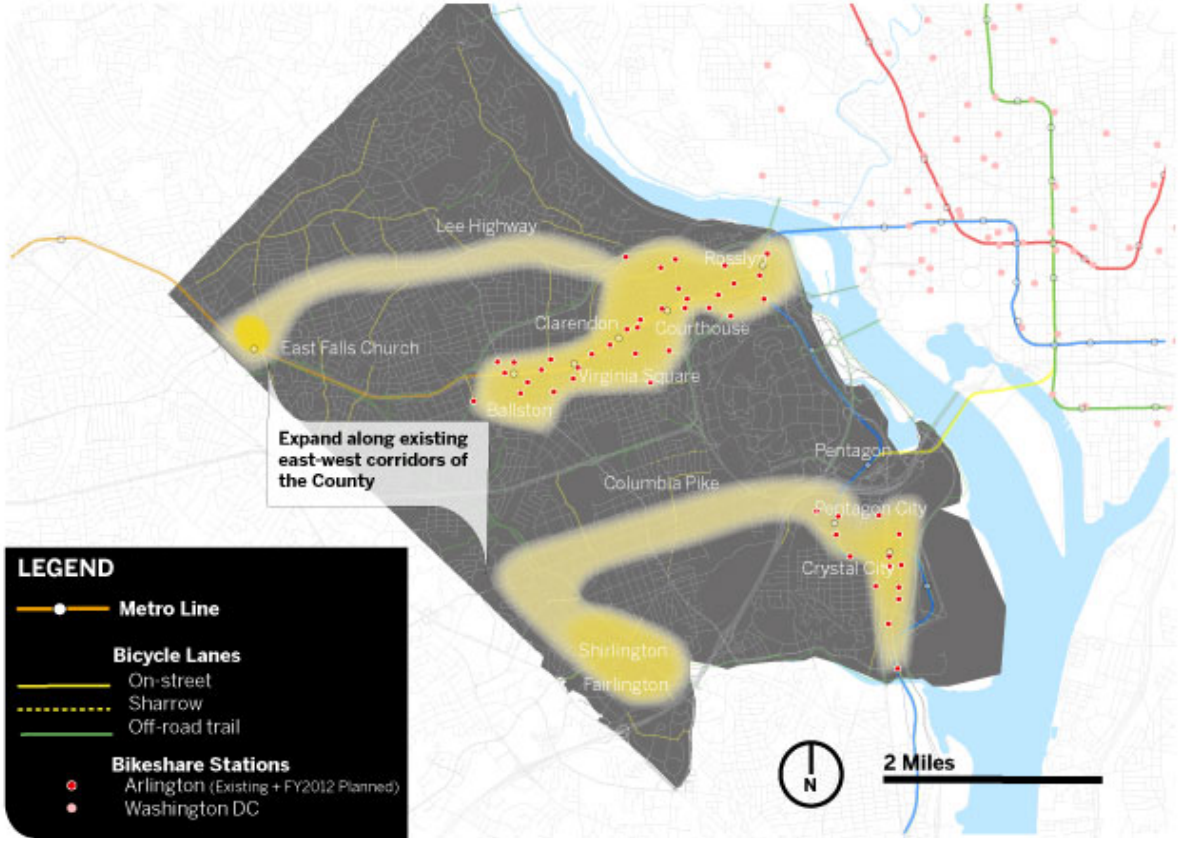
Pros
- Connects North and South Arlington
- Connects Shirlington, Route 50, Columbia Pike and mid-to-high density neighborhoods in between
- Serves Columbia Pike
- Continues to add stations in existing corridors
- Better demographic diversity

Cons
- Difficult to cross Route 50 by bicycle
- Not leveraging existing bicycle infrastructure
- Higher operating costs / more rebalancing compared to Scenario 1

SCENARIO THREE: new corridor expansion

Concentrate Expansion in New Corridors

This scenario would expand bikeshare to Shirlington and East Falls Church by adding stations along two major east-west corridors, Columbia Pike and Lee Highway. This scenario would serve both the northern and southern portions of the County and connect a number of key neighborhoods and community facilities.



Pros

- Leverages existing high frequency bus service
- Provides service in North Arlington
- Access to East Falls Church Metro
- Better geographic coverage and demographic diversity

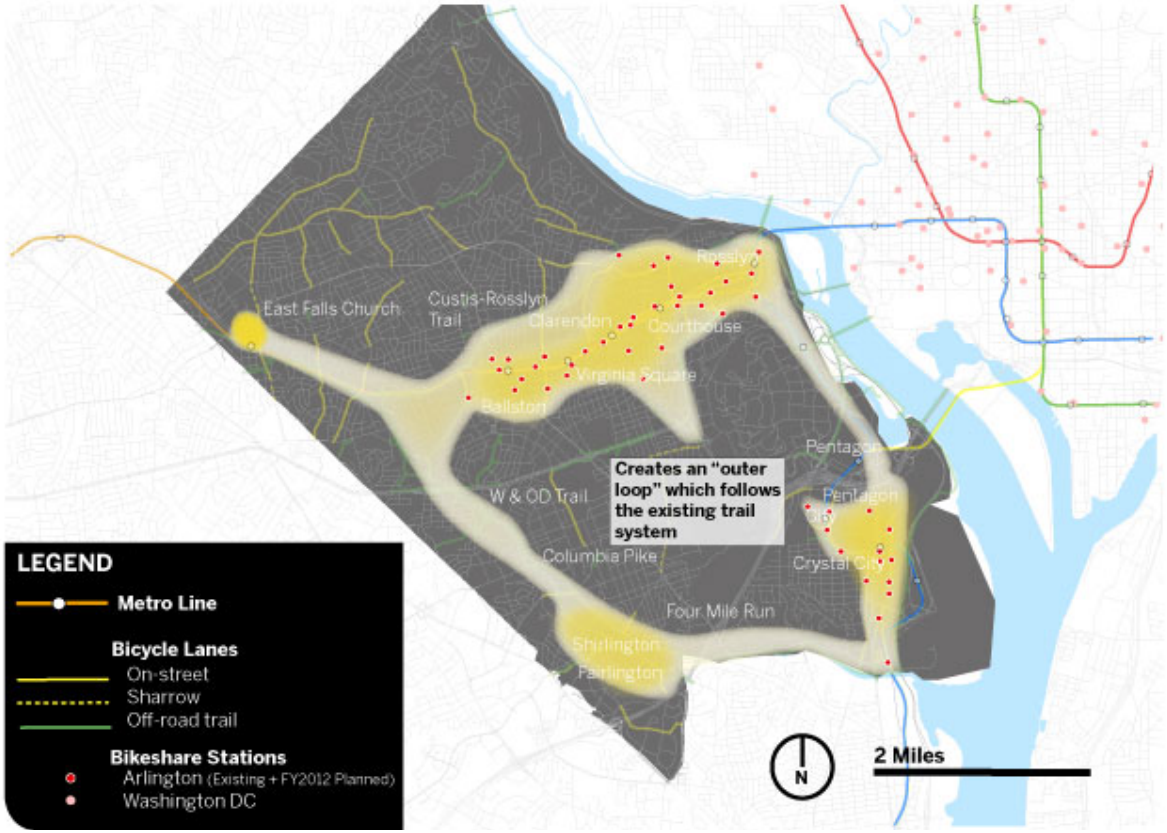
Cons

- Not well connected to the trail network
- Not well connected to existing bikeshare network
- Challenging environment for bicyclists/ safety
- Higher operating costs / more rebalancing compared to Scenario 1

SCENARIO FOUR: **trail focused expansion**

Expand Along the County Trail Network

Arlington has an expansive trail system that serves many portions of the County. This scenario would locate Capital Bikeshare stations at destinations alongside or near existing trails in addition to providing stations in Shirlington and East Falls Church. This scenario would help attract users not comfortable riding in mixed traffic on roads.



Pros

- Significant number of destinations along the W&OD Trail (schools, recreation centers, etc.)
- Attracts new users not comfortable cycling in traffic (safety)
- Connects medium to high density garden apartment neighborhoods at the western end of Columbia Pike to system
- Access to East Falls Church Metro

Cons

- Not well lit at night along trails (safety)
- Short-term deployment will not directly connect two existing corridors
- Lack of geographic coverage (particularly Central Arlington)
- Higher operating costs / more rebalancing compared to Scenario 1

NEXT STEPS

Stay Involved with the Capital Bikeshare TDP

Visit **http://arlingtoncabi.uservoice.com/** to continue the conversation about the Capital Bikeshare TDP. See what others are saying about the plan and provide your own feedback.

The online/public comment period ends April 13th.

Learn more about the TDP and see all the draft chapters completed to date at: **bikearlington.com**

Sections to be Completed

Operations plan
Capital improvement program
Financial plan
Monitoring and Evaluation Plan
Expansion strategy

↓

Draft Plan for Public Review

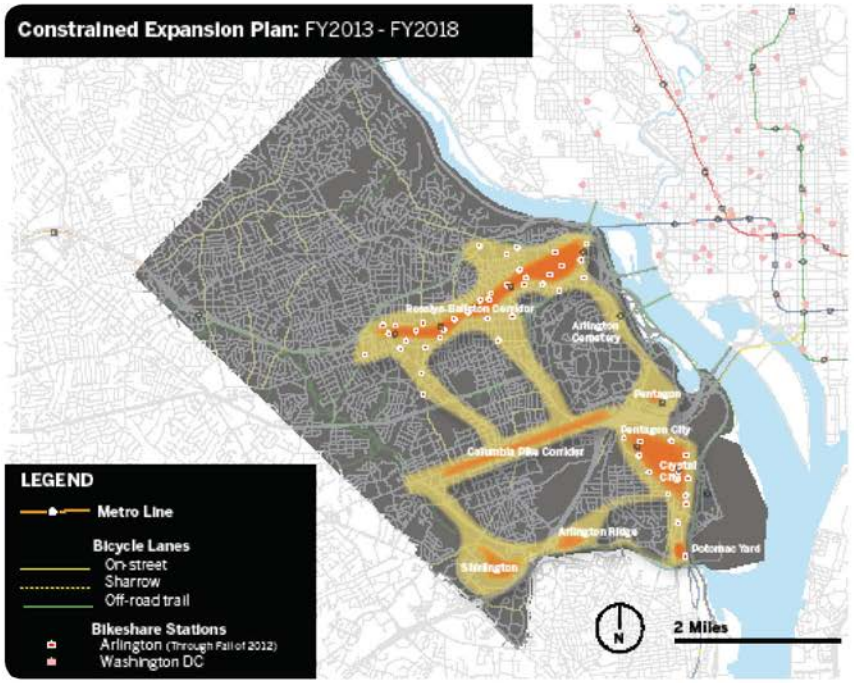
- April 13 - End of online comment period
- End of May - Draft Plan posted on BikeArlington.com
- June 27 - Public meeting on Draft Final Plan
- July 21 - Plan presented at County Board Meeting
- End of July - Final Plan posted on BikeArlington.com

Flickr.com / District Department of Transportation

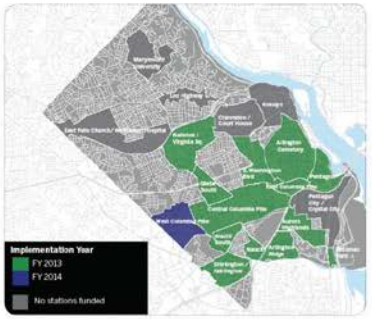
July 11, 2012 Public Meeting Additional Presentation Boards

**Note these boards represent the draft final plan and have been subject to change since they were presented to the public*

CONSTRAINED EXPANSION PLAN



Station Phasing



Expansion will occur primarily in the first two years of the plan. Expansion will occur in the first three years of the planning period. Between fiscal years 2016 and 2018 all available capital funding will be used to maintain the existing system equipment. Additional stations may be added depending on future private sponsorships and advertising.

Number of Stations

Corridor	# of Stations
Shirlington / Fairlington	6
Arlington Ridge	3
Aurora Highlands	1
W&OD South	2
Columbia Pike East	1
Pentagon	2
Arlington National Cemetery	1
Columbia Pike Central	9
Nauck	2
Ballston / Virginia Square	1
Clarendon / Courthouse	0
S. Washington Boulevard	2
Glebe Corridor	1
Mini Station Pilot	3
Rosslyn	0
Columbia Pike West	1
Potomac Yard	2
Crystal City / Pentagon City	0
East Falls Church	0
Lee Highway	0
Marymount University	0
Unassigned Stations*	2
TOTAL	39

* Unassigned stations can be placed anywhere within the 20 expansion areas to respond to changing demand

Neighborhood Mini Station Pilot

Arlington County will reserve the funding equivalent of three full-size stations for a neighborhood bikeshare pilot program. The pilot will utilize lower cost, simplified stations in lower density neighborhoods that may not be able to support traditional bikeshare. Arlington is currently exploring options for such a pilot. If the pilot is infeasible, the funding will be used for full-size stations in areas currently underserved by the constrained plan.

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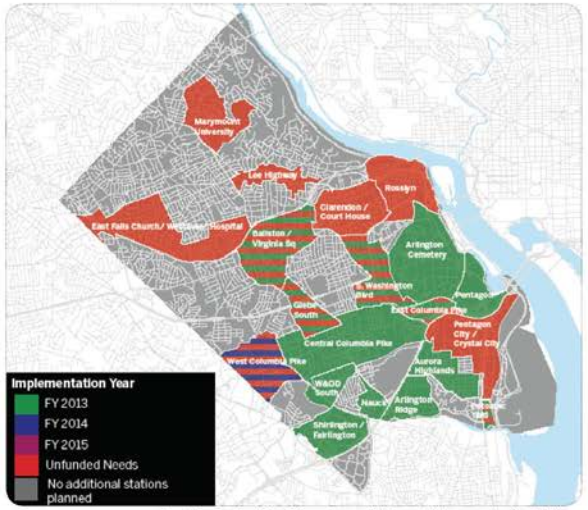
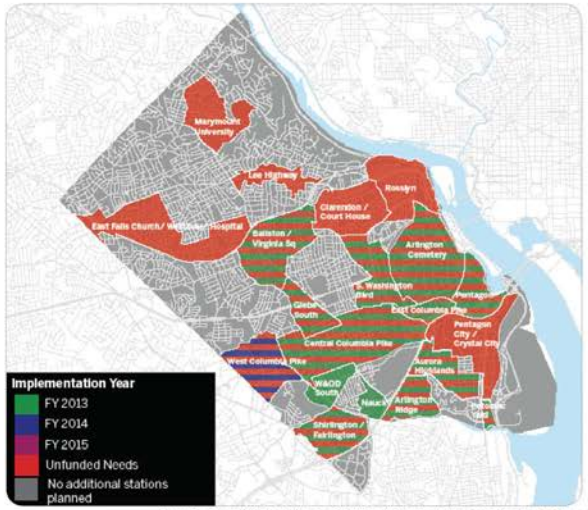
Arlington County Commuter Services
Bike Arlington

UNCONSTRAINED EXPANSION PLAN

Unmet Expansion Needs



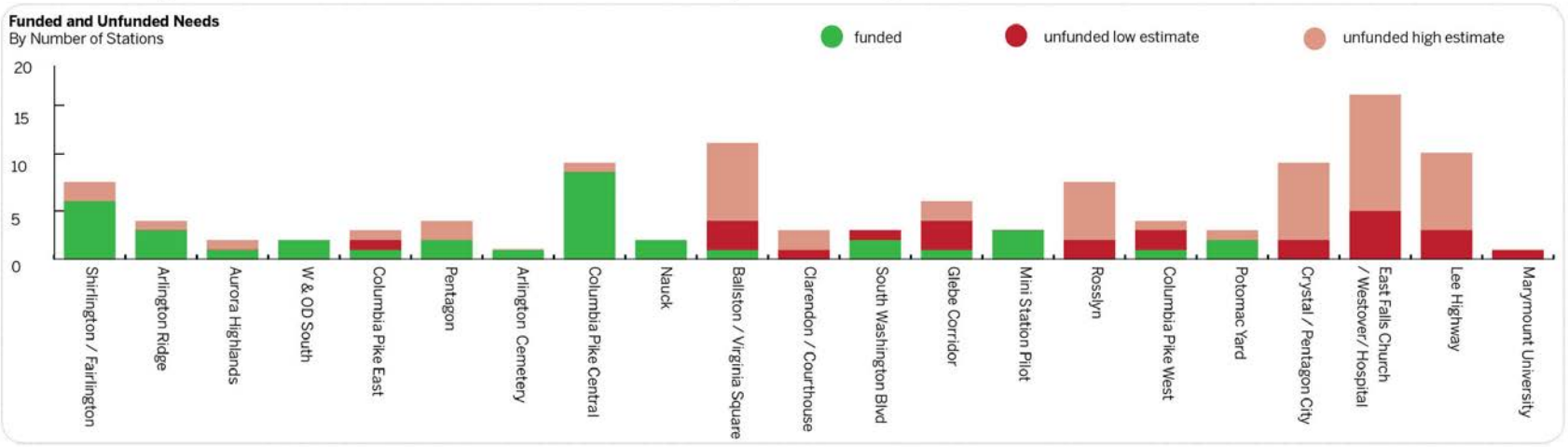
Implementation Year: Low Estimate Unconstrained Plan



Implementation Year: High Estimate Unconstrained Plan

The unconstrained expansion plan represents the bikeshare system if it is fully built out within the 20 expansion areas. The two bikeshare demand analyses provide us with a low and high estimate of system size at full build out. The 39 stations of the constrained plan leave significant unmet needs within the bikeshare network. A number of areas, particularly in North Arlington, would not receive bikeshare stations under the constrained plan. Nearly all of the areas will require additional stations to meet full demand.

If additional funding becomes available, the unconstrained plan will serve as a road map for the County in addressing the unmet needs for bikeshare stations.



FINANCIAL PLAN

Operating Costs

As Capital Bikeshare continues to grow, Arlington County will need to explore new sources of operating revenue for the system. While system expansion helps increase membership revenue, the additional docks cost the County money to operate and maintain.

	2013	2014	2015	2016	2017	2018
			operating expenses			
Contract Operations	$880,725	$1,336,141	$1,457,335	$1,546,383	$1,600,507	$1,656,524
Administration and Marketing	$180,044	$186,346	$192,868	$199,618	$206,605	$213,836
TOTAL	$1,060,769	$1,522,487	$1,650,203	$1,746,001	$1,807,111	$1,870,360
			operating revenue			
Station Sponsorships	$84,155	$67,656	$69,209	$70,817	$72,481	$50,924
Farebox Revenue Projection	$530,384	$761,243	$825,101	$873,001	$903,556	$935,180
TOTAL	$614,540	$828,899	$894,311	$943,817	$976,036	$986,104
OPERATING DEFICIT	$(446,229)	$(693,587)	$(755,892)	$(802,184)	$(831,075)	$(884,256)

Operating Budget

Capital Costs

As Arlington's bikeshare system ages, capital funding will have to shift from funding system expansion to system replacement and maintenance. Between FY2016 and FY2018, equipment replacement costs will exceed available capital revenue.

	2013	2014	2015	2016	2017	2018
			capital expenditures			
New Capital Equipment and Installation	$1,312,719	$161,838	$142,248	-	-	-
New Station Site Planning and Pad Construction	$61,830	$6,430	$5,848	-	-	-
Replacement Stations and Bicycles	$11,151	$29,667	$50,959	$221,310	$300,492	$535,671
TOTAL	$1,385,700	$197,935	$199,054	$221,310	$300,492	$535,671
			capital revenues			
Decal Fee	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Congestion Mitigation and Air Quality	$1,236,000	-	-	-	-	-
Total	$1,436,000	$200,000	$200,000	$200,000	$200,000	$200,000
CAPITAL PLAN BALANCE	$50,300	$2,065	$946	$(21,310)	$(100,492)	$(335,671)

Capital Budget

Arlington will only install additional stations once new operating revenue sources are identified. The County is exploring a number of options, including station and system sponsorships, station advertising, and other public and private sources. Station advertising requires County Board approval.

Barclays, a British bank, sponsors London's bikeshare system. Along with naming rights, the system features the Barclays logo on the rear fenders and front baskets of the bicycles.

photo: wemadethis.co.uk 2012

Advertising on the bikeshare stations themselves can also help fund the system. A number of cities, like Minneapolis (pictured to the left), include advertising on station map boards.

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Bike Arlington

PERFORMANCE MONITORING PLAN

Arlington will track 14 performance measures related to the plan's goals and objectives. The purpose of performance measures is to monitor whether implementation of the plan is helping the County to meet the plan objectives. Each measure will be tracked at least annually, allowing the County to adjust strategies as needed.

Goal Intentions for bikeshare in Arlington	Objectives How we plan to meet plan goals	Performance Measure How we measure attainment of objectives
 1	1.1: Divert vehicle miles traveled from automobile to bicycle.	A: Ratio of Arlington bikeshare miles traveled to total vehicle miles traveled (VMT)
	1.2: Foster improved public health by increasing bicycle vehicle miles traveled.	B: Total calories burned and average calories burned per trip
 2	2.1: Support regional and local economic development, especially in transit-oriented, mixed-use communities.	C: Combined number of bikeshare trips for shopping, errands, eating-out, and socializing D: Average money saved per bikeshare user and total annual savings among all Arlington Capital Bikeshare users
	2.2: Attract a wide variety of users, including by age, race, income, and gender.	E: Percentage of members by age bracket, race, household income bracket, and gender
 3	3.1: Increase the reach of other transportation modes that complement bicycle use, particularly transit and walking.	F: Percent of bikeshare trips that link to another mode (broken down by mode)
	3.2: Provide mobility through bicycle and transit connections to Arlington residents, employees, and visitors to and between Regional Activity Centers and mixed-use corridors.	G: Absolute number and percent of Arlington jobs and population within a quarter mile of a bikeshare station H. Percentage of hotel rooms in Arlington within a quarter mile of a Capital Bikeshare station
 4	4.1: Increase bicycle mode share for a variety of trip types, contributing to the County objective of an annual one-half percent SOV mode share reduction.	I: Bicycle commute mode share J: Public opinion on bicycling as a legitimate transportation option
	4.2: Reduce bikesharing crashes and encourage a culture of safety among users.	K: Helmet use among bikeshare users L: Crash rates among bikeshare users
 5	5.1: Minimize operating costs while providing an effective service at the regional and local levels.	M: Cost recovery ratio
	5.2: Provide cost-competitive transportation for individual users.	N: Average cost per trip for bikeshare users

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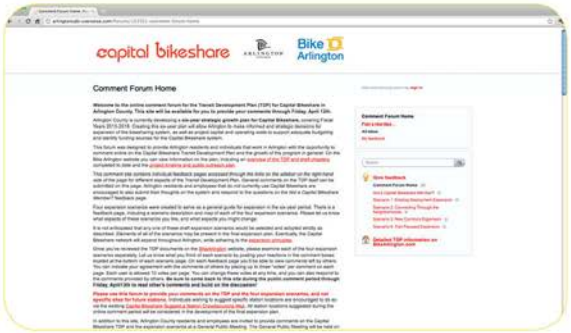
Bike Arlington

NEXT STEPS

Stay Involved with the Capital Bikeshare TDP



Visit **http://arlingtoncabi.uservoice.com/** to continue the conversation about the Capital Bikeshare TDP. See what others are saying about the draft plan and provide your own feedback.

The online public comment period ends July 27th.

Learn more about the plan and see all the draft chapters completed to date at: **bikearlington.com**.

Key Dates

- July 27th- End of public comment period
- September 11- Plan presentation to the Transportation Commission
- September 15- Plan presented to the County Board
- Fall 2012- Implementation of plan begins
- Fall 2012 to Spring of 2013- First stations outlined by plan installed*

* dates tentative

Implementation

The Capital Bikeshare TDP is just the first step in expanding bikeshare in Arlington. Once the plan is finalized, the implementation phase will commence. **Arlington will work with community residents to identify specific station locations.** Site planning, permitting and all other required approvals must take place prior to station installation. Finally, implementation depends on securing additional sources of revenue for the system.

Steps Toward Implementation

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Bike Arlington

... and we need your help to select the best locations for future stations!

2013 EXPANSION NEIGHBORHOODS:

- Arlington Heights
- Arlington Highlands
- Arlington Ridge
- Ashton Heights
- Buckingham
- Claremont
- Columbia Pike Corridor
- Lyon Park
- Nauck
- Shirlington & Fairlington

HOW TO STAY INVOLVED

In each of the expansion neighborhoods we are working with community members to select the best locations for future bikeshare stations. To learn more about the implementation process and find out specific meeting dates and locations, please visit: **bikearlington.com/bikesharing.**

ABOUT THE PLAN

The Arlington Bikeshare Transit Development Plan (TDP) is the nation's first long-term blueprint for bikeshare. The plan lays out a six year strategy for expanding, maintaining, and operating the bikeshare system in Arlington.

Arlington County **recognizes bikeshare as a form of public transportation that complements traditional modes** like bus and rail. Bikeshare provides additional mobility options for Arlingtonians.

Over the last eight months Arlington has studied the existing system, analyzing months of trip data to better understand how riders use bikeshare and what makes particular stations more successful than others. To help guide the planning process, the TDP team worked with stakeholders to develop a set of goals and objectives for the growing system. Performance measures have been assigned to each objective to allow the County to track whether the system is meeting expectations.

Using system analysis as well as the input from an extensive public and stakeholder involvement process, the TDP team developed a strategy for growing the Capital Bikeshare system in Arlington. The following boards lay out the plan's proposed strategy for expanding and funding the system. To read the entire plan, please visit **bikearlington.com/bikeshare** and click on the link "Arlington Bikeshare Transit Development Plan."

capital bikeshare

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Bike Arlington

APPENDIX D: ONLINE COMMENT FORUM COMMENTS BY DATE (VERBATIM)

Spring Draft Plan Comments

Comment Title	Comment Description	Date
Arlington new station placement	I would love a station near the Lee Harrison shopping center in the 22207 area of North Arlington. Also by the Ballston Mall! And as for DC we need more Glover Park stations!!	3/13/12
Penrose Square - Columbia Pike	At grocery store, 2 blocks from Public Library, convenient to Pike Ride rapid bus line, midway stop on major bike rout between the Ballston/Clarendon Corridor and Shirlington.	3/13/12
The corner of George Mason Dr and Henderson Rd near the massive Madison development (that is under served by bus/rail)		3/13/12
A Shirlington placement would be so helpful!		3/13/12
Better gears for hills	To be useful in Rosslyn or to get from Arlington to DC something has to be done about the lack of gears on the bike. It really can't handle more than a tiny incline. When I used to try and bike between Courthouse and the Capitol (via the memorial bridge), getting to work was no problem but coming back I had to ditch my bike at the closest Rosslyn station and walk the hill because there was no way to bike was making it up. That was inefficient and would also lead to problems of not enough bikes coming back to Courthouse or Clarendon and too many trying to park at Rosslyn.	3/13/12
Lyon Village Shoping Center on Lee Hwy	It's on the bike path and a popular commercial center within close proximity to Clarendon metro	3/13/12
bike commuting benefits	Transit riders get free or discounted transit via their employers. It would be great if Arlington could figure out a way (a card swipe station on the bike paths?) to offer bike commuters some sort of incentive, such as a discount at bike stores.	3/13/12
The transit development plan and expansion scenarios are very helpful. Good way to get input.	I appreciate the global approach being discussed here. It encourages people to think about how the system will be used and where people will go using it. As a Cabi user, I also think people should be cognizant of the full/empty dock issue. There will occasionally be times when one will have to walk to a different station than the one they intended to dock or find a bike at, so it's important, especially in popular places (e.g. Shirlington) that each station have another one that is not too far away. That's something to think about when making site suggestions on the crowdsourcing map.	3/14/12

Comment Title	Comment Description	Date
Rental Bike Helmets	Too many rides, myself included for a while, do not ride with a helmet. There are a number of reasons from being at work and not having access to a helmet or just plain ol' not carrying one around with you when you want an "impromptu" bike trip. Some sort of device adjacent to the stations that allowed individuals to rent/loan helmets would be great, especially from a safety view. Somehow the device would have to find a way to "wash" the helmets after use so I'm not sure of the technical details of how it might be accomplished.	3/14/12
Stations at Arlington Blvd to provide access to existing bike and Metro Stations.	Arlington Blvd has high population density and poor public transportation options. Bike stations at major Arlington Boulevard intersections (10th Street, Pershing, Fillmore, Glebe, G Mason, Park Rd, Carlin Springs) would provide bike access to existing bike network and Metro Stations along Orange Line corridor.	3/15/12
Westover Station	How about a new station at the Westover Shopping Center? The buses are fairly infrequent. This would assist those wanting to catch the metro at East Falls Church, those wanting to go to Ballston, or even to Lee Harrison or the Lee Heights Shopping Center.	3/15/12
Lee Heights Shopping Center	Lots of apartment density. People could ride the bikes down to either the Virginia Square metro or Ballston Metro.	3/15/12
Scenario 2 or 4 please!		3/16/12
A site at National Foreign Affairs Training Center on Arlington Blvd and George Mason	A site at National Foreign Affairs Training Center on Arlington Blvd and George Mason	3/16/12
Scenario 3 - Please add some stops on Columbia Pike, especially with the new bike access from Arlington View to Army Navy Drive	See http://www.arlingtonva.us/departments/Communications/PressReleases/page77109.aspx and http://www.arlingtonva.us/departments/EnvironmentalServices/CapTrack/Details.aspx?q=UHJval9JZD0zMzA0&r=TmVpZ2hib3Job29kX05tPSZTdHJlZXRfTm09JlByb2dfSWQ9NyZQcm9qX1R5cGVfSWQ9MCZQcm9qX05tPSZQaGFzZV9JZD0w for more information on the new bike access.	3/16/12
West End of Columbia Pike at Dinwiddie or Buchanan. Popular shopping areas with transit stops and WO&D access between Shirlington & Ballston		3/16/12
Scale back existing operations.		3/16/12
True Superstops!	Add bikeshare stations to new Columbia Pike super bus stops.	3/17/12
Can bikes be placed at 2250 clarendon blvd/at the courthouse metro stop?		3/18/12

Comment Title	Comment Description	Date
Mix of Scenario 1 and 3	I believe bolstering BikeShare around existing and planned infrastructure in Arlington is well suited to relieve some typical vehicle use, as well as leverage current trails. I believe continued development along the B-R corridor can also reduce metro use for stops across those station areas. This would apply for work and non-work commuting areas.	3/18/12
Put a bike share in Shirlington		3/19/12
Stop taking away parking spots in Arlington for bikeshare!		3/19/12
I support Scenario 4	Scenario 4 creates a continuous loop connecting key parts of the county, linking the greater Shirlington area and Four Mile Run Drive with the existing sites.	3/19/12
Connect Pentagon City and Clarendon with a more direct route	Adding some stations to the south of Clarendon and Court House, and along the eastern part of Columbia Pike, would tie the two existing bike station groups together. This would make it easier to ride between Pentagon City and Clarendon.	3/21/12
Connect Crystal City with Shirlington and maybe future stations in Potomac Yard in Alexandria	Additional stations could be added to the southern end of Crystal City. Those stations could be connected to stations in Shirlington, providing better transportation options between the two areas. The southern Crystal City stations could also tie into future stations in Potomac Yard, Del Ray, Arlandria and the northern part of Old Town in Alexandria.	3/21/12

Comment Title	Comment Description	Date
Take the best from Scenarios 2,3, and 4.	As illustrated here: http://bit.ly/GSd0u4 1. This steals the "Connect through the Neighborhoods" idea from Scenario 2, but do so through the Lyon Park Commercial District along Washington Blvd so the new stations will have both sources of trips (Lyon Park neighborhood) and destinations for trips (commercial strip along Washington Blvd, Sequoia Complex). Over the next 4 years the bike infrastructure in the area should drastically improve through Washington Blvd Trail, 27 / 244 Bridge project, Pike Multimodal Project and Joyce St upgrades under 395. 2. Of the 2 corridors in Scenario 3, the Pike has the best mix of residential & commercial, will soon have the better bike infrastructure (Bike Boulevards project) so my proposal adds in the Pike expansion from Scenario 3. 3. While connecting along the trails as envisioned in Scenario 4 would be great from a safety perspective, unfortunately the areas along our trails are primarily sparse residential areas without significant destinations for trips. My scenario retains the link from Potomac Yard to Shirlington by way of Four Mile run because it would enable stations that link up with the Arlington Ridge Shopping Center and potential future Arlandria stations. It also retains a small swoop up the trails from Shirlington to the Columbia Pike Corridor so as to avoid the Walter Reed Drive hill when linking Shirlington to the Pike.	3/26/12
Make the seats thinner!	Right now big issue is that on cannot get full leg movement because the wide seat stops your thigh from having full movement. Maybe just have some seats thinner for smaller, thinner bottoms.	4/6/12

Summer Draft Final Plan Comments

Comment Title	Comment Description	Date
How about a bikeshare corral at Fort Scott Park in Arlington? This park has tennis courts, baseball and softball diamonds, picnic areas,	How about a bikeshare corral at Fort Scott Park in Arlington? People could ride their bikes to this park and it would also serve the neighborhood. Thanks.	7/2/12
Station Placement on WO&D trail by merge of Bluemont trail	with the next station at the Corner of WO&D and Columbia Pike will help close the loop already created by the trails.	7/5/12
Typo on page 8-3. It says that stations need to be replaced in 2012, but that should be 2022.	Typo on page 8-3. It says that stations need to be replaced in 2012, but that should be 2022.	7/5/12
Scenario 4 (Trail-focused expansion) is the worst scenario if it places Capital Bikeshare stations in the parks and natural areas throughout Arlington	Scenario 4 (Trail-focused expansion) is the worst scenario if it places Capital Bikeshare stations in the parks and natural areas through which these trails travel. The stations and their large unsightly signs will clutter the parks and detract from the public's enjoyment of the parks and the trails. Paving for the stations will create impermeable surfaces, increasing run-off into nearby streams and the Chesapeake Bay. Construction of the stations will destroy green space. Increased mowing around the stations will adversely affect natural areas near the trails. Any Bikeshare stations near the trails must be located on surfaces that are already paved, especially those already used for transportation purposes. It is better to reallocate transportation uses (for example, from parking spaces to Bikeshare stations) that to pave over green areas to create Bikeshare stations.	7/6/12
Stop installing Capital Bikeshare stations in the County's parks.	Stop installing Capital Bikeshare stations in the County's parks, such as the ones in Bluemont Junction Park northeast of the intersection of Wilson Boulevard and George Mason Drive and in Oakland Park on Wilson Boulevard near N. Oakland Street. The stations contain large and unsightly signs that detract from the public's enjoyment of the parks. The pads for the bikes pave over green areas, add impervious surfaces to the parks, and increase run-off into the County's streams and the Chesapeake Bay.	7/6/12
Expand Bikeshare into the neighborhoods and to the county recreation centers within the neighborhoods.	The map has the greatest Bikeshare density along the public transit lines (e.g. Orange line), but does not provide available bikes to bring residents from their neighborhoods to the public transit lines. The gray areas on the map, many of which are fairly level for easy biking, will remain unserved by Bikeshare requiring the use of cars or other means to access the transit corridors.	7/9/12

Comment Title	Comment Description	Date
Vote for a station at Thomas Jefferson Community Center	A station at Thomas Jefferson Community Center would be at the nexus of two bike routes -- the Irving bike route and the 2nd Street bike route, and would serve commuters and community center visitors alike. Better than a station on Glebe which is dangerous for bike travel, Irving is already a designated bike route, its level and it is easy to cross Arlington Blvd (50) by bridge or at the stop light at Irving. Thomas Jefferson is a destination for many Arlingtonians due to the theater, the gym and the park. Commuters could pick up bikes at TJ and ride to the metro and those wanting to use the facility at TJ would bring the bikes back all along the Irving Corridor. In addition, TJ is a perfect staging point for commuting by bike downtown (through the Ft Meyer) and then returning via Metro from Clarendon or Ballston. This would make bike commuting much more feasible, since the uphill climb back to NOVA is a deterrent for some individuals. In summary, Thomas Jefferson Community Center is a perfect bike commuting distance from Ballston, Clarendon AND Rosslyn. Please add a station at Thomas Jefferson Community Center.	7/10/12
Westward ho! How about Westover?	You've done a great job building along the Orange Line corridor. You should continue that corridor by putting a station a little farther west in the Westover area. It's an ideal location with nice restaurants, a public library and some relatively dense residential development (apartments, single family homes on small lots). It's also very close to the Custis and W&OD trails.	7/10/12
VOTE FOR BALLSTON METRO STATION/BUS HUB	It makes sense to place Capital Bikeshare stations just outside the Metro. I've been frustrated at times to look for a station in DC that has a Metro name ie Capitol South, to then find out by going in circles around the Metro station that the bikeshare station is 3 blocks away. This is not fun late at night. So please make Arlington's stations OBVIOUS! We need them at ALL the Metro stops in Arlington.	7/10/12
Pointing out a typo in the Exec Summary. Table 4 has "Capital" misspelled a couple of times.		7/26/12

Comment Title	Comment Description	Date
Consider expanding Capital BikeShare with electric bikes. See university of Tennessee model.	Offering electric bikes would expand the pool of potential users to include those that do not think of themselves as being fit, would help in climbing hills or biking when dress for business. http://electricbikereport.com/video-electric-bike-sharing-program-with-solar-charging-station-at-university-of-tennessee/	7/26/12
Need Funding for Lee Hwy - crucial for connection to orange line corridor!	This is a growing community where we are so close to being able to navigate Arlington and commute into DC, but with bus service being relatively limited and walking out of the question (too far), having a bike share to quickly get to the orange line corridor when we need to would significantly increase the value of this neighborhood!	7/27/12
Station at or near intersection of W&OD trail and Columbia Pike	This would provide an important link to the streetcar, and is of special concern and interest because it might not be easy or possible for us to put our own bikes on the streetcar. Also, because this is also at the intersection of Four Mile Run Drive and Columbia Pike, I believe it would get a lot of use. Many docks at that location would be helpful. Shirlington residents would also use it.	7/27/12
Expansion of bike share program should continue through Westover/VHC/East Falls Church corridor, especially along the bike trail system.	There are numerous commuters and families that live between Ballston and East Falls Church along the Westover/Virginia Hospital Center/East Falls Church sections that border the Custis Trail, 4 mile run trail, and the Washington & Old Dominion trail system. It would increase usage for these individuals and families to use the bike share system instead of driving. I highly recommend expanding the system into this area instead of some other stations in South Arlington.	7/27/12
Expand into Transit Deserts	Arlington has several neighborhoods that are nearly devoid of transit options. It seems to me that we should have an emphasis on providing bikeshare especially in these areas. For example, the region of South Arlington that is south of the Pike and north of Four Mile Run is in *dire* need of more connectivity. Please place a few stations along South Walter Reed drive to connect this transit desert with the major transit corridor on the Pike.	7/27/12
The Court House area BADLY NEEDS MORE BIKE RACKs - Especially on Clarendon between 14th and Barton		7/27/12
Stop subsidizing businesses!	Government needs to get out of the way between consumers and businesses. Subsidies for the Capital Bike Share program total more than $16 million. Why should government be doing this? Explain where an authoritarian entity should be able to decide winners and losers rather than letting free and voluntary association drive winners and losers.	7/27/12
The Pentagon needs a station or two.		7/27/12

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APPENDIX E: CAPITAL AND OPERATING COST PROJECTIONS

OPERATING COSTS	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Monthly operating cost per dock	$107	$111	$115	$119	$123	$127
STATION CAPITAL COSTS	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**
7-dock, 4-bike Station	$26,976	$28,325	$29,741	$31,228	$32,790	$34,429
11-dock, 7-bike Station	$37,476	$39,350	$41,318	$43,384	$45,553	$47,830
15-dock, 8-bike Station	$45,941	$48,238	$50,649	$53,182	$55,841	$58,633
17-dock, 9-bike Station	$51,372	$53,941	$56,638	$59,470	$62,443	$65,566
19-docks, 10-bike Station	$54,405	$57,125	$59,981	$62,980	$66,129	$69,436
23-dock, 12-bike Station	$62,809	$65,949	$69,247	$72,709	$76,345	$80,162
27-dock, 14-bike Station	$71,091	$74,646	$78,378	$82,297	$86,412	$90,732
OTHER CAPITAL COSTS	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**
Bicycle (3 speed)	$1,209	$1,270	$1,333	$1,400	$1,470	$1,543
Bicycle (7 speed)	$1,265	$1,328	$1,394	$1,464	$1,537	$1,614
Second Original Paint Color per Bicycle	$31	$33	$34	$36	$38	$40
Bicycle Fender (Front, Each):	$6	$6	$6	$7	$7	$7
Bicycle Fender (Rear, Each):	$21	$22	$23	$25	$26	$27
Complete Terminal	$11,408	$11,978	$12,577	$13,206	$13,866	$14,560
Complete Dock	$880	$924	$970	$1,018	$1,069	$1,123
B-Plate (Four Dock Module)	$5,133	$5,390	$5,660	$5,943	$6,240	$6,552
B-Plate Installation	$1,035	$1,087	$1,141	$1,198	$1,258	$1,321
Technical Platform 180 Degree (Each):	$2,100	$2,205	$2,315	$2,431	$2,552	$2,680
Technical Platform 180 Degree (With Docking Points):	$4,100	$4,305	$4,521	$4,747	$4,984	$5,233
Technical Platform 90 Degree Plate (Each):	$1,163	$1,222	$1,283	$1,347	$1,414	$1,485
Technical Platform 90 Degree (With Docking Points):	$2,495	$2,620	$2,751	$2,889	$3,033	$3,185
STATION PLANNING AND INSTALLATION COSTS	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**
Installation Only, No Permit	$3,000	$3,150	$3,308	$3,473	$3,647	$3,829
Obtain PROW/TROW Permit	$1,035	$1,087	$1,141	$1,198	$1,258	$1,321
Develop and obtain approval of use permit/site land amendment application	$5,000 + $300 each station included in application					
Obtain license agreement from property owner	$2,070	$2,174	$2,282	$2,396	$2,516	$2,642
Develop site plan	$2,588	$2,717	$2,853	$2,995	$3,145	$3,302
Survey and station plan design	$828	$878	$930	$986	$1,045	$1,108
Concrete Pad Installation (7X35)	$3,616	$3,797	$3,987	$4,186	$4,396	$4,615

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