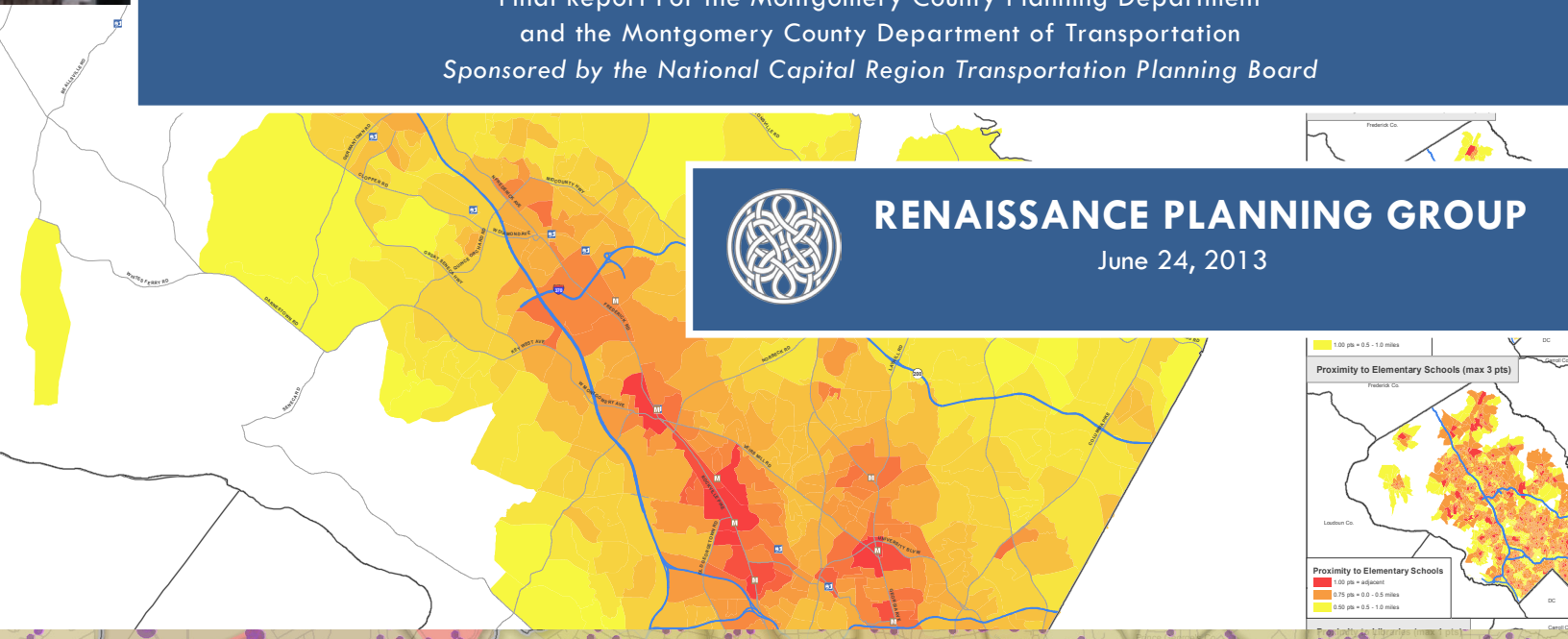

# MONTGOMERY COUNTY PARKING CREDITS FOR BIKESHARE

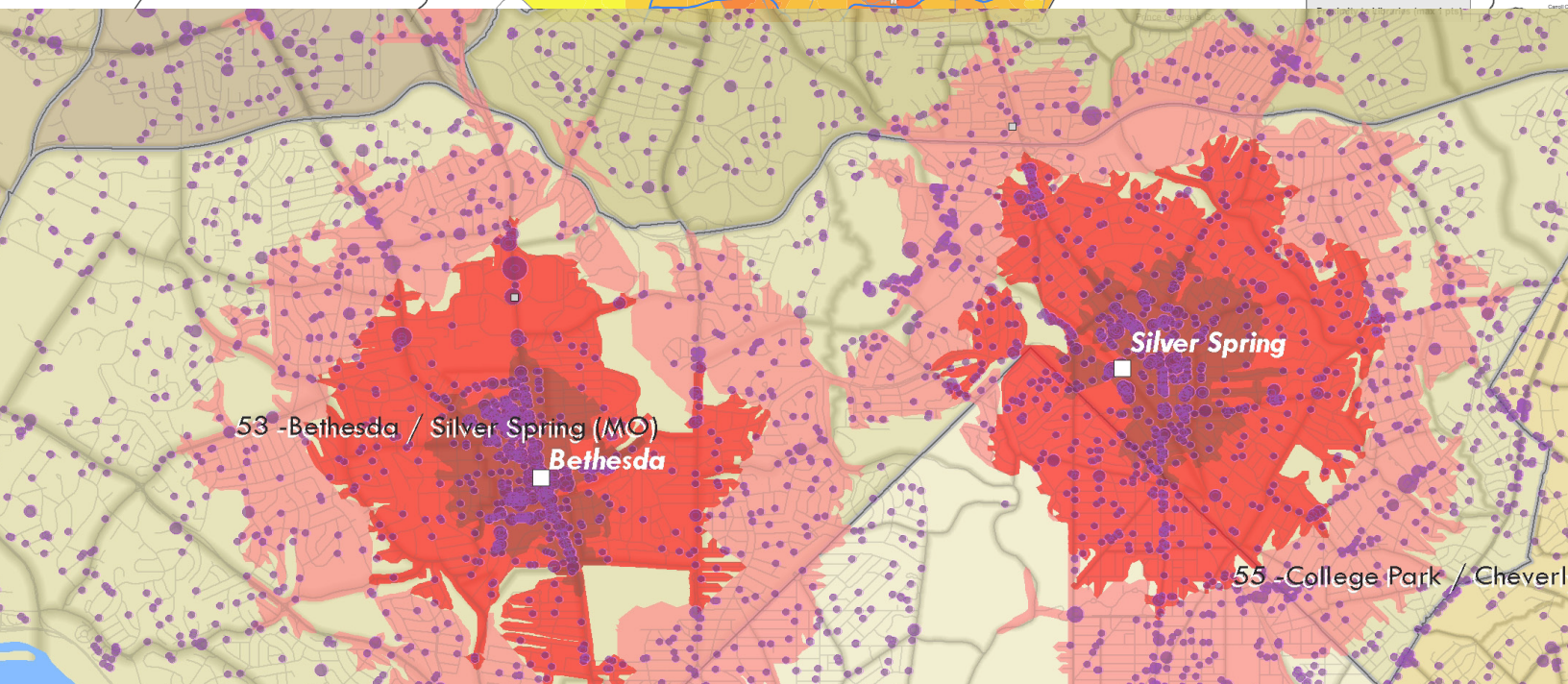
Final Report For the Montgomery County Planning Department
and the Montgomery County Department of Transportation
*Sponsored by the National Capital Region Transportation Planning Board*



**RENAISSANCE PLANNING GROUP**

June 24, 2013



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# Table of Exhibits

# 1. Executive Summary

In 2012, the Montgomery County Planning Department and Montgomery County Department of Transportation initiated an analysis of vehicular parking credits that should be allowed for development applicants proposing to provide bikeshare stations as part of their development approvals. This analysis was conducted through the Transportation/Land-Use Connections (TLC) program, which is sponsored by the National Capital Region Transportation Planning Board (TPB) of the Metropolitan Washington Council of Governments (MWCOG). The study included three primary objectives, listed below in order of descending priority:

1. Identifying reduced vehicle parking space demand associated with provision of a bikeshare station (that might be formalized in the County Code through a Zoning Text Amendment)
2. Identifying reduced vehicle trip generation rate associated with provision of a bikeshare station (that might be formalized through a revision to the Planning Board's Local Area Transportation Review Guidelines), and
3. Monetizable benefits of bikeshare station provision, considering:
    - Reduced cost of providing and operating infrastructure including parking (journey to work or midday)
    - Economic impact in terms of property or sales tax values
    - Savings in terms of public health or safety

In summary, the technical and policy analyses indicate that bikesharing is a desirable element of the County's goals to reduce motor vehicle travel demand and expand travel options for a wide variety of users, particularly in densely developed locations such as Central Business Districts and many Metrorail Station Policy Areas. However, the supporting technical and policy information suggest that there are more effective means than parking credits to promote both the County provision of bikesharing and private sector participation in those systems.

This report summarizes the findings and recommendations of the study.

- Section 2 describes the philosophical challenges associated with linking the provision of bikeshare infrastructure to an individual development's parking space requirements and explores several alternative potential policies that could be employed to incorporate bikesharing into the County's development review processes,
- Section 3 provides a technical analysis of the degree to which a bikeshare system might be expected to reduce peak hour vehicle trip generation and the need for vehicle parking spaces,
- Section 4 identifies several tools that might be employed to better improve the understanding of the bikeshare/travel demand relationship identified in Section 3,
- Section 5 summarizes emerging practices in areas with bikeshare systems to develop bikeshare-supportive policies and infrastructure, and
- Section 6 provides guidance on methods for marketing the indirect benefits associated with bikesharing

Additional materials on the study analysis and literature review are included in the Attachments to this report.

# 2. Potential Policies to Link Development Review and Bikesharing

A key study objective was to determine whether vehicular parking credits that should be allowed for development applicants proposing to provide bikeshare stations as part of their development approvals. This assessment has incorporated several aspects, including:

- a review of technical information on Capital Bikeshare system use and regional vehicle tripmaking characteristics to assess the degree to which bikeshare stations could be estimated to reduce parking demand,
- consideration of implementation and operational characteristics associated with bikeshare system establishment and expansion, and
- assessment of the degree to which replacing parking with bikeshare stations would be an attractive policy incentive for development in areas likely to be candidate bikeshare station locations.

In summary, the technical and policy analyses indicate that bikesharing is a desirable element of the County's goals to reduce motor vehicle travel demand and expand travel options for a wide variety of users, particularly in densely developed locations such as Central Business Districts and many Metrorail Station Policy Areas. However, the supporting technical and policy information suggest that there are more effective means than parking credits to promote both the County provision of bikesharing and private sector participation in those systems.

## REVIEW OF TECHNICAL INFORMATION

### How Many Parking Spaces Does A Bikeshare Station Remove?

Analysis of Capital Bikeshare (CaBi) user characteristics and regional travel demand suggests that a bikeshare system in Montgomery County that has characteristics similar to the portions of the CaBi system outside the DC Core might be expected to reduce commercial parking demand by 1 to 2 spaces for each bikeshare station provided, as described in the section of this memorandum on analysis of vehicle trip and parking demand reduction. Note that this is based on all development in the vicinity of the bikeshare station, not just the development that is most proximate to (or potentially would fund) a specific bikeshare station. In summary, the analysis found that bikeshare systems are having a positive effect in increasing mobility choices and an identifiable effect on reducing vehicular traffic, but while that traffic reduction effect is measurable, it is also small.

However, a development policy that supports bikeshare would not need to base the numeric equivalencies of parking demand reduction based on currently observed relationships between bikeshare use and parking demand. In fact, the technical analysis found that bikesharing is roughly four times as effective in reducing vehicle trips in the DC core (where parking availability is arguably the most constrained) as it is outside the DC core. In that regard, one could argue that the parking space credits available for bikesharing should be much higher than the current non-DC-core experience has yielded to date in order to help incent a mode shift toward bikesharing.

However, there are other practical considerations that lead to the conclusion that bikesharing stations are not best associated with individual development applications at all.

### Bikesharing as a shared public resource

From a development/zoning perspective, we hypothesize that Montgomery County's bikeshare credit program would most effectively function in a manner similar to the existing Parking Lot Districts. Like public parking structures, bikeshare stations are part of a system that functions more effectively as a shared resource rather than an element of a particular property:

- Bikeshare stations will generally not be located within a particular private structure, but rather owned and operated by the County (or and external company working with the County) within the public right-of-way or on County property.
- In general, the net present value of the operating costs of bikeshare is substantially higher than the initial capital cost, unless the demand is sufficiently high that user fees offset operating costs. (While fiscal self-sufficiency may arguably be achievable for certain Parking Lot Districts, it may not be the case among even the most successful bikeshare systems today. Furthermore, fiscal self-sufficiency is not and should not be a guiding objective of bikeshare policy.)
- The accessibility benefits of a given bikeshare station will not accrue only to the tenants or visitors of the immediately adjacent property, but rather collectively to all properties in the immediate vicinity.
- A single bikeshare station has no value; bikeshare stations are only effective as part of a network of closely spaced facilities. This characteristic is more closely associated with bikeshare than with public parking, but the economies of scale for both operators and customers associated with multiple facilities applies to both bikeshare and public parking.
- At the other end of the scale, there is a point of diminishing returns where providing either too many public parking spaces or bikeshare stations becomes a poor use of public space and a disproportionate operating burden. This characteristic is more closely associated with public parking than with bikeshare due to the relative size and permanence associated with investment in a single facility, but at the same time the County would likely not benefit from, say, several bikeshare stations located along a single block-face.
- The County plans to implement two initial bikeshare systems using public funds, setting up a "free rider" dilemma for properties proximate to those public facilities.

Just as a developer in a Parking Lot District can elect to pay an Ad Valorem tax to reduce parking requirements associated with public sector provision of parking spaces, we suggest that a developer proximate to a bikeshare system would most logically be allowed to reduce parking space requirements by making a bikeshare system payment that the County could use to maintain and/or expand the system. The property could be located either within a certain defined district or within a maximum radius of influence of a bikeshare station, perhaps approximately ½ mile around the station, which corresponds to the approximate upper boundary of the distance people will walk to access bikeshare[1].

[1] Bikesharing in the United States: State of the Practice and Guide to Implementation. Federal Highway Administration. US Department of Transportation.

Subsequently, a crediting strategy must be able to allocate such benefits to, and receive financial contributions from, multiple developers within a radius of influence of a bikeshare station. Under one possible scenario, the initial stations will be funded by a combination of County, State and Federal funding. Developers will be able to receive credit in the form of a proportional reduction in parking requirements, but in return must contribute a proportional amount to support the bikeshare program. Developers may also be able to partially or fully underwrite one or more bikeshare stations. The corresponding challenges will include the appropriate allocation of credits to the sponsoring developer while allowing other developments to participate in the credit/revenue exchange. However, it is not desirable for every new development to install a bikeshare station adjoining their development as the positioning may not be optimal for the operational wellbeing of the system. To this end, it will be of importance that the County is able to distribute contributions to enhance the existing network regionally (i.e. by expanding the number of bikeshare stations or bicycle fleet) regardless of the location of the development.

### Bikesharing as a relatively poor development incentive

Finally, the allowance of a parking credit for bikeshare station installation is not expected to have a substantial incentivizing effect for developers, simply because it will generally overlap with other incentives, most notably the County's shift towards more flexible parking requirements independent of a connection to provisions such as bikesharing. Currently, parking requirements in the CR Zone allow flexibility within a broad range of parking space requirements. For instance, a 100,000 square foot office building in a CR Zone located in the South Central Area of the County (i.e., a place like White Flint) can provide anywhere between 162 and 270 parking spaces. Even if the provision of a bikeshare station were worth one or two parking spaces, it is unlikely that the additional flexibility would exert a significant influence on the parking provision decision.

## SUMMARY OF PRIVATE SECTOR PARTICIPATION OPTIONS

Exhibit 1 summarizes the advantages and limitations associated with a range of options for involving private sector participation in bikeshare station implementation and operations.

**Exhibit 1. Options for Private Sector Developer Participation in Bikeshare System Expansion**

| Option | Description | Advantages | Constraints | Potential |
|---|---|---|---|---|
| Parking credits under Section 59-E of County Code | Developer can reduce number of vehicle parking spaces in exchange for providing bikeshare station | Policy linkage to incent development through reduced development costs in smart growth locations, help achieve adopted non-auto driver mode share goals | Indirect linkage between individual development and bikeshare system, expected lack of incentive due to existing parking requirement flexibility, high operating/capital cost ratio of bikesharing limits efficacy of one-time contribution ratio of bikesharing, "Free Rider" concern | Low |
| LATR or TPAR vehicle trip reduction credits | Specific per-station reduction in vehicle trip generation associated with development review transportation impact studies in exchange for providing bikeshare station | Policy linkage to reduce development impact and cost | Indirect linkage between individual development and bikeshare system, high operating/capital cost ratio of bikesharing limits efficacy of one-time contribution | Low |
| LATR or TPAR trip mitigation credits through Non-Automobile Transportation Facilities | Reduction in vehicle trip mitigation associated with development review transportation impact studies (i.e., at current $12,000 investment per vehicle trip for LATR, or other rate established for LATR and/or TPAR) | Policy linkage to reduce development pressure for roadway widening and provide private sector cost-sharing for bikeshare system expansion | High operating/capital cost ratio of bikesharing limits efficacy of one-time contribution | Exists for LATR, moderate potential for TPAR |
| Negotiation of bikeshare funding as part of Site Plan review | Incorporation of bikeshare provision/funding as part of amenities package | Facilitates best fit for applicant and review/approval agencies | Limited participation by applicants without site plan review | High |
| Bikeshare District | Areawide operating district similar to (or amendment of) Parking Lot District, Transportation Management District, or Urban District with mandatory fees to cover portion of bikeshare system operating costs | Eliminates "free rider" concern | Requires organizational change to implement | Moderate in near term, high in long term |

# 3. Analysis of Vehicle Trip and Parking Demand Reduction

This Section summarizes the findings of the technical analysis to estimate the relationship between bikeshare usage, vehicle trip reduction and parking demand reduction. The relationship compares the extent of observed bikeshare usage from 2012 Capital Bikeshare ridership data and estimated total travel demand patterns from the MWCOG validation year (2007) model for the region. The principal findings are that:

- The influence of bikeshare on vehicle trip reduction is roughly two orders of magnitude greater in the DC Core than in Arlington or Alexandria.
- In Montgomery County, a bikeshare station might be assumed to take between 0.50 and 1.0 peak hour vehicle trips off the road
- In Montgomery County, a bikeshare station taking 1.0 peak hour vehicle trips off the road might be assumed to alleviate the need for about 1.4 parking spaces in an office development or about 1.9 parking spaces in a retail development.
- The technical process has applicability to other MWCOG jurisdictions and future horizon years.

## TECHNICAL ANALYSIS PROCESS

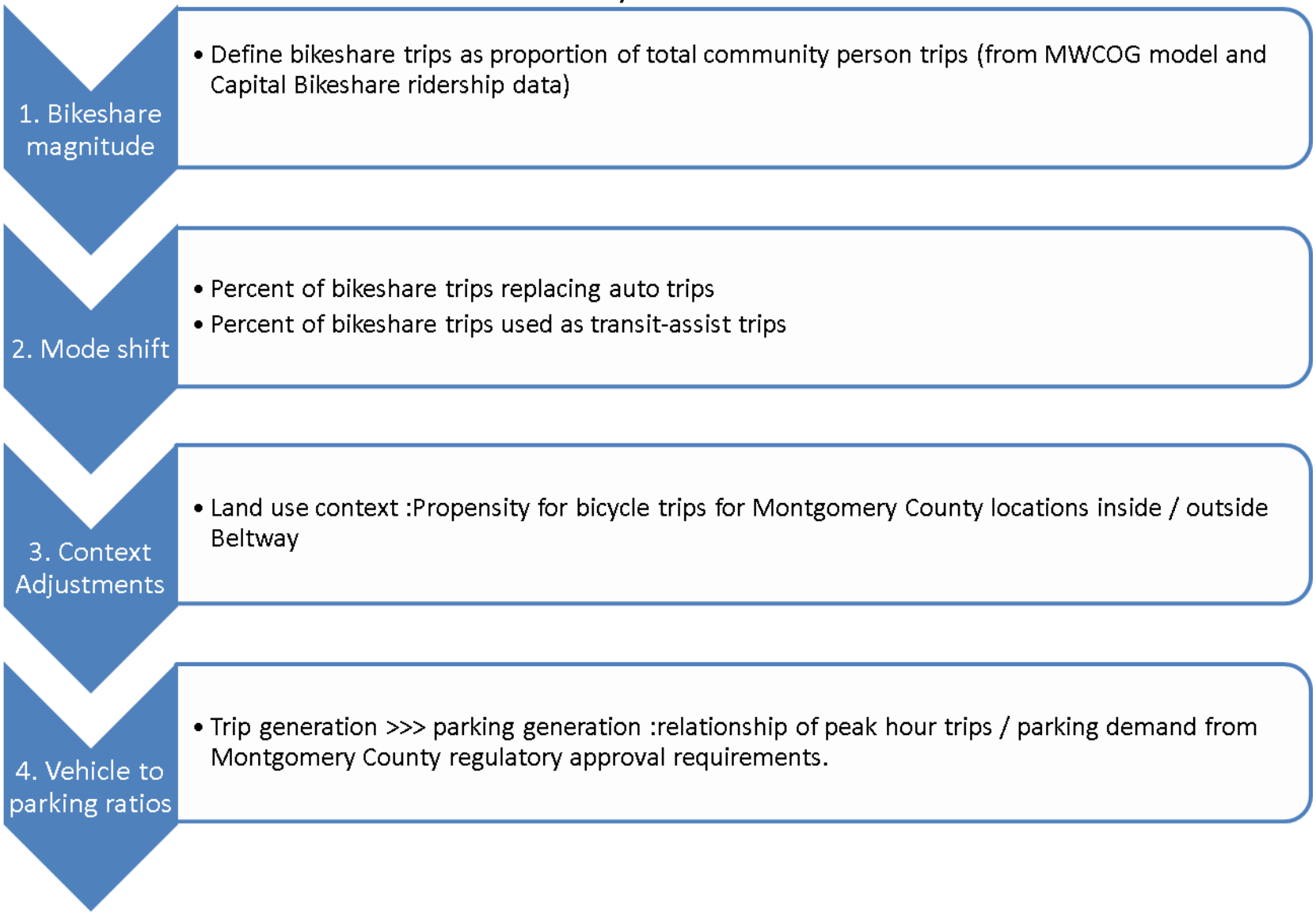
The technical analysis follows the information flow presented at the January 23 technical team meeting, comparing Capital Bikeshare observed trip data to the typical weekday productions and attractions in the MWCOG Version 2.3.37 model. This process is summarized in Exhibit 2. The use of the MWCOG model dataset facilitates a number of potential sensitivity analyses:

- The types of land use "D" variables; notably density, diversity, design, distance to transit, and distance to the core; can be used to translate the existing Capital Bikeshare experience (limited to DC, the Arlington Metrorail corridors, and most recently Old Town Alexandria) to other locations such as Montgomery County.
- The analysis can reflect planned changes in "D" variables over time, particularly valuable in assessing places where substantial changes are contemplated, such as the White Flint and Shady Grove Metrorail stations.

The analytic process to develop vehicle trip and parking space reduction factors expected from bikeshare system development in Montgomery County consists of the three basic steps identified in the flowchart below:

- Step 1: Bikeshare magnitude. This step estimates the proportion of bikeshare trips to all person trips, motorized trips, and auto trips in a geographic area, using the Capital Bikeshare observed trip data and the MWCOG model daily trip production and attraction estimates for the same geographic area.

**Exhibit 2. Analytic Process Flowchart**



- Step 2: Mode shift. This step estimates the number of vehicle trips that can be reduced for each new bikeshare trip. Steps 1 and 2 in tandem describe the estimated number of vehicle trips that will be reduced for each bikeshare trip (and this relationship can be extrapolated to estimate the number of trips per new bikeshare station).
- Step 3: Contextual adjustments. This step builds in the adjustments for land use "D" variables considering the Montgomery County environment.
- Step 4: Vehicle to parking ratios: This step converts the vehicle trip reduction estimates to a parking trip reduction factor.

## EXAMINATION OF INCREASED ACCESSIBILITY

One of the characteristics of the Capital Bikeshare system that inform this analysis is that the bikeshare stations in the DC Core have by far the greatest ridership levels. In part this is due to the demographics of DC Core residents. We find that it is also related to the geographic extent of development in the DC core, compared to that in Arlington and Alexandria, where the transit oriented development has, by policy and design, focused higher densities in a relatively narrow transit corridor. This policy has been extremely successful in helping to create walkable places. The Arlington success in this regard along the Orange Line between Rosslyn and Ballston may, ironically, be a limitation in terms of bikesharing success, in that many of the places one might choose to travel on bike are generally also readily accessible by walking.

We have applied this information to considering pedestrian and bicyclist access from several illustrative origins to help explain how the robust level of destinations in the Washington DC core helps explain the differences in bikeshare use as compared to other activity centers in Arlington and Montgomery County. Exhibits 3 through 8 provide a graphical representation of the areas (or isochrones) that can be reached in 5, 10, and 15 minutes from a sampling of Metrorail stations by pedestrians and bicyclists, including Union Station in DC; Rosslyn and Ballston in Arlington; and Bethesda, Silver Spring, and White Flint in Montgomery County. In each case, the activity centers have a fairly robust local street grid so that the total acreages reachable by either mode are not substantially different for any of the six sample sites. In all cases, the destinations reachable by bicyclists are substantially greater than for pedestrians.

The purple dots on these exhibits show the commercial establishments by location and size. The geographic extent of commercial establishments throughout the DC Core is evidenced by the number of dots throughout the Union Station isochrones. In contrast, the commercial establishments in each of the Arlington and Montgomery County locations are concentrated within the ½ mile walkshed of the Metrorail stations, surrounded by established residential communities.

Exhibits 7 and 8 show the number of cumulative jobs accessible from several of our study area Metrorail stations by walking and bicycling, respectively. This information helps reinforce the value of connectivity and land use in supporting the use of non-motorized modes of travel for short trips. Two findings are of particular note and relevance to this study:

- For places like Union Station that are well connected by a street grid to an extensive commercial business district, the increased mobility provided by bicycle can result in better access to jobs;

**Exhibit 3. Pedestrian Isochrones – Core Jurisdiction Examples**

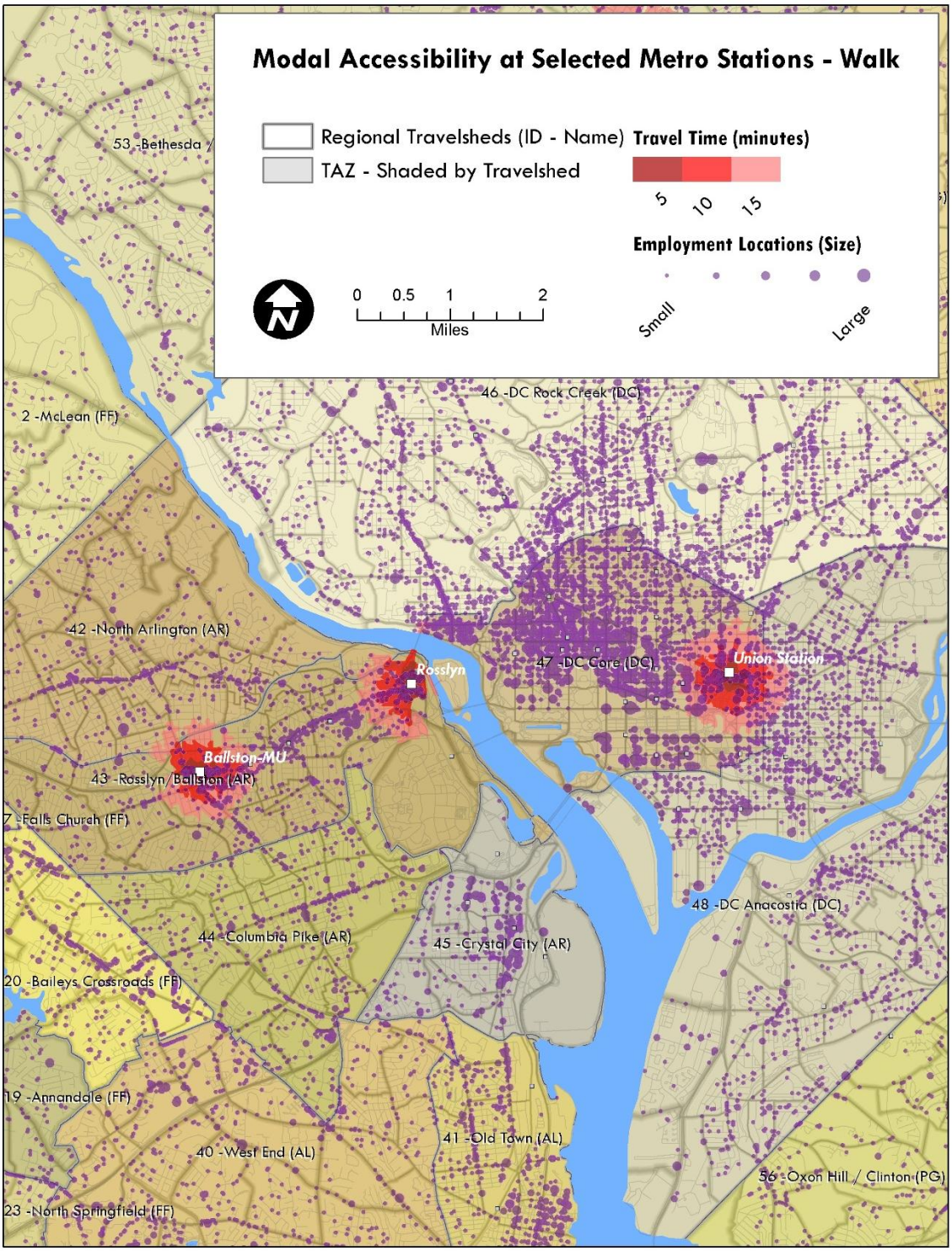


**Exhibit 4. Pedestrian Isochrones – Montgomery County Examples**

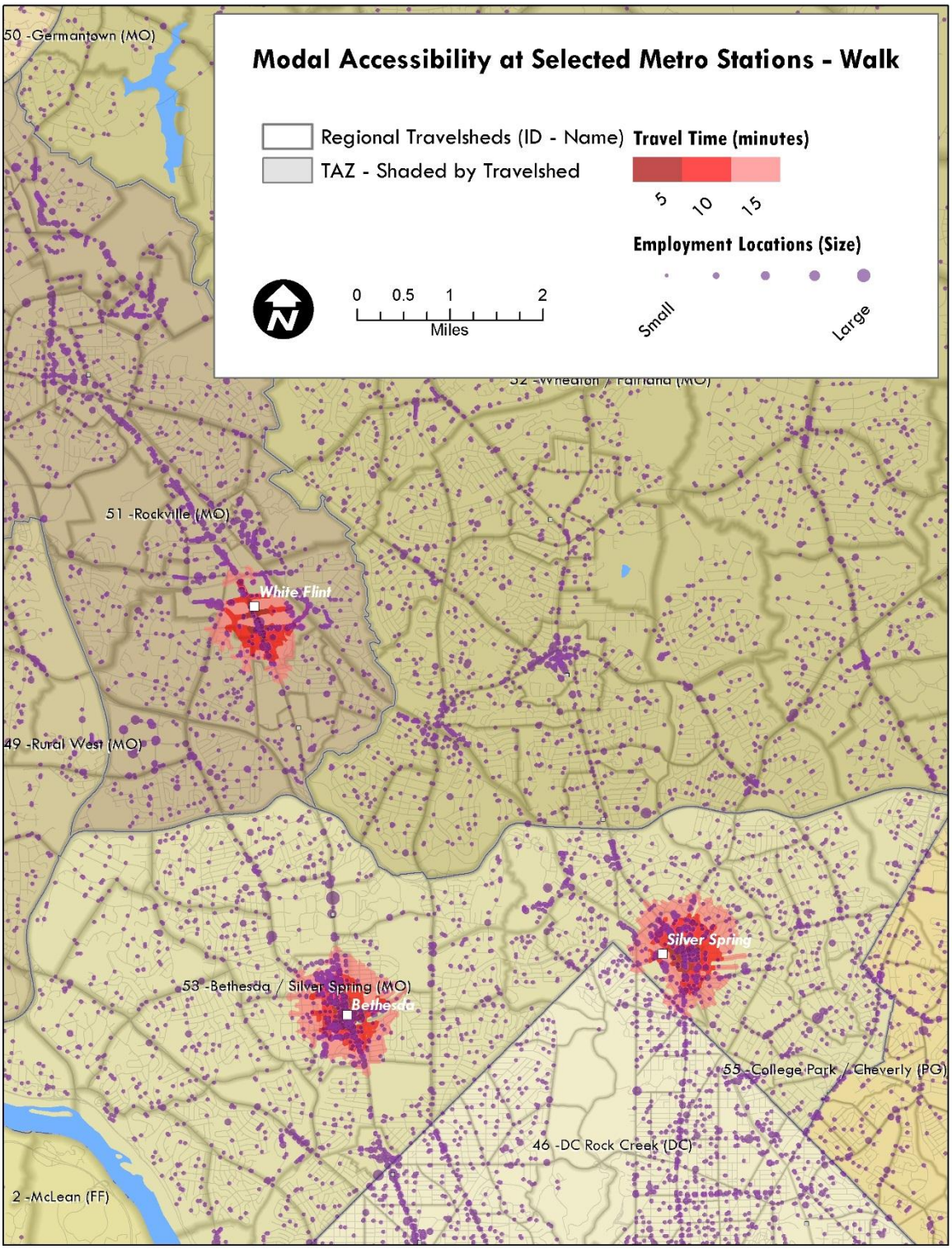


**Exhibit 5. Bicyclist Isochrones – Core Jurisdiction Examples**

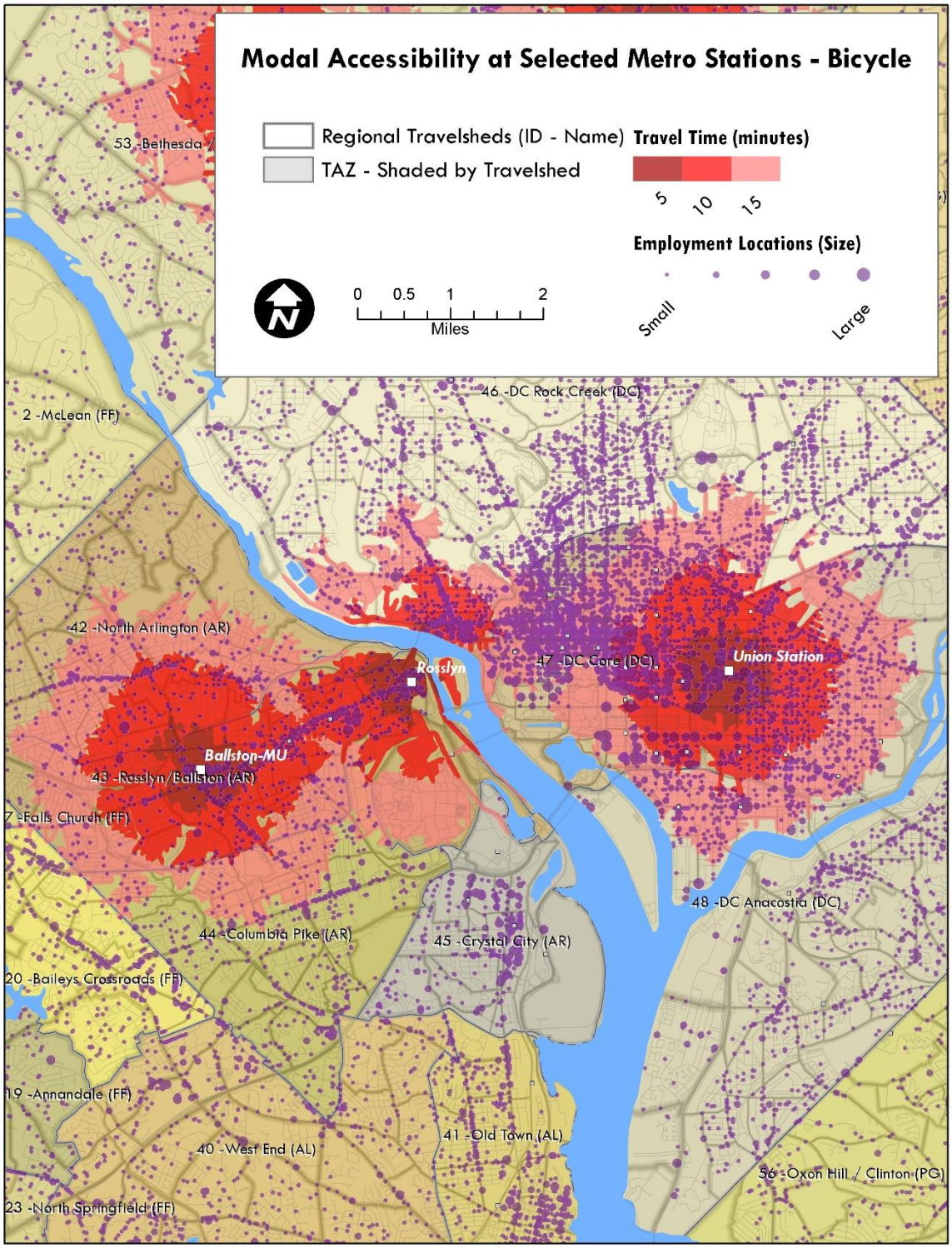


**Exhibit 6. Bicyclist Isochrones – Montgomery County Examples**

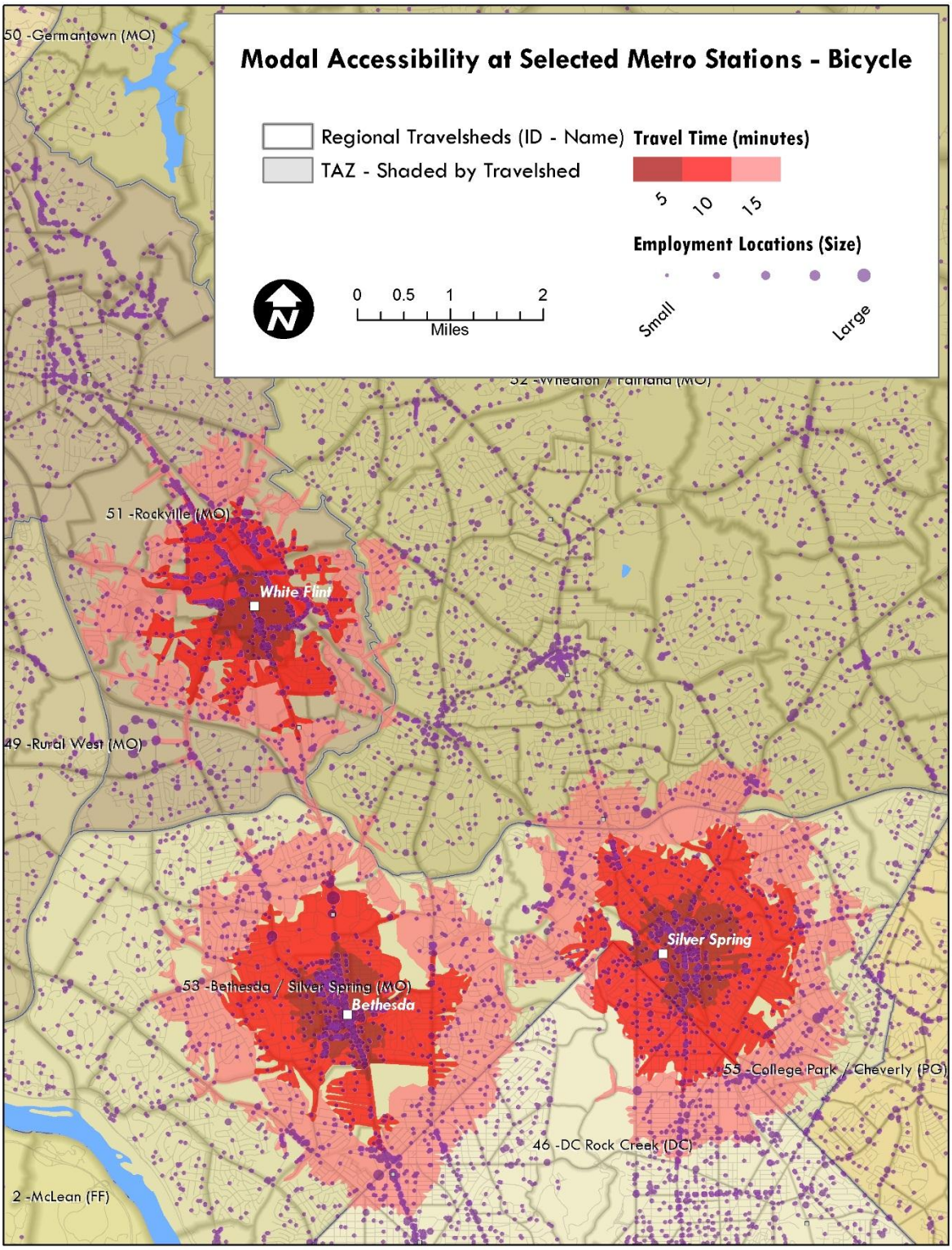


**Exhibit 7. Walk Access to Jobs: 5, 10 and 15 Minute Sheds**

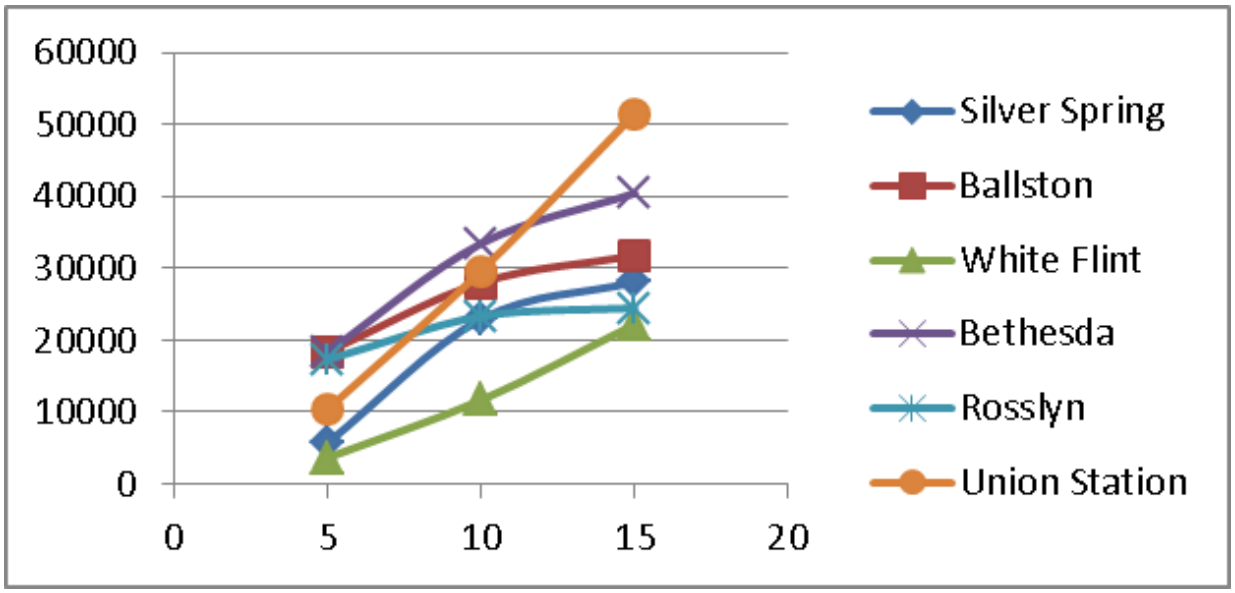
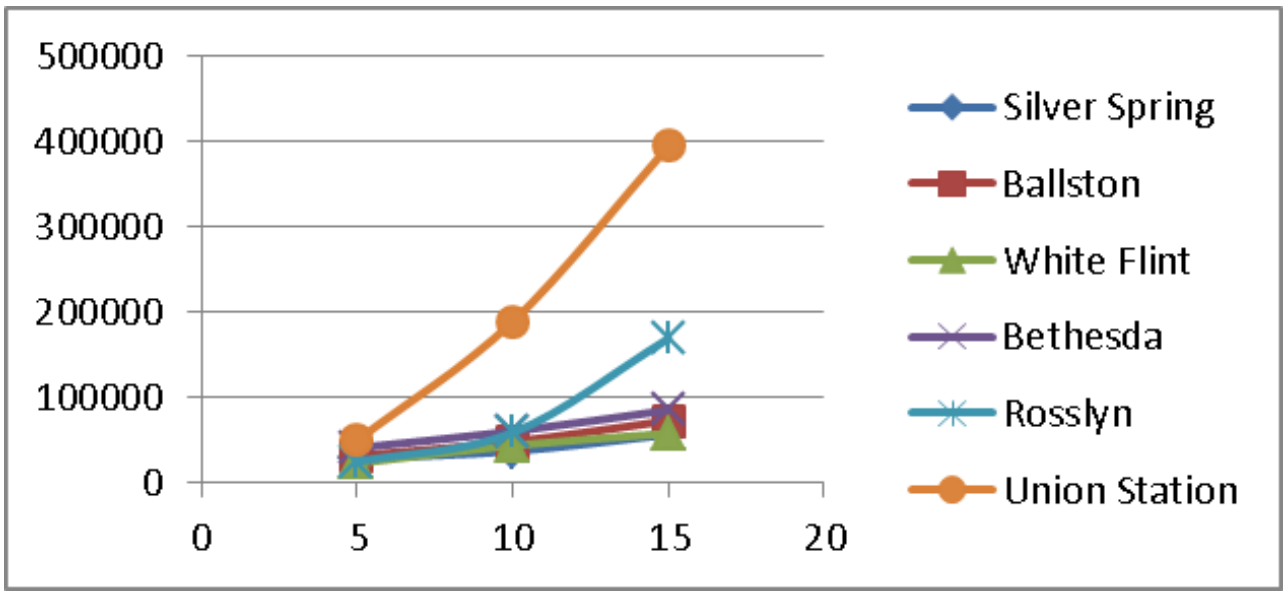



**Exhibit 8. Bicycle Access to Jobs: 5, 10 and 15 Minute Sheds**



- about 8 times as many jobs are reachable from Union Station in a 15-minute bike ride as compared to a 15-minute walk
- Conversely, in places like most Montgomery County business districts that are both compact (i.e., a 15-minute walk takes you from the Metrorail station to any point in the business district) and surrounded by lower density residential communities, the number of job opportunities within 15-minutes by bike is only about 2 times as many as are available by a 15-minute walk.

One area for further study could be how much more accessible the Montgomery County CBDs become with bikeshare allowing a pedestrian with a 10 to 15 minute travel budget to become a bicyclist with a 2 to 3 minute travel budget.

## STEP 1. BIKESHARE MAGNITUDE

The Capital Bikeshare ridership data for 2012 can be aggregated to show trip ends by MWCOG model TAZ, and into larger aggregations of TAZs that we label "travelsheds", to examine trip patterns at a subregional level. For the sake of efficiency in model development, we have used travelsheds as defined for the Fairfax Countywide Transit Network Study, as shown in Exhibit 9. The Capital Bikeshare stations are currently distributed throughout six of these travelsheds. We have defined the average weekday ridership as the sum of the average ridership at each station for weekdays that the station was open (in order to avoid including zero values for stations that opened mid-year). The average weekday ridership of 6,100 bikeshare trips therefore serves as the basis for our analysis. Weekday ridership is higher during warm weather, as shown in Exhibit 10, although we believe the average weekday ridership across the full year is an appropriate value to base the analysis on.

Exhibit 11 compares current MWCOG travel demand for the TAZs in these travelsheds that have Capital Bikeshare stations and compares those MWCOG person-trip estimates to the number of bikeshare trips and stations. Exhibit 11 tabulates the following information, reading from left to right:

- The TAZs in each travelshed that have Capital Bikeshare stations
- The number of MWCOG model daily person trip ends, or twice the number of productions and attractions from the trip generation file.
- The number of Capital Bikeshare stations in each travelshed
- The number of Capital Bikeshare trip ends in each travelshed, or the sum of the daily bikeshare trips that started in that travelshed plus the daily bikeshare trips that ended in that travelshed
- The ratio between the MWCOG estimates of total person trips and the Capital Bikeshare ridership.

The following exhibits present information for a variety of geographies, including:

- each of the six travelsheds,
- the total system extent
- the portion of the system outside the DC core (the current basis for future Montgomery County characteristics), and
- the portion of the system in Arlington/Alexandria

**Exhibit 9. Bikeshare TAZs and Travelsheds**

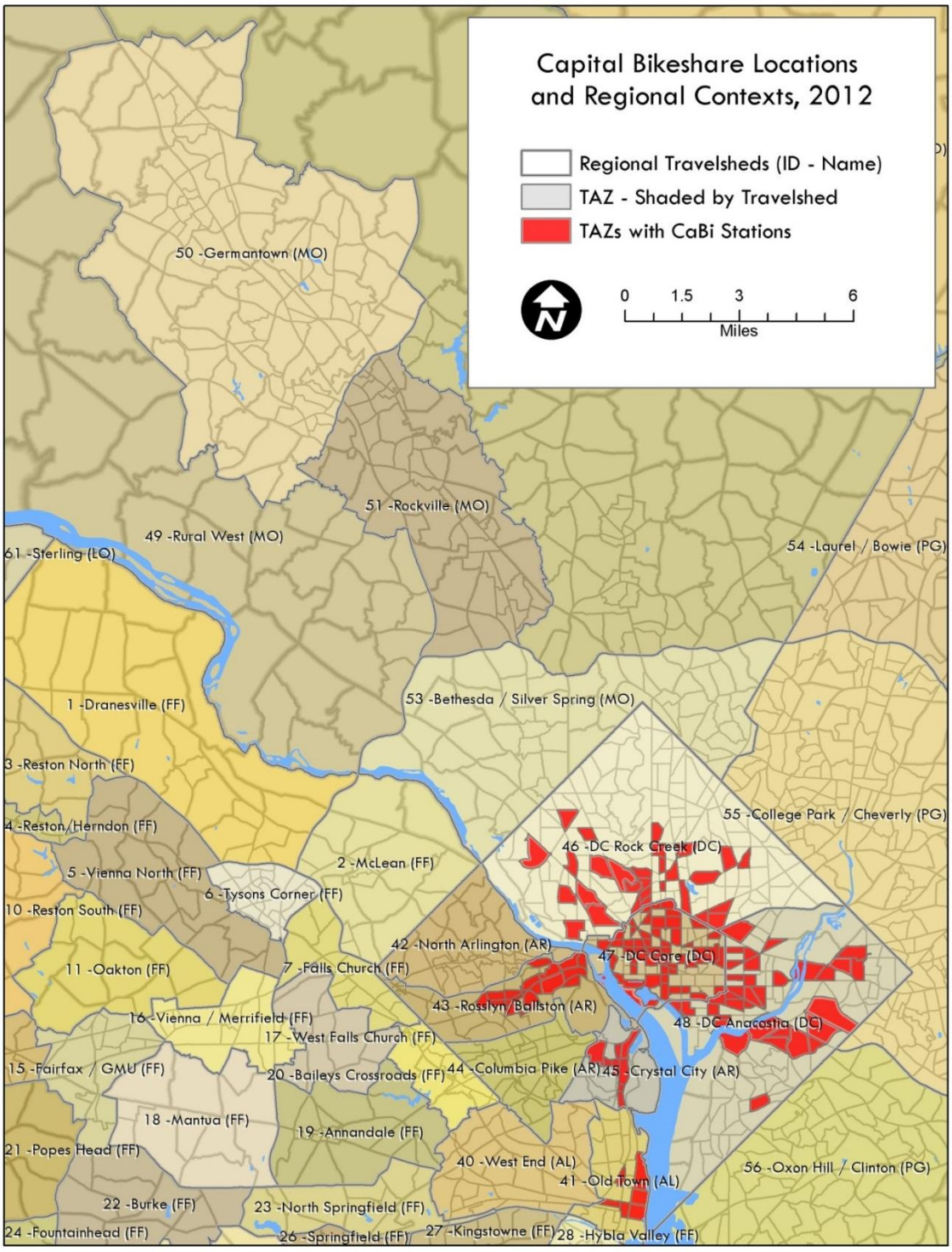
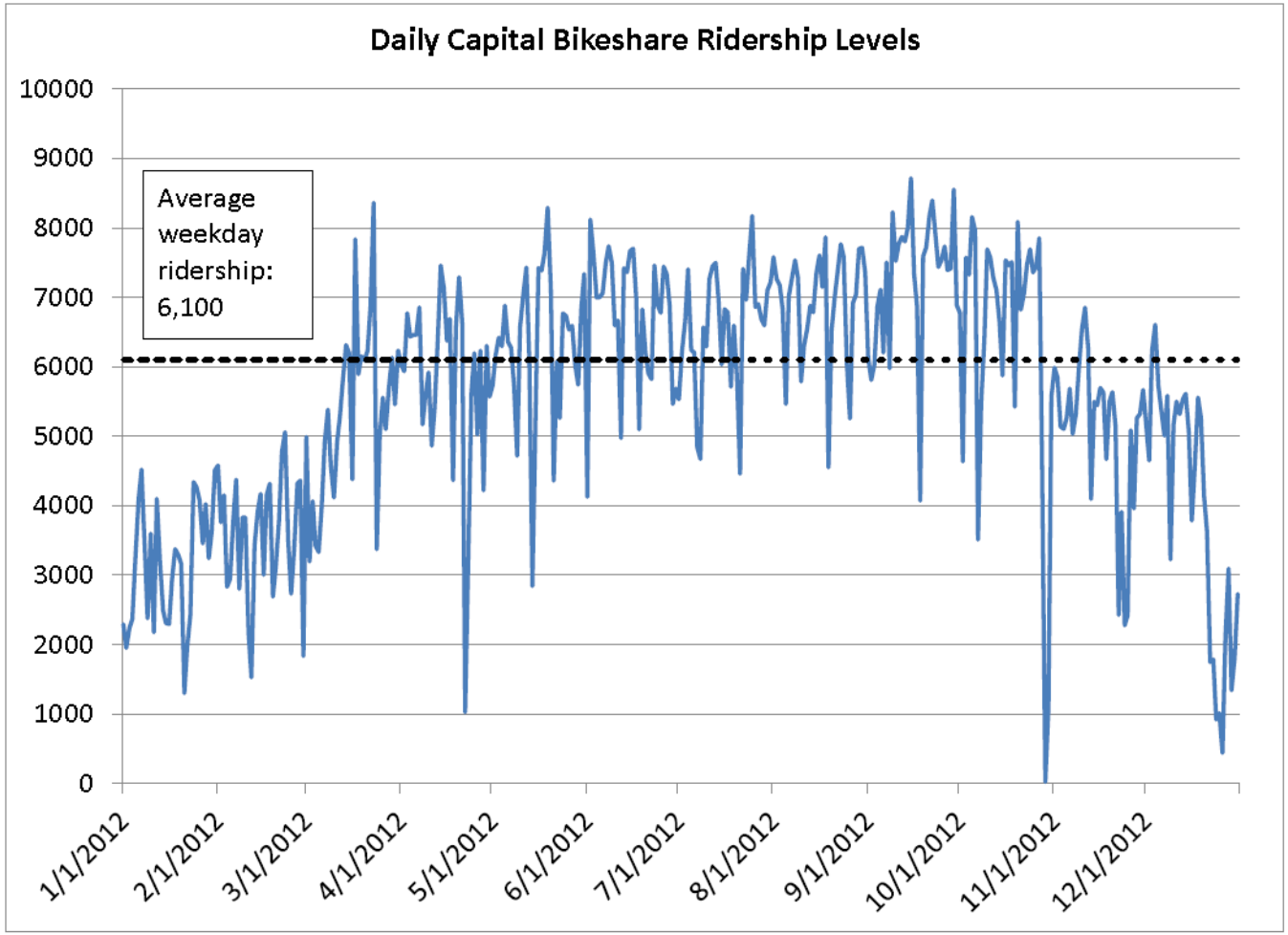


**Exhibit 10. Capital Bikeshare Daily Ridership**



It is clear that the land use and socioeconomic differences in the DC Core create a unique bikeshare environment as evidenced by the transit and nonmotorized mode shares in that travelshed. The DC Rock Creek and DC Anacostia are also somewhat more residentially oriented and less dense than the planned Montgomery County bikeshare environments. Arlington and Alexandria may both have more comparable land use density and diversity to Montgomery County, but the bikeshare experience is newer than in DC. The Alexandria bikeshare stations opened in August 2012, although the Alexandria data shown in this memorandum have been normalized to reflect average weekday ridership for the entire year (in other words, the relationships for Alexandria are not half as strong as they should be based on a half-year of data). The detailed information for Exhibit 11 is also provided in Attachment A, showing both the travelshed totals and the individual TAZ information.

**Exhibit 11. Bikeshare Proportion of Total Person Trip Ends by Travelshed**

| A. Geographic location (and Travelshed) | B. MWCOG TAZs | C. MWCOG 2007 daily person trips | D. Capital Bikeshare stations, 2012 | E. Capital Bikeshare average weekday trip ends, 2012 | F. Daily person trips per bikeshare trip (C/E) |
|---|---|---|---|---|---|
| **DC Core (#47)** | 2, 3, 6, 9, 11-14, 18, 20, 21-23, 26-30, 32, 34-39, 41, 43, 45, 46, 50, 54-56, 60, 62, 180, 182, 183,185, 186, 188, 189, 190, 194, 196, 200, 201, 206, 209, 282, 283, 287 | 3,028,901 | 69 | 7,804 | 388 |
| **DC Rock Creek (parts of #46)** | 66, 70, 75, 76, 81, 94, 101, 134, 142, 149, 150, 152-154, 159, 160, 162, 163, 166, 169, 174, 178, 179, 210, 212, 213, 223, 226, 231 | 923,884 | 34 | 1,863 | 496 |
| **DC Anacostia (parts of #48)** | 255-257, 269, 273, 275, 277, 278, 280, 289, 297, 298, 300, 302, 307, 309, 310, 312, 315-318, 323, 357, 363, 366, 367, 372-374, 378, 383, 384 | 699,379 | 37 | 1,546 | 452 |
| **Arlington R-B corridor (parts of #43)** | 1414-1416, 1457-1460, 1465, 1472-1475, 1477, 1478, 1480, 1481, 1483, 1535 | 1,896,794 | 32 | 556 | 3,414 |
| **Arlington Jeff Davis corridor (parts of #45)** | 1492, 1499-1502, 1504, 1507, 1508 | 878,853 | 15 | 309 | 2,843 |
| **Old Town Alexandria (parts of #46)** | 1579, 1594, 1596, 1600, 1601, 1604 | 286,584 | 8 | 110 | 2,602 |
| **TOTALS** | | 7,714,395 | 195 | 12,188 | 633 |
| **TOTALS, non-DC-Core** | | 4,685,494 | 126 | 4,384 | 1,068 |
| **TOTALS, Virginia** | | 3,062,230 | 55 | 975 | 3,141 |

Exhibit 11 shows that in downtown DC there are about 388 person trips for every bikeshare trip, whereas in the Rosslyn-Ballston corridor there are about 3,414 person-trips for every bikeshare trip. The prevalence of non-motorized trips and transit trips are both key elements in the relationship between bikeshare trips and vehicle trips. The MWCOG model data permits development of this linkage, but it has to occur in a two-step process based on the way the MWCOG model processes travel demand estimates. The MWCOG estimates non-motorized trip productions and attractions on a daily basis, but transit trips on a peak period basis. Exhibit 12 provides this information in tabular format. For instance, in the DC Core area, about 31% of all daily trips (for all purposes) are made by walking or biking (or some other non-motorized mode like rollerblading). Of those trips that are motorized, about 43% of the peak period trips are auto driver trips. Combining these two factors, each person trip generates about 0.296 auto trips. Applying this factor to the person trip / Capital Bikeshare trip ratio in Exhibit 11 we see that while there are 388 person trips per Capital Bikeshare trip in the DC Core, we only expect about 115 vehicle trips per Capital Bikeshare trip in the DC Core. The Metrorail station corridors in Arlington and Alexandria also have relatively high proportions of non-motorized and transit mode shares, but the auto trip / person trip conversion factors are still quite higher than in the DC Core.

**Exhibit 12. MWCOG Modal Estimates for Study Travelsheds**

| A.Travelshed | B. Person Trips / Bikeshare Trip | C. Daily Motorized Trip Percentage | D. Peak Period Auto Driver Trips / (Transit Plus Vehicle Trips) | E. Auto Trip / Person Trip Conversion Factor (C*D) | F. Auto Trips / Capital Bikeshare Trips (B*D) |
|---|---|---|---|---|---|
| **DC Core (#47)** | 388 | 69% | 43% | 0.296 | 115 |
| **DC Rock Creek (parts of #46)** | 496 | 78% | 58% | 0.452 | 224 |
| **DC Anacostia (parts of #48)** | 452 | 81% | 58% | 0.474 | 215 |
| **Arlington R-B corridor (parts of #43)** | 3,414 | 82% | 59% | 0.482 | 1,647 |
| **Arlington Jeff Davis corridor (parts of #45)** | 2,843 | 88% | 63% | 0.554 | 1,574 |
| **Old Town Alexandria (parts of #46)** | 2,602 | 78% | 74% | 0.578 | 1,504 |
| **TOTALS** | 633 | 77% | 53% | 0.411 | 201 |
| **TOTALS, non-DC-Core** | 1,068 | 82% | 60% | 0.493 | 433 |
| **TOTALS, Virginia** | 3,141 | 83% | 74% | 0.532 | 1,394 |

## STEP 2. MODE SHIFT

Our second step in assessing the direct vehicle trip reduction associated with a Capital Bikeshare trip is in assessing the likelihood that a Capital Bikeshare trip either replaces an auto trip or provides the "last mile" service that allows an auto trip to be converted to a transit-plus-bikeshare trip.

### Direct Substitution

From Figure 19 of the Capital Bikeshare survey we know that survey respondents indicate that about 7% of Capital Bikeshare trips would have been made via auto if Capital Bikeshare did not exist. Exhibit 6 shows the effect of taking these cars off the road. We can also conclude from Figure 19 of the Capital Bikeshare survey that another 6% of Capital Bikeshare trips replace taxi trips. However, we do not propose to incorporate taxi trips into this analysis on the presumption that the use of Capital Bikeshare doesn't reduce taxi demand substantially enough to reduce the fleet of cruising cabs in any of our travelsheds (nor does it reduce parking demand as addressed in the next section of the analysis).

The first column of Exhibit 13 presents the number of auto trips per Capital Bikeshare trips in the travelshed (from Exhibit 11). The second column of Exhibit 13 presents the percentage of Capital Bikeshare trips that replace an auto trip from the Capital Bikeshare survey, as shown in Attachment B. This information was obtained by crosstabulating the Capital Bikeshare survey data regarding how a Bikeshare trip would have been made (Question 7) by bikeshare trip destination (Question 7C). As indicated Figure 19 in the Capital Bikeshare survey report, the substitution of auto trips (including personal vehicle, company vehicle, and Zipcar) is about 7% systemwide, with only the Anacostia area (at 12.5%) having a significantly different share of auto trips replaced by bikeshare trips.

The first line of Exhibit 13, summarizing the DC Core experience, can be interpreted as follows:

- Column B states the Exhibit 12 conclusion: there are about 115 auto trips for every Capital Bikeshare trip;
- Column C summarizes the Attachment B information: 6.8% of bikeshare trips take one auto trip off the road. Another way of expressing that is the inverse: it takes 100/6.8, or 14.7 bikeshare trips to take one auto trip off the road;
- Column D is the product of Columns B and C: if there are 115 auto trips for every Capital Bikeshare trip and one out of every 14.7 bikeshare trips takes an auto trip off the road, then there are 1,689 auto trips remaining for every auto trip taken off the road.
- Column E is the inverse of Column D; each bikeshare trip reduces area auto trip generation by 0.0592%
- Column F identifies the number of bikeshare trip ends per bikeshare station from the 2012 bikeshare data: on average, each bikeshare station in the DC Core has 113 docking actions (either a bikeshare trip beginning or ending) on a typical weekday; and
- Column G expands the auto trip reduction factor from the individual trip to the total bikeshare station (the product of Columns E and F). In the DC Core, each bikeshare station can be considered equivalent to reducing auto trips by about 6.70%.

**Exhibit 13. Direct Trip Substitution: Bikeshare for Auto Trip**

| A.Travelshed | B. Auto Trips / Capital Bikeshare Trips | C. Percent Capital Bikeshare Trips Replacing Auto trips | D. Auto Trips Remaining For Each Trip Replaced By Capital Bikeshare Trip (B/C) | E. Percent Auto Trips Reduced By Capital Bikeshare Trip (1/D) | F. Capital Bikeshare Trip Ends Per Capital Bikeshare Station | G. Percent Auto Trips Reduced By Capital Bikeshare Station (E*F) |
|---|---|---|---|---|---|---|
| **DC Core (#47)** | 115 | 6.8% | 1,689 | 0.0592% | 113 | 6.70% |
| **DC Rock Creek (parts of #46)** | 224 | 5.6% | 3,998 | 0.0250% | 55 | 1.37% |
| **DC Anacostia (parts of #48)** | 215 | 12.5% | 1,716 | 0.0583% | 42 | 2.44% |
| **Arlington R-B corridor (parts of #43)** | 1,647 | 6.6% | 24,950 | 0.0040% | 17 | 0.07% |
| **Arlington Jeff Davis corridor (parts of #45)** | 1,574 | 6.6% | 23,852 | 0.0042% | 21 | 0.09% |
| **Old Town Alexandria (parts of #46)** | 1,504 | 7.0% | 22,784 | 0.0044% | 14 | 0.06% |
| **TOTALS** | 201 | 7.0% | 2,870 | 0.0348% | 62 | 2.18% |
| **TOTALS, non-DC-Core** | 433 | 7.1% | 6,096 | 0.0164% | 35 | 0.57% |
| **TOTALS, Virginia** | 1,394 | 6.6% | 21,119 | 0.0047% | 18 | 0.08% |

As indicated in Exhibit 13, the estimated effect of Capital Bikeshare trips on reducing auto trips is measurable in the DC Core, but based on current bikeshare system travel patterns, the same effect is substantially muted for locations beyond the DC boundary.

In the non-DC Core areas the ratio of auto trips to bikeshare trips (Exhibit 13, Column B) are more than three times as high as in the DC Core, and the number of daily trips per bikeshare station (Exhibit 13, Column F) is about one-third the rate of stations in the DC Core. Therefore, the vehicle trip reduction associated with a bikeshare station outside the DC Core through direct substitution is a multiplier of those two ratios, or less than one-tenth of that in the DC Core. In other words, a bikeshare station in the DC Core might reduce area auto traffic by as much as 6.70%, but elsewhere in the system the effect of a bikeshare station is about a 0.57% reduction in vehicle traffic

## Transit Assist Trips

About 2,300 of the 5,464 Capital Bikeshare survey respondents answered Question 8 regarding whether or not they used Capital Bikeshare to access transit. As indicated in Figure 17 of the survey report, about half of the respondents answered this question and of those, about 80% indicated that they used Capital Bikeshare to get to or from Metrorail (whether always, sometimes, or rarely) and about 45% indicated that they used Capital Bikeshare to get to bus services.

The adjustment of reported "typical" use to reflect average uses is challenging. Fortunately, we have a somewhat similar comparable in the reporting of induced trips. From page 33 of the Capital Bikeshare survey report we know that 44% of survey respondents said they have used Capital Bikeshare to take at least one induced trip (i.e., a trip they would not have made without Capital Bikeshare) during the past month and from Figure 19 we understand that, for the most recent trip, only 4% of the trips were induced trips. Applying a similar percentage, if 80% of respondents indicate that they have used Capital Bikeshare to connect to transit in the past month, then perhaps as many as 8% of the most recent trips could have that function. (Note that access to transit was an option, equivalent to more conventional trip purposes such as work-related or shopping related, but was not reported in the survey report). This assumption, in comparison with the 7% assumption for direct substitution trips would lead us to conclude that the proportion of vehicle trips reduced by transit-assist bikeshare trips would be roughly equivalent to the number reduced by direct substitution (about 0.059% in the DC Core, and about 0.016% elsewhere in the system). We therefore conclude that for the purposes of the Montgomery County analysis, **each bikeshare trip contributes 0.016% towards removing one vehicle trip off the road through transit-assist replacement.**

## STEP 3. APPLICATION TO MONTGOMERY COUNTY

We would initially propose that the Arlington relationships be applied to Montgomery County, considering the specific locations of bikeshare in Montgomery County activity centers. For this status report, we provide an example below that shows how the application would work for Silver Spring and Bethesda.

Exhibit 14 provides a summary of the "reverse engineering" process to derive an estimated number of vehicle trips reduced per bikeshare station in Silver Spring and Bethesda. For Silver Spring:

- Column B shows that there are 222,508 daily motorized trips generated by the Silver Spring CBD from the MWCOG model;
- Column C shows the prevailing transit/auto mode share, 73%, for the Bethesda/Silver Spring travelshed;
- Column D calculates the daily vehicle trip ends, 162,431;
- Column E identifies the percent auto trips reduced by the Capital Bikeshare system in a non-DC core environment:
    - 0.0164% for direct substitution, plus
    - 0.0164% for transit assist, equals
    - 0.0328% total
- Column F shows that 53 daily vehicle trips would be assumed to be reduced by a Capital Bikeshare system in Silver Spring that has similar extent and success of that in DC;
- Column G assumes that this system would have about 5 bikeshare stations based on the density of bikeshare stations outside the DC core (where there are 8.9 stations per square mile in those TAZs that have stations as identified in Exhibit 9)
- Column H identifies that on average, the 162 daily vehicle trips reduced would be distributed across the 20 stations for 8.1 vehicle trips per station; and
- Column I applies a 10% peak-to-daily ratio to estimate that each bikeshare station might be assumed to take 1.0 peak hour vehicle trips off the road.

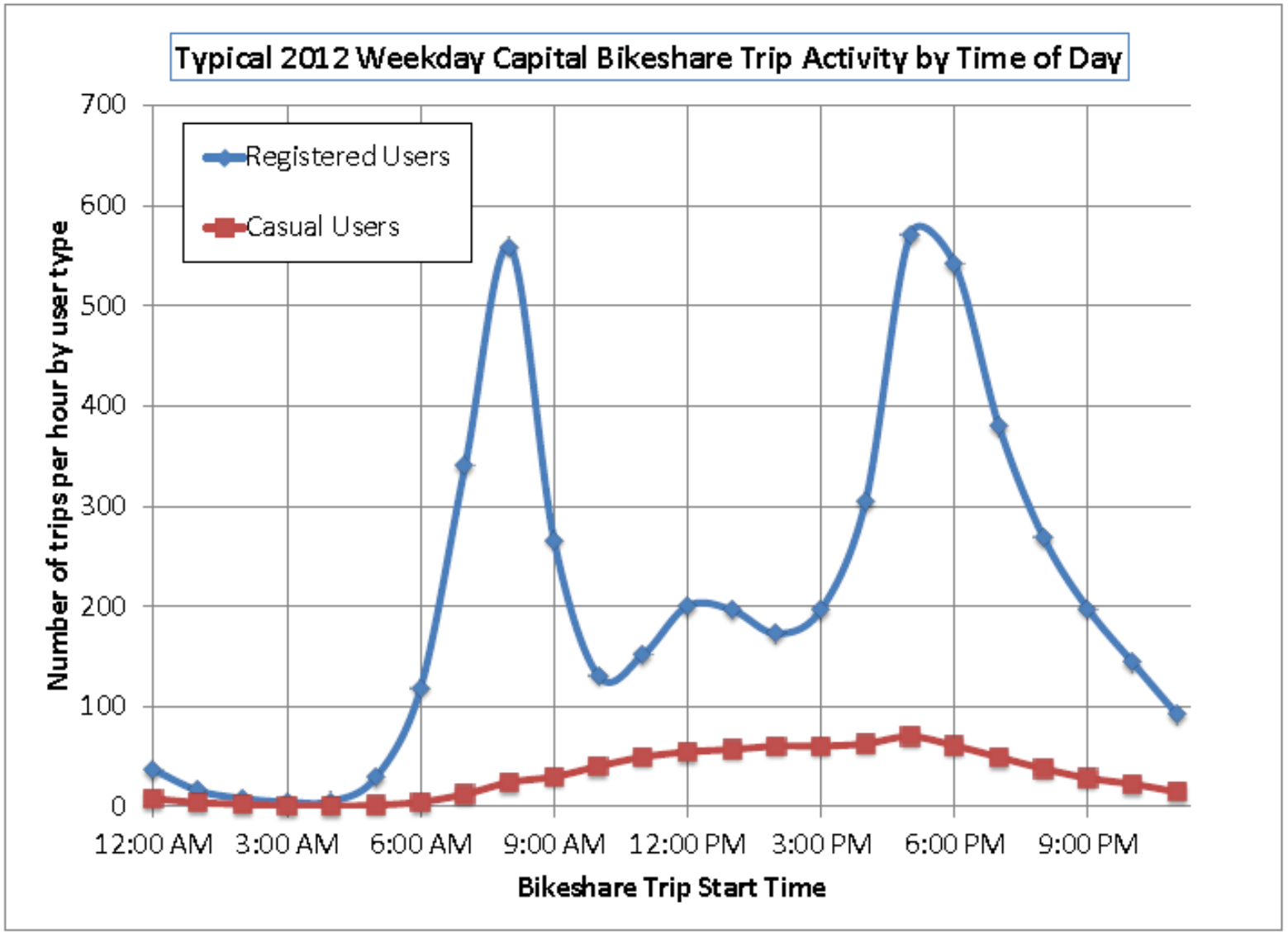
**Exhibit 14. Application of Auto Trip Reduction Percentage to Silver Spring and Bethesda**

| A. Activity Center | B. Daily Motorized Trip Ends From MWCOG Model | C. Peak Period Auto Driver Trips / (Transit Plus Vehicle Trips) | D. Daily Auto Trips (B*C) | E. Percent Auto Trips Reduced By Capital Bikeshare System Equivalent To Dc Non-Core System | F. Daily Vehicle Trips Reduced Per Capital Bikeshare System (D*E) | G. Assumed Number Of Capital Bikeshare Stations In System | H. Daily Vehicle Trips Reduced Per Capital Bikeshare Station (F/G) | I. Peak Hour Vehicle Trips Reduced By Capital Bikeshare Station (10% K Factor) |
|---|---|---|---|---|---|---|---|---|
| **Silver Spring (TAZs 623-625)** | 222,508 | 73% | 162,431 | 0.033% | 53 | 5.3 | 10.0 | 1.0 |
| **Bethesda (TAZs 632, 662, 663)** | 204,681 | 73% | 149,417 | 0.033% | 49 | 9.9 | 4.9 | 0.49 |
| **White Flint (TAZs 686, 687)** | 107,267 | 85% | 91,177 | 0.033% | 30 | 5.9 | 5.1 | 0.51 |

The same calculations for Bethesda and White Flint demonstrate slightly lower, yet similar results. Overall, we might expect **each bikeshare station to reduce trip generation at that station (i.e., one trip end) by between 0.5 and 1.0 vehicle trips.**

We find that the Capital Bikeshare survey data indicates that bikeshare trip purposes are generally compatible with overall trip purposes. As shown in Exhibit 15, we also see that the diurnal curve for typical weekday trips is generally compatible with vehicle trip diurnal curves. The diurnal curve for casual users is different than that for registered users, but the number of trips taken by registered users is substantially higher than those by casual users. We therefore conclude that **no special factors need to be applied in this analysis for trip purpose or time of day.**

**Exhibit 15. Capital Bikeshare Typical Weekday Diurnal Curve**



## STEP 4. PARKING REDUCTION

The next step in the study process is the conversion of the vehicle trip reduction estimates to parking reduction estimates. For this exercise, we would propose to convert vehicle trip generation rates to parking generation rates, using equivalency factors as described below:

### Office

The LATR trip generation rate for the Bethesda/Friendship Heights CBD is 1.5 trips per 1,000 GSF and the number of required parking spaces in the Southern area is 2.1 spaces per 1,000 GSF (for an office located 800' – 1,600' from a Metrorail station). So a bikeshare station that reduces 1.0 peak hour vehicle trips could also be assumed to **reduce the need for about 1.4 parking spaces in an office development.**

### Retail

The LATR trip generation rate for the Bethesda/Friendship Heights CBD is 2.6 trips per 1,000 GSF and the number of required parking spaces for general retail is 5.0 spaces per 1,000 GSLA. So a bikeshare station that reduces 1.0 peak hour vehicle trips could also be assumed **to reduce the need for about 1.9 parking spaces in a retail development.**

# 4. Potential Tools to Reduce Bikeshare Data Gaps

This study identified a number of data gaps regarding bikeshare use during the analytic review process, particularly related to the effect of bikeshare systems on travel behavior. Some of this data could require significant resources to acquire through additional survey activities, otherwise might be more readily developed through minor changes in survey instruments already used by local, regional, and national organizations. In particular, two types of data limitations affected this study and these gaps could be closed by changes to future travel survey instruments.

## UNDERSTANDING TRANSIT-ASSIST TRIPS

Bikesharing is widely accepted as a logical "last-mile" connection to transit, based on its clear ability to perform this function. However, the degree to which bikeshare actually is serving this function is difficult to ascertain. For instance, the 2011 Capital Bikeshare survey asked a variety of questions of CaBi members specifically regarding both the most recent bikeshare trip taken and also about the use of CaBi generally. The CaBi survey revealed that:

- More than half of respondents indicated that they use bikeshare to get to or from Metrorail "always" or "sometimes", yet less than 1% of respondents indicated that their most recent trip was to access another form of transportation.
- 44% of respondents indicated that they have used bikeshare to make an induced trip (a trip they would not have made if bikeshare was not available), yet only 4% indicated that their last trip was an induced trip.

To close this gap:

- Bikeshare system user surveys might separate out the "access to other transportation" trip purpose as one of the primary purposes (equivalent to "access to another destination" or "bicycle circular tour returning to station of origin") before asking about trip purposes.
- Transit user surveys could include "bikeshare" (and "carshare") as independent mode-of-access opinions to begin identifying the proportion of bikeshare users out of the observed total universe of transit users as identified by farebox data.

## UNDERSTANDING BIKESHARE MODE SHARE OF ALL PERSON TRIPS

The extent of bikesharing trips as a proportion of overall travel is not directly estimable. The process described in Section 3 of this report provides a workable linkage between the amount of observed bikeshare activity from bikeshare station transactional data and the amount of estimated person tripmaking for a generally comparable geographic area from a regional travel demand model. The primary limitations of this approach is that the geographic areas of bikeshare system coverage and travelshed coverage must be approximated, and that the person-trip and non-motorized trip estimates used as a denominator are synthetic (model based) rather than survey based.

The following changes to survey instruments are recommended for consideration to close this gap.

- Survey instruments should treat bikeshare (and carshare) as separate modes from privately owned bicycles and autos for the purposes of reporting journeys. This change could be fairly readily incorporated into next generation surveys for a variety of data collection efforts, including:
    - Montgomery County Transportation Management District employer commute surveys
    - MWCOG Household Travel Surveys
    - WMATA mode of access surveys
    - On-board transit operator surveys
    - Site level trip-generation surveys
    - Trip diary surveys developed for activity based modeling
    - National Personal Transportation Survey

# 5. Emerging Practices for Supporting Infrastructure and Policies

This memorandum identifies those practices for bikeshare system supporting infrastructure and policies identified as preferable through coordination with bikeshare system operators, both during and subsequent to the development of the Federal Highway Administration report "Bikesharing in the United States: State of the Practice and Guide to Implementation", prepared by Toole Design Group in September 2012.

As part of the FHWA study, operators and managers of existing bike share systems were asked if the presence of a completely built out network of bicycle facilities was a prerequisite to launching a bike share system. Generally, the answers were nuanced. Almost all responded that they had some level of bike infrastructure in place (trails, bike lanes, etc.) at the time of launch, but no one indicated that they had a complete network.

## INFRASTRUCTURE CONSIDERATIONS

### Extent of Bike Network

Respondents did agree that in order for bike share to work, the areas around and between stations had to be "bikeable." This could include low speed and low volume streets, dedicated facilities on major streets (bike lanes, cycle tracks, etc.) likely to be used by bike share users, and a general awareness of bicyclists by all users of the transportation system (including transit drivers and taxi operators).

Furthermore, there was broad consensus that introduction of a bike share system almost immediately created a demand for more bicycle facilities to support travel by bike share, and by general bicycling.

It is our understanding the Montgomery County will be installing wayfinding to help bike share users find stations, which will help with local navigation.

### Location of Bike Share Stations on Sidewalks

Care should be taken to locate bike share stations in a manner to minimize conflicts with pedestrians, maintain accessible pathways, and avoid conflicts with off-street garage driveways. Care should also be taken to ensure that bike share does not impair normal pedestrian flows in and out of entrances to buildings near the stations. It should be assumed that bike share riders will ride bicycles on sidewalks near the bike share station on both ends of a trip (traveling from a dock or to a dock).

### Location of Bike Share Stations On Street (e.g. in on-street parking stalls)

Bike share stations can be located in on street parking stalls. This can be a quick way of locating a station in an area where the demand justifies the installation, but there is not adequate sidewalk space. However, care is necessary in selecting a location and designing the facility. Candidate streets should be relatively low speed and low volume local streets with 24-hour on-street parking. The actual bike share facility should be located at one end of the block, unless a mid-block location is desirable in order to locate the station near a trail or other high demand destination. Stations should be protected by either a curb extension, or flexible curbing and flexpost bollards to alert motorists to the station.

Consideration should be given to how a cyclist would enter/exit the station. It is not desirable to have a bike share rider back up into a travel lane to exit the station. Installation designs should consider how a rider would navigate the sidewalk curb (i.e. does the bike need to be lifted up onto the curb?).

### Service Vehicle Parking

All bike share stations will need to be attended by the system operator regularly to maintain the station and bicycles, rebalance bikes, change batteries, etc. As such, consideration should be given to where the service vehicle will park. Generally, service vehicles are only at a station for brief periods of time (up to 10 minutes) and may park temporarily. Stations should not be located too far from a roadway. Bike share stations located on trails may need to be visited occasionally and service vehicle access and parking should be considered.

## POLICY CONSIDERATIONS

### Supportive Policies

#### Permitting

It is beneficial to have flexible policies related to installation of bike share stations in the public right of way. Many communities have streamlined the station permitting process- either waiving permit requirements for all bike share stations provided certain criteria are met, or at the very least requiring minimal administrative processes to obtain approval for installation. For instance, the City of Phoenix, Arizona has indicated that it will perform all permitting functions in house, and not require the selected bike share vendor to develop applications and apply for permits.

#### Outdoor Advertising

Restrictive outdoor advertising regulations can reduce revenue-generating opportunities for a bike share system. Many communities are reviewing their outdoor advertising requirements to allow modest advertising on the bikes, on the stations, or both. Any consideration of advertising should also consider community preferences and broader goals related to visual clutter. Washington DC recently passed special legislation related to outdoor advertising that allows advertising on the two sided map panel at a station see:

http://www.dccouncil.us/files/user_uploads/event_testimony/Appendix_K_SpecialPurposeRevenue.pdf)

Arlington, Washington DC and Alexandria all currently allow advertising on the bicycles as they are not fixed objects.

#### Roadway Design

As part of the need to create bikeable areas to support bike share, it is important for communities to have roadway design policies, guidelines and standards that accommodate and provide high quality bicycling environments for cyclists. In urbanized areas, standards should provide flexibility to utilize road diets (removing travel lanes) and lane diets (narrowing travel lanes) to allow for the reconfiguration of roadway surfaces to accommodate bicyclists. The AASHTO Guide for the Development of Bicycle Facilities provides useful guidance on the bicycle facility design. Departments of transportation should evaluate level of

service targets to see if higher motor vehicle level of service targets are creating obstacles to improving accommodations for non-motorized travel modes.

## Potentially Detrimental Policies

### Mandatory Helmet Laws

Currently, bike share is not operating in cities in the US that have mandatory helmet laws. When the Seattle bike share system launches, it will be the first system in a US city with a mandatory helmet requirement. This requirement has proven to be a logistical and technological challenge to provide helmets at all bike share stations. Helmet dispensing machine prototypes have been developed; however they have a fairly large footprint, will require significant electrical power, and will need to be resupplied with fresh helmets frequently. Melbourne, Australia instituted its bikeshare system in 2010, although ridership has been disappointing, and has been linked to a nationwide mandatory helmet law instituted in the 1990s. When the laws were introduced, several studies estimated overall cycling rates dropping by 30 to 40 percent:

http://ipa.org.au/publications/2019/australia's-helmet-law-disaster

A recent research report of barriers to use of the Melbourne bike share system identified the mandatory helmet requirement as one of the most significant challenges:

http://www.sciencedirect.com/science/article/pii/S1369847812000733

Conversely, Mexico City removed a mandatory helmet law prior to launching their bike share system to remove barriers to system success.

### Historic District Requirements

The installation of the New York City bike share system has brought with it some confusion and pushback from preservationists with regards to the location of bike share systems in historic districts in New York. Concerns have been raised about the visual impact of bike share stations on the historic character of neighborhoods. As of now, New York City officials have not indicated that any policy changes are needed to allow bike share stations to be located in their historic districts, but this is an important factor for Montgomery County to have in mind when considering neighborhood acceptance of bike share stations.

# 6. Marketing Indirect Benefits Associated With Bikesharing

This paper addresses two important aspects of implementing and evaluating a bike share program. The first section, Bike Share Performance Metrics, introduces an array of potential performance metrics that can be used to evaluate bike share programs. The second section, Marketing Bike Share, introduces the components of a marketing and sponsorship deck that Montgomery County might further develop to effectively solicit support and partnerships from the private sector.

## BIKE SHARE PERFORMANCE METRICS

The following metrics have been compiled from various sources including bikeshare system operators, customer surveys and household surveys. Most of the already available data has been used in the planning and optimization of existing programs as well as the evaluation of customer service. The data has been divided into three different subgroups that correspond to different aspects of bike share.

### Operations

This data is readily available by most US operators, and it helps qualify system usage. The data serves a function for both system planners and operators. On the planning side, the data helps demonstrate the efficiencies and needs of the existing program, so as to help plan additional stations. On the operator perspective, the data helps demonstrate system patterns that can help with redistribution patterns. Local jurisdictions including Washington, DC, Arlington County, and the City of Alexandria have required the operator of their bike share program, Alta Bikeshare, to report on these metrics on a monthly basis to better understand the progress in the implementation of said program.

- Rides per bike
- Rides per station
- Station origin
- Station destination
- Rides per customer
- As the crow flies destinations
- Rides per time interval
- Miles traveled
- Instances of full stations
- Instances of empty stations
- Number of bikes
- Number of stations
- Number of users by type (i.e. annual, monthly, weekly, daily)
- Customer service (i.e. calls received, answered, solved, etc.)
- Incidents (crash/accidents)
- GPS routes

### Revenue

The data included in this category is used to understand the true costs of implementing, managing and operating a bike sharing program. It also helps planners understand how land use patterns affect the revenues generated throughout the system, and provides an account of which locations will generate more revenue, and which locations will need to be subsidized. Local jurisdictions including Washington, DC, Arlington County, and the City of Alexandria have required the operator of their bike share program, Alta Bikeshare, to report on these metrics on a monthly basis to better understand the progress in the implementation of the program.

- Revenue by user type
- Usage Revenue
- Revenue by station
- O&M Costs (i.e. marketing, customer service, rebalancing)
- Refunds
- Revenue by Sponsorship type
- Revenue by Advertising

### Customer Demographics

This set of metrics helps planners and operators gain a better understanding of bike share users. By learning about user age, sex, ethnicity, and other demographics; planners and operators can determine which populations are using the system, as well as promote and market the program to those populations which have not yet experienced it. This information is collected for annual and monthly members during system signup and through an annual customer survey. Data on casual users (i.e. daily, three day, weekly users) is limited as the sign-up interface does not require the user to share all this data.

- Gender
- Age
- Zip Code of Residence
- Ethnicity
- Household Income
- Educational Achievement

### TDM Program Survey

This information helps improve the effectiveness of TDM programs, and identify possible problems and opportunities for improvement. This information can be used to produce an annual "State of the Commute" report, which describes TDM programs and resources, travel trends, and comparisons with other communities.

## MARKETING BIKESHARE

Montgomery County's expansion of the Capital Bikeshare system will require a substantial capital outlay to ongoing operations and additional maintenance needs including new parts, normal wear and tear on the bikes, as well as bicycle and station replacements. These ongoing maintenance and replacement needs,

known as State of Good Repair (SGR) costs, will initially be only a small share of the capital budget but will grow over time and may become quite substantial. Recognizing the County's interest in establishing partnerships with private sector to diversify the funding sources, it will be beneficial for the County to put together a sound Marketing and Sponsorship Deck to inform potential partners about the benefits of marketing with Montgomery County's bike share program.

A Marketing and Sponsorship deck uses targeted and strategic messaging to help promote and increase financial support for a product or program. A bike share marketing and sponsorship deck typically includes information about what bike share is, the benefits of bike share, the types of sponsorship available and associated costs, information on potential users, and an explanation on why a company should consider sponsoring the program.

The following is an example of the elements included in a Sponsorship Deck:

## What is bike share?

Bike sharing is a non-motorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (usually around 1/2 mile to 3 miles). It provides users the ability to pick up a bicycle at any self-serve bike station in the network and return it to any bike station located near their destination.

## What kinds of sponsorships are available?

Existing programs throughout the U.S. have offered different types of sponsorships to help fund the system. However, because of the regional nature of the Capital Bikeshare system requiring agreement by all jurisdictions on any major system-wide changes, the Station Sponsorship model will be is the most viable sponsorship option for the County as it does not require approval from other jurisdictions signed on to the project.

Station sponsorships allow organizations to fund the placement of a station in the location of their choice. Station sponsorships vary in cost depending on location and size of station, but in general will equal the capital cost of the station itself along with the cost of subsidizing operations and future maintenance needs. Station sponsors will receive branding recognition on the station, typically alongside the station name or within the map panel.

## Who will be using bike share?

### User Demographics

User demographics are important for potential sponsors to understand what the potential audience will be. User demographics are usually broken down by age, race, income distribution and location.

### A large user base of regular members and infrequent users

Sponsoring bike share stations will allow organizations to connect with a large base of bike share members and irregular casual users. With over four million individual trips already under its belt, Capital Bikeshare is the largest bike share program in the US. The system has approximately 20,000 annual members and over 240,000 casual users who utilize the system regularly for everything from commuting to work to a fun evening out with friends.

### A dynamic, young, and well-educated demographic

Experience from Capital Bikeshare indicates that users tend to be young and well-educated. The 2011 Capital Bikeshare member Survey results indicated that "compared to all commuters in the region [Capital Bikeshare users] are on average, considerably younger, more likely to be male and Caucasian, highly educated, and slightly less affluent.

### Connect with users through multiple means

Station Sponsors may have the opportunity to reach users through various means. Along with branding on the stations and bicycles, the station sponsor's branding may be featured on the system's website, mobile app, and marketing materials.

## Why Support Bike share?

### Connect to one of the country's largest planned bike sharing systems

Bike share has the ability to drastically change how people in Montgomery County get around. The first two phases of the system have been designed to extend the reach of Montgomery County's existing public transit system, providing people greater access to jobs, work, recreation, and entertainment. Sponsored stations will be able to connect into an existing network of 221 stations serving that serves a residential population of upwards of 1 million people and a worker population of more than 2 million people per day.

### Create an attractive amenity for employees, residents and visitors

On-site bike share stations have increasingly become an amenity used to attract and retain tenants and visitors. A bike share program can help attract additional customers to the different retail locations, while providing enhanced mobility options for employees and residents.

### Reduce parking demands on your site

Because of the County's interest in reducing parking demands on different sites, the County may want to encourage developers to sponsor and locate bike share stations on their properties as part of their site plan review process for new development. Peer communities are utilizing bike share as a way to mitigate the traffic impacts of new development and even reduce development parking requirements. In a survey of four major North American bike share systems, 40% of respondents said they drive less since joining bike share.

### Receive Brand Exposure and Join in the "Buzz"

Station sponsors in other programs have reported receiving branding exposure through stations located with close proximity to their properties, and have joined in on the media buzz generated by the system launch.

### Contribute to a Healthier Environment for Your Clientele

A variety of indirect benefits are associated with bikeshare activities, including those excerpted below from the MWCOG Tiger II grant application:

- User Cost Savings – change in per mile user fee based on mode shift. Assumptions include average trip length (HHTS 2007/2008), vehicle operating costs (fuel costs, maintenance, repair, tire costs and capital depreciation), average transit fares (average rail vs. bus trips, SmarTrip usage, and fares), average taxi fares; and bike fees.
- Travel Time savings – measures the time difference for bike trip shifted from another source. Assumptions include mode shifts, average trip length, average speed by mode, value of time. All assumptions from NHTSA data
- Increased access – benefit from trips taken that previously were not possible or worth the time or cost.
- Congestion reduction – VMT reduction calculations and a congestion reduction value all using NHTSA data.
- Emissions reduction – reductions in VOC's, Nitrogen Dioxide, and CO2. All data from MWCOG.
- Improved public health – Assumptions: health care cost increase for people completing 30 minutes of daily exercise vs. those that currently do not ($20 per year), the percent of those bicycling or walking who do not meet activity recommendations (conservatively assumed to be 20%), and the average extra exercise time needed to meet the requirement (15 minutes).
- Accident reduction - calculation assuming that with each VMT reduced, accident risk decreases. Data from NHTSA.

## Becoming a Sponsor

### Levels of Participation

A sponsorship and marketing deck will include descriptions of the various types of advertising available, and the associated costs. It should be organized by media type (e.g. on the bikes, on the station kiosks, program website, promotional materials, promotional events, smartphone app, etc.). It should also provide information about the amount of space available, colors available, etc.

### Contact Information

The sponsorship and marketing deck should identify a point of contact for parties interested in obtaining more information about underwriting/advertising the bike share program.

## Other Considerations

### Outdoor Advertising Regulations

Montgomery County staff involved with bikeshare have already investigated existing regulations related to advertising associated with the County's bikeshare program. It will be important to incorporate these regulations into the program, and evaluate whether modifications to regulations may be necessary to allow for desired types of advertising.

# Attachment A: MWCOG P/A data and bikeshare trips by TAZ

| | | MWCOG 2007 model daily trip ends Twice the P's and A's | | | | | CaBi Daily Trip Ends | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Summary | | Square Mi | PandA_MTR | PandA_NMT | PandA_ALL | PandA_PctNMT | Num Stations | Trips begin | Trips end | Total | Pct Tot Trips | Motor/CaBi | Trip ends/ station | Stations/ Square Mile |
| DC Core (DC) | | 3.6 | 2,104,826.8 | 923,673.8 | 3,028,900.6 | 31% | 69.0 | 3,987.2 | 3,806.3 | 7,833.5 | 0.26% | 268.74 | 113.09 | 19.0 |
| DC Rock Creek (DC) | | 4.6 | 724,482.3 | 199,402.5 | 923,884.8 | 22% | 34.0 | 824.0 | 1,039.0 | 1,863.0 | 0.20% | 388.88 | 54.79 | 7.3 |
| DC Anacostia (DC) | | 5.9 | 569,414.5 | 129,264.8 | 698,679.3 | 19% | 37.0 | 786.3 | 760.0 | 1,546.3 | 0.22% | 368.24 | 41.79 | 6.3 |
| Rosslyn/Ballston (AR) | | 1.9 | 1,558,881.5 | 337,512.6 | 1,896,794.1 | 18% | 32.0 | 265.0 | 230.6 | 595.6 | 0.03% | 2305.90 | 17.36 | 16.9 |
| Crystal City (AR) | | 0.8 | 769,566.4 | 109,296.1 | 878,862.6 | 12% | 15.0 | 158.2 | 150.9 | 309.1 | 0.04% | 2488.80 | 20.61 | 17.8 |
| Old Town (AL) | | 0.9 | 223,795.7 | 62,787.8 | 286,583.5 | 22% | 8.0 | 56.5 | 53.7 | 110.2 | 0.04% | 2031.61 | 13.77 | 9.0 |
| TOTALS | | 17.8 | 5,951,957.3 | 1,763,337.6 | 7,714,395.0 | 23% | 195.0 | 6,087.1 | 6,100.5 | 12,187.6 | 0.16% | 488.29 | 62.50 | 11.0 |
| TOTALS minus DC Core | | 14.1 | 3,846,130.5 | 839,663.8 | 4,685,494.3 | 18% | 126.0 | 2,099.9 | 2,294.2 | 4,394.1 | 0.09% | 377.29 | 34.79 | 8.9 |
| TOTALS ARL/ALX only | | 3.6 | 2,552,233.7 | 509,696.6 | 3,062,230.2 | 17% | 55.0 | 479.7 | 495.2 | 974.8 | 0.03% | 2518.18 | 17.72 | 15.2 |

| | | TAZ | PandA_MTR | PandA_NMT | PandA_ALL | PandA_PctNMT | TERMINALS | AvgWkdayAs | AvgWkdayPs | AvgWkdayT | PCTTOT | LAND AREA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| District of Columbia | DC Core (DC) | 2 | 582.64 | 104.5 | 687.14 | 15% | 1 | 44.89 | 49.03 | 93.92 | 13.67% | 0.1553 |
| District of Columbia | DC Core (DC) | 3 | 0.00 | 0.00 | 0.00 | 0% | 1 | 43.27 | 42.60 | 85.87 | #DIV/0! | 0.2038 |
| District of Columbia | DC Core (DC) | 6 | 0.00 | 0.00 | 0.00 | 0% | 1 | 37.32 | 38.43 | 75.75 | #DIV/0! | 0.0385 |
| District of Columbia | DC Core (DC) | 9 | 512.16 | 121.20 | 633.36 | 19% | 1 | 75.88 | 76.05 | 151.94 | 23.99% | 0.1368 |
| District of Columbia | DC Core (DC) | 11 | 39119.74 | 8773.14 | 47852.88 | 18% | 1 | 47.09 | 47.53 | 94.62 | 0.20% | 0.0565 |
| District of Columbia | DC Core (DC) | 12 | 45541.56 | 11306.00 | 56847.56 | 20% | 1 | 47.21 | 46.00 | 93.21 | 0.16% | 0.0645 |
| District of Columbia | DC Core (DC) | 13 | 1515.66 | 502.48 | 2018.14 | 25% | 1 | 56.06 | 54.88 | 110.94 | 5.50% | 0.0502 |
| District of Columbia | DC Core (DC) | 14 | 22903.64 | 7626.30 | 30529.94 | 25% | 1 | 53.92 | 44.60 | 98.51 | 0.32% | 0.0366 |
| District of Columbia | DC Core (DC) | 18 | 62158.06 | 19560.76 | 81718.84 | 24% | 2 | 85.05 | 79.77 | 164.82 | 0.20% | 0.0501 |
| District of Columbia | DC Core (DC) | 20 | 70391.32 | 29156.36 | 99547.68 | 29% | 2 | 161.02 | 145.15 | 306.16 | 0.31% | 0.0556 |
| District of Columbia | DC Core (DC) | 21 | 47846.52 | 18636.94 | 66483.46 | 28% | 1 | 38.96 | 35.91 | 74.87 | 0.11% | 0.0309 |
| District of Columbia | DC Core (DC) | 22 | 27453.86 | 10114.34 | 37568.20 | 27% | 1 | 55.22 | 48.62 | 103.83 | 0.28% | 0.0487 |
| District of Columbia | DC Core (DC) | 23 | 34032.44 | 16377.00 | 50409.44 | 32% | 1 | 60.46 | 75.03 | 135.49 | 0.31% | 0.0355 |
| District of Columbia | DC Core (DC) | 26 | 24716.70 | 12690.20 | 37316.90 | 34% | 1 | 50.07 | 53.70 | 103.77 | 0.28% | 0.0466 |
| District of Columbia | DC Core (DC) | 27 | 38697.28 | 20649.14 | 59346.42 | 35% | 1 | 46.31 | 48.56 | 94.87 | 0.16% | 0.0411 |
| District of Columbia | DC Core (DC) | 28 | 140039.52 | 66937.04 | 206976.56 | 32% | 2 | 91.18 | 95.73 | 186.91 | 0.09% | 0.0596 |
| District of Columbia | DC Core (DC) | 29 | 67188.48 | 29701.92 | 96890.40 | 31% | 2 | 106.72 | 107.67 | 214.39 | 0.22% | 0.0359 |
| District of Columbia | DC Core (DC) | 30 | 34969.94 | 17779.94 | 52749.88 | 34% | 1 | 53.73 | 50.82 | 104.54 | 0.20% | 0.0355 |
| District of Columbia | DC Core (DC) | 32 | 9335.32 | 3970.92 | 13306.24 | 30% | 1 | 4.24 | 4.41 | 8.65 | 0.07% | 0.0686 |
| District of Columbia | DC Core (DC) | 34 | 38600.46 | 13032.48 | 51632.94 | 25% | 3 | 132.78 | 125.94 | 258.72 | 0.50% | 0.0433 |
| District of Columbia | DC Core (DC) | 35 | 40941.34 | 16477.96 | 57419.30 | 29% | 1 | 46.52 | 47.24 | 93.76 | 0.16% | 0.0456 |
| District of Columbia | DC Core (DC) | 36 | 54814.18 | 25879.06 | 80693.24 | 32% | 1 | 46.58 | 51.03 | 97.61 | 0.12% | 0.0507 |
| District of Columbia | DC Core (DC) | 37 | 144542.16 | 68377.72 | 212919.88 | 32% | 2 | 71.45 | 77.03 | 148.48 | 0.07% | 0.0505 |
| District of Columbia | DC Core (DC) | 38 | 242315.58 | 118496.04 | 360811.62 | 33% | 3 | 127.71 | 125.93 | 253.64 | 0.07% | 0.0544 |
| District of Columbia | DC Core (DC) | 39 | 60328.38 | 30120.10 | 90448.48 | 33% | 1 | 66.97 | 64.20 | 131.17 | 0.15% | 0.0428 |
| District of Columbia | DC Core (DC) | 41 | 78175.98 | 51394.26 | 129570.24 | 40% | 3 | 259.68 | 280.96 | 580.63 | 0.45% | 0.0557 |
| District of Columbia | DC Core (DC) | 43 | 29906.40 | 15228.66 | 45135.06 | 34% | 1 | 79.23 | 78.01 | 157.24 | 0.35% | 0.0535 |
| District of Columbia | DC Core (DC) | 45 | 10170.16 | 5424.48 | 15594.64 | 35% | 1 | 56.54 | 51.29 | 107.82 | 0.69% | 0.0313 |
| District of Columbia | DC Core (DC) | 46 | 10486.26 | 5636.20 | 16122.46 | 35% | 1 | 173.26 | 160.99 | 334.25 | 2.07% | 0.036 |
| District of Columbia | DC Core (DC) | 50 | 20999.24 | 9926.42 | 30925.66 | 32% | 1 | 34.20 | 31.73 | 65.94 | 0.21% | 0.0756 |
| District of Columbia | DC Core (DC) | 54 | 24629.34 | 11118.00 | 35747.34 | 31% | 1 | 60.90 | 57.93 | 118.83 | 0.33% | 0.0632 |
| District of Columbia | DC Core (DC) | 55 | 47764.24 | 23330.64 | 71094.88 | 33% | 1 | 74.72 | 69.69 | 144.41 | 0.20% | 0.0552 |
| District of Columbia | DC Core (DC) | 56 | 137685.36 | 60738.54 | 198423.90 | 31% | 3 | 181.13 | 175.27 | 356.40 | 0.18% | 0.0652 |
| District of Columbia | DC Core (DC) | 60 | 17401.00 | 6496.88 | 23897.88 | 27% | 1 | 12.06 | 10.17 | 22.23 | 0.09% | 0.0743 |
| District of Columbia | DC Core (DC) | 62 | 106035.36 | 45093.68 | 151129.04 | 30% | 4 | 154.90 | 117.74 | 272.64 | 0.18% | 0.0824 |
| District of Columbia | DC Rock Creek (DC) | 66 | 44882.06 | 7081.06 | 51963.12 | 14% | 1 | 37.49 | 35.84 | 73.34 | 0.14% | 0.2166 |
| District of Columbia | DC Rock Creek (DC) | 70 | 14266.96 | 3272.08 | 17539.04 | 19% | 1 | 16.20 | 21.76 | 37.96 | 0.22% | 0.3141 |
| District of Columbia | DC Rock Creek (DC) | 75 | 17476.52 | 2972.60 | 20449.12 | 15% | 1 | 7.58 | 14.22 | 21.80 | 0.11% | 0.2581 |
| District of Columbia | DC Rock Creek (DC) | 76 | 46783.48 | 8299.12 | 55082.60 | 15% | 1 | 8.61 | 18.99 | 27.61 | 0.05% | 0.19 |
| District of Columbia | DC Rock Creek (DC) | 81 | 31679.24 | 5857.58 | 37536.82 | 16% | 1 | 11.79 | 22.29 | 34.08 | 0.09% | 0.1532 |
| District of Columbia | DC Rock Creek (DC) | 94 | 29751.68 | 4122.66 | 33874.34 | 12% | 1 | 9.67 | 16.07 | 25.74 | 0.08% | 0.3621 |
| District of Columbia | DC Rock Creek (DC) | 101 | 9073.98 | 2195.72 | 11229.70 | 19% | 1 | 12.65 | 23.43 | 36.08 | 0.32% | 0.1713 |
| District of Columbia | DC Rock Creek (DC) | 134 | 13237.08 | 3663.72 | 16900.80 | 22% | 1 | 6.08 | 8.27 | 14.34 | 0.08% | 0.1278 |
| District of Columbia | DC Rock Creek (DC) | 142 | 12732.50 | 2195.92 | 14928.42 | 15% | 1 | 14.24 | 19.78 | 34.02 | 0.23% | 0.1187 |
| District of Columbia | DC Rock Creek (DC) | 149 | 48111.72 | 9173.52 | 57285.24 | 16% | 2 | 34.37 | 43.36 | 77.73 | 0.14% | 0.2583 |
| District of Columbia | DC Rock Creek (DC) | 150 | 31051.26 | 6883.78 | 37935.04 | 18% | 1 | 57.44 | 64.10 | 121.54 | 0.32% | 0.3054 |
| District of Columbia | DC Rock Creek (DC) | 152 | 14533.76 | 4892.90 | 19426.66 | 25% | 1 | 9.03 | 8.58 | 17.61 | 0.09% | 0.1182 |
| District of Columbia | DC Rock Creek (DC) | 153 | 25152.12 | 10548.76 | 35700.88 | 30% | 1 | 38.66 | 50.69 | 89.34 | 0.25% | 0.1167 |
| District of Columbia | DC Rock Creek (DC) | 154 | 25924.54 | 11693.36 | 37617.90 | 31% | 1 | 68.88 | 85.50 | 154.38 | 0.42% | 0.0881 |
| District of Columbia | DC Rock Creek (DC) | 159 | 19387.52 | 8334.16 | 27721.68 | 30% | 1 | 16.85 | 22.38 | 39.23 | 0.14% | 0.1203 |
| District of Columbia | DC Rock Creek (DC) | 160 | 15726.20 | 7235.90 | 22962.10 | 32% | 1 | 46.61 | 60.32 | 106.93 | 0.47% | 0.0658 |
| District of Columbia | DC Rock Creek (DC) | 162 | 7077.22 | 2317.10 | 9394.32 | 25% | 1 | 10.19 | 14.49 | 24.68 | 0.26% | 0.0551 |
| District of Columbia | DC Rock Creek (DC) | 163 | 13365.72 | 4892.00 | 18257.72 | 27% | 1 | 26.55 | 34.69 | 61.24 | 0.34% | 0.1169 |
| District of Columbia | DC Rock Creek (DC) | 166 | 37851.96 | 16560.96 | 54412.92 | 30% | 2 | 51.00 | 71.98 | 122.98 | 0.23% | 0.1272 |
| District of Columbia | DC Rock Creek (DC) | 169 | 33980.10 | 9213.98 | 43194.08 | 21% | 1 | 10.66 | 15.00 | 25.66 | 0.06% | 0.1781 |
| District of Columbia | DC Rock Creek (DC) | 174 | 10053.96 | 5509.44 | 15562.80 | 35% | 1 | 41.23 | 56.65 | 97.88 | 0.63% | 0.0772 |
| District of Columbia | DC Rock Creek (DC) | 178 | 11661.60 | 5648.02 | 17309.62 | 33% | 1 | 53.36 | 50.05 | 103.41 | 0.60% | 0.0575 |
| District of Columbia | DC Rock Creek (DC) | 179 | 23377.42 | 10995.66 | 34373.08 | 32% | 1 | 44.51 | 75.18 | 119.69 | 0.35% | 0.0799 |
| District of Columbia | DC Rock Creek (DC) | 180 | 63800.00 | 25301.08 | 89101.08 | 28% | 2 | 107.53 | 120.90 | 228.43 | 0.26% | 0.0757 |
| District of Columbia | DC Core (DC) | 182 | 14769.94 | 8525.94 | 23295.88 | 37% | 1 | 90.46 | 82.46 | 172.92 | 0.74% | 0.0468 |
| District of Columbia | DC Core (DC) | 183 | 11969.12 | 6306.86 | 18275.98 | 35% | 1 | 90.73 | 84.89 | 175.63 | 0.96% | 0.0422 |
| District of Columbia | DC Core (DC) | 185 | 30023.78 | 19916.08 | 49939.86 | 40% | 1 | 102.73 | 93.32 | 196.05 | 0.39% | 0.0609 |
| District of Columbia | DC Core (DC) | 186 | 21373.34 | 14277.58 | 35650.92 | 40% | 1 | 56.78 | 53.28 | 110.06 | 0.31% | 0.1173 |
| District of Columbia | DC Core (DC) | 188 | 14196.16 | 8399.20 | 22595.36 | 37% | 1 | 41.88 | 42.68 | 84.55 | 0.37% | 0.1261 |
| District of Columbia | DC Core (DC) | 189 | 19959.62 | 8929.02 | 28888.64 | 31% | 1 | 59.27 | 54.80 | 114.07 | 0.39% | 0.091 |
| District of Columbia | DC Core (DC) | 190 | 9057.90 | 4534.46 | 13592.36 | 33% | 1 | 37.09 | 34.32 | 71.41 | 0.53% | 0.0809 |
| District of Columbia | DC Core (DC) | 194 | 18870.44 | 11357.64 | 30228.08 | 38% | 1 | 55.46 | 57.53 | 112.98 | 0.37% | 0.1223 |
| District of Columbia | DC Core (DC) | 196 | 4627.42 | 1915.48 | 6542.90 | 29% | 1 | 68.39 | 66.20 | 134.59 | 2.06% | 0.029 |
| District of Columbia | DC Core (DC) | 200 | 31001.02 | 8247.14 | 39248.16 | 21% | 1 | 96.03 | 88.00 | 184.03 | 0.47% | 0.0586 |
| District of Columbia | DC Core (DC) | 201 | 23308.12 | 6504.12 | 29812.24 | 22% | 1 | 54.76 | 54.46 | 109.22 | 0.37% | 0.0664 |
| District of Columbia | DC Core (DC) | 206 | 6732.8 | 1354.84 | 8087.64 | 17% | 1 | 63.75 | 60.12 | 123.87 | 1.53% | 0.0607 |
| District of Columbia | DC Core (DC) | 209 | 12049.4 | 3908.38 | 15957.78 | 24% | 1 | 41.01 | 38.92 | 79.93 | 0.50% | 0.0525 |
| District of Columbia | DC Rock Creek (DC) | 210 | 13272.02 | 4331.18 | 17603.2 | 25% | 1 | 37.25 | 35.31 | 72.46 | 0.41% | 0.0669 |
| District of Columbia | DC Rock Creek (DC) | 212 | 15029.72 | 3101.2 | 19130.92 | 16% | 1 | 9.76 | 9.65 | 19.41 | 0.10% | 0.1526 |
| District of Columbia | DC Rock Creek (DC) | 213 | 21915.26 | 4025.68 | 25940.94 | 16% | 1 | 14.28 | 15.17 | 29.35 | 0.11% | 0.1881 |
| District of Columbia | DC Rock Creek (DC) | 223 | 37973.06 | 4170.18 | 42143.24 | 10% | 1 | 5.53 | 7.32 | 12.85 | 0.03% | 0.218 |
| District of Columbia | DC Rock Creek (DC) | 226 | 17760.06 | 2015.32 | 19775.4 | 10% | 1 | 4.51 | 4.97 | 9.48 | 0.05% | 0.1554 |
| District of Columbia | DC Rock Creek (DC) | 231 | 16604.2 | 2937.84 | 19542.04 | 15% | 2 | 11.68 | 12.05 | 23.74 | 0.12% | 0.1024 |
| District of Columbia | DC Anacostia (DC) | 255 | 16305.82 | 3050.16 | 19355.98 | 16% | 1 | 0.00 | 0.00 | 0.00 | 0.00% | 0.2217 |
| District of Columbia | DC Anacostia (DC) | 256 | 11574.98 | 2557.72 | 14132.7 | 18% | 1 | 2.03 | 2.04 | 4.06 | 0.03% | 0.1865 |
| District of Columbia | DC Anacostia (DC) | 257 | 9407.66 | 1866.12 | 11273.78 | 17% | 1 | 1.59 | 1.56 | 3.16 | 0.03% | 0.196 |
| District of Columbia | DC Anacostia (DC) | 269 | 15730.2 | 3353.64 | 19083.84 | 18% | 1 | 14.76 | 13.92 | 28.68 | 0.15% | 0.1022 |
| District of Columbia | DC Anacostia (DC) | 273 | 17999.42 | 3050.56 | 21049.98 | 14% | 1 | 11.79 | 13.03 | 24.82 | 0.12% | 0.3152 |
| District of Columbia | DC Anacostia (DC) | 275 | 22719.8 | 8424.92 | 31144.72 | 27% | 2 | 75.63 | 61.07 | 136.71 | 0.44% | 0.0617 |
| District of Columbia | DC Anacostia (DC) | 277 | 20388.38 | 7755.9 | 28145.28 | 28% | 1 | 44.93 | 44.82 | 89.75 | 0.32% | 0.1425 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| District of Columbia | DC Anacostia (DC) | 278 | 14067.64 | 5268.6 | 19336.24 | 27% | 1 | 45.21 | 48.09 | 93.30 | 0.48% | 0.075 |
| District of Columbia | DC Anacostia (DC) | 280 | 7016 | 2601.46 | 9617.46 | 27% | 1 | 32.80 | 28.98 | 61.78 | 0.64% | 0.0776 |
| District of Columbia | DC Core (DC) | 282 | 20745.82 | 6354.4 | 27100.22 | 23% | 1 | 38.36 | 35.11 | 73.47 | 0.27% | 0.0974 |
| District of Columbia | DC Core (DC) | 283 | 59043.72 | 14054.84 | 73098.56 | 19% | 1 | 150.84 | 147.14 | 297.98 | 0.40% | 0.1396 |
| District of Columbia | DC Core (DC) | 287 | 30227.86 | 8464.62 | 38692.48 | 22% | 1 | 50.36 | 50.50 | 100.86 | 0.26% | 0.0637 |
| District of Columbia | DC Anacostia (DC) | 288 | 11025.46 | 3826.82 | 14852.28 | 25% | 1 | 84.65 | 89.47 | 174.12 | 1.17% | 0.0622 |
| District of Columbia | DC Anacostia (DC) | 289 | 14436.44 | 4908.86 | 19345.3 | 25% | 1 | 42.78 | 45.77 | 88.55 | 0.46% | 0.1 |
| District of Columbia | DC Anacostia (DC) | 291 | 11500.3 | 4415.38 | 15915.68 | 28% | 1 | 47.38 | 50.15 | 97.53 | 0.61% | 0.0743 |
| District of Columbia | DC Anacostia (DC) | 293 | 12409.28 | 4836.6 | 17245.88 | 28% | 1 | 63.75 | 65.69 | 129.44 | 0.75% | 0.0989 |
| District of Columbia | DC Anacostia (DC) | 296 | 16893.8 | 4331.48 | 21225.28 | 20% | 1 | 23.61 | 24.47 | 48.08 | 0.23% | 0.13 |
| District of Columbia | DC Anacostia (DC) | 297 | 17221.58 | 5530.62 | 22802.8 | 24% | 1 | 26.56 | 25.99 | 52.55 | 0.23% | 0.149 |
| District of Columbia | DC Anacostia (DC) | 298 | 20785.58 | 5756.58 | 26542.16 | 22% | 1 | 17.90 | 17.44 | 35.34 | 0.13% | 0.1232 |
| District of Columbia | DC Anacostia (DC) | 300 | 7608.72 | 2126.16 | 9734.88 | 22% | 1 | 30.22 | 29.98 | 60.20 | 0.62% | 0.0454 |
| District of Columbia | DC Anacostia (DC) | 302 | 52374.84 | 11180.36 | 63555.2 | 18% | 2 | 4.30 | 3.92 | 8.22 | 0.01% | 0.3291 |
| District of Columbia | DC Anacostia (DC) | 307 | 4131.8 | 883.24 | 5015.04 | 18% | 1 | 12.36 | 11.08 | 23.43 | 0.47% | 0.1318 |
| District of Columbia | DC Anacostia (DC) | 309 | 15350.68 | 2627.3 | 17978.18 | 15% | 1 | 2.50 | 2.33 | 4.83 | 0.03% | 0.2414 |
| District of Columbia | DC Anacostia (DC) | 310 | 14720.52 | 2344.64 | 17065.56 | 14% | 1 | 1.58 | 1.52 | 3.11 | 0.02% | 0.1456 |
| District of Columbia | DC Anacostia (DC) | 312 | 13842.52 | 1028.42 | 14870.94 | 7% | 1 | 1.15 | 1.18 | 2.37 | 0.02% | 0.3984 |
| District of Columbia | DC Anacostia (DC) | 315 | 14258.66 | 2859.18 | 17138.84 | 17% | 1 | 1.81 | 1.62 | 3.43 | 0.02% | 0.1421 |
| District of Columbia | DC Anacostia (DC) | 316 | 22419.86 | 4045.38 | 26465.24 | 15% | 1 | 1.51 | 1.62 | 3.13 | 0.01% | 0.1752 |
| District of Columbia | DC Anacostia (DC) | 317 | 24502.22 | 1754.16 | 26256.38 | 7% | 1 | 1.15 | 1.45 | 2.60 | 0.01% | 0.3695 |
| District of Columbia | DC Anacostia (DC) | 318 | 2549.3 | 169.66 | 2718.96 | 6% | 1 | 1.13 | 1.32 | 2.44 | 0.09% | 0.1126 |
| District of Columbia | DC Anacostia (DC) | 323 | 5607.26 | 416.64 | 6023.9 | 7% | 1 | 1.26 | 1.26 | 2.52 | 0.04% | 0.6637 |
| District of Columbia | DC Anacostia (DC) | 357 | 20987.82 | 3037.48 | 23125.3 | 13% | 1 | 1.24 | 1.25 | 2.49 | 0.01% | 0.1591 |
| District of Columbia | DC Anacostia (DC) | 363 | 6919.36 | 859.14 | 7778.5 | 11% | 1 | 2.65 | 2.62 | 5.27 | 0.07% | 0.3236 |
| District of Columbia | DC Anacostia (DC) | 366 | 22054.86 | 4178.14 | 26233 | 15% | 1 | 36.66 | 32.25 | 68.95 | 0.26% | 0.0498 |
| District of Columbia | DC Anacostia (DC) | 367 | 64.4 | 11.08 | 75.48 | 15% | 1 | 13.33 | 10.77 | 24.10 | 31.92% | 0.0658 |
| District of Columbia | DC Anacostia (DC) | 372 | 36042.66 | 8082.88 | 44125.84 | 18% | 1 | 38.21 | 35.21 | 73.42 | 0.17% | 0.093 |
| District of Columbia | DC Anacostia (DC) | 373 | 9465.14 | 2809.58 | 12275.12 | 23% | 1 | 26.42 | 27.06 | 53.48 | 0.44% | 0.1027 |
| District of Columbia | DC Core (DC) | 374 | 25107.14 | 5470.46 | 30577.6 | 18% | 1 | 47.43 | 40.35 | 87.77 | 0.29% | 0.0874 |
| District of Columbia | DC Core (DC) | 378 | 19208.54 | 4812.42 | 24021.36 | 20% | 1 | 54.77 | 52.63 | 107.39 | 0.45% | 0.0435 |
| District of Columbia | DC Anacostia (DC) | 383 | 17028.72 | 3198.74 | 20227.46 | 16% | 1 | 21.35 | 15.24 | 36.59 | 0.18% | 0.0837 |
| District of Columbia | DC Anacostia (DC) | 384 | 40855.52 | 6824.6 | 47676.12 | 14% | 1 | 52.04 | 45.84 | 97.88 | 0.21% | 0.1186 |
| Arlington | Rosslyn/Ballston (AR) | 1414 | 219911.52 | 43385.6 | 263297.52 | 16% | 4 | 16.16 | 16.06 | 32.22 | 0.01% | 0.1057 |
| Arlington | Rosslyn/Ballston (AR) | 1415 | 161031.12 | 30565.6 | 191596.72 | 16% | 2 | 21.66 | 24.61 | 46.28 | 0.02% | 0.0644 |
| Arlington | Rosslyn/Ballston (AR) | 1416 | 536967.08 | 91082 | 628579.28 | 15% | 2 | 11.46 | 12.63 | 24.10 | 0.00% | 0.1152 |
| Arlington | Rosslyn/Ballston (AR) | 1457 | 14444.36 | 3191 | 17635.36 | 18% | 1 | 6.02 | 6.14 | 12.17 | 0.07% | 0.0836 |
| Arlington | Rosslyn/Ballston (AR) | 1458 | 62319.8 | 16719.72 | 79039.52 | 21% | 2 | 18.75 | 21.87 | 40.62 | 0.05% | 0.0598 |
| Arlington | Rosslyn/Ballston (AR) | 1459 | 870.74 | 239.02 | 1109.76 | 22% | 1 | 9.10 | 10.82 | 19.93 | 1.80% | 0.011 |
| Arlington | Rosslyn/Ballston (AR) | 1460 | 35748.76 | 9308.6 | 45057.36 | 21% | 2 | 15.64 | 18.65 | 34.29 | 0.08% | 0.1125 |
| Arlington | Rosslyn/Ballston (AR) | 1465 | 50987.52 | 10485.12 | 61473.04 | 17% | 2 | 17.27 | 22.92 | 40.19 | 0.07% | 0.1177 |
| Arlington | Rosslyn/Ballston (AR) | 1472 | 50463.32 | 10337 | 60800.32 | 17% | 1 | 40.96 | 31.76 | 72.72 | 0.12% | 0.078 |
| Arlington | Rosslyn/Ballston (AR) | 1473 | 44662.44 | 10259.7 | 54921.44 | 19% | 1 | 5.98 | 7.06 | 13.04 | 0.02% | 0.1559 |
| Arlington | Rosslyn/Ballston (AR) | 1474 | 23069.24 | 4237.38 | 27306.62 | 15% | 1 | 0.00 | 0.00 | 0.00 | 0.00% | 0.087 |
| Arlington | Rosslyn/Ballston (AR) | 1475 | 471417.84 | 100137.76 | 571555.6 | 18% | 4 | 41.51 | 41.31 | 82.82 | 0.01% | 0.1477 |
| Arlington | Rosslyn/Ballston (AR) | 1477 | 99634.44 | 23417.94 | 123052.38 | 19% | 3 | 27.75 | 37.71 | 65.50 | 0.05% | 0.1414 |
| Arlington | Rosslyn/Ballston (AR) | 1478 | 230642.2 | 54126.52 | 284768.72 | 19% | 2 | 11.50 | 14.67 | 26.16 | 0.01% | 0.2472 |
| Arlington | Rosslyn/Ballston (AR) | 1480 | 16372.12 | 5460.82 | 21832.94 | 25% | 1 | 5.65 | 7.72 | 13.36 | 0.06% | 0.0754 |
| Arlington | Rosslyn/Ballston (AR) | 1481 | 9208.02 | 2935.84 | 12143.86 | 24% | 1 | 3.04 | 3.28 | 6.33 | 0.05% | 0.1277 |
| Arlington | Rosslyn/Ballston (AR) | 1483 | 1754.54 | 515.56 | 2270.5 | 23% | 1 | 4.10 | 3.96 | 8.05 | 0.35% | 0.0635 |
| Arlington | Crystal City (AR) | 1492 | 240718.08 | 45205.02 | 285923.1 | 16% | 3 | 23.52 | 23.00 | 46.52 | 0.02% | 0.2489 |
| Arlington | Crystal City (AR) | 1499 | 17219.54 | 1563.58 | 18783.52 | 8% | 1 | 7.29 | 6.94 | 14.23 | 0.08% | 0.1575 |
| Arlington | Crystal City (AR) | 1500 | 35310.76 | 5349.86 | 40660.62 | 13% | 1 | 9.54 | 8.70 | 18.24 | 0.04% | 0.0552 |
| Arlington | Crystal City (AR) | 1501 | 418511.7 | 47521 | 466032.7 | 10% | 5 | 69.61 | 72.44 | 142.05 | 0.03% | 0.1586 |
| Arlington | Crystal City (AR) | 1502 | 42708.88 | 7378.06 | 50086.94 | 15% | 1 | 7.50 | 6.84 | 14.34 | 0.03% | 0.0858 |
| Arlington | Crystal City (AR) | 1504 | 8612.66 | 1598.72 | 10211.38 | 15% | 1 | 4.79 | 4.68 | 9.47 | 0.09% | 0.0379 |
| Arlington | Crystal City (AR) | 1507 | 5196.02 | 566.6 | 5762.62 | 10% | 1 | 20.16 | 16.25 | 36.41 | 0.63% | 0.33 |
| Arlington | Crystal City (AR) | 1508 | 12784 | 113.28 | 12981.68 | 8% | 2 | 15.81 | 12.00 | 27.81 | 2.00% | 0.0674 |
| Arlington | Rosslyn/Ballston (AR) | 1535 | 12876.32 | 3480.86 | 16357.18 | 21% | 1 | 8.39 | 9.41 | 17.80 | 0.11% | 0.0939 |
| Alexandria | Old Town (AL) | 1579 | 50845.52 | 10509.7 | 61355.22 | 17% | 1 | 7.86 | 6.99 | 14.44 | 0.02% | 0.2874 |
| Alexandria | Old Town (AL) | 1594 | 59335.32 | 16515.52 | 75850.84 | 22% | 2 | 14.39 | 17.11 | 31.51 | 0.04% | 0.0843 |
| Alexandria | Old Town (AL) | 1596 | 35622.4 | 8468.76 | 44092.16 | 19% | 2 | 10.57 | 12.48 | 23.05 | 0.05% | 0.0854 |
| Alexandria | Old Town (AL) | 1600 | 33717.06 | 13397.78 | 47114.84 | 28% | 1 | 8.99 | 6.61 | 15.60 | 0.03% | 0.1677 |
| Alexandria | Old Town (AL) | 1601 | 29091.52 | 9235.74 | 38327.26 | 24% | 1 | 7.05 | 4.85 | 11.34 | 0.03% | 0.1742 |
| Alexandria | Old Town (AL) | 1604 | 15183.62 | 4659.3 | 19843.22 | 23% | 1 | 7.54 | 6.09 | 13.62 | 0.07% | 0.0852 |

## Attachment B: Direct Substitution of Auto Trips

The table below shows the crosstabulation of Capital Bikeshare survey results for Question 7 (mode) and Question 7C (destination). The total number of responses shown is slightly higher than the 5,465 total survey responses because some surveys identified multiple destinations. The personal car, company car and Zipcar responses were used in the assessment of direct substitution auto trips as indicated in the highlighted rows below.

Without Capital Bikeshare, how would you have made your most recent Bikeshare trip to…

| | Mode | ARL | DC Core | DC RC | DC AN | Other | TOTAL |
|---|---|---|---|---|---|---|---|
| 1 | Transit | 82 | 736 | 583 | 8 | 1366 | 2775 |
| 2 | Personal bike | 8 | 102 | 80 | 0 | 168 | 358 |
| 3 | Personal car | 13 | 101 | 63 | 2 | 221 | 400 |
| 4 | Company car | 0 | 6 | 1 | 0 | 10 | 17 |
| 5 | Taxi | 5 | 109 | 91 | 1 | 150 | 356 |
| 6 | Walk | 68 | 457 | 358 | 4 | 950 | 1837 |
| 7 | Zipcar | 0 | 1 | 5 | 0 | 2 | 8 |
| 8 | Would not have made | 21 | 92 | 60 | 1 | 57 | 231 |
| 9 | Other | 1 | 2 | 3 | 0 | 15 | 21 |
| 88 | No trips yet | 0 | 0 | 1 | 0 | 59 | 60 |
| 99 | Blank | 0 | 1 | 1 | 0 | 0 | 2 |
| | **TOTALS** | **198** | **1607** | **1246** | **16** | **2998** | **6065** |

| | Mode | ARL | DC Core | DC RC | DC AN | Other | TOTAL |
|---|---|---|---|---|---|---|---|
| 1 | Transit | 41.4% | 45.8% | 46.8% | 50.0% | 45.6% | 45.8% |
| 2 | Personal bike | 4.0% | 6.3% | 6.4% | 0.0% | 5.6% | 5.9% |
| 3 | Personal car | 6.6% | 6.3% | 5.1% | 12.5% | 7.4% | 6.6% |
| 4 | Company car | 0.0% | 0.4% | 0.1% | 0.0% | 0.3% | 0.3% |
| 5 | Taxi | 2.5% | 6.8% | 7.3% | 6.3% | 5.0% | 5.9% |
| 6 | Walk | 34.3% | 28.4% | 28.7% | 25.0% | 31.7% | 30.3% |
| 7 | Zipcar | 0.0% | 0.1% | 0.4% | 0.0% | 0.1% | 0.1% |
| 8 | Would not have made | 10.6% | 5.7% | 4.8% | 6.3% | 1.9% | 3.8% |
| 9 | Other | 0.5% | 0.1% | 0.2% | 0.0% | 0.5% | 0.3% |
| 88 | No trips yet | 0.0% | 0.0% | 0.1% | 0.0% | 2.0% | 1.0% |
| 99 | Blank | 0.0% | 0.1% | 0.1% | 0.0% | 0.0% | 0.0% |
| | **TOTALS** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

# Attachment C: Literature Review Gap Analysis

The project literature review focused certain elements of travel behavior as indicated below.

## TARGET AUDIENCE

For the purposes of this project, the primary target market for potential bikeshare users consists of people who are currently driving regularly in the study area and could shift either to bikeshare only, or to a combination of transit and bikeshare to complete their commuting and utilitarian trips. While we have included some information regarding current transit and bicycle usage in Montgomery County in the materials in this report, we have also concluded that further analysis and research should focus on those who are driving and could use bikeshare in the future either as their primary mode of travel or as a mode of access to and from transit.

### Bikeshare Trips Made as Primary Mode

Most of the evidence suggested bikesharing is used for commuting to work and that most trips were less than three miles. Additionally:

- Capital Bikeshare members used the system to get to work (36 %) and from work (46%)
- 63% Capital Bikeshare survey respondents travel fewer than five miles to work and 40% traveled fewer than three miles.
- 29% of Madison B-Cycle users' most common use for B-cycle is getting to work.[2]
- 37.2% of Minneapolis Nice Ride users utilize the system for commuting to work.[3]
- Madison B-Cycle annual member's trips follow a commuter pattern with the heaviest traffic seen at the end of the day (4-4:15 and 5-5:15). Casual users (non-members) show similar patterns, but with more traffic in the early afternoon hours. [4]
- The MWCOG Cost Benefit analysis[5] assumed there would be a mode shift to bikeshare of:
    - 50% from transit
    - 26% from walking
    - 8% from cars or motorcycles
    - 5% from personal bicycles
    - 3% from taxi

### Bikeshare Trips Made as Transit Assist

Initial analysis of various resources points to an increased number of combined bikeshare trips with transit for commuting purposes.

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[2]Madison B-cycle 2012 Annual Report. Accessed from http://madison.bcycle.com/LinkClick.aspx?fileticket=PH2i0HRwo7w%3d&tabid=474 on January 1st, 2013.

[3] Nice Ride MN. Customer Nice Ride Subscriber Survey -Summary Report - Nov/1/2010. Accessed from http://appv3.sgizmo.com/reportsview/?key=102593-416326-6d13ea0276ea0822c9f59f4411b6c779 on January 2, 2013

[4] Ibid.

[5] Metropolitan Washington Council of Governments. FY 2011 and FY 2012 TIGER Grant Application Materials Documentation. Final Application, A Regional Bike-sharing System for the National Capital Region. Appendix 4: Benefit cost analysis model. http://www.mwcog.org/uploads/committee-documents/bV5YWl1d20100820125709.xlsx

- Capital Bikeshare members appear to have shifted some trips to bicycle from taxi, transit, and walking[6]
    - 56% of respondents reduced their use of taxi,
    - 47% ride Metrorail less often
    - 39% reduced their use of bus since joining Capital Bikeshare.
- Capital Bikeshare served as a feeder service to reach transit stops
    - More than half of all respondents used Capital Bikeshare to get to or from a Metrorail station
    - Two in ten CaBi members used it to access a bus stop.
    - Bikeshare was more often used to get FROM transit than TO transit (further investigation is needed to fully understand this pattern).
- About a quarter of employed respondents started or increased use of a non-drive alone mode since joining Capital Bikeshare
    - 15% of members started or increased use of bicycle
    - 6% switched from drive alone to public transit
    - 3% switched from driving alone to walking
- 31% of Nice Ride members use Nice Ride to connect with transit (i.e. light rail, bus, North Star rail)[7]
- Transit accounts for 15.8% of commuting trips in Montgomery County[8]

## LATENT DEMAND

Does the presence of a bike sharing system increase total trip making or distance traveled? From the Capital Bikeshare survey, we understand that:

- The typical member makes about 8.1 bikeshare trips per month [9]
- About 70% of all bikeshare trips were considered "induced" trips; the trip would not have been made if not for the bikeshare service[10]
- Arlington residents (38%) were slightly less likely to make an induced trip than were Washington DC residents (46%)[11]

The Madison B-cycle 2012 survey, however, indicates that latent demand represents less than 5% of the bikeshare trips[12]

The assessment of latent demand is important if the vehicular trip generation and parking generation effects are developed using an estimate of the number of bikeshare trips as a starting point, in which case the amount of increased travel needs to be accounted for. If the trip generation and parking generation

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[6] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012.

7 Nice Ride MN. Customer Nice Ride Subscriber Survey -Summary Report - Nov/1/2010. Accessed from http://appv3.sgizmo.com/reportsview/?key=102593-416326-6d13ea0276ea0822c9f59f4411b6c779 on January 2, 2013.

[8] American Community Survey. Commuting Characteristics by Sex. 2007-2011 American Community Survey 5-Year Estimates (S0801). Accessed December 20, 2012.

[9] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 19. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012

[10] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 34. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012

[11] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 36. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012

[12] Madison B-cycle 2012 Annual Report. Page 18. Accessed from http://madison.bcycle.com/LinkClick.aspx?fileticket=PH2i0HRwo7w%3d&tabid=474 on January 1st, 2013.

effects are developed using ratios that start from vehicle trip or VMT reduction estimates, then the latent demand effects are not needed.

## CONTEXT TRANSFERABILITY

How well are relationships observed in more in urban areas, with greater densities and bicycle infrastructure (i.e. Washington DC, Arlington County, New York City) and how do they translate to the Montgomery County environment?

Bikeshare travel analysis should:

- Focus on surveys from places that have similar "4D" environments, including the Arlington portion of Capital Bikeshare, NiceRide, or Denver B-cycle. In general, the "design" element can be assumed to follow (i.e., for a given land use density/diversity mix, Montgomery County is neither significantly ahead of or behind the curve in bicycle infrastructure compared to other jurisdictions with bikeshare systems).
- Focus on mixed-use commercial business districts. College (i.e., UC Irvine Zotwheels) and corporate (i.e., Google) locations are also generally less applicable for Montgomery County.
- Recognize that bikeshare station implementation in Montgomery County should occur in the most densely developed portions of the County. Therefore, county-wide averages for traveler behavior elements such as mode share are not a particularly useful basis for developing results.

One way to compare Arlington and Montgomery County is to examine the non-motorized modal share of daily productions and attractions in the MWCOG travel demand model. An initial assessment suggests that the Washington, DC land use characteristics and socioeconomics create higher propensities for walking and biking for all purposes. These considerations could be incorporated into a sliding scale for estimating bikeshare utilization, perhaps with different rates for Montgomery County locations outside the Beltway (where the predominant attraction non-motorized mode shares are around 10%) and inside the Beltway (where the predominant attraction non-motorized mode shares are around 16%).

**MWCOG Model 2007 Non-Motorized Mode Share for Daily Productions and Attractions in Selected TAZ**

| TAZ | Productions | Attractions |
|---|---|---|
| Washington, DC | | |
| 193 – Logan Circle | 36.2% | 42.4% |
| 187 – Logan Circle | 35.5% | 41.3% |
| 186 – Logan Circle | 38.9% | 40.9% |
| 188 – Logan Circle | 37.3% | 37.2% |
| 288 – Eastern Market | 21.6% | 24.2% |
| 289 – Eastern Market | 27.0% | 23.4% |
| Arlington County | | |
| 1472 – Rosslyn | 16.9% | 23.6% |
| 1475 – Rosslyn | 16.1% | 23.6% |
| 1473 – Rosslyn | 17.1% | 21.9% |
| 1414 – Ballston | 15.5% | 18.2% |
| 1415 – Ballston | 15.0% | 17.9% |

| | | |
|---|---|---|
| Montgomery County (inside Beltway) | | |
| 625 – Silver Spring CBD | 15.9% | 16.8% |
| 663 – Bethedsa CBD | 15.1% | 16.4% |
| 662 – Bethesda CBD | 14.2% | 16.3% |
| 623 – Silver Spring CBD | 13.9% | 16.2% |
| 624 – Silver Spring CBD | 14.8% | 15.9% |
| 632 – Bethesda CBD | 4.2% | 7.7% |
| Montgomery County (outside Beltway) | | |
| 714 – Rockville Town Center | 10.5% | 11.6% |
| 717 – Rockville Town Center | 9.3% | 11.5% |
| 687 – White Flint | 6.6% | 9.9% |
| 686 – White Flint | 5.5% | 9.0% |

# LITERATURE REVIEW FINDINGS AND STUDY HYPOTHESES

Based on the initial literature review findings, the study team developed some initial study hypotheses regarding the number of vehicle trips and parking space reductions. These hypotheses helped define information gaps and the analytic approach used in the study.

## Vehicle Trip Generation

### Method V-1: Extrapolate member survey responses about bikeshare effect on annual VMT[13]

**What we have**

- Estimate of annual VMT reduced by bikeshare member (for purposes of this analysis, VMT is deemed to mean motor vehicle miles traveled)
  - Page 56 = 523 estimated annual VMT reduced per bikeshare member
  - Text suggestion that the estimate is conservative

**What we need**

- Percentage of bikeshare members among general public
  - From the Capital Bikeshare member survey we will be using 18,000 annual members (figures as of 2011) as numerator.[14]
  - 2010 population of DC and Arlington = 810,000 as denominator
  - 2.2% of population as bikeshare members
- Percentage VMT reduced by bikeshare members
  - Page (v) = 4015 VMT before bikeshare
  - 13% reduction in annual VMT (523/4015)
  - Average regional annual VMT of 8400, therefore
  - 523 typical bikeshare member reduction is 6%
- Assumptions that:
  - Bikeshare trip purposes and times of day are consistent with vehicle trip generation rates
  - One bikeshare member uses one/tenth of a bikeshare station
- Estimated trip reduction:

[13] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012.
[14] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 56. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012.

- 2.2% of population and 6% reduction in average regional VMT per capita yields a 0.13% reduction in total bikeshare area vehicle miles per bikeshare member
- One bikeshare station equaling ten bikeshare members yields a 1.3% reduction in vehicle trips

**Supporting context**

- How many vehicle miles of travel were reduced by the presence of bikeshare?[15]
  - 17% of respondents reduced from 1-500 miles
    - 7% reduced between 501-1,000
    - 8% reduced between 1,001-2,500
    - 6% reduced more than 2,500 annual driving miles.
  - 33% of respondents who increased bicycle use said Capital Bikeshare had been very important in helping or encouraging them to ride a bike more often.[16]
- What is the current mode-share for Montgomery County?
  - 0.4% bike to work[17]

## Parking Generation

### Method P-1: Use vehicle trip generation Method V-1 and extrapolate from peak hour vehicle trip reduction to parking reduction

**What we have**

- Vehicle trip generation reduced by 1.3% by bikeshare station (from Tripgen Method V-1)

**What we need**

- Assumption of vehicle / parking generation relationship (if 1:1, **parking generation also reduced by 1.3%**), additional comparison of this relationship can be derived from comparison of the ITE Trip Generation and Parking Generation rates.

**Supporting context**

- Number of people likely to convert a driving trip to a bikeshare trip?
  - 30% respondents drove a car less often (CaBi survey, page 44)
    Of those respondents who decreased driving, 94% indicated that bikeshare had been at least somewhat of a factor contributing to the reduction. (CaBi survey, page 45)

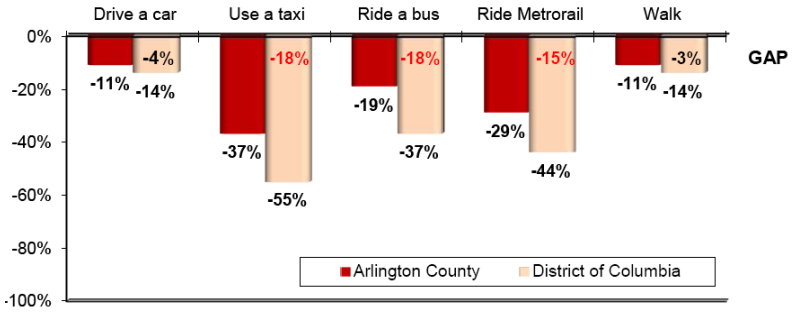
[15] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 54. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012.
[16] Capital Bikeshare 2011 Member Survey Report. Capital Bikeshare. Page 42. Accessed from http://capitalbikeshare.com/assets/pdf/Capital%20Bikeshare-SurveyReport-Final.pdf on December 10, 2012.
[17] American Community Survey. COMMUTING CHARACTERISTICS BY SEX. 2007-2011 American Community Survey 5-Year Estimates (S0801). Accessed December 20, 2012.

Table 10
Respondents Who Reduced Use of Transportation Modes Other than Bicycle – by Frequency of Capital Bikeshare Use
(0 trips n=928, 1-2 trips n=947, 3-5 trips n=1,114, 6-10 trips n=917, 11 or more trips n=1,383)

| Capital Bikeshare Trips In Past Month | Percentage of Respondents who Reduced Use of Mode | | | | |
|---|---|---|---|---|---|
| | Bus | Metrorail | Walk | Drive a Car | Taxi |
| 0 trips | 25% | 28% | 18% | 30% | 37% |
| 1-2 trips | 29% | 32% | 28% | 37% | 48% |
| 3-5 trips | 38% | 47% | 32% | 43% | 58% |
| 6-10 trips | 43% | 54% | 33% | 46% | 58% |
| 11 or more trips | 53% | 66% | 39% | 45% | 61% |
| **Net reduction** | **28%** | **38%** | **21%** | **15%** | **24%** |

- As shown in Table 10, the overall net reduction in the use of car trips overall was estimated to be 15%, but more information is needed to reconcile the net reduction information with the information in the prior lines of the table suggesting rates in the 30% to 46% range.
- As shown in Figure 35, there was an 11 % net reduction in the use of car trips in Arlington due to bikeshare (CaBi survey, page 50)

Figure 35
Net Change in Use of Car, Taxi, Bus, Metrorail, and Walk Since Joining Capital Bikeshare – by Home Location
(Arlington County n = 331, District of Columbia n = 4,241)
Statistical differences highlighted in red




- 28% respondents living in Arlington made 6 or more CaBi trips in the last month (CaBi survey, page 19)
- About 70% of all bikeshare trips were considered "induced" trips (CaBi survey, page 34); the trip would not have been made if not for the bikeshare service
- 38% respondents in Arlington made an induced trip via CaBi (CaBi survey, page 36)
- For all general trips 45% (Metro/Bus), 7% (personal vehicle); 31% (Walk); 6% (Taxi) of respondents would have used other forms of transportation before Capital Bikeshare. (CaBi survey Table 9 – page 33)

### Method P-2: Extrapolate per-trip modal shift estimate to total trips (Primary Source: Denver B Cycle)

**What we have:**

- About 35% to 43% (so assume 40%) of bikeshare trips replaced car trips (Denver survey)
  http://denver.bcycle.com/News.aspx?itemid=63
  http://denver.bcycle.com/tabid/99/itemid/313/news.aspx
- Estimate of number of bicycle trips made (500,000 in three years)
  http://denver.bcycle.com/tabid/99/itemid/313/news.aspx
- Estimate of total downtown parking spaces (44,000)
  http://www.downtowndenver.com/Life/GettingAround/Driving/Parking/tabid/163/Default.aspx

**What we need:**

- Peak parking occupancy (assume 80% = 35,200 spaces / day)
- Daily bikeshare trips (assume even distribution across weekday/weekend/holiday, = ~500 bike trips per day, with 40%, or 200, replacing a car trip)
- Parking space reduction = 200 spaces out of 35,200, or **about a 0.6% reduction**

The analytic process applied and described in the study represented a shift of Method P-2 above to shift from parking space to vehicle trip generation by estimating the proportion of total person trips generated in a subregional (or travelshed) area and applying that proportion to an estimate of the number of vehicle trips reduced by a robust bikeshare system.

## PRELIMINARY INFORMATION ON BIKESHARE COSTS, BENEFITS AND PARKING REQUIREMENTS

This section of the Gap Analysis provides a compilation of the relevant materials identified during the development of this technical memorandum. It is not integral to the Gap Analysis per se, but will become part of the overall project literature review.

### Cost Benefit Analysis

- **Annual VMT reduced by bikeshare member**

| **Calculation of VMT per Year Reduced (PG 56)** | |
|---|---|
| Number of Capital Bikeshare members (November 2011) | 18,000 |
| Percentage with vehicle available | 53% |
| Bikeshare members with vehicle available | 9,540 |
| Estimated annual VMT reduced per member | 523 |
| Estimated total annual VMT reduced (annual) | **4,989,400** |

- **Percentage of Bikeshare members among the general public**
  - 18,000 as numerator
  - 2010 population of DC and Arlington = 810,000 as denominator
  - 2.2% of population as bikeshare members

- **Cost to provide SOV parking**
  - Total Number of parking spaces in PLD's (Bethesda, Montgomery Hills, Silver Spring, Wheaton) = 19,451[18]

| | Cost per Space | Total |
|---|---|---|
| **Construction** | $ 30,100[19] | $ 585,475,100 |
| **Debt Service** | $302.88 | $ 5,891,405 |
| **O&M** | $ 1068.55 | $ 20,784,506 |
| **Total Costs** | $31,471 | $612,151,011 |
| **Revenue (Fees & Fines[20])** | $ 1,328 | $ 25,823,253 |

- **Cost to implement and run a bikeshare program**

TABLE 4 – APPROXIMATE EQUIPMENT COSTS[81]

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

Bikesharing in the US – Guide to Implementation (Pg 27)[21]

## User Benefits:

- **Calories Burned**
  - Annual Members[22] 2,675 (includes daily riders)
  - Total Calories burned 12,954,511 calories
  - Calories per member 4842

- **Miles Ridden**
  - Denver Bcycle 431,817 (161 per member)
  - Capital Bikeshare[23] 2,078,821 (114 per member)
  - Madison Bcycle 94,400 (43.9 per member)

[18] Montgomery County Parking Study. July 2010.
[19] Montgomery County Parking Study. July 2010. Pg. 1-6 footer. This is an average between above ground costs ($24,000) and sub-surface garage spaces ($36,200)
[20] All fees and fines are considered revenues obtained by hourly parking fees in parking lots and coined parking spaces
[21] Bikesharing in the United States: State of the Practice and Guide to Implementation. Federal Highway Administration. US Department of Transportation
[22] Denver Bikesharing 2011 Annual Report. Accessed from http://www.denverbikesharing.org/files/DBS_2011_Annual_Report.pdf on December 31, 2012.
[23] Capital Bikeshare Celebrates its second anniversary. Accessed from http://capitalbikeshare.com/news/2012/09/20/capital-bikeshare-celebrates-its-second-anniversary on December 31, 2012.

- **Dollars saved on car parking** [24]
  - 2011: $506,909
  - 2010: $311,126

## Bike parking requirements in other jurisdictions:

Spacing requirements for bikeshare stations and potential administration of developer credits could be managed in such way that credits are granted in relation to or as part of a development's bicycle parking credits. The following is a transitory review of what other jurisdictions are require in relation to bicycle parking:

- **Arlington County, VA**[25]

  The developer agrees to provide secure bicycle storage facilities in a location convenient to both office and retail areas on the following minimum basis:
  - One (1) employee space for every 7,500 square feet, or portion thereof, of office floor area and one (1) visitor space for every 20,000 square feet, or portion thereof, of office floor area;
  - Three (3) spaces for every 10 residential units, or portion thereof, and one (1) visitor space for every 50 residential units, or portion thereof;
  - Two (2) visitor/customer spaces for every 10,000 square feet, or portion thereof, of the first 50,000 square feet of retail floor area; one (1) space for every 12,500 square feet, or portion thereof, of additional retail floor area and one (1) employee space for every 25,000 square feet, or portion thereof, of retail floor area. The facilities for visitor and customer use shall be highly visible to the intended users and shall not encroach on the sidewalk or on any area in the public right-of-way intended for use by pedestrians. The facilities for employee and residential users must meet the acceptable standards for Class I storage space and be highly visible from an elevator entrance, a full-time parking attendant, a full-time security guard or a visitor/customer entrance.

  Facilities for visitors/customers must meet the standards for either Class II or Class III storage space and be highly visible from a main street-level visitor/customer entrance. Drawings showing that these requirements have been met shall be approved by the Zoning Administrator before the issuance of the Footing to Grade Structure Permit.

- **Classes of parking:**
  - Class I - Maximum Security for All-Day Employee Parking: This is a locked room or cage or a fully enclosed locker. It can be located in or outside a building. If located outdoors or in a parking garage it is highly visible from an elevator entrance, parking attendant security guard, closed-circuit television camera, or visitor/customer entrance, but such that parked bicycles are not visible from the street. If bicycles are parked vertically the bottom wheel should rest on the ground. At least 1/10 of all Class I parking for a site accommodates horizontal (both wheels touching the floor) parking.
  - Class II – Medium Security: This facility secures and provides firm support for the frame and both wheels of the bicycle without a cable and prevents access to the user's padlock by long-handled bolt cutters. If bicycles are parallel parked (side-by-side), at least 23 inches

[24] Denver Bikesharing 2011 Annual Report. Accessed from http://www.denverbikesharing.org/files/DBS_2011_Annual_Report.pdf on December 31, 2012.

[25] Arlington Master Transportation Plan – Bicycle Element –July 2008. Pg. 33. Accessed from http://www.arlingtonva.us/departments/EnvironmentalServices/ProjectsAndPlanning/file65401.pdf on January 4, 2013.

is provided between bicycles (from one bicycle frame centerline to the next). All parking is horizontal and is highly visible from visitor/customer entrances.
  - Class III – Bike Parking Racks: Light Security for Short-Term Parking: Arlington utilizes the Class III Bicycle Parking Guidelines developed by the Association of Pedestrian and Bicycle Professionals (APBP)

- **Washington, DC[26]**

Bicycle parking is required in all buildings with car parking. For advice and assistance on installing bike parking in your building, call the DDOT Bicycle Program at (202) 671-2331.

The following rules come from the District of Columbia Municipal Regulations Title 18, Chapter 21: 2119 BICYCLE PARKING SPACES:
  - Bicycle parking spaces shall be provided for office, retail and service uses, except for retail and service uses in the C-3-C (Medium Density Office, Retail, and Housing), C-4 (Central Business District), and C-5 (Pennsylvania Avenue) (PAD) districts.
  - The number of bicycle parking spaces provided shall be at least equal to five percent (5%) of the number of automobile parking spaces required under §2101.1.
  - Bicycle facilities shall have convenient access from the building or structure and street or other bicycle right-of-way, be clean, secure and well lit and shall be located within a building or structure, either on the ground floor, basement, or first cellar level.
  - All bicycle parking spaces required under §2119.1 shall be a minimum of two feet (2') in width and six feet (6') in length.
  - An aisle five feet (5') in width shall be provided between rows of bicycle parking spaces and the perimeter of the area devoted to bicycle parking.
  - If a room or common locker not divided into individual spaces is used to meet these requirements, twelve square feet of floor area shall be considered the equivalent of one (1) bicycle parking space. Where manufactured metal lockers or racks are provided, each locker or stall devoted to bicycle parking shall be counted as one bicycle parking space.
  - For office uses in the C-4 and C-5 (PAD) districts, bicycle parking spaces shall be provided as if the building or structure were located in a C-3-C district.
  - Signs shall be posted stating where bicycle parking spaces are located in each building or structure where bicycle parking spaces are required. The signs shall be located in a prominent place at each entrance to the building or structure. The sign shall have a white background, with black lettering which is no more than two inches (2") in height.
  - For a building or structure existing on March 1, 1985, one percent (1%) of the amount of required parking spaces may be converted to bicycle parking spaces of appropriate size.

- **Alexandria, VA[27]**

The developer agrees to provide, at no charge to the user, secure bicycle storage facilities. These facilities should be highly visible to the intended users and protected from rain from within a structure shown on the site plan. One inverted U bicycle rack can hold up to two bicycles.

The following minimum standards should be met for office, retail and residential developments:
  - Office Bicycle Storage Facilities: The office requirement for bicycle parking is one (1) employee space for every 7,500 square feet, or portion thereof, of office floor area and

[26]District Department of Transportation. Bicycle Parking Regulations. http://www.dc.gov/DC/DDOT/On+Your+Street/Traffic+Management/Parking/Bicycle+Parking+Regulations

[27] Rules and regulations establishing the Dimensional and Equipment standards for bicycle parking Areas. City of Alexandria. Accessed from http://alexandriava.gov/uploadedFiles/localmotion/info/BicycleParkingStandards2006.pdf on December 4, 2012.

one (1) visitor space for every 20,000 square feet, or portion thereof, of office floor area to the satisfaction of the Director of T&ES. The facilities for office users must meet the acceptable standards for Class I storage space and be highly visible by a parking attendant booth or a visitor/customer entrance. Class I storage space should be a locked room or cage or fully enclosed locker. Drawings showing that these requirements have been met shall be approved by the Director of T&ES before the issuance of the Construction Permit.

- Retail Bicycle Facilities: The retail requirement is two (2) spaces for every 10,000 square feet, or portion thereof, of the first 50,000 square feet of retail floor area; one (1) space for every 12,500 square feet, or portion thereof, of additional retail floor area and one (1) employee space for every 25,000 square feet, or portion thereof, of retail floor area. These bicycle parking spaces shall be installed at exterior locations that are convenient to the retail customers and employees, and such locations shall be reviewed by T&ES.
- Residential Bicycle Facilities: The residential requirement is one (1) space for every 10 residential units, or portion thereof, and one (1) visitor space for every 50 residential units, or portion thereof to the satisfaction of the Director of T&ES.

- **Scottsdale, AZ[28]**

Every principal and accessory use of land which is required to provide at least forty (40) vehicular parking spaces shall be required to provide bicycle parking spaces at a rate of one (1) bicycle parking space per every ten (10) required vehicular parking spaces; and after July 9, 2010, new development shall provide, at a minimum, two (2) bicycle parking spaces. No use shall be required to provide more than one hundred (100) bicycle parking spaces.

Subject to the approval of the Zoning Administrator, in the Downtown Area, bicycle parking spaces may be provided within a common location that is obvious and convenient for the bicyclist, does not encroach into adjacent pedestrian pathways or landscape areas, and the location shall be open to view for natural surveillance by pedestrians. Such common bicycle parking areas shall be subject to the approval of the Zoning Administrator.

## Credit for bicycle parking facilities.

1. Purpose. The City of Scottsdale, in keeping with the federal and Maricopa County Clean Air Acts, wishes to encourage the use of alternative transportation modes such as the bicycle instead of the private vehicle. Reducing the number of vehicular parking spaces in favor of bicycle parking spaces helps to attain the standards of the Clean Air Act, to reduce impervious surfaces, and to save on land and development costs.
2. Performance standards. The Zoning Administrator may authorize credit towards on-site parking requirements for all uses except residential uses, for the provision of bicycle facilities beyond those required by this ordinance, subject to the following guidelines:
   a. Wherever bicycle parking is provided beyond the amount required per Section 9.103.C., required bicycle parking, credit toward required on-site vehicular parking may be granted pursuant to the following:
      i. Downtown Area: one (1) vehicular space per eight (8) bicycle spaces.
      ii. All other zoning districts: one (1) vehicular space per ten (10) bicycle spaces.

[28] City of Scottsdale Code of Ordinances. Volume 2. Appendix B – Basic Zoning Ordinance. Article 9: Parking and loading requirements. Accessed from http://library.municode.com/HTML/10075/level3/VOLII_APXBBAZOOR_ARTIXPALORE.html#VOLII_APXBBAZOOR_ARTIXPALORE_S9.103PARE on December 30,2012.

b. Wherever bicycle parking facilities exceed the minimum security level required per Section 9.103.D., required bicycle parking, credit towards required onsite vehicular parking may be granted at a rate of one (1) vehicular space per every four (4) high-security bicycle spaces. High-security bicycle spaces shall include those which protect against the theft of the entire bicycle and of its components and accessories by enclosure through the use of bicycle lockers, check-in facilities, monitored parking areas, or other means which provide the above level of security as approved by the Zoning Administrator.
c. Wherever shower and changing facilities for bicyclists are provided, credit towards required on-site vehicular parking may be granted at the rate of two (2) vehicular spaces per one (1) shower.
d. The number of vehicular spaces required Table 9.103.A., or when applicable Table 9.103.B., shall not be reduced by more than five (5) percent or ten (10) spaces, whichever is less.

- **Miami-Dade County**[29]

Quantity of bicycle parking spaces required:

| Total Parking Spaces in Lot | Required Number of Bicycle Parking Spaces: |
|---|---|
| 25 to 50 | 4 |
| 51 to 100 | 8 |
| 101 to 500 | 12 |
| 501 to 1000 | 16 |
| over 1000 | four (4) additional spaces for each 500 parking spaces over1000. |

[29]Miami Dade County Regulations. Requirement of bicycle racks or other means of storage. **Sec. 33-122.3. Accessed from** http://miamidade.fl.eregulations.us/code/ordinancehome/3/6/2012/1C019216-1948-46C8-B1F3-461470CFFBDB/a5fb5ca8-3ee5-44ac-b8d0-40da77c90e4e.html on December 31, 2012.

- **Bend, OR**

| Use | Requirement |
|---|---|
| Multi-family dwellings with 4 units or more: | 1 covered space per unit. Covered bicycle parking spaces may be located within a garage, storage shed, basement, utility room or similar area. In those instances in which the residential complex has no garage or other easily accessible storage unit, the bicycle parking spaces may be sheltered from sun and precipitation under an eave, overhang, an independent structure, or similar cover. |
| Retirement home or assisted living complex: | 2 covered spaces or 1 covered space for every 10 employees, whichever is greater |
| Retail sales and service | 1 covered space for every 10 employees plus 1 space for every 20 motor vehicle spaces |
| Multiple Uses | For buildings with multiple uses (such as a commercial or mixed use center), bicycle parking standards shall be calculated by using the total number of motor vehicle parking spaces required for the entire development. A minimum of one bicycle parking space for every 10 motor vehicle parking spaces is required. |
| Street vendors, itinerant merchants, and similar temporary sales operations | No bicycle spaces required |
| Restaurants, cafes, and bars | 1 covered space for every 10 employees plus 1 space for every 20 motor vehicle spaces |
| Professional office | 1 covered space for every 10 employees plus 1 space for every 20 motor vehicle spaces |
| Medical or dental office or clinic or hospital | 1 covered space for every 10 employees plus 1 space for every 20 motor vehicle spaces |
| Stadium, arena, theater or similar use | 1 covered space for every 20 seats ☐ |
| Public or private recreational facility | 1 space for every 10 employees plus 1 space for every 20 motor vehicle spaces |
| Parking Lots | All public and commercial parking lots and parking structures shall provide a minimum of one bicycle parking space for every 10 motor vehicle parking spaces |
| Industrial uses without retail trade or service | 1 covered space for every 20 employees |
| Industrial uses with retail | 1 covered space for every 20 employees |
| Elementary School 1 covered space for every 25 students. | All spaces should be sheltered under an eave, overhang, independent structure, or similar cover. |
| Junior High School 1 covered space for every 25 students. | All spaces should be sheltered under an eave, overhang, independent structure, or similar cover. |
| High School 1 covered space for every 25 students. | All spaces should be sheltered under an eave, overhang, independent structure, or similar cover. |
| College, university or trade school | 1 space for every 10 motor vehicle spaces plus 1 covered space for every dormitory unit. Colleges and trade schools shall provide one bicycle parking space for every 10 motor vehicle spaces plus one space for every dormitory unit. Fifty percent (50%) of the bicycle parking spaces shall be sheltered under an eave, overhang, independent structure, or similar cover |

## SUMMARY OF INFORMATION GAPS

The initial literature review suggests that there is a wealth of information from user surveys on the degree with which bikeshare systems influence traveler behavior. We expect that the quantitative relationship between bikeshare and vehicular travel will be most readily estimated at either the VMT or vehicle trip level, rather than the parking space equivalency. The gaps that need to be filled in relate to appropriate assumptions regarding:

- Latent demand: is the Capital Bikeshare experience to date representative of the expected experience in Montgomery County?
- Potential transit linkages: How would bikeshare enable a combined bikeshare/transit trip. In other words, to what extent will bikeshare convert a primary auto driver trip to a primary transit trip (with bikeshare providing an assist at either end of the trip)?
- Total number of vehicle trips generated within an area that has bikeshare trips, to estimate bikeshare mode / total mode. Use factored ITE trip generation data or travel model data to estimate total vehicle trips generated for a bikeshare environment (i.e., R-B Corridor in Arlington)
- Relationship between observed data in DC, Arlington, or other cities to the environment expected in Montgomery County.

Our experience indicates that the number of possible variables regarding land uses, demographics, prior mode, induced travel, trip purposes, trip frequency, and time of day will require continuation of the types of analyses we have begun with hypothetical Methods V-1, P-1, and P-2 described above. The value in continuing to explore these relationships is to develop a range of vehicle trip reduction estimates (currently around 0.5% to 1.5% without any adjustment for 4D factors).

These gaps could be filled in the following manner:

- **For this MWCOG TLC study**
  - Cross-tabulation of Capital Bikeshare member survey results to examine:
    - Question 4 (trips per month)
    - Question 7 (prior mode, or trip not made, for most recent bikeshare trip)
    - Question 7C (Arlington County destination for trips not made without bikeshare)
  - Outreach to Denver, Madison, and Minneapolis operators to determine whether similar cross-tabulation can be obtained
  - Assessment of 4D land use models to determine the degree with which candidate (current and potential future) Montgomery County bikeshare districts have notably different characteristics that would warrant a change in relationships derived from existing surveys.
- **For subsequent potential localized survey efforts**
  - Consider including "bikeshare" as a separate modal option within the regular Montgomery County TMD surveys to monitor the degree to which bikesharing is a key element in the journey to work within TMD areas
  - Consider including "bikeshare" as a separate modal option within subsequent MWCOG Household Travel Surveys to consider the degree to which bikeshare is an element of tripmaking
  - For both local survey efforts, "carshare" should also be identified as a separate mode.

- For subsequent national survey efforts
    - Work with ITE to examine the potential for subsequent generations of the ITE Trip Generation Handbook to consider incorporating bikeshare into site trip generation activities.

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# RENAISSANCE PLANNING GROUP

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