Arlington County: 8-80 Cities Recommendations

Prepared for

Transportation Policy, Operations, and Logistics

Practicum Final Report

Spring 2014
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Introduction

Objective Statement

The GMU Project Team will conceptualize, research and analyze transportation demand strategies, infrastructure improvements and technical innovations that can help meet the transportation and mobility needs of the juniors (5 to 12 years old) and seniors (over 65 years old) of Arlington County. This work will account for lifestyle, livability and costs requirements of the two age groups and lead to a series of recommendations that the GMU Project Team will present to Mobility Lab.

Acknowledgements

The 2014 Transportation Policy, Operations and Logistics (TPOL) Practicum Team completed this report with assistance from many different sources. We would like to acknowledge those who helped guide us during the creation process. First we would like to thank our Professor Dr. Laurie Schintler, for her supervision and continued support throughout the semester. Without her leadership we would not have been able to create an effective project. Next, we would like to thank Tom Fairchild, the Mobility Lab Director, for giving us the opportunity to work with him on this unique and enlightening experience. We would also like to thank Kyle Lukacs, the Coordinator from Safe Routes to School, for his professional insight and data access that helped enhance the junior surveys. Finally we would like to extend a special thanks to Barbara Thode, the Service Coordinator at Culpepper Garden Residence, for her knowledge of senior activity and generous support in facilitating the senior surveys.

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Executive Summary

A city that can address the mobility needs of its youngest and oldest residents will also provide adequate mobility for all its residents. This was the simple idea of a Canadian non-profit organization when it developed the 8-80 Cities concept. As proof of concept, 8-80 Cities initiated the "Make a Place for People Project" and selected eight unique public spaces in Ontario based on the idea that community participation is the key to the creation of vibrant and healthy public spaces. Cities around the world have spent significant time and resources to develop and implement Transportation Demand Management (TDM) programs that improve mobility for their citizens while accounting for a growing focus on livability and general well-being. Arlington County, Virginia is no exception.

Today, after years of sustained growth, Arlington County is considering numerous transportation demand strategies to serve the needs of its citizens. The County relies heavily on a local non-profit, Mobility Lab, to explore, test and manage mobility strategies that support and enhance the transportation needs of Arlington. Mobility Lab has begun to explore the 8-80 Cities concept and its associated goals to see how they can be applied to its TDM approaches.

The purpose of this study is to review current mobility challenges within Arlington County and provide creative, sensible and proven recommendations to Mobility Lab that support the continuous improvement of TDM strategies within the County. The focus of this study is on the youngest and oldest residents of the county. The study uses sample data to identify transportation needs for these populations and tailor TDM recommendations to address them. Each recommendation aligns to components of the 8-80 Cities concept to incorporate a stronger focus on livability and personal well-being. The result is a list of 11 recommendations, each with a unique set of benefits and challenges that the George Mason University Team offers Mobility Lab and Arlington County for consideration. Arlington County has an exemplary track record for advancing TDM ideas and the authors of this study – graduate students at George Mason University’s School of Public Policy – hope these recommendations and their associated analysis can strengthen the County’s position as a leader in addressing transportation needs while improving the lives of its growing population.
Overview of Arlington County

A Case Study for 8-80 Cities Ideas

8-80 Cities is a concept developed by a non-profit organization in Toronto, Canada. This organization states, “If you create a city that’s good for an 8 year old and good for an 80 year old, you will create a successful city for everyone.” This concept proposes the construction of urban spaces and transportation methods and corridors that focus on the needs of urban residents with the greatest mobility challenges. The assertion then follows that the balance of the population will jointly benefit from these infrastructure improvements.

This study reviews current mobility issues within Arlington County and provides recommendations based on the 8-80 concept to Mobility Lab for consideration as possible improvements to Arlington County’s TDM program. It should also be noted that although Arlington is a county, its small size and relative density lend it traits more characteristic of a city, making the 8-80 concept relevant to addressing Arlington’s TDM needs.

Arlington History

What is now Arlington County was formed as a part of the city of Washington DC in the late 18th century, and was eventually ceded back to the state of Virginia in the mid-19th century due to political issues related to slavery and economics. The county was primarily agricultural until the early 20th century when its proximity to Washington DC led to residential development for federal government employees and local businesses that supported the government.

Between the turn of the 20th century and World War Two came a rapid increase in population within the county and a transition from largely rural and agricultural uses to suburban and residential. Construction of the Pentagon building in Arlington County just across the river from the capitol began in 1941, and this brought with it increased residential and commercial development as thousands of construction workers, and then military employees required housing and services.

Hundreds of private businesses also sprang up to provide for the needs of the new office complex and the new citizens within the county. Unfortunately, this development occurred rapidly and the result was an almost hasty establishment of many areas of the County, with very little planning in regard to transportation infrastructure. This was also occurring during a period

1 (8-80 Cities n.d.)
when automotive transportation was the primary consideration. As a result, the transportation infrastructure that was constructed was somewhat haphazard and lacked in facilities for pedestrians, bicyclists and other non-automotive modes.

In 1950, Arlington County Government initiated a planning process intended to span the following six years creating plans for capital improvements for essential services and facilities which ultimately resulted in a county wide Master Plan in the 1960’s. Many areas of small businesses, bars, pawnshops, automobile dealerships, and construction yards were replaced with high-rise apartments, office buildings and hotels, a significant shift to high density development. The county plan was to keep these high density areas confined to the corridors serviced by the new subway system\(^2\).

Another source of change in the 1960’s was from entities outside of Arlington. Considered a choke point for traffic, the Bureau of Public Roads (predecessor to the Federal Highway Administration) envisioned an 8-lane freeway and other roadway expansions throughout Arlington to carry traffic through the County, without much consideration for the needs of the local residents. The local residents, however, were somewhat hostile to these proposals, vocally objecting to roadway expansion and freeway projects in what would become known as the “Arlington Way.”\(^3\) These protests were largely successful in scaling-back the size and scope of freeway and other roadway expansion projects, and instead utilizing the allotted funds to construct the underground Metrorail system that flows through Roslyn, Clarendon and Ballston.

The existing transportation infrastructure in Arlington County is the result of years of rapid development in the absence of comprehensive planning. This has created unique challenges when attempting to accommodate the transportation needs of the County residents as well as persons who travel to or through the County to reach employment centers. A clear understanding of Arlington County’s history is important when considering changes and/or improvements to mobility within the County.

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\(^2\) Ibid
\(^3\) (Technoflak 2005)
Description of Focus Area

Arlington County is one of the most densely populated counties in the country, with much of the growth highly concentrated in two commercial and residential development corridors paralleling the Metrorail between the Rosslyn and Ballston stations and along Jefferson Davis Highway. Along these major corridors Arlington County has private office space comparable to that of other major cities such as Los Angeles, Dallas and Seattle. A large percentage of the population is single, with a majority (63%) of the housing consisting of multi-family units divided between apartments and condominiums. Less than 26% of housing within Arlington County are single-family detached homes.4

Public School System

Arlington County’s public school system is made up of 35 schools; 22 elementary, 6 middle, and 4 high schools with a population of approximately 20,000 students, 57% of which are in elementary school, and compose the juniors that are the subject of this study. The school district has approximately 1,300 full-time teachers for an average student to teacher ratio of 15 to 1. This ratio is lower than other counties in Virginia and the United States average of 16.6

4 (Arlington County n.d.)
5 (Arlington County Planning Profile 2013)
6 (Arlington County n.d.)
Arlington County also has a very robust private school population, serving a very diverse student population of approximately 3,300. There are currently 17 private schools serving kindergarten to high school aged children located throughout the county, with a student to teacher ratio of 10 to 1.

**Community and Employment**

Arlington County is a very diverse community with 36% of the population belonging to minority or multiracial groups. This results in a diverse public school system that speaks more than 90 different languages from over 120 different countries. Arlington County also has a very highly educated population. Among those 25 and older, 70% have at least a bachelor’s degree and approximately 37% had graduate or professional degrees (Figure 2). Arlington County has a median family income of $107,300 and a low unemployment rate of 3.3%7.

![Educational Attainment Age 25 and Older (2011)](image)

**Figure 2**

White collar and technical service professionals represent Arlington’s labor force, the largest portion being comprised of government related positions equaling nearly 26% of the workforce. Other services such as construction, retail trade, transportation, and warehousing make up about 10% of the working population9. The top five employers in the county are Deloitte (Accounting), Accenture (technology and government contracting), SAIC (government contracting), Virginia Hospital Center (health), and Marriott International (hospitality).

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7 (Arlington County n.d.)
8 (U.S. Census Bureau, 2011 American Community Survey)
9 (Arlington County n.d.)
Specialized Senior Transportation

Arlington County has a very robust system of services providing a wide range of options to address senior mobility. One of these options is Metro Access, which provides door-to-door paratransit service for individuals with physical and mental disabilities. An application and interview with the County are required to qualify for this program. Should an individual not qualify for Metro Access, other options like the Senior Center Adult Transport Program and the Specialized Transit for Arlington Residents or “STAR” is available for seniors.

There are also Metro discount passes and Senior Loop programs for seniors. The Metro discount passes are for use with patrons that already possess Metro ID cards; they allow seniors to purchase fares at a discount. The Senior Loops Apartments and Senior Loops Neighborhoods have programs that take residents from designated senior apartments and neighborhoods to the grocery stores on a weekly basis, allowing seniors to remain mobile.

Transportation

With its central metropolitan location and close proximity to U.S. Government offices and activity centers in the District of Columbia, the Pentagon, and numerous national monuments, transportation for Arlington County is a major priority. To support the associated transportation demands, Arlington County has 11 Metrorail stations located on two of the busiest (Figure 3) corridors in the system and 13 Arlington Regional Transit bus routes. Numerous bike-share stations further enhance 86 miles of bicycle and multi-use trails.

Figure 3

Three major airports also serve Arlington County within a 35 mile radius, Ronald Reagan

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10 (Arlington County Planning Division)
(Arlington), Washington Dulles, and Baltimore Washington International Airports, which have a combined annual passenger volume of over 64 million people\textsuperscript{11}. Arlington sits at a crossroads of travelers commuting daily within the region, along with all the other national attractions within the area.

Even with this broad range of transportation options available to them, large portions of the commuting public still choose to drive alone (Figure 4). Due to this population density, the D.C. Metro area received a rating of the most congested region in the United States in a study conducted by the Texas Transportation Institute in 2011.

<table>
<thead>
<tr>
<th>Commute Mode</th>
<th>TDM Services Offered</th>
<th>TDM Services Not Offered</th>
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<tbody>
<tr>
<td>Drive Alone</td>
<td>57%</td>
<td>79%</td>
</tr>
<tr>
<td>Train (Subway or Commuter Train)</td>
<td>22%</td>
<td>11%</td>
</tr>
<tr>
<td>Bus</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Carpool/Vanpool</td>
<td>12%</td>
<td>4%</td>
</tr>
<tr>
<td>Walk/Bicycle</td>
<td>3%</td>
<td>3%</td>
</tr>
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Figure 4\textsuperscript{12}

In a recent transportation demand studies completed by Arlington County, capacity was identified as a primary weaknesses within the road network. The report states the County would be unable to meet the road capacity demands of all travelers should they choose single occupant vehicles (SOVs) as their mode of transportation rather than using other forms or mass transit or carpooling\textsuperscript{13}. Therefore, Arlington County is acting in coordination with all of its regional partners to help manage the projected growth in travel demand.

The County is continuously looking to technology and infrastructure improvements in order to achieve a greater utilization of non-automotive travel options such as mass transit, walking, carpooling, and telecommuting. The focus on these areas has provided Arlington County with a robust and diverse transportation network, resulting in more than 55% of the commuting public using at least one form of transportation other than SOVs during the past year\textsuperscript{14}.

\textsuperscript{11} (Arlington County n.d.)
\textsuperscript{13} (Arlington Master Transportation Plan Streets Element n.d.)
\textsuperscript{14} (Arlington Master Transportation Plan Streets Element n.d.)
Population

Arlington County had a total population of 207,627 according to the 2010 United States Census Bureau. The most recent population estimate is 212,900 as of March 2013. Arlington County has experienced a significant population growth in the last century. From 1900 to 1940, the Censuses showed a consistent population growth, averaging 58.39% over these four decades. Then in the ten year period from 1940 through 1950 Arlington saw a 137.5% population increase. This can be attributed to the suburban expansion that occurred during and after World War II\(^{15}\). This population growth continued through 1970, but total population growth rates declined during the next decade.

Since 1980, Arlington has seen a steady population increase due to the development of the underground Metrorail from Rosslyn to Ballston and along the Jefferson Davis Highway. The new Metrorail, paired with better land use policies surrounding these corridors, resulted in a population rebound of 12% from 1980 to 1990, and a 10.8% population increase from 1990 to 2000. The most recent Census shows only a 9.8% population increase from 2000 to 2010. This slowing rate of population growth may be due to national economic factors\(^{16}\).

Current population estimates from Arlington County Department of Planning, Housing and Development expect a 13.7% overall population growth during the next decade. Forecasts also expect a total population of 276,100 by the 2040 United States Census. To achieve this prediction Arlington County must grow by more than 68,000 people during the thirty years between the 2010 and 2040 Censuses\(^ {17}\). Figure 5\(^{18}\)

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\(^{15}\) (Arlington County Planning Division n.d.)  
\(^{16}\) (Arlington County Planning Division n.d.)  
\(^{17}\) (Arlington County Planning Division n.d.)
Age

According to the 2010 United States Census Bureau, Arlington County experienced population increases, over the last decade, in the following age categories: under 10, 20 to 34, 40 to 49, 55 to 69 and over 85. The population has decreased with those whose ages are between 10 to 19, and 70 to 84. The Census also shows the median age has decreased slightly in Arlington County from 34.0 in 2000, to 33.4 in 2010. The age cohort that increased the most from the 2000 Census was the 25 to 29 cohort with a 30.5% increase\(^{19}\).

![Figure 6](image_url)

Current age distribution estimates from the Arlington County Department of Planning, Housing and Development predict the age cohorts of 5 to 14 and 65 to 84 will not only increase in population, but also increase their percentage of the overall population since the 2010 census. The younger cohort (5 to 14) will increase from 8.3% in 2010 to 9.2% in 2013, while the older cohort (65-84) will increase from 7.1% in 2010 to 7.6% in 2013. However, estimates for the oldest population of 85+ will slowly diminish in overall numbers, from 3,200 in 2010 to 2,900 in 2013\(^{21}\). This decline will decrease overall age population percentage for the 85+ cohort.

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\(^{18}\) (Arlington County Census Results)  
\(^{19}\) (Arlington County Planning Division n.d.)  
\(^{20}\) (2010 Census Highlights, Arlington County VA)  
\(^{21}\) (Arlington County Planning Division n.d.)
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<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<td>0 to 4</td>
<td>13,000</td>
<td>13,300</td>
<td>10,400</td>
<td>10,800</td>
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<td>0 to 4 %</td>
<td>6.3%</td>
<td>6.3%</td>
<td>4.9%</td>
<td>5.1%</td>
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<td>5 to 14</td>
<td>17,200</td>
<td>17,500</td>
<td>18,600</td>
<td>19,600</td>
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<td>5 to 14 %</td>
<td>8.3%</td>
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<td>8.8%</td>
<td>9.2%</td>
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<td>15 to 19</td>
<td>7,500</td>
<td>7,200</td>
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<tr>
<td>15 to 19 %</td>
<td>3.6%</td>
<td>3.4%</td>
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<tr>
<td>20 to 24</td>
<td>16,600</td>
<td>16,500</td>
<td>18,500</td>
<td>15,400</td>
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<tr>
<td>20 to 24 %</td>
<td>8.0%</td>
<td>7.8%</td>
<td>8.7%</td>
<td>7.2%</td>
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<tr>
<td>25 to 34</td>
<td>58,400</td>
<td>60,800</td>
<td>61,000</td>
<td>62,100</td>
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<tr>
<td>25 to 34 %</td>
<td>28.1%</td>
<td>28.9%</td>
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<td>29.2%</td>
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<td>33,000</td>
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<td>45 to 64</td>
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<td>65 to 84</td>
<td>14,800</td>
<td>14,900</td>
<td>15,800</td>
<td>16,300</td>
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<td>65 to 84 %</td>
<td>7.1%</td>
<td>7.1%</td>
<td>7.5%</td>
<td>7.7%</td>
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<tr>
<td>85 +</td>
<td>3,200</td>
<td>3,200</td>
<td>3,100</td>
<td>2,900</td>
</tr>
<tr>
<td>85 + %</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.4%</td>
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<td>207,700</td>
<td>210,200</td>
<td>211,700</td>
<td>212,900</td>
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</table>

*(Numbers Rounded)*

In Arlington County, population estimates show that during 2013 the age groups of 0 to 14 and 65+ represent 23.3% of the total population. Creating beneficial TDM programs for junior and senior populations will directly affect almost a quarter of Arlington County’s total population, and pave the way for a better transportation system for all.

---

22 (Arlington County Planning Division)
23 (Arlington County Planning Division n.d.)
**Land Use**

TDM must take into account land use patterns that alter peoples’ transport behavior, while encouraging individuals to use other modes of transportation: bicycles, transit, and ridesharing are alternative options to automobiles. However, communities must be equipped with the infrastructure necessary to accommodate varying travel demand preferences. Not everyone will be able to use other modes of transportation to his or her desired destinations. The peer group for both ends of the 8-80 concept falls into that mobility category.

**Biking**

Many communities are seeking to manage transportation demand by adding additional biking capacity. The land use decision by communities to incorporate bike lanes in their TDM strategy is a legitimate alternative. Bike lanes allow users to travel without the burden of owning, parking, or maintaining an automobile. Particularly in urban areas, bike lanes and bike friendly communities add additional capacity to strained highways and congested roads.

In urban areas like San Francisco that incorporate multiple TDM strategies, bike initiatives play a critical role in reducing automobile travel demand. San Francisco added 100 miles of new and upgraded bike lanes improving the pedestrian transportation experience with redesigned streets, shorter crossing distances, and enhanced safety conditions.24

The reduction in vehicle-miles-traveled (VMT) due to increased biking was linked to automobile users opting to use bikes for their trips instead of driving. Transit users also switched to using bikes to make their trips, further reducing VMT. By removing all automobile trips of less than two miles reflected a conclusion of a 34% reduction in VMT.25

Bikeshare is also a value-add for San Francisco’s TDM strategies in their deployment of 2,750 bikes for the program.26 According to modal diversion data, the savings are predicted to be significant by 2040.

**Transit**

Many communities view transit as the mode best able to compete with the automobile, provided these transit options provide the reliability and accessibility those users desire. Urban areas have various forms of transit options, particularly those areas with 5 million people living

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24 (Brisson 2013)
25 Ibid.
26 Ibid.
with the geographic area. As an example, San Francisco has Bay Area Rapid Transit (BART) rail line and street-car options, which accommodates many riders on a daily basis.

Other cities such as New York and Chicago offer multiple forms of transit. The goal being reduced automobile demand and mitigating road congestion and countless lost hours spent in traffic. The Federal Transit Administration has several programs geared towards helping communities build transit oriented communities. New Starts is a program created to deliver transit projects with the collaboration of public and private sectors.\(^{27}\)

At a recent House Transportation and Infrastructure hearing on highways and transit projects, the Denver Regional Transportation District’s representative discussed the benefits of the New Starts program and how those efforts have resulted in a commuter rail project linking people in downtown Denver, CO with the Denver International Airport.\(^{28}\)

**Transit-Oriented Development**

Smart growth strategies have led to many cities to develop transit-friendly urban environments. Transit-Oriented Development (TOD) is an effort to blend the urban experience with more transit options that factor in high density, mixed-use, and walkable communities.\(^{29}\)

TOD goals are:

- Organize growth on a regional level to be compact and transit-supportive.
- Place commercial, housing, jobs, parks, and civic uses within walking distances of transit.
- Create pedestrian-friendly street networks that directly connect local destinations.
- Preserve sensitive habitat, riparian zones, and high quality open spaces.
- Make public spaces the focus of building orientation and neighborhood activity.
- Encourage infill and redevelopment along transit corridors within existing neighborhoods.\(^{30}\)

According to the State Highway Administration’s research report, cities that implement TOD tend to have fewer people using automobiles and making fewer trips.\(^{31}\) It also notes that the

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\(^{27}\) Ibid.

\(^{28}\) (Washington 2014)

\(^{29}\) (Mansoureh Jeihani 2013)

\(^{30}\) Ibid.
fewer trips incorporate shorter distances by all modes; implying VMT reductions if focused on shorter distances—less than two miles, and linking destinations around TOD’s. The cities used in the report are Washington, D.C. and Baltimore, MD and both cities saw marked reductions in VMT because of TOD. Of note is that route development includes shopping centers, restaurants, and destinations people are interested in and willing to use alternatives to automobiles to get there.

Similar to Denver, CO, the Maryland report indicates the public benefits that flow from a TOD, and incorporates bus, bike, and walking. However, seniors’ enthusiasm towards transit use is low. According to the report, seniors are less likely to use transit for a trip. Compared to other cohorts, seniors utilize it much less and prefer to ride with others or some variation of a carpool. This should not stop investments in transit as these options play a vital role in reducing VMT’s and creating livable communities.

Land use and TDM is intertwined. Effective TDM policy should take into account the demand for various modes used in urban transport. The future build-out and development of communities that incorporate multi-modal solutions in the long-run could materialize reductions in VMT and suppress automobile demand.

31 Ibid.
32 Ibid.
33 Ibid.
34 Ibid.
Transportation Demand Management in Arlington

A critical component of developing new TDM measures and recommendations for Arlington County children and seniors is collecting an inventory of the current state of Arlington County TDM programs, policies and stakeholders, focusing on their relation to children and seniors. It is important to first note that Arlington County is on the forefront of implementing TDM measures when compared to other localities, from both a statewide and national perspective. The County’s TDM Strategic Plan contains specific references to TDM programs and practices in which the County is currently engaged.

Existing Arlington County TDM programs:

<table>
<thead>
<tr>
<th>TDM Programs</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arlington Transportation Partners</td>
<td>Provide incentives, such as free services, to Arlington employers in order to establish commuter-benefits programs</td>
</tr>
<tr>
<td>Transportation Information Display Deployment</td>
<td>Provide relevant travel information via various types of displays across commercial, retail and residential developments</td>
</tr>
<tr>
<td>Bus Stop Information</td>
<td>Disseminates transit information that includes maps and timetables, to individuals and companies via brochures and display boards</td>
</tr>
<tr>
<td>Commuter Store and Mobile Commuter Store</td>
<td>Sells transit fares for regional transit services and provide information to commuters on Arlington TDM programs</td>
</tr>
<tr>
<td>Arlington TDM Social Media Campaign</td>
<td>Promote targeted transit routes with complementary fares, flyers, bags and brochures.</td>
</tr>
</tbody>
</table>

A number of these programs have been successful for the county. 465 employers offered transit benefits to over 150,000 at the end of fiscal year 2012 through the Arlington Transportation Partners program. The Commuter Store concept continues to grow by adding new locations in high traffic areas such as the Ballston Metro entrance. The Commuter Store now sells over $45 million in fares annually. Arlington has also received a number of awards

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35 (Arlington County Commuter Services n.d.)
and grants for their TDM programs. In 2012, the America Public Transportation Association awarded Arlington County the AdWheel Award of Excellence.

Arlington County has an exemplary track record for advancing TDM ideas. By incorporating the 8-80 concept, a new framework can be used to further refine TDM opportunities presented in the County’s TDM Strategic Plan. “WALKArlington” and “BIKEArlington” are programs that have successfully engaged in this endeavor. The “WALKArlington” program aims to promote pedestrian activities by teaming with businesses, county departments and citizens to emphasize the benefits of (non-automotive) transport. Similarly, the “BIKEArlington” program aims to promote cycling activities within the County. These programs strive to expand adoption from the current “Walk to School Day” initiative to a “Walk or Bike to School Every Day” initiative for elementary and middle school aged students. Every year, for Walk to School Day, elementary and middle school students are encouraged to walk or bike to school as well as to walk more throughout the school day\textsuperscript{36}. The County intends to expand this initiative by working with the Arlington County School System to enhance the Safe Routes to School program.

FY12 accomplishments for WALKArlington and BIKEArlington are as follows:

- Coordinated and participated in 34 community and partner events reaching 53,000 individuals.
- Promoted Arlington County’s national Gold-level “Walk Friendly Community” designation with a celebratory Walkabout.
- Planned and coordinated Walk and Bike to School Day event in partnership with Arlington County Public Schools, supporting more than 600 participants.
- Organized and participated in 100 events with a total attendance of over 18,000, compared to 39 events with 10,000 attendees in FY2011.
- Helped 9 new Arlington businesses become certified as Bicycle Friendly Businesses in FY2012, bringing the total number of certified businesses to 19, the second highest in the country\textsuperscript{37}.

\textsuperscript{36} (Arlington County 2011)
\textsuperscript{37} (Arlington County Commuter Services n.d.)
The Arlington County TDM Strategic Plan references juniors and seniors as underserved and underrepresented populations in its “Consideration of Future Markets” section. This plan also identifies holding an annual “Cyclovia” and other cycling events through business sponsorships and community partnerships as a means of enhancing the existing “BIKEArlington” program. Similarly, the plan promotes reinvigorating the “I-Ride program with new marketing and benefits for transit riding Arlington teens” as a way of enhancing the current “Youth Outreach” program. In 2008, a similar program was explored to improve the mobility of Arlington’s seniors, by encouraging them to use transit\(^3\). The ACCS also considered programs aimed at Arlington’s juniors, but chose instead to pursue funding opportunities, such as grants, that could be applied to other programs, since junior outreach is not the primary goal of TDM\(^4\).

\[^3\text{(Arlington Master Transportation Plan Streets Element)}\]
\[^4\text{(Arlington Transportation Demand Management Strategic Plan: FY 2013 - 2040 2012)}\]
Methodology

Using TDM strategies, Mobility Lab is tasked with decreasing congestion on Arlington County streets by reducing SOV trips within the County. TDM encourages people to use transit, ridesharing, walking, biking, telework and other alternatives to decrease SOV travel.

The approach identified by our team is to engage people and communities across multiple sectors to determine specific needs of children and seniors in accordance with the 8-80 philosophy. After discussing project needs and objectives with the client, our team outlined different recommendations based on surveys and interviews with parents, seniors, and other persons with interest in these communities. The class also conducted research into a variety of innovative ideas aligned with the goals of the 8-80 philosophy. The class was divided into two teams: juniors and seniors.

The teams developed surveys for both focus groups keeping in view the philosophy of 8-80 concepts. The junior team developed an online survey that was distributed to Arlington public elementary school parents, through the Facebook page of each elementary school. Additionally, the junior group met with Kyle Lukacs, the Coordinator for Safe Routes to School. Mr. Lukacs provided access to existing survey data conducted by Arlington Public Schools (APS). The senior team was provided with contact information from Maimoona Bah-Duckenfield, the Program Director for the Arlington Agency for Aging, to meet with Barbara Thode, the Service Coordinator at the Culpepper Garden Residence. Ms. Thode helped us distribute surveys at Culpepper Garden Residence. The survey collection and data tabulation effort yielded a diverse and valuable results.

The time constraints associated with this specific project did not allow the team to obtain in depth costs for each recommendation. Rather, we took a broad view of some topics and attempted to convey cost ranges for given proposals. Further in depth financial analysis is required to ascertain specific costs associated with undertaking any of the recommended proposals.
Mobility Objectives

Arlington Goals

Arlington County’s goals and policies are detailed in its Master Transportation Plan\(^ {40}\). The plan provides a long-term view of effective and accessible transportation options for all of Arlington’s residents, workers, and visitors. The projects and programs that Arlington County plans to use to meet its goals and objectives provide for Arlington’s expected population growth. This plan is part of a more comprehensive strategy that includes the General Land Use Plan\(^ {41}\). Together these plans shape land use locations and features, while ensuring that future land use and transportation infrastructure are integrated.

Arlington’s vision for its transportation network includes goals and strategies for upgrading existing transportation facilities and providing for system enhancements. In addition, Arlington uses Transportation Demand and System Management to encourage the use of public transit and non-motorized travel, in an effort to minimize SOV travel. Arlington envisions a transportation network with equity and access for all of its residents and workers. Therefore, Arlington invests in transportation projects and programs that provide for public health and fitness as well as an environment for an improved quality of life. Arlington’s plan for transportation and urban development focuses on moving people rather than cars. The plan is for high density commercial and residential development around Metro stations and other forms of transit with lower density development elsewhere in the county. By coordinating land use and transportation, routine destinations are placed closer to each other. Arlington is seeking to realize its vision of being a model urban community.

Based on Arlington’s vision of having walkable communities, mixed use developments, and extensive use of public transportation and biking facilities, the County has developed six transportation goals and several strategies to achieve those goals:

1. Provide high-quality transportation services for all users of all modes by making the transportation network affordable, convenient, integrated, comfortable, and safe for pedestrians, bicyclists, transit riders, and motorists. Strategies include increasing capacities of the transportation network, expanding and connecting bikeways, and integrating local

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\(^{40}\) (Arlington County 2007)

\(^{41}\) (Arlington County 1961-2013)
and regional transportation networks. Additional strategies to meet this goal include dedicating resources to provide frequent and reliable transit services, car sharing, and regulating taxicab services to compliment transit, paratransit, and non-motorized travel.

2. Move more people without more traffic by increasing travel mode choices, reducing single occupant vehicle travel, using TDM, and promoting telecommuting, public transit, and carpooling, walking, and biking.

3. Promote safety to minimize injuries and accidents, and provide for emergency responses when needed. Strategies to achieve this goal include infrastructure improvements and development that ensures safety for transit riders, pedestrians, bicyclists, and motorists, while ensuring the ability of first responders to reach an emergency situation quickly.

4. Establish equity by ensuring that mobility and accessibility needs of all residents are met, regardless of their income, age, or abilities. Strategies to meet this goal include providing pedestrian access on all roads, ensuring that public transit meets the Americans with Disabilities Act guidelines, and providing travel options that meet the needs of children, the elderly, and the disabled. Providing travel options also ensures access and affordability of travel within Arlington County.

5. Manage the funding, development, and maintenance of transportation facilities and services effective and efficiently through TDM and Transportation System Management. These systems produce efficient and high-quality transportation facilities and services with minimal life-cycle costs.

6. Advance environmental sustainability by reducing the impact of travel on air and water quality as well as improving energy efficiency. Strategies to achieve environmental sustainability include reducing hydrocarbon emission by promoting biking, walking, carpooling, telecommuting, and alternative fuel vehicles. Additional strategies include minimizing impervious surfaces, and managing the runoff of those surfaces.\textsuperscript{42}

\textsuperscript{42} (Arlington County 2007)
Junior Goals

Our major goal for children is to get more of them walking and biking – especially to school. Outside of a school bus, the family car is the predominant means for children between the ages of 6 and 15 to reach their destinations. This is detrimental to children, parents, and Arlington as a whole, as auto-dependence encourages sedentary lifestyles, requires parents to act as on-call drivers for their children (reducing both children’s and parents’ independence), and increases congestion. By rebuilding streets to safely accommodate children – as well as seniors and everybody in between – Arlington can greatly increase the number of children who walk and bike to school.

It is important to note that Arlington is already a leader in this area: 22% of Arlington county students walk or bike compared to 13% nationwide. This is due to Arlington’s existing participation in programs like Safe Routes to School and events like Walk and Bike to School Day and also attributable to the county’s relatively walkable and compact urban form. Still, there is much room for improvement. While nearly 75% of students live within a mile of their elementary school, many of them are driven or take the bus (23% within ¼ mile of school, 45% between ¼ and ½ mile, and 68% between ½ and 1 mile).

We began the process of crafting recommendations by designing a survey that reveals the largest barriers parents of elementary-age Arlington students perceived in letting their children walk or bike to school. The feedback we received from parents was critical in formulating our recommendations for making walking and biking to school a regular occurrence. We asked parents to rate the safety of their child’s walk or bike trip to school, whether real or perceived. Only 25% of respondents said that their child’s trip is or would be safe. The other 75% rated the trip as varying degrees of unsafe, with almost half of those parents describing it as ‘extremely unsafe’. Without a doubt, safety is the major barrier when it comes to increasing walking and biking to school. Many of the parents indicated that speeding drivers were their major safety concern. More than 40% said they would support street calming measures, such as narrowing intersection widths and adding speed humps near schools. Other safety improvements parents supported include separated bike paths, additional sidewalks and signalized crosswalks, and

43 (Trapp 2013)
44 (Arlington Public Schools n.d.)
45 (National Center for Safe Routes to School 2011)
46 (Arlington Public Schools n.d.)
increased crossing guards. Of note is that the parents surveyed seemed wary of unprotected bike lanes, with none indicating that bike lanes would make their child’s trip to school safer. Parents driving their children to school represent up to 14% of all rush hour trips. A reduction in these trips would positively impact not only the parents and students, but the entire community. Safety improvements and additional walking and biking infrastructure improvements would make parents more likely to let their children make school and non-school trips by biking or walking. Examples given by parents in the survey include trips to the park, library, pool, a friend’s house, playground, and convenience or grocery stores. Adults would also benefit from safer walking and biking conditions and would be more likely to make these short trips as well.

47 (National Center for Safe Routes to School 2011)
Senior Goals

Even with Arlington County’s range of senior targeted mobility programs, opportunities for improvement are available. Arlington County is committed to serving the needs of its senior citizens, which is reflected in the positive ratings of its programs. The goal of any senior oriented program should be to allow seniors to move freely and easily and maintain an active lifestyle within their community.

Mobility among seniors will become an increasingly important subject in the coming years as baby boomers make the transition into this demographic. By the year 2030, one in five Americans will be over the age of 65. Current budget restraints will force difficult decisions to meet the need for increased mobility options among seniors. It will take ingenuity and creativity to address these expanding needs.

Mobility has been studied widely as a key health indicator among the senior population. However, specific land use patterns relating to retail and amenity availability have not proven definitive in altering senior mobility patterns. Seniors are much more likely to follow a travel routine based on personal comfort, even if there are more modern or convenient amenities closely located. They are also more likely to focus on their specific individual needs rather than focusing on the land use offerings around them. This puts perspective on the problem of directly addressing senior mobility through specific action plans. Because it is not clear that any individual factor influences senior mobility, creating a single electronic application or senior friendly destination cannot be the only course of action.

The problem with creating applications to address senior mobility is that this age group does not have a defined schedule of need in most cases. They have the flexibility to schedule their appointments and shopping needs at their convenience. Therefore, it is difficult to demonstrate how a modern technology solution could lead to mobility alternatives because, most seniors don’t have a nine to five job or set schedule.

Rather than focusing on complex technologies that may not be fully understood by many seniors, the County should instead focus on simple and immediate solutions to their mobility needs. The County can continue to build more complex systems for future generations that have

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48 (Rosso 2013)
49 (Rosso 2013)
50 (Mitzner, 2010)
grown up using newer technologies and will be more comfortable with its use. They should offer today’s seniors immediate access and options based on technology they are comfortable using. (Landline phones, paper based presentations, etc.). There should also be a focus on continued development of technology options for future generations of seniors who will be more comfortable using current technologies\textsuperscript{51}.

\textsuperscript{51} (Mitzner, 2010)
**Junior Survey Responses**

The junior group collected survey results from the parents of Arlington elementary school children. Parents were targeted through the Facebook pages of APS elementary schools. Using this method, we were able to limit respondents to those living in Arlington County with children between the ages of 5 and 12 years old. Unfortunately this method had the side effect of excluding parents who send their children to private school or the small number of APS elementary schools without a dedicated Facebook page. We received 50 responses over a 6-week period.

Because our goals for children’s mobility focused on increasing walking and biking to school, our survey questions were designed to find out which parents currently do or do not let their children walk to school. We asked parents what barriers existed that precluded them from allowing their children to walk to school (including perceived safety) and solicited their ideas for ideal solutions to those barriers, and the other trips that children could potentially make by biking or walking.

Our first question asked if the respondent’s family lived within a mile of their elementary school, and whether the family’s children biked and/or walked to school. Half the respondents lived more than a mile away. Of the half that did live within a mile of school, 15% had elementary children that never walked or biked to school. This is the group of children – those who already within walking distance but, for whatever reason, do not walk or bike – that stand benefit the most from our recommendations.

![Do you live within 1 mile of your child’s elementary school?](image)

Figure 8
The results of our next question show just how much safety plays a role in keeping children from walking or biking to school. We asked parents to rate the perceived safety of their child’s walk or bike ride to school. No parent indicated their child’s trip as ‘Extremely Safe’, while a full 38% perceived the trip as ‘Extremely Unsafe’. In total, 80% of parents said that their child’s walk or bike to school is or would be some degree of ‘Unsafe’, while only 20% felt it was some degree of ‘Safe’. Clearly, safety is a major barrier standing in the way of getting more children to walk or bike to school.

![Pie chart showing safety perceptions](image)

We then asked parents to indicate the kinds of infrastructure improvements that would increase their perceptions of safety when it comes to their child walking or biking to school. The most popular options were sidewalk improvements and measures to slow down traffic. Separated bike path and additional crosswalks were also popular options. A large number of parents indicated that no infrastructure improvement would make them comfortable with their child walking or biking to school. Of note is that very few parents chose on-street painted bike lanes, implying that only bike infrastructure segregated from road traffic can create a sufficient level of safety to induce additional children to bike to school. Other recommendations provided by parents include expanded drop-off zones and several requests for additional crossing guards.
Finally, we asked parents to tell us the kind of other trips, if any, their children make by biking or walking. A full 64% of parents said that their children bike or walk to destinations besides school, though the vast majority of those trips only occur when accompanied by an adult. Parents gave examples of these trips – the most popular being walks to the park. Others include the pool, library, community center, friends' houses, and the corner store. These are the kinds of trips that will only increase if walking and biking to school is encouraged and made safer.

Figure 10

![Bar chart showing infrastructure improvements mentioned by parents.](chart.png)

Figure 11

![Pie chart showing child non-school trips.](chart.png)
Senior Survey Responses

The senior group distributed over 120 surveys during a two week period in March at the Culpepper Garden Senior Residence, in Arlington County. We received 52 responses, with ages ranging from 65 to 85 and over.

We asked seniors about their technology use, and our hypothesis of "never" was supported in the results. Our follow-up question shows seniors would use internet connected devices to plan an array of different transportation modes, the most popular being "paratransit". However a majority of the seniors who selected "other" wrote in "none" or "no internet access." Acquiring internet access is the first barrier seniors must overcome before getting or using internet connected devices.
The senior group asked questions about how far seniors were willing to walk for different activities. We found that a majority of seniors were willing to walk shorter distances for basic needs such as grocery, pharmacy, or retail location, than for non-basic needs such as entertainment. This difference in distance willingness to walking for a specific purpose shows how important entertainment locations are to seniors.

When we asked seniors about what would improve their walking experience a majority of responders answered "more accessible sidewalks". The top "other" responses included "better sidewalk conditions" and "longer traffic lights". Seniors also answered that their biggest impediment to traveling was the "destination is too far to walk" and the "weather". Closer destinations, paired with better sidewalk and street conditions would help seniors walking experiences.
We found a majority of seniors at Culpepper Garden use paratransit for their transportation. Based on these responses, we believe a more enhanced paratransit service would be beneficial to seniors. We also asked about which hypothetical free retail home delivery services that would be most useful. A majority of responders choose "Grocery" and "Pharmacy," these responses made up 56% of the total. These delivery services would be helpful to seniors.

![Figure 20](image1.png)  
**What mode of transportation do you use?**

![Figure 21](image2.png)  
**If retail services were available to your home for free, what type of services would mostly you use?**

A vast majority, 61%, of seniors responded "grocery, pharmacy, or retail" location as their most common trip. When asked about places they would like to go if transportation was not an issue, a majority responded with "personal or social" locations, followed by "arts or entertainment" locations. Combining places that seniors most commonly go, with places they would like to go would begin to satisfy the difference in these responses.

![Figure 22](image3.png)  
**What is your most common trip?**

![Figure 23](image4.png)  
**Where would you like to go if transportation was not an issue?**
Recommendations

Arlington County Needs Assessment

Arlington County is recognized as one of the best multi-modal, pedestrian friendly urban communities in the country\textsuperscript{52}. The Metrorail transit system traverses the county providing tremendous economic activity and allows citizens to move in harmony, while reducing vehicle miles traveled. Arlington has the 12\textsuperscript{th} highest population density when ranked by county in the United States, yet its population is expected to increase 33\% by 2040. In addition, employment is expected to significantly grow during that same period, easily outpacing population. These numbers paint a daunting picture for managing a continuously growing community faced with adjusting to both the quality of life standards demanded by its own residents, and pressures from adjacent and equally expanding neighboring communities\textsuperscript{53}.

With this in mind, the GMU team has developed a group of recommendations that we believe will enhance TDM within Arlington County and fit neatly within the 8-80 Cities philosophy. Furthermore the recommendations have been ranked in the following chart based on how well they fit within the four areas of focus of the 8-80 Cities program.

\textsuperscript{52} (Community Highlights)
\textsuperscript{53} (Arlington County 2012 Annual Report 2012)
### 8-80 Cities Areas of Focus

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Audience</th>
<th>Page Number</th>
<th>8-80 Area of Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Streets</td>
<td>Junior &amp; Senior</td>
<td>36</td>
<td><img src="green" alt="" /> ![red] ![blue]</td>
</tr>
<tr>
<td>Open Streets</td>
<td>Junior &amp; Senior</td>
<td>39</td>
<td><img src="green" alt="" /> ![red] ![yellow]</td>
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<tr>
<td>Flexible Pavement Materials</td>
<td>Junior &amp; Senior</td>
<td>46</td>
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<td>School Space and Park Air Rights</td>
<td>Junior &amp; Senior</td>
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<tr>
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<tr>
<td>Gaming Software Application</td>
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<tr>
<td>Grocery and Pharmacy Delivery Services</td>
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<tr>
<td>Back-in Parking</td>
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<tr>
<td>Family Nights</td>
<td>Junior</td>
<td>68</td>
<td><img src="blue" alt="" /></td>
</tr>
</tbody>
</table>
Complete Streets

‘Complete Streets’ is a concept centered on the idea that public rights of way should not be solely focused on moving automobiles. It acknowledges that some streets (e.g. highways) will always be oriented around motorized vehicles exclusively. Many other streets, however, could better accommodate children and the elderly, as well as provide an alternative to automobile congestion, by dedicating some street space to bikes and pedestrians and by slowing down vehicles through traffic calming. We recognize that Arlington is already a national leader when it comes to implementing complete streets. However, few children or seniors in the area have felt the effects of Arlington’s previously implemented projects. As our survey data shows, a perceived (and real) lack of safety on Arlington’s roads is the main factor that keeps more kids from walking and biking to school. With improvements added to the current infrastructure, the opening of many additional routes allowing greatly increased pedestrian utilization throughout the community is possible.

Bicycle Infrastructure:

Arlington County’s on-street bike infrastructure has predominately taken the form of bike lanes. While bike lanes provide an option for dedicated cyclists, they do not create the perception of safety needed to get seniors and kids on bicycles or adult tricycles. Very positive results of protected on-street cycle tracks are half the injuries, an increased number of bikers, and

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54 (Nelson/Nygaard 2012)
boost local businesses. Our survey of Arlington elementary-school parents found that no parents recommended on-street bike lanes as a way to encourage more biking to school, an indication of parents’ unease with Arlington’s current complete streets implementation with regards to bicycles. While fully segregated cycle tracks with bike-specific lights at intersections will always be the gold standard of bicycle infrastructure, they are not always feasible when space is limited. However, small changes to the way Arlington implements bike lanes on smaller streets could lead to a big increase in perception of safety. Arlington’s current bike lane implementation puts danger on both sides of the rider: fast-moving traffic on the bicyclist’s left, and the potential of being ‘doored’ by a parked driver exiting their vehicle on the bicyclist’s right. Instead of placing the bike lane between driving and parking lanes, Arlington’s Complete Streets policy should call for placing bike lanes between the sidewalk and parking lane. This would eliminate the problem of cars whizzing closely by cyclists and go a long way toward assuaging fears of being ‘doored’, all while using the same amount of road space.

**Pedestrian Infrastructure:**

Many areas in the county that lack the most basic of walking infrastructure: sidewalks. Some of these areas include school zones and senior centers. An aggressive complete streets implementation plan would see full sidewalks added to these areas. Beyond sidewalks, crosswalks represent another area of pedestrian infrastructure in which Arlington can improve. Low-visibility and dangerous mid-block crosswalks should be made more visible. This can take the form of ‘rectangular rapid flashing beacons’ (RRFBs) which are sign-mounted flashing lights adjacent to the crosswalk and are activated by a pedestrian wanting to cross, or ‘in-pavement flashers’, lights installed in the roadway surrounding crosswalks, also pedestrian activated.

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55 (Hall 2012)  
56 (Teschke 2012)  
57 (What if bike comfort is more important than bike safety? 2013)
RRFBs alone increased the amount of drivers yielding at crosswalks in St. Petersburg, Florida from 23% to 93%\(^{58}\). Finally, Arlington should explore creating additional mid-block crosswalks near schools and senior centers (preferably with one of the aforementioned technologies) that enhance walking patterns currently used by pedestrians.

58\ (Van Houten n.d.)
Open Streets

Many cities around the world have embraced "Open Streets" as a way to encourage citizens to abandon their automobile and adopt walking or biking, if even for a day. The idea behind Open Streets is removal of automotive traffic either temporarily or permanently from a street within the commercial area of the city. In this way people are encouraged to patronize shops and restaurants in these areas without fear of entanglement with cars. Open Streets are designed to accommodate a range of transportation options: walking, bicycling, and transit and with an emphasis on moving people, not just cars. This helps expand transportation choice and make the city and region more accessible for everyone irrespective of age, mobility, or income. Greater transportation choice can help reduce people’s dependency on the automobile and increase travel by walking, bicycling and transit. Giving people choices besides driving can help protect air quality, reduce greenhouse gas emissions, and address public health concerns such as childhood asthma and obesity.

Ciclovia is another alternate name given to the Open Streets project in Bogota, Columbia. In 1965, Seattle started Bicycle Sunday, the first documented Open Streets initiative in the world. The idea spread slowly across North America and beyond, as cities began to open their streets to people. Bogotá’s Ciclovia began in 1976, and has inspired Open Streets initiatives across the world. Much of this inspiration came in the form of a 2007 Streetfilms video on the world’s most successful Open Streets. At the time of the video’s creation, there were only about 10 Open Streets in North America. Now there are over 100, in cities and towns of all sizes\(^\text{59}\).

Some successful case studies are as follows:

\(^{59}\) (Samuelson 2014)
CicLAvia Project LA

Ciclovías started in Bogotá, Colombia, over thirty years ago as a response to the congestion and pollution of city streets. This concept has grown throughout Latin America and the United States. On date of 10/10/10, Los Angeles launched “CicLAvia.” Open Streets initiative catalyzed vibrant public spaces, active transportation and good health through car-free street events. CicLAvia engages with people to transform relationship with communities and with each other.\(^{60}\)

Living Street Denver, Colorado

In 2008, the city of Denver in collaboration with Environmental Protection Agency (EPA) launched the Living Streets Initiative. This initiative is a multi-jurisdictional effort to shape future street investments and policies and transform existing commercial corridors into living streets pedestrian oriented, multi-modal streets that can support a dense, vibrant mix of shops, offices, and residences.\(^{62}\)

Baltimore Sunday Ciclovia

On October 25th, 2009, Baltimore’s first Ciclovia took place as a field test for the success of the program and its feasibility in Baltimore City. It was called “Sunday Streets” and was conducted as part of Roland Park’s Seven Generations Weekend, a weekend of activities promoting green behavior in the area sponsored by the Roland Park Civic League. Sunday Streets is outlined in the city-sponsored 2009 Sustainability Plan, with the eventual goal being that every Sunday from 8 am to 1 pm, a number of usually heavily-traveled streets are closed off.

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\(^{60}\) CicLAvia n.d.
\(^{61}\) CicLAvia n.d.
\(^{62}\) US EPA Smart Growth Implementation Assistance 2009
\(^{63}\) US EPA Smart Growth Implementation Assistance 2009
to motorists and instead used by pedestrians, cyclists, rollerbladers, etc.—anyone not in a vehicle. This idea is modeled Bogota, Colombia’s Ciclovias, which have had enormous success and have prompted a number of cities all over the globe to adopt similar programs. In this case, the southbound lanes of Roland Avenue were closed to traffic between Northern Parkway and Cold Spring Lane, creating a 1 mile route.  

**Minneapolis Open Street Project**

Open Streets Minneapolis has quickly become one of the most successful initiatives in North America. From its humble beginnings in 2011 as an all-volunteer run event, the initiative now receives city in-kind support and features four routes, one in each of the city’s four quadrants. Open Street Minneapolis is now called as "Open Streets Mpls", and it has grown from one event in 2011 to four in 2013. Open Streets Minneapolis finished the 2013 season with a one mile route on North Lowry Ave, which is quickly becoming the favorite location for local Open Streets enthusiast. Last year, local business leaders pushed to bring the initiative to North Minneapolis, and community members from across the north side came out to celebrate. This year’s initiative was no different, with thousands taking to the streets.

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64 (Baltimore Office of Sustainability n.d.)
65 (Open Streets Project 2014)
66 (Open Streets Project 2014)
Food Street Lahore, Pakistan

The Open street concept has been adopted worldwide. Pakistan has already implemented the open street concept in an area known as Food Street. “Food Street” is open to traffic during the day but as the sun sets, the street is closed to motorized vehicles. Food Street in Gawalmandi, Lahore is a center of traditional Pakistani food. Centuries-old buildings surround the site. Hungry visitors arrive and stay till very late at night, enjoying some of the best local food available in Lahore. It is one of the unique tourist attractions in Lahore. It is open 24/7, and food can be ordered from any shop while sitting at one place.

Benefits of Open Streets & Ciclovia

Open streets and Ciclovia offer many benefits. They increase non-automotive transportation choices giving people more ways to get around. Providing alternatives to the car helps protect the environment and can make it easier for people to have an active, healthy lifestyle.

Transportation Choice

Open streets are multimodal—that is, they support multiple ways to get around, including walking, bicycling, and transit. These transportation options make the city more accessible for people of all ages and abilities, including people who are not able, cannot afford, or otherwise do not want to drive. This is especially important to children, the elderly, and disabled or low-income people. Open streets often support higher-density, mixed-use development that place residents closer to goods, services, jobs, and each other and can make it possible for people to meet some of their daily needs by walking or bicycling.

67 (Food Street, Lahore Pakistan n.d.)
68 (Food Street, Lahore Pakistan n.d.)
69 (US EPA Smart Growth Implementation Assistance 2009)
Environment and Public Health

Increasing transportation choices makes it possible and convenient for people to choose alternatives to driving. This helps reduce dependency on the automobile, protect air and water quality and reduce greenhouse gas emissions. Increasing transportation choice can also help communities address public health concerns such as childhood asthma. Air pollution is a leading cause of asthma and other respiratory diseases among urban residents, particularly among children. Increasing transportation options can help to reduce exposure to air pollution. The lack of physical activity contributes to obesity and other chronic health problems, such as diabetes and heart disease. Open streets create safe and convenient places for walking and bicycling, allowing people to integrate physical activity into their daily routine.\footnote{70}{US EPA Smart Growth Implementation Assistance 2009}

Safe, Vibrant and Convenient Neighborhoods

Open Street can create areas that attract people. They feature wide, pleasant, shaded sidewalks, plazas, and other public spaces that encourage people to stroll, stop, sit and gather. People will feel better and excited because they will not be worried about traffic, speed, noise and pollution. A mix of people and land use means that streets are busy throughout the day. An Open Streets approach can help spur development in existing neighborhoods. This initiative can improve and support new investment and reinvestment in the neighborhoods, it can help in bringing new residents, jobs, and businesses back to centrally located and established city neighborhoods. Directing development to existing neighborhoods will maximize past investment in infrastructure and can help to keep future infrastructure costs in check. It will give new and existing residents more housing options they can afford, closer to employment centers.\footnote{71}{US EPA Smart Growth Implementation Assistance 2009}

Ciclovia

Arlington County has already developed a comprehensive and hierarchal network of bike facilities that include Multi-Use Trails, On Street Bike Lanes (including Buffered and Green Bike Lanes), Shared Streets (Using Sharrows), and local unmarked low volume roads.\footnote{72}{Bike Arlington n.d.} However, the majority of the network relies heavily upon squeezing bikes and people onto facilities primarily designed for automobiles. This recommendation involves both the temporary
closure of an individual roadway segment to all automobiles, as well as the permanent closure of several linked street segments to create a network of non-motorized multi-use streets that will serve as a non-motorized backbone to the County.

**Open Streets in Arlington**

Arlington County would seem to be an ideal location for Open Streets, particularly in the areas surrounding the Metro line. There are a number of ideal locations for the implementation Open Streets in Arlington. We offer the highlighted routes as suggested locations for Open Streets in Arlington. The first option could be the closure of Wilson Boulevard, second option could be closure of Clarendon Boulevard between Clarendon Metro Station and Courthouse Metro Station and the third option could be the closure of North Stuart Street between Fairfax Boulevard and Wilson Boulevard. There is an abundance of restaurants in these areas, helping to increase expected business activity. Several high density residential areas are located close to these proposed routes that should serve as an excellent customer base for this idea. Finally, all the suggested locations are easily accessible by Metroline. We can easily notice Metro Stations like Clarendon, Courthouse and Ballston Metrorail.

**First Suggested Location: Wilson Boulevard, from Courthouse Metro to Clarendon Metro**

![Figure 30](image-url)
Second Suggested Location: Clarendon Boulevard, from Clarendon Metro to Courthouse Metro

![Map of Clarendon Boulevard](image1)

Figure 31

Third Suggested Location: North Stuart Street between Fairfax Drive and Wilson Boulevard

![Map of North Stuart Street](image2)

Figure 32

### Benefits

- Transportation choice.
- Environment and public health.
- Safe, vibrant and convenient neighborhoods.

### Challenges

- Marketing and outreach through advocacy groups.
- Influence policy makers to increase support.
- Ensure financing and sustainability.
Flexible Pavement Materials

Arlington County has many older neighborhoods with thousands of mature trees in close proximity to sidewalks often leading to root upheaval of concrete sidewalks. This creates an uneven walking surface that can be hazardous to not only children and seniors, but to the general pedestrian population as well. Innovative rubberized pavement materials have been developed and successfully utilized to address this problem. We recommend a pilot project to test these materials at problem areas within the county.

Recycled Materials for Tree Wells and Sidewalks

Recycled materials for use in tree wells and sidewalks have specific benefits support the 8-80 philosophy in Arlington County. Terrecon has installed its Rubbersidewalks and Terrewalks materials in Washington D.C. and has received praise for effectiveness on installed product dating back more than seven years. These materials are available at reasonable cost when measured by the full lifecycle of the product, and provide a viable solution for the preservation of existing green spaces in the face of future urban growth. With proper planning, effective management of this growth will greatly mitigate impacts on established trees and parks and allow urban areas to thrive without extensive costs to the environment.  

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71 (Terrecon n.d.)
72 (Industrial Ecology Blog 2006)
Benefits

- No requirement to remove trees that are encroaching on concrete sidewalks. Even if the new material is subject to tree root growth in the future, minimal impact and costs are involved by removing the material, re-grading the area, and reinstalling the rubberized material. If the rubber material is not destroyed in the removal process it can be reused resulting in to longevity and lifecycle cost savings.

- The rubberized material is much safer for trip and fall accidents that are common among both the junior and senior demographics. Since jurisdictions must take into account liability for trip and fall lawsuits, potential litigation cost savings should be factored as a hard cost in feasibility studies for the installation of rubber materials.

- The material is environmentally friendly and can be obtained through different funding streams for green or eco-friendly building supplies such as federal or state programs that support LEED-certified products.\(^{76}\)

- Based on current estimates, the lifecycle cost of rubber material is lower than concrete because of the ability to move rubber materials for tree root maintenance versus removing and replacing concrete.\(^ {77}\)

- The porous nature of the material reduces runoff that can be a major safety factor in urban environments. The porous nature of this product vs. an impervious surface such as concrete reduces both freezing sidewalks and major storm runoff that can lead to pedestrian and vehicle accidents.\(^ {78}\)

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\(^{75}\) (Chang 2008)

\(^{76}\) (Terrecon n.d.)

\(^{77}\) (Terrecon n.d.)

\(^{78}\) (Terrecon n.d.)
Challenges

- The initial cost of rubber building materials for sidewalks and tree wells is higher than conventional concrete because few companies currently provide product.
- The lifecycle of these materials have not been proven, especially in areas with varying climates. The programs that have been undertaken have occurred within the last decade, so long-term durability is not proven.

Figure 35

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79 (Hoboken 411 2007)
Where to Target

We recommended that Arlington County undertake installation of rubber sidewalk material and tree wells that are in need of repair. This program could be limited to an initial pilot area and expand to further areas in the future.

Arlington County should target the installation of rubberized material in the following areas:

- **In areas of high pedestrian traffic:** Specifically where tree root growth has damaged sidewalks.
- **Near schools:** School age children are a major part of the 8-80 Cities strategy, and any increase in safety among this demographic should be embraced.
- **Near senior centers:** Seniors are negatively impacted by trip and fall accidents leading to increased health care costs. Providing a material that would lessen the instances of serious falls would prove an ideal solution in mitigating these risks.
- **In county parks:** The rubberized material could also be utilized for walking or jogging paths, as well as other pedestrian surfaces within and around parks. This material application would be beneficial to all users of this open space.

### Benefits

- Environmentally friendly.
- Reduced personal injury in falls.
- Mobile for maintenance procedures. Product is not destroyed if moved.
- Allows for large trees in high traffic urban environments.

### Challenges

- Long term viability of product in varying climates is unknown.
- Few companies available that can produce product on a large scale.
- High initial capital cost.
School Space and Park Air Rights

In highly urbanized environments, such as those characteristic of many areas in Arlington County, land and real estate is available only at a premium cost. These characteristics of urbanized areas often make open space for parks and recreational uses, as well as the land necessary for the construction of new schools, cost prohibitive. The following are recommendations that may prove beneficial in addressing some of the county’s needs.

Vacant Office Space for Schools

Attempt to identify vacant office space for classrooms within the County. The benefits would be annual leases that would allow the district to expand and contract as student population changes over time, reducing the cycles of when the County ranges between not having enough classroom capacity to too much capacity. It may also reduce bus funding requirements and decrease traffic flow into and out of current schools by parent drop-offs. The idea would also create greater possibilities for older students to use in-place transit options to travel to and from school at varying times. In addition, for the older students, the close proximity to businesses could spur more student interaction with employers and/or public/private interaction serving as an effective learning tool, particularly with regard to Science, Technology, Engineering, and Math (STEM) education initiatives. For younger students, the benefits would fall mostly to the parent with reduced travel miles and congestion issues for extra travel to schools.

The primary challenge would be to find suitable locations that can serve as schools depending on grade level. The parents would not need to work directly in these buildings but should have reasonable access at times when they need to arrive for work and at the end of the day. For younger children, there would be a need to consideration of safely accessible outside space for recess such as parks or open areas. For older children access to after school activities are possible by utilization of current busses in the system or through transit access.

As with most proposals involving many individuals and an established educational

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80 (Ballston Office Building to Be Vacated, Renovated)
structure, institutional barriers and issues, such as school districting, exist with implementing this recommendation. Another institutional barrier would likely include office building security, especially if the proposed office space identified for classrooms exists within an office building that contains secured sections. However, identifying a comprehensive list of institutional barriers and issues for this recommendation is beyond the scope of this project. While recognizing numerous potential institutional barriers and issues exist with the implementation of this recommendation, these issues can be addressed and barriers overcome provided that stakeholder groups (including schools, unions, parents and teachers) are involved in the early stages of a continuing, comprehensive, and collaborative process to increase the likelihood of majority acceptance.

We recognize there are many additional issues surrounding this idea. A full study of the idea would entail not only monetary outlays by the county but the feasibility of all students receiving a quality education and parental willingness to study the idea. This concept may become more feasible for either younger or older students.

**Benefits**
- Demand based classroom space.
- Decrease traffic to & from current schools by parent drop-offs.
- More efficient use of public transit near schools / increased ridership.
- Increased educational opportunities via agency / company partnerships.

**Challenges**
- Identifying suitable locations: nearby parents / parks / ballfields.
- Potential new trips generated when parents change work locations.
- Monetary outlays by the County and parents adoption of idea.
Air Rights for Parks or Sports Fields

Sport and leisure fields consume large amounts of costly land. We submit that a study assessing the feasibility of using the air rights over county owned properties would prove beneficial to all residents in providing meaningful outdoor space for physical activities. With construction possible on top of parking garages, buildings, public rights-of-way, there would be a creation of additional green space for communities which in turn would increase the aesthetic value of the area or neighborhood. The primary costs for parks/sports fields built above the public right-of-way would only be those associated with construction, not the potentially significant cost of land. An Air Rights proposal by VDOT expanding Gateway Park in the Rosslyn neighborhood may serve as the benchmark for further expansion of public properties. The figure below represents the possible expansions to the park that may facilitate growth for the area.

Figure 37

81 (Jackman 2013)
**Bike Share**

Since its launch in 2008 the Capital Bikeshare program has become one of the largest and most successful bikeshare programs operating in the United States. The program covers the Arlington, Alexandria, and Washington DC area. The bikeshare program operates over 300 stations with more than 2,500 bicycles in the metropolitan area. In the Arlington area on the date of this report there are 54 stations, 375 bikes, and 698 docks for bike returns\(^82\).

The bikeshare program is operated to fulfill the need for individuals with short point to point journeys. The program allows great flexibility for riders to purchase memberships based on individual needs that include 24 hour, 3 day, monthly, or annual options. Based on analysis and information from the Bike Arlington report of August 2013, the program has been a success among Arlington residents and has been growing exponentially. Arlington County statistics show that the program has doubled in trips over the last year reaching 174,413 trips. Arlington County expects this unprecedented growth to continue with the expansion of the program by 39 new stations within the next two years\(^83\).

Given the success of the current program, there remains a segment of the population that either chooses not to or is unable to participate in the bikeshare program due to age, physical inability to safely operate a standard two-wheel bicycle, or loading capacity needed for shopping trips. A possible positive response to meet some of these needs would be electric assisted bicycles or tricycles integrated into the bikeshare program.

**Mode Options / Benefits and Challenges**

San Francisco and several other cities (San Antonio, Austin) have started bikeshare testing power assisted bikes. These bikes have an electric motor and battery system that can be

\(^{82}\) (Bike Arlington n.d.)  
\(^{83}\) (Bike Arlington n.d.)  
\(^{84}\) (Capital Bikeshare n.d.)
charged upon return to the bike dock. The power assisted bikes allow the user to pedal or use the electric motor to do the work. These pioneering locations have noted that offering the two wheeled versions alone eliminates an entirely different sub-section of the population that does not feel comfortable with the two wheeled bike. This form of bicycle is more suitable for users that decline the use of a bike simply because they do not want to or cannot exert the amount of energy required to travel from point to point. It also meets the needs of individual users that have minor injuries that prevent them from more strenuous activities.

Madison, WI and San Antonio, TX are two cities sites utilizing a three wheeled version of an adult sized bicycle on a test basis, which, among other benefits, allow for greater flexibility when transporting loads. The bikes currently in the Capital Bikeshare program fleet do offer options with racks, but they are only designed for one to two small to medium sized bags Tricycle versions provide riders with greater flexibility and are easy to ride and offer users more comfort and stability.

Tricycle:

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal balance required.</td>
<td>Higher cost per unit.</td>
</tr>
<tr>
<td>Additional load/carrying capacity.</td>
<td>Larger footprint in bike lanes.</td>
</tr>
<tr>
<td>Works well for people with disabilities.</td>
<td>Additional user fees.</td>
</tr>
<tr>
<td>Accessiblility and comfort.</td>
<td>Bike weight (harder to peddle).</td>
</tr>
</tbody>
</table>

Figure 39

85 (Madison B Cycle 2013)
Electric Assisted Bikes:

**Benefits**
- Easier to get around the city.
- Environmentally friendly.
- Reach speeds of 20 mph.
- Ability to turn the motor on and off.

**Challenges**
- Acquisition Cost per unit.
- Additional user fees (estimated $1.50 per hr).
- Costly infrastructure updates to charge bikes.
- Fitness factor.

**Cost Estimates**

The estimated cost for one ten-bike docking bay designed for the electric assist is roughly $55,000\(^{86}\). This includes the installation of the docking bay, but does not include the potential for additional infrastructure or code updates due to additional electrical retrofitting. There are also several different cost structures in the initial procurement of the electric assist bikes, depending on whether the bikes will be retrofitted or bought new with the electric assist technology.

- New bike docks will be required for either version at an estimated cost of $55,000 per station\(^{87}\).
- Assuming current bike setup will allow for retrofit, the per bike cost begins at $1,699 and may exceed $2,000\(^{88}\).
- New bicycle prices begin at $2,549 and may reach $3,999\(^{89}\).

The potential cost to add one bike dock with 10 electric assist bikes would range in cost from $80,490 to $94,900. This does not allow for non-bidirectional trips that begin and end in the same locations. Additional bike docks would be required for charging in more than one

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\(^{86}\) (Alta Planning and Design 2012 2012)  
\(^{87}\) (Alta Planning and Design 2012 2012)  
\(^{88}\) (Donohue 2012)  
\(^{89}\) (Donohue 2012)
location if desired. In order to manage the initial acquisition costs, an offset may be additional user fees combined, potential corporate sponsorships, or federal grants. However, use of any combination of the three would flatten the cost curve.

The cost estimates for a commercial grade tricycle that would meet the needs of constant use and constant outdoor storage range from $800 to $2,000. Depending on the manufacturer, the tricycle would be adaptable to the current bike docks with little to no modification required. The addition of 10 tricycles would range in cost from $8,000 to $20,000. Unlike the electric assisted bikes, these would not be limited to specific bike docks and can use existing infrastructure. The acquisition costs are absorbed for the tricycles by the normal membership costs. We recommend purchase of three wheeled variants as replacements for current bikes removed from inventory due to maintenance, theft, or established phase out criteria of a fixed percentage of standard bicycles.

The options of the power assisted bicycle and tricycle would close the gap left by utility needs, rider abilities, or comfort level. However, we recognize that the power assisted bicycle option requires a substantial monetary commitment. Existing test programs should be monitored for signs of successful implementation. Should these programs prove successful, an understanding of how the funding streams are managed and sustained is imperative. Sponsorships and advertising opportunities should also be explored as a way to offset initial acquisition and sustainment costs.
Gaming Software Application

The use of computer gaming application software for internet connected mobile devices has become extremely prominent, especially for children. Most people recognize that the primary purpose for gaming applications is entertainment. However, a new market is emerging where individuals can use applications for educational purposes. Today’s mobile application marketplace demonstrates numerous linkages between applications developed for children and education. More than 80% of the applications available within the education category of the online Apple iTunes store have children as their target audience\(^9\). Shuler also notes that application developers are dedicating a significant amount of resources using games as the foundation for delivering content to promote learning and education. These applications could be an important learning tool for children as the use of mobile technology for common activities continues to grow.

Research supports the use of mobile applications for children’s educational benefits. The appropriate use of applications within technology platforms can enhance learning through gaming technologies that develop knowledge, skills and situational awareness of common activities\(^1\). Games provide users with reward systems that promote competition and use common, collaborative tools to achieve learning objectives\(^2\). Using gaming platforms to teach activities both inside and outside the classroom is now commonplace. Results show positive attitudes towards learning among individuals. Games allow users to make decisions encouraging participation in activities while engaging them in real-world scenarios\(^3\). Arlington County is actively investigating the use of applications and mobile technology to enrich the learning experience\(^4\).

Offering these applications to Arlington County students through their internet connected mobile devices would not only make travel to school more entertaining, it would also increase elements of safety and security. Whether riding a bike or walking, safety is critical since

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\(^9\) (Shuler 2012)  
\(^1\) (Walsh 2012)  
\(^2\) (Shuler 2012)  
\(^3\) (Kenney 2013)  
\(^4\) (Arlington Public Schools 2013)
pedestrians remain vulnerable to heavy vehicle traffic even when wearing protective gear\textsuperscript{95}. Specifically, a mobile device application could benefit students by:

- Connecting local students so that they travel in groups to school;
- Using real-time traffic data to identify less congested routes to and from school; or
- Identifying monitored routes by Arlington Police or traffic guards.

The application could assign points for traveling in groups or following suggested routes. The application could also use readily available data, such as traffic data from Google, for positioning information to monitor travel, or allow parents to remotely monitor progress of their child to ensure they get to school safely.

The application could also reward students with points for obeying local laws, such as stopping at all stop signs or crossing at designated crosswalks. Students could use their points to receive prizes after each semester or compete in friendly competition. This could also

\textsuperscript{95} (Oxley and Melinda Congiu 2008) \\
\textsuperscript{96} (Mills 2008)
potentially provide Arlington County an additional source of revenue as families pay to
download the application.

Numerous school systems administer educational programs to help promote the safety
and security of students when walking or biking to school. However, statistics raise doubts on
how effectively these programs reduce the safety risk for children traveling to school. A
significant challenge with the aforementioned educational programs is ensuring that children use
this knowledge to change their behaviors when traveling as a pedestrian\textsuperscript{97}.

Conversely research has shown the benefits of incorporating interactive scenarios to
improve how administrators can teach road safety education. Interactive scenarios, such as a
game, can help build real-world skills about how children should function in traffic scenarios
instead of simply conveying knowledge. Scenarios provide user feedback to help influence how
they apply their knowledge to real-world scenarios, thus improving the users’ skills\textsuperscript{98}. Users
were then able to demonstrate the benefits of interactive scenarios to teach children the skills
necessary to interact with traffic. Overall, children decreased the number of poor decisions they
made under various pedestrian conditions.

\begin{itemize}
  \item \textbf{Benefits}\textsuperscript{97} (Oxley and Melinda Congiu 2008)
  \begin{itemize}
    \item Uses fast-growing medium to teach kids safety and security.
    \item Leverages real-time data to increase safety.
    \item Teaches traffic safety more effectively than knowledge-based programs.
    \item Provides the ability to add additional features to the same application.
  \end{itemize}
  \item \textbf{Challenges}\textsuperscript{98} (Oxley and Melinda Congiu 2008)
  \begin{itemize}
    \item Producing game applications can be costly.
    \item Relies heavily on other kids to download the app to be successful.
    \item Requies updates and maintaence for security, bug fixes and enhancements.
  \end{itemize}
\end{itemize}
**Digital Signage**

Having access to real-time public transportation data increases efficiency and communication between the user and service provider and can be readily accessed through the public transportation provider's website. For example, the Washington Metropolitan Area Transit Authority (WMATA) posts real-time rail and bus information on their website. When accessing this data through mobile applications it gives potential riders easier access to this timely information. However, some individuals do not have immediate access to internet connected devices for this information; using digital signage will overcome this disadvantage to display local public transportation information.

Digital signs display public transportation information through real-time internet accessed data. The leading provider of this service in Arlington County Virginia is the Redmon Digital Signage System (RDSS). According to John Redmon, a GMU Bachelor of Arts and Masters of Business Administration Graduate and former GMU Professor, the Redmon Group Inc. "...has around 38 signs in the local area and we have another 80 that we will be installing this year". Since 2003, Arlington County Commuter Services (ACCS) has been working with RDSS to better serve Arlington County buildings, bus and rail stations. This technology could be customized to operate within Arlington County Senior Centers, to provide senior-specific transportation information, as well as relevant topics important for seniors.

Currently RDSS provides real-time transportation information on Capital Bikeshare, Zipcar, ART (Arlington County buses), WMATA, and RideOn (Montgomery County buses). In addition to this service, RDSS also provides basic information on current time, date, weather, Metrobus Alerts, and commuter news. If this transportation information was displayed on a digital sign with more senior citizen specific transportation services, such as MetroAccess,

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99 (Washington Metropolitan Area Transit Authority 2014)
100 (Arlington Rapid Transit n.d.)
101 (Digital Signage 2014)
Senior Center Adult Transportation Program (SCAT), Senior Center Nutrition Programs, Senior Loops, or Specialized Transit for Arlington Residents (STAR), then seniors could take advantage of real-time transportation data without having to use their own technology. In addition, this digital sign could be used to display the senior center or residence daily and monthly schedule, current events or meeting, and other relevant senior specific information. The RDSS starts at $2,000 per sign in addition to other hardware such as the monitor, display mount, wires, and internet connection.

**Benefits**

- Environmentally friendly over paper flyers.
- Promotes local public transportation alternatives.
- Easy to customize relevant information for a specific audience.
- Push-button ADA compliant screen reader for those with poor eye sight.

**Challenges**

- Requires previous knowledge of bus and metro routes and destinations.
- Does not say the location of where the various services meet.
- Some service providers may not have real-time data available.
Bundled Taxi Paratransit Service

Arlington County already has paratransit services available to its citizens; however, many of the services are very expensive to Arlington County seniors and Arlington County government. For example, seniors pay twice the amount of the non-paratransit fares and WMATA pays $45 for each trip. In addition, MetroAccess and Specialized Transit for Arlington Residents require prior approval and advanced notification to use the services. An alternative option would be to use taxi paratransit services to transport several seniors per trip to either Metro stations or their desired destinations.

According to Marlene Berlin, author of Taxis Could Make Paratransit Service Cheaper, “In 2005, Arlington County’s taxi paratransit cost $20.50 per trip, versus $35 for WMATA.” By bundling the trips, both Arlington County and its seniors will be able to realize additional savings, making the trips more affordable. Taxi paratransit service could be made more efficient by encouraging senior centers to organize specific times for trips with particular purposes so that taxi paratransit vehicles are moving more people with each trip. Examples are trips to Metro stations, grocery stores, pharmacies, restaurants or entertainment centers. Obvious benefits include reduced trips for paratransit vehicles, reduced costs for seniors and government, and increased mobility for seniors.

Seniors have few existing options that meet their needs to access Metro stations and other desired destinations. Currently, seniors who qualify may enroll in paratransit programs to use MetroAccess and Specialized Transit for Arlington Residents (STAR). Also, Super Senior Taxi is a program which allows seniors 70 and over purchase a limited amount of discounted taxi fare vouchers on a first-come, first-served basis. Clearly, there is a need for less restricted

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102 (Berlin 2012)
103 (Red Top cab)
104 (Berlin 2012)
transportation services for seniors to reach their desired destinations. Berlin\textsuperscript{105} states “taxis are there when you need them, can handle a trip without needing to know the day ahead of time, often come quickly, and force riders to wait less.” An affordable bundled taxi paratransit service available to seniors who may or may not qualify to use MetroAccess and STAR will provide for more mobility of seniors, and allow them more convenient to access Metro stations and their other desired destinations.

\begin{itemize}
  \item \textbf{Benefits}\textsuperscript{105} (Berlin 2012)
    \begin{itemize}
      \item Convenient, reliable, and cost effective transportation for seniors.
      \item Reduced cost of paratransit trips from use of taxis and bundling trips.
      \item Less restrictions on use of the service than other available services.
    \end{itemize}
  \item \textbf{Challenges}\textsuperscript{105} (Berlin 2012)
    \begin{itemize}
      \item Seniors will be required to share the taxi with other users.
      \item Funding will be needed to subsidize the cost for seniors who may not qualify for MetroAccess and STAR.
      \item Despite ride sharing, some vehicles may be added to roadways.
    \end{itemize}
\end{itemize}
**Grocery and Pharmacy Delivery Services**

Many retail establishments in Arlington County already offer delivery of goods such as groceries and pharmaceuticals. Examples are Giant's Peapod, and Safeway's home deliver. We recommend partnering with companies to encourage use of these services by seniors to reduce automobile trips. This could include providing direct financial assistance to seniors to encourage the use of the service as well as outreach and training for seniors who may be intimidated by the technology necessary to utilize these services.

There are two primary grocery store chains located within Arlington County; Giant and Safeway. Both of these companies include delivery services throughout the county for a fee. In the case of Giant, their “Peapod” standard service has a minimum order of $60.00 and a delivery fee of $9.95\textsuperscript{106}. Safeway offers a similar service with a minimum order of $49.00 and a delivery fee of $12.95\textsuperscript{107}. Discounted rates are available from both retailers based on larger volume orders. The Giant Peapod service also has a “Delivery Pass” option that can be purchased by regular users of the service to provide discounted rates on all deliveries over a specific period of time. The Delivery Pass can be purchased for a fee of $99 and is good for a 12 month period; individual delivery fees are as follows: order value over $100 is free of charge, between $75 and $100 is $1, and $60 - $75 bears a cost of $2 per delivery. The minimum order still remains $60\textsuperscript{108}. Discussions with Safeway’s delivery program representatives revealed that they currently do not offer a similar “Delivery Pass” option\textsuperscript{109}.

We recommend that Arlington County provide a subsidy to seniors to encourage the use of grocery and pharmaceutical delivery services. There may be opportunities for a more beneficial arrangement through contract negotiations with individual vendors or through a bidding process. We recommend opening a dialog with these grocery and pharmaceutical retailers, explaining the goals of Arlington Counties TDM program.

Based on data from the US Census Bureau, there are approximately 19,200 seniors above the age of 65 living within the county. For the purposes of this report we will assume that approximately 50% this population resides independently in their own homes or in senior communities. Of this population, we will further assume that 50% may take advantage of either

\textsuperscript{106} (Peapod n.d.)
\textsuperscript{107} (Safeway n.d.)
\textsuperscript{108} (G. F. Stores 2014)
\textsuperscript{109} (S. F. Stores 2014)
grocery or pharmacy delivery services, if they were offered at reduced rates. This leaves a population of approximately 4,800 for whom some type of home delivery services and/or subsidies are to be considered. Further, we will assume that the average resident may visit the grocery store once per week.

Assuming that the Giant Peapod Delivery Pass is the lowest priced option available, the cost of providing this service would be $99 per person per year. If this were successfully implemented with the estimated 4800 seniors who may be eligible for such a subsidy, the total expenditure to the county, without administrative costs, would be roughly $475,200 per year. Seniors would still be responsible for the balance of the delivery fees, but assuming that a minimum order is placed once per week, the total cost to an individual would be just $104 per year.

Benefits
- Reduced car trips by seniors.
- Fewer crashes resulting from driving by impaired seniors.
- Reduced roadway congestion
- Lower emissions, pollution and roadway noise.

Challenges
- Significant cost to county.
- Administrative burden on county.
- Cost to train in use of technology necessary to utilize service.
**Back-in Parking**

Back-in parking\(^{110}\) is an innovative concept that already exists in Arlington County. We recommend considering several additional streets in Arlington for this method of parking because of the safety advantages and traffic flow improvements associated with this parking style. An added benefit of this recommendation would be a 50% reduction in the number of parking ticket vending machines required due to the removal of left-street parking, resulting in decreased purchase and maintenance costs.

It may be less challenging for most drivers to enter these angled spaces than to properly enter a parallel space. Many people are intimidated by parallel parking and often take significant measures to avoid doing so, especially if the parallel space is on the driver’s side. In addition, parallel parking on both sides of the street at times results in drivers attempting to back into parking in both traffic lanes at the same time, effectively stopping traffic flow. Of real concern in this situation are drivers improperly maneuvering between vehicles attempting to park.

It can also be difficult for left-side parallel-parked motorists to reenter the traffic stream due to sight distance limitations caused by surrounding vehicles. The greatest safety improvement occurs as the driver leaves the space. Needing only to look left the driver has a full view of oncoming traffic prior to entering the traffic stream lane.

Many surface streets of varying widths currently offer parallel parking in the county, and many of these are likely good candidates for this parking style. The most advantageous locations

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\(^{110}\) (Nelson/Nygarrd Consulting Associates, 2005)  
\(^{111}\) (Austin, Texas Daily Photo n.d.)  
\(^{112}\) (Save Our Lands, Save Our Towns n.d.)
would be on multi-lane, one-way streets that currently have parallel parking on both sides. By shifting to right side back-in-parking where parallel parking bordered two lanes of traffic, two travel lanes remain in use. Traffic would still need to stop when a motorist is parking just as in the previous situation, temporarily blocking only the right travel lane. Traffic in the left lane would continue to flow unimpeded.

**Benefits**

- Major traffic safety improvement on exiting space.
- Easier access for majority of drivers.
- Traffic flow improvements.
- Requires fewer meters.

**Challenges**

- Driver acceptance.
- Informing public of change.
- Limited locations.
- Minimal increase in signage.
**Family Nights**

With ever-increasing demands on their time, American families are finding themselves spending less time with each other and are eating out more often. In this rush to be somewhere else, an American adult will eat nearly five meals a week at restaurants.\(^{113}\) One in 5 meals or snacks are eaten in a vehicle,\(^{114}\) totaling 12.4 billion fast food drive-thru visits annually.\(^{115}\) This recommendation involves removing a portion of these "on the road" dining trips by promoting opportunities for households to come together at least once a week for a “Family Night.”

The family night could consist of something as simple as just sitting down together one night a week for a relaxed dinner and conversation with each other. The Center on Addiction and Substance Abuse (CASA) notes that most addictions begin prior to the age of 18 and that parental engagement can be a simple and effective tool to help prevent substance use.\(^{116}\) Not surprisingly, several food companies (Nestle, Coca-Cola, Smuckers, Stouffers, etc.)\(^{117}\), have combined with CASA to promote an annual "Family Day--A day to Eat Dinner with Your Children"\(^{118}\) event. In Britain, gravy maker Bisto has gone so far as to create a family pledge called the "Aah Night Pledge", calling for families to put off their friends, meetings, and television to come together one evening a week for a proper home cooked meal.\(^{119}\)

In addition to sitting down together for a meal, a family might enjoy a movie or game as well. A survey conducted by the Association of National Advertisers (ANA) Alliance for Family Entertainment found that "...94% of parents said it was extremely or very important that their families spend time together and entertainment is a primary way their families get together."\(^{120}\) Proctor and Gamble combined with Wal-Mart in 2010 to promote a version of this concept with the "Family Movie Night" initiative.\(^{121}\) Hasbro has actively promoted its "Family Game Nights"\(^{122}\) and Orville Redenbacher offered free Redbox movie rentals and sodas with the purchase of "specially marked" popcorn boxes.\(^{123}\)

\(^{113}\) (Americans Eat Out About 5 Times a Week 2011)
\(^{114}\) (Mooallem 2006)
\(^{115}\) (Drive-Thru Windows Still Put the Fast in Fast Food Restaurants, Reports NPD Group 2012)
\(^{116}\) (About CASAColumbia Family Day n.d.)
\(^{117}\) (Sponsors n.d.)
\(^{118}\) (Dear Family Day Supporters... 2011)
\(^{119}\) (We Want Aah Nights! 2014)
\(^{120}\) (Proctor & Gamble 2011)
\(^{121}\) (Proctor & Gamble 2011)
\(^{122}\) (Case Studies; Toys and Games PR Case Study; Hasbro Family Game Night n.d.)
\(^{123}\) (Orville Redenbacher n.d.)
Beyond a healthy meal, warm conversations, and a movie or game, other Family Night activities might include casual bike rides, conversations with neighbors, leisurely walks, visiting parks, historical sites, or museums, or watching concerts or plays. During these Family Nights, automobile trips are reduced, parks and public spaces close to home are utilized, health and personal mobility is improved, multiple generations of families are strengthened as they interact with each other, and streets will become more open as people meet with each other.

In order to develop this recommendation, Arlington County will need to develop public outreach campaigns that promote the mental, social, and physical well-being of families who take time to be with each other, particularly at dinnertime. Officially, the county can choose one night a week (i.e. Monday) free from public meetings or school activities, thus allowing elected officials, employees, and citizens to be home with their families without the fear of missing some crucial meeting. The County can leverage their efforts by combining forces with various health service organizations (i.e. CASA), safety organizations, and retailers to assist with these campaigns. Health service organizations will benefit over time by reducing the frequency of new addictions. Retailers will benefit by marketing entertainment and meals to families. Safety organizations will benefit by reminding drivers of the dangers of eating in a car. Lastly, the County will benefit by reducing the number of vehicle trips to and from drive-thru fast food establishments.

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**Benefits**

- Reduced vehicle trips to restaurants.
- Increased safety by reducing distractions from eating in car.
- Physically healthier population.
- Socially healthier population.

**Challenges**

- Individual time commitment.
- Reduced restaurant revenues.
- Family schedule coordination.

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124 (NCI Visuals Online)
Conclusion

Given its population density, access to the region’s metro line, and its adjacency to the nation’s capital, Arlington County already stands as a pioneering leader among urban communities in managing their traffic demand and being amendable to both the young and old alike. The recommendations contained herein represent opportunities to continue to improve the lives of the citizens within the County and in particular, the lives of those whose ages fall on the edges of the population. Ultimately, the measure by which the County can judge the success of these recommendations is as simple as determining whether or not it will help an older adult and younger child feel safe on a walk together.\(^{125}\) If they do, then the recommendations will have met the goals laid out in the 8-80 Cities concept.

In addition to meeting the needs and desires of the junior and senior populations, these recommendations also offer environmental benefits to the County as a whole. As well, they improve the safety of vulnerable populations, reduce vehicle trips and congestion, and increase the health of its citizens. As these recommendations are investigated further and ultimately implemented, both juniors and seniors will find their lives enhanced, and have increased opportunities to contribute to and engage with their community in ways that are more meaningful and beneficial.

\(^{125}\) (8-80 Cities n.d.)
Appendix

Appendix A - Junior Survey

1. Do you live within 1 mile of your child’s elementary school? (Please circle either walks, bikes, or both)
   a) Yes, and (weather permitting) my child regularly walks or bikes to school.
   b) No, but (weather permitting) my child regularly walks or bikes to school.
   c) Yes, but my child does not walk or bike to school.
   d) No, and my child does not walk or bike to school.

2. Imagine the most reasonable biking or walking route to your child’s elementary school. Based on traffic conditions and infrastructure (e.g. sidewalks, crosswalks, bike lanes), how would you rate the safety of your child’s walk or bike ride?
   a) Extremely safe.
   b) Very safe.
   c) Somewhat safe.
   d) Somewhat unsafe.
   e) Very unsafe.
   f) Extremely unsafe.

3. Which of the following infrastructure improvements would make you comfortable with the idea of letting your child regularly walk or bike to school? (Please circle all that apply)
   a) On-street bike lanes.
   b) Bike lanes or paths separated from car traffic (e.g. cycle tracks, bike trails, multi-use paths).
   c) Additional/wider sidewalks.
   d) Additional crosswalks.
   e) Traffic calming (e.g. narrowing intersection widths near schools, speed humps).
   f) Other: ________________________
   g) No infrastructure improvement would make me comfortable with my child biking or walking to school.

4. Does your child currently make any non-school related trips by biking or walking?
   a) Yes, either alone or accompanied by adult (Where?) ________________________
   b) Yes, but only when accompanied by an adult (Where?) ________________________
   c) No

5. Do you have any suggestions of ways Arlington County can make it easier for parents and children to get to the places children want or need to go?
Appendix B - Senior Survey

1. What age range do you belong to?
   a) 65-69
   b) 70-74
   c) 75-79
   d) 80-84
   e) 85 and over

2. What gender are you?
   a) Female
   b) Male

3. How often do you use an internet connected device? (i.e. smart phone, computer, tablet)
   a) Never
   b) Once Per Day
   c) More Than Once Per Day
   d) Once a Week
   e) Other (Please Specify): __________________________

4. What mode of transportation would you arrange using your internet connected device?
   a) Limousine or Taxi Service
   b) Paratransit (Metro Access or Similar)
   c) Public Transit (Bus/Train)
   d) Walking Destination Directions
   e) Other (Please Specify): __________________________

5. What is your most common trip?
   a) Grocery, Pharmacy or Retail
   b) Arts or Entertainment
   c) Personal or Social
   d) Other (Please Specify): __________________________

6. Where would you like to go if transportation was not an issue?
   a) Grocery, Pharmacy or Retail
   b) Arts or Entertainment
   c) Personal or Social
   d) Other (Please Specify): __________________________
7. What mode of transportation do you use?
   a) Limousine or Taxi Service
   b) Paratransit (Metro Access or Similar)
   c) Public Transit (Bus/Train)
   d) Drive Yourself
   e) Other (Please Specify): __________________________

8. What time of day do you travel most often?
   a) Dawn (4am-8am)
   b) Morning (8am-12pm)
   c) Noon (12pm-4pm)
   d) Afternoon (4pm-8pm)
   e) Evening (8pm-12am)

9. What would improve your walking experience?
   a) More Accessible Sidewalks
   b) Better Lighting
   c) More Legible Signage (Larger Font)
   d) Other (Please Specify): __________________________

10. How far are you willing to walk to grocery, pharmacy or retail locations?
    a) Less Than 2 Blocks
    b) Less Than 4 Blocks
    c) Less Than 6 Blocks
    d) More Than 6 Blocks

11. How far are you willing to walk to arts or entertainment locations?
    a) Less Than 2 Blocks
    b) Less Than 4 Blocks
    c) Less Than 6 Blocks
    d) More Than 6 Blocks

12. How far are you willing to walk to personal or social locations?
    a) Less Than 2 Blocks
    b) Less Than 4 Blocks
    c) Less Than 6 Blocks
    d) More Than 6 Blocks
13. If retail services were available to your home for free, what type of services would mostly you use?
   a) Medical/Home Doctor Visit
   b) Grocery
   c) Pharmacy
   d) General Retail
   e) Other (Please Specify): __________________________

14. How long are you willing to wait for public transportation?
   a) Less Than 5 Minutes
   b) Less Than 10 Minutes
   c) Less Than 15 Minutes
   d) More Than 15 Minutes

15. What is your biggest impediment to travel?
   a) Lack of Access to Public Transportation
   b) Distance to Public Transportation
   c) Destination is too Far to Walk
   d) Weather
   e) Other (Please Specify): __________________________
Sources


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