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# Last Mile: Connecting Businesses and Residents in the Purple Line Corridor

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## Contents

Acknowledgement .....	2
Executive Summary.....	3
Introduction: The Last-/First-Mile Issue .....	4
Purple Line Corridor .....	7
Methodology and Data .....	8
Findings: Last Mile.....	10
Findings: First Mile .....	14
Policy Implication .....	16
Policy Suggestion 1. Fixing Purple Line Station Access Barriers .....	16
Example 1. Woodside Station .....	16
Example 2. Riggs Road .....	20
Policy Suggestion 2. Enhancing Bus Service .....	21
Example 1. Riverdale Park Station.....	21
Example 2. International Corridor.....	23
Policy Suggestion 3. Adding Bicycling/Bikesharing as an Alternative to Public Transportation .....	24
Example: East Campus .....	25
Policy suggestion 4. Innovative Transit Connection Programs .....	26

## Acknowledgement

This report suggests a path to resolve an issue of connecting people to the places they need to go, known as the last-mile problem, and thus to increase access to public transit for both employees and residents in the Purple Line corridor. The National Center for Smart Growth Research and Education (NCSG, the Center) at the University of Maryland is solely responsible for its content.

NCSG conducts research and leadership training on growth and related land use and development issues in Maryland, in metropolitan regions around the nation, and in Asia and Europe. It was founded in 2000 as a cooperative venture of four University of Maryland schools: Architecture, Planning and Preservation, Public Policy, Agriculture and Natural Resources, and Engineering.

The Center's mission is to bring the diverse resources of the University of Maryland and a network of national experts to bear on issues related to land use and the environment, transportation and public health, housing and community development, and international urban development. The Center accomplishes this through independent, objective, interdisciplinary research and through outreach and education.

For more information about NCSG, visit [www.smartgrowth.umd.edu](http://www.smartgrowth.umd.edu).

NCSG gratefully acknowledges the substantial assistance provided by graduate student Ting Ma and undergraduate summer intern Olivia Newport. We also appreciate the input from members of the Purple Line Coalition and planning departments of Prince George's County and Montgomery County.

For more information about this report, please contact:

Name: Gerrit-Jan Knaap  
Address: National Center for Smart Growth  
University of Maryland  
College Park, MD 20905  
Phone: 301-405-6083  
Email: [gknaap@umd.edu](mailto:gknaap@umd.edu)

## Executive Summary

The proposed Purple Line light rail transitway presents tremendous opportunity for improving access to public transportation in the corridor neighborhoods. However, there exists a gap between future Purple Line stations and passengers' destinations (usually workplace or home) that is currently underserved by public transit. This "last-/first-mile" issue may prevent people from taking the Purple Line and instead steer them toward driving. Providing options to bridge the last/first mile gap can increase Purple Line ridership and maximize the Purple Line's benefits to residents and workers in the corridor.

This report examines the businesses and residences located in the Purple Line corridor that have a last- or first-mile gap. A business or residence is identified as being in a last-/first-mile gap if it is not within a 20-minute bus ride and/or a ¼-mile walking distance from the proposed Purple Line.

Currently, in the Purple Line corridor, the last-mile issue affects 413 businesses that employ 2,929 people. The majority of these are small businesses with fewer than 25 employees. Among five subareas along the Purple Line corridor, the largest number of businesses that do not bridge the last mile are in Bethesda-Chevy Chase. In terms of sectors, the construction industry has the largest number of workers missing the last mile connection.

The first-mile issue affects 7,193 residents in the Purple Line corridor. Proportionally, residents living in 22 percent of residential properties are affected. The Riverdale-New Carrollton subarea has the largest number of residential housing units (3,034) that miss the opportunity to connect to the planned Purple Line.

Four policy suggestions for increasing access to transit service in the Purple Line corridor are included at the end of this report. These include:

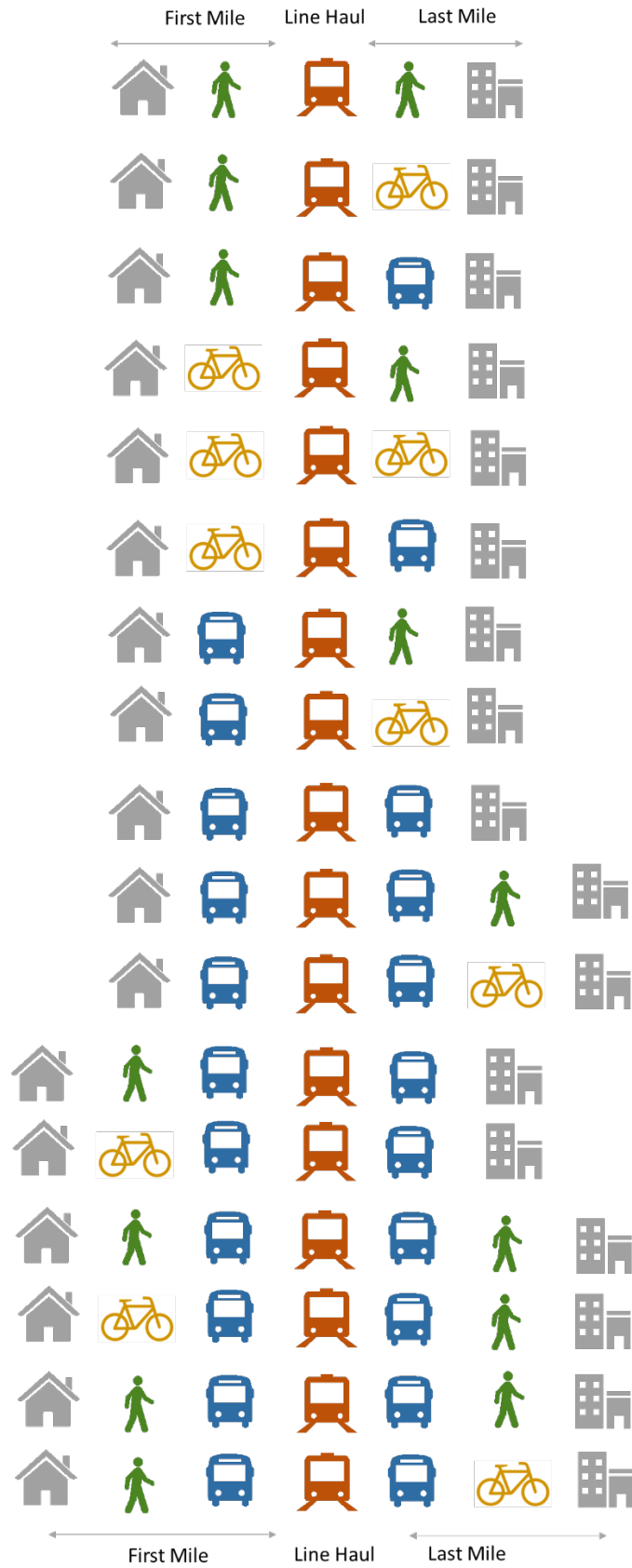
- eliminating access barriers to the proposed Purple Line stations
- comprehensive evaluation of transit service and adding/relocating bus service to fill the last-/first-mile gap
- introducing a bicycle sharing program in areas whose demographics and built environment supports bicycling activities
- exploring and experimenting with cutting-edge programs with the help of new technology

Examples are given to illustrate each of these policy suggestions to address the last mile/first mile gap in the Purple Line corridor.

## Introduction: The Last/First Mile Issue

The “last mile” generally refers to a gap in connectivity that inhibits access to a destination. It is a unique challenge that requires special considerations in logistics and planning. The concept was introduced by companies in the telecommunications industry.<sup>i</sup> While these companies could easily create a network to provide data to one large hub, it was more difficult to reach individual households and businesses not in the main hub. This “last mile” of data exchange was more expensive and experienced more trouble with loss of quality than other parts of the network.<sup>ii</sup> The last mile issue definition was adapted to refer to transportation.

In this research, the distance between the workplace and the closest Purple Line stop is considered the last mile, and similarly the distance between one’s home and the closest Purple Line station is considered the first mile. A typical commute consists of three parts: the first mile between home and transit station, the line haul, and the last mile between transit station and workplace or other destinations.<sup>iii</sup> Rail transit is one method used to cover the line haul, but patrons must first be able to get to these transit hubs, and also must get to their final destination after leaving the station. Transportation options provided by light rail succeed in increasing the physical distance covered in an area, but because they typically stop every mile, much of the urban space they serve is beyond walking distance of the stations.<sup>iv</sup> Bus service, bicycling, and walking are major ways to close the first- and last-mile gaps of a transit rider using rail transit. A typical complete commute trip with rail transit can comprise one of the following combinations.



Bus service helps to fill the gaps between Purple Line stations, yet there are still workplaces and homes for which bus commuting takes too long for regular use. Research indicates that the acceptable commute time by bus after taking rail transit is less than 20 minutes, or 5 miles in distance.<sup>v</sup> In addition, the average person's walking distance is about  $\frac{1}{4}$  mile, or 400 meters. By definition, if a business or residence is located more than a 5-mile bus distance and/or a  $\frac{1}{4}$ -mile walking distance from a rail transit station it has a last-/first-mile problem that needs to be fixed.

Much of the last-/first-mile issue arises from lack of infrastructure between people and transportation hubs, which leads to the use of cars instead of public transit.<sup>vi</sup> Providing options to bridge the last mile can maximize the benefit and increase the ease of using transportation systems. This could increase the number of public transportation patrons and decrease commuters' use of cars. Potential solutions include bicycle infrastructure, local buses, and walkable environments.<sup>vii</sup> Adding physically separated bikeways near Metro, light rail, and bus stations, in addition to bike racks and/or bike-sharing programs, will increase the distance riders can travel after exiting public transportation without increasing time spent traveling. Car-sharing programs are also a cost-effective and efficient way to connect transit stops and final destinations.<sup>viii</sup> Building and repairing sidewalks and increasing signage with directions to the nearest public transit can also make the environment friendlier to pedestrians.<sup>ix</sup>

## Purple Line Corridor

The Purple Line is a 16-mile light rail transitway that will extend from Bethesda in Montgomery County to New Carrollton in Prince George's County. The area's first light rail project, it is expected to break ground in 2015 and begin service operation in 2020. The Purple Line corridor consists of five subareas, each with different demographic and economic characteristics and conditions.

In June 2013, the University of Maryland's National Center for Smart Growth founded the Purple Line Corridor Coalition (PLCC) to support sustainable and equitable development along the light rail corridor. This corridor-based approach brings together different levels of government, nonprofits, communities, educational institutions, and businesses in the private sector.

NCSG held a one-day workshop on March 21, 2014 titled "Beyond the Tracks: Community Development in the Purple Line Corridor." The workshop featured speakers from other metropolitan areas. Denver and Minneapolis-St. Paul served as case studies for discussing how to incorporate a major transit corridor while also creating and maintaining livable communities. Sessions focused on housing for all, local business development, jobs-housing balance, and place-making. This workshop highlighted the diversity and potential of the corridor while also identifying the challenges that face it.

While large employment centers and a variety of job opportunities already exist in the corridor, many more will come with the Purple Line. However, the last-/first-mile gap prevents residents and workers from maximizing the transportation benefits that the Purple Line will provide. The last-/first-mile issue is critical to the community experience. What can be done to maximize the benefit of the Purple Line's added transportation and connectivity? Local planning departments in both Montgomery and Prince George's counties have conducted studies identifying physical barriers and proposing access improvement to Purple Line stations.<sup>x</sup> The NCSG report uses a different analysis methodology and serves to complement local planning agencies' findings and policy suggestions.

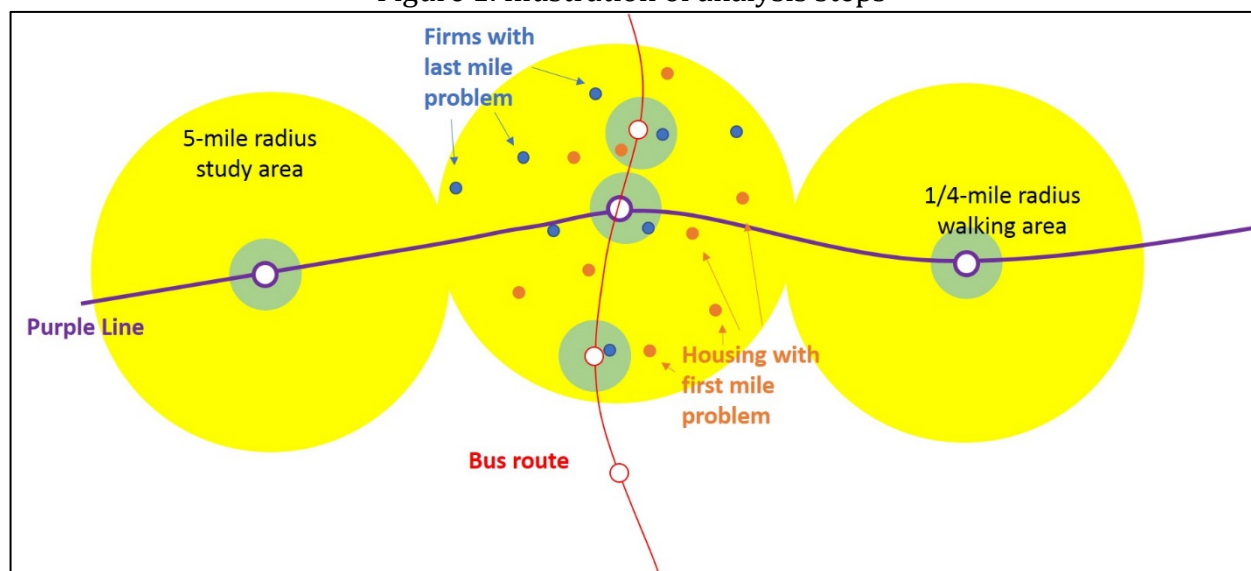


## Methodology and Data

The last-/first-mile gap research has two elements: to identify employers whose last mile from Purple Line stations is not well connected by buses, and to identify residential buildings whose first mile from Purple Line stations is not well connected by buses. There are three fundamental assumptions in this analysis. First, although the term “last mile” describes the problem—lack of bus transit between the rail transit station and the trip destination—it should not be interpreted literally as “one mile.” As concluded in a previous survey, commuters travel about 20 minutes by bus to reach their workplace after they get off trains. If the bus travels 15 miles per hour, then the commuter travels 5 miles in 20 minutes. Therefore, in this research, we examine access to businesses that are located within a five-mile radius of any Purple Line station. The same logic is used for first mile calculations. Second, considering there is still some distance between the bus stop and the destination, we assume a  $\frac{1}{4}$  mile is a reasonable distance to walk after exiting the bus. Third, and similarly, we assume it is reasonable for people to walk a  $\frac{1}{4}$  mile between the Purple Line station and a bus stop to make the transfer.

Building upon these three assumptions, we developed steps for identifying and analyzing employers whose “last-mile” gaps and households whose first-mile gaps are being underserved. Figure 1 illustrates the analysis flow. Detailed steps are listed below. ESRI ArcGIS 10.1 is the software package used in this research.

Figure 1. Illustration of analysis steps



[1] A 5-mile network-based buffer (yellow in Figure 1) was created around each Purple Line station. A network-based buffer, rather than a circle, was used to make the analysis a more realistic measure of distance.

[2] Bus stops (red circles in Figure 1) were identified within the 5-mile radius of each Purple Line station. Then a 1/4-mile walking distance buffer (green in Figure 1) was created around each bus stop.

[3] A similar walking buffer around the Purple Line stations was created for those employers within walking distance of the station itself and therefore not requiring bus transportation.

[4] The businesses and residential buildings not located within either the walking buffer of a Purple Line station or the walking buffer of a bus stop were identified as having last- and first-mile problems, respectively. In these areas, workers who commute by public transportation must spend more than 20 minutes on a bus to connect a Purple Line station and their workplace, or must walk more than a 1/4 mile from their home to a bus stop. In other words, the last- and first-mile gaps are not filled.

Firm data, including the location and employment size, is from the 2012 Quarterly Census of Employment and Wages (QCEW). The third quarter data was used because employment in this quarter tends to be more stable than others, with fewer seasonal variations. Residential building data is from MDProperty View 2011 for Prince George's and Montgomery counties. Table 1 shows all data for this research and their resources.

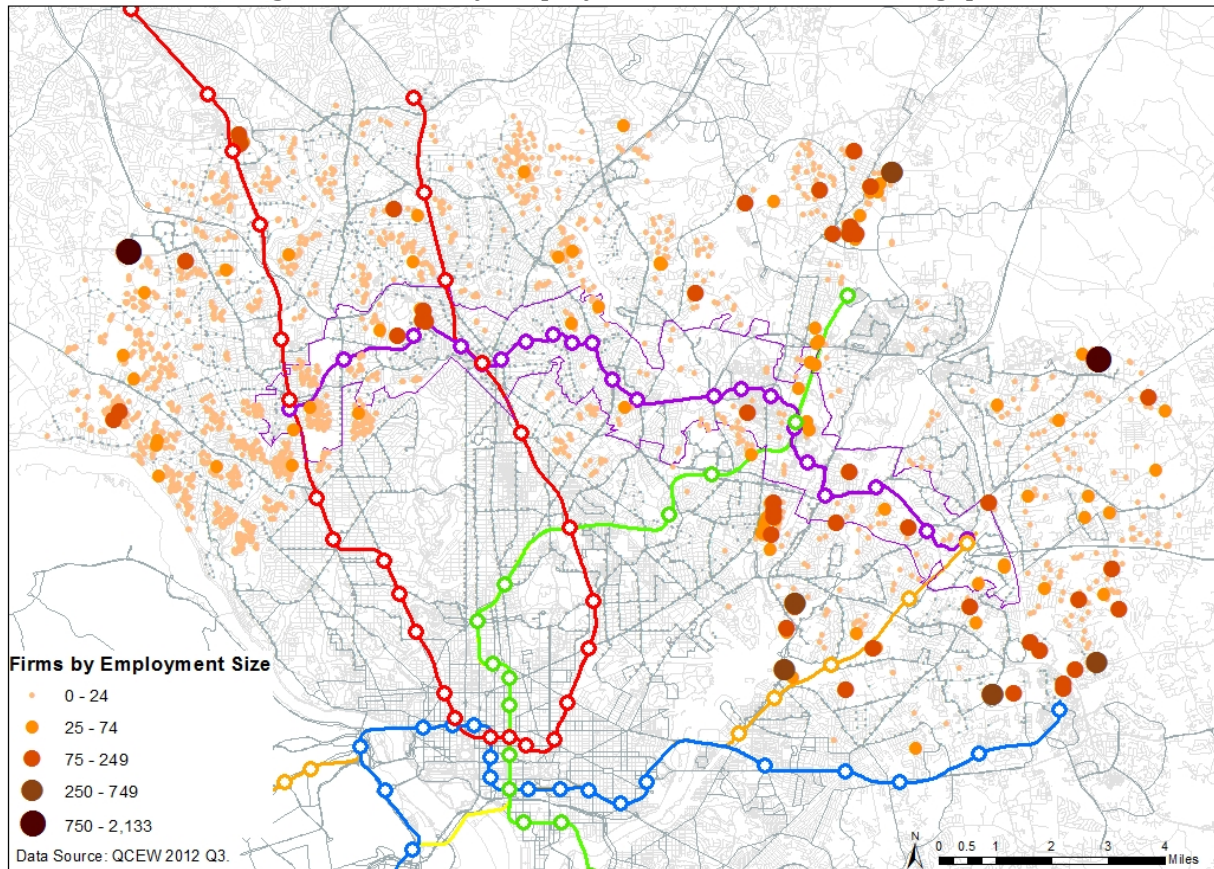
Table 1: Data and Sources

Data	Source
Firm and employment	Quarterly Census of Employment and Wages (QCEW), 2012
Residential buildings	MDProperty View 2011
Street network	OpenStreetMap
Bus	WMATA bus, MTA bus, Prince George's <i>TheBus</i> , Montgomery <i>RideOn</i>
Purple Line	MTA

## Findings: Last Mile

Figure 2 shows businesses with a last-mile gap, categorized by employment size. In the Purple Line corridor, 413 businesses have a last-mile gap by bus. As listed in Table 2 and Table 3, seven of these employ between 75 and 249 workers, 24 employ between 25 and 75 workers, and 382 employ fewer than 25 people. This amounts to 2,929 jobs in the Purple Line Corridor with a last-mile gap.

Figure 2. Firms by employment size with last-mile gap



Each subarea is different in the number of businesses affected. The Bethesda-Chevy Chase subarea has the greatest number affected, with three firms employing between 25 and 74 people and 217 firms employing fewer than 25 people. This leaves 421 employees from different-sized businesses with no public transportation options in the last-mile gap. In terms of industry split, as Table 4 and Table 5 show, the majority of employers within the last-mile gap are in the Other Services (except Public Administration) industry. According to the North American Industry Classification System (NAICS), Other Service industry includes Repair and Maintenance, Personal and Laundry Services, Religious, Grantmaking, Civic, Professional, and Similar Organizations. The Professional, Science and Technology industry has the second largest number of employers with the last-mile issue.

In the Silver Spring subarea, 1,182 jobs are within the last-mile gap, with four businesses employing between 75 and 249 employees, six employing between 25 and 74 workers, and 64 businesses with 24 or fewer employees. Of the employers with a last-mile gap, Construction, Retail Trade, and Accommodation and Food Services sectors have the largest number of employees.

In the corridor's University of Maryland subarea, there is one employer with between 75 to 249 workers, four firms with between 25 and 74 employees, and 55 firms that employ fewer than 25 people, amounting to 491 jobs. The three largest sectors in this subarea are Accommodation and Food Services, Construction, and Finance and Insurance.

A total of 35 employers in the Riverdale-New Carrollton subarea are affected by the last-mile problem. Two of these employ between 75 and 249 workers, eight employ between 25 and 74, and 25 employ fewer than 24. In this subarea, 597 jobs cannot be reached by public transit. The majority of those affected by the last-mile issue are in the Education industry.

The research found that the International Corridor subarea of the Purple Line corridor has the smallest number of employers affected by the last-mile issue, with 24 affected. Three of these firms have between 25 and 74 employees, and 24 have fewer than 24 employees. This amounts to 238 total jobs prone to the last-mile gap. The majority of these jobs are in the Education or Health Care and Social Assistance industries.

**Table 2: Number of Firms by Employment with Last-Mile Gap in the Purple Line Corridor**

<b>Subarea</b>	<b>Bethesda-Chevy Chase</b>	<b>International Corridor</b>	<b>Riverdale-New Carrollton</b>	<b>Silver Spring</b>	<b>UMD</b>	<b>Total</b>
<b>0-24</b>	217	21	25	64	55	382
<b>25-74</b>	3	3	8	6	4	24
<b>75-249</b>	0	0	2	4	1	7
<b>250-749</b>	0	0	0	0	0	0
<b>750-2,133</b>	0	0	0	0	0	0
<b>Total</b>	220	24	35	74	60	413

Table 3: Number of Employees by Subarea with Last-Mile Gap in the Purple Line Corridor

Subarea	Bethesda-Chevy Chase	International Corridor	Riverdale-New Carrollton	Silver Spring	UMD	Total
0-24	291	47	109	342	188	977
25-74	130	191	314	261	228	1,124
75-249	0	0	174	579	75	828
250-749	0	0	0	0	0	0
750-2,133	0	0	0	0	0	0
<b>Total</b>	421	238	597	1,182	491	2,929

Table 4: Number of Employers by Industry by Subarea of the Purple Line Corridor

Subarea	Bethesda-Chevy Chase	International Corridor	Riverdale-New Carrollton	Silver Spring	UMD	Total
Agriculture	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Construction	3	3	7	17	12	42
Manufacturing	1	0	1	3	2	7
Wholesale Trade	0	1	2	15	2	20
Retail Trade	1	0	1	8	5	15
Transport, Warehouse	0	1	2	3	1	7
Information	4	0	0	1	4	9
Finance, Insurance	4	0	2	1	1	8
Real Estate	0	0	0	2	1	3
Professional, Science, Technology	26	3	1	2	9	41
Company Management	0	0	0	0	0	0
Administrative, Waste Management	1	4	6	5	3	19
Education	0	2	6	0	3	11
Health Care	6	4	1	0	2	13
Arts and Rec	3	1	1	1	0	6
Accommodation, Food	0	0	0	5	4	9
Other Services	170	5	4	11	11	201
Public Administration	1	0	1	0	0	2
<b>Total</b>	220	24	35	74	60	413

Table 5: Number of Employees by Industry by Subarea of the Purple Line Corridor

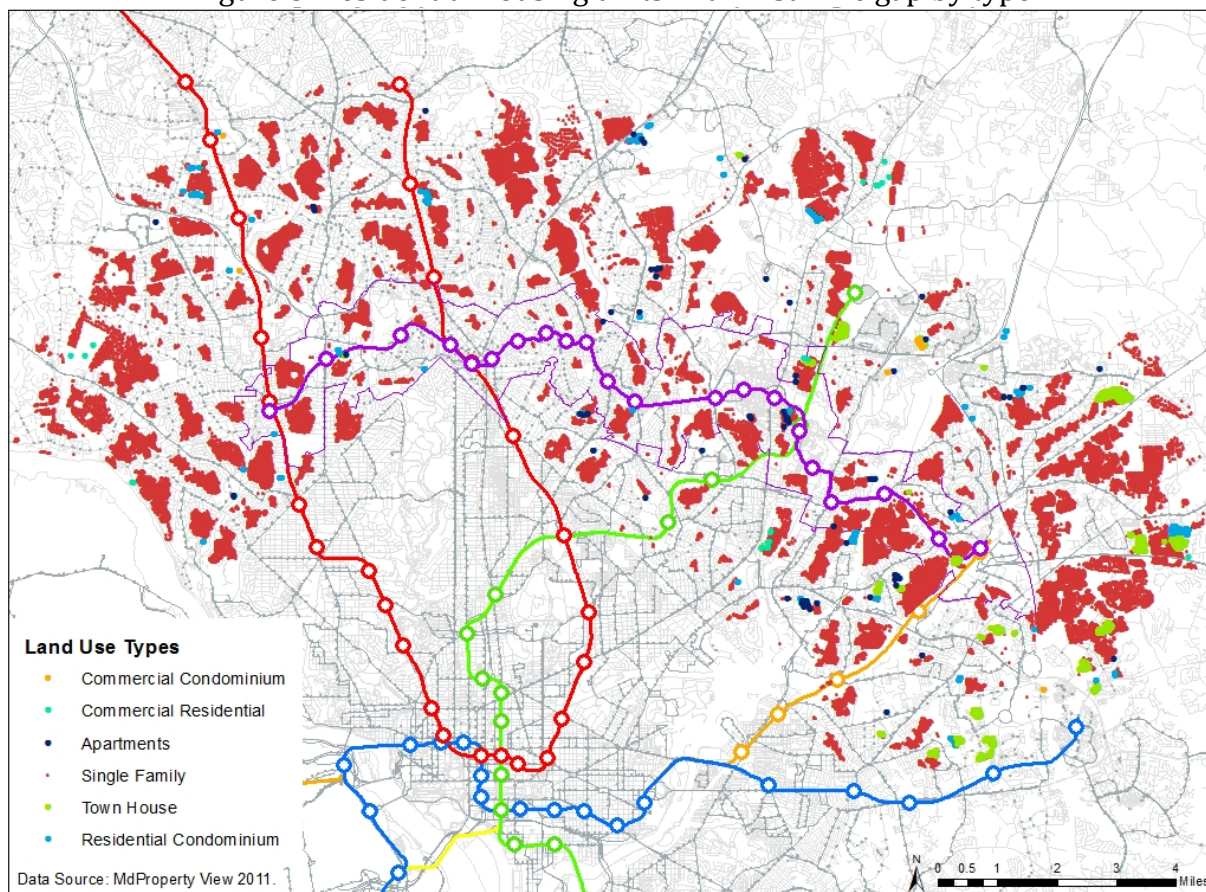
Subarea	Bethesda-Chevy Chase	International Corridor	Riverdale-New Carrollton	Silver Spring	UMD	Total
Agriculture	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Construction	0	14	64	516	87	681
Manufacturing	1	0	1	12	5	19
Wholesale Trade	0	4	81	96	6	187
Retail Trade	2	0	47	180	35	264
Transport, Warehouse	0	1	2	10	1	14
Information	4	0	0	0	7	11
Finance, Insurance	5	0	5	50	75	135
Real Estate	0	0	0	9	1	10
Professional, Science, Technology	93	10	9	9	33	154
Company Management	0	0	0	0	0	0
Administrative, Waste Management	11	7	20	73	12	123
Education	0	123	294	0	60	477
Health Care	39	74	4	0	1	118
Arts and Rec	6	0	27	3	0	36
Accommodation, Food	0	0	0	188	147	335
Other Services	232	5	26	36	21	320
Public Administration	28	0	17	0	0	45
Total	421	238	597	1182	491	2,929



## Findings: First Mile

There are 7,193 residential housing units in the Purple Line corridor with a first-mile gap. Figure 3 illustrates these residences, categorized by housing type. The Riverdale-New Carrollton subarea has the largest number of buildings (3,034) with a first-mile gap. Table 6 lists the number of residences with a first-mile gap by housing type for the corridor and five subareas.

Figure 3. Residential housing units with first-mile gap by type



In the Purple Line corridor, about 22 percent of residential buildings, comprising a wide range of housing, have a first-mile gap. The Riverdale-New Carrollton subarea has the largest percentage of residential buildings with a first-mile gap, at more than 48 percent, and Silver Spring has the lowest, with about 2 percent. About 45 percent of residential buildings in the University of Maryland subarea have a first-mile gap, compared with 21 percent in Bethesda-Chevy Chase and 12 percent in the International Corridor.

The majority of residential land use types that do not meet the last-mile gap are classified solely as single family, at 6,717 of the total buildings (93 percent). Residential condominiums are the next highest, at 300 buildings (4 percent).

Table 6: Residential Buildings by Type with First-Mile Gap along Purple Line Corridor

<b>Subarea</b>	<b>Bethesda-Chevy Chase</b>	<b>International Corridor</b>	<b>Riverdale-New Carrollton</b>	<b>Silver Spring</b>	<b>UMD</b>	<b>Total</b>
<b>Commercial Condo</b>	0	0	0	0	0	0
<b>Commercial Residential</b>	0	0	0	0	1	1
<b>Apartment</b>	1	1	9	0	8	19
<b>Single Family</b>	1,473	1,055	2,872	119	1,198	6,717
<b>Town House</b>	53	0	67	0	36	156
<b>Residential Condo</b>	74	79	86	49	12	300
<b>Total</b>	1,601	1,135	3,034	168	1,255	7,193



## Policy Implication

Reasons for the first-/last-mile issue are many. The nature of residential distribution associated with suburban sprawl has created lower density developments, making it harder for public transit to reach these developments. Last-mile issues arise due to lack of infrastructure, such as gaps in sidewalks and lack of bike parking or bike lanes, inadequacy in the frequency or timing of public transit, and built environments around the stations that cause safety concerns.<sup>xi</sup> Having established that there are businesses within last-mile gaps and houses within first-mile gaps, we introduce three solutions in this section.

First, access to and from proposed Purple Line stations will be improved by adding connections to existing streets. Part of the proposed Purple Line will run on existing trail and will lack connection to street network. This could prevent transit riders from using the Purple Line. Second, adding or restructuring bus service to underserved areas can help solve the problem. Third, in specific areas, such as those surrounding university buildings and offices, we suggest introducing bikesharing programs or adding comfortable and convenient bikeway facilities such as bike lanes and cycle tracks as an alternative to public transportation.

Particularly, our analysis highlights solving minority and under-poverty citizens' last-/first-mile problem. Statistically speaking, low-/medium-income population and minority groups tend to rely on public transportation more than other population groups. Fixing the problem will greatly improve their access to public transit.

### Policy Suggestion 1. Fixing Purple Line Station Access Barriers

Through the last-mile analysis, numerous connection issues to both homes and businesses were discovered at different stations. The current infrastructure at many of these locations is inadequate to connect residences and businesses within a ½-mile radius of the stations. Barriers exist in the form of railroads and high-speed roads that lack crosswalks, as well as an existing road network that does not connect to the station's location. Walkability and connectivity should be considered along with Purple Line construction to maximize the benefit of the light rail. The following examples describe specific Purple Line stations that have potential connectivity issues to surrounding firms and households.

#### Example 1. Woodside Station

The proposed Woodside Station is located at 16<sup>th</sup> Street near Spring Street. Residential areas surround the station site, including single-family homes to the north, Summit Hills apartment complex to the south, and Barrington Apartments to the southwest. Being in close proximity to downtown Silver Spring, a regional transit hub, this neighborhood has very high public transportation ridership ratio, 39 percent for residents to the south of the station and 35 percent for the northern side.

Since there are railroad tracks to the north of the station with only limited spots for safe crossing to and from the proposed station, the connection between the northern neighborhood and Woodside Station is not ideal. As Figure 4 shows, one must traverse a long section of 16<sup>th</sup> Street to get from Woodside Station to the light blue dot in the northern neighborhood. This is because all neighborhood roads, such as Noyes Lane and Leighton Wood Lane, end north of the railroad track, or dead-end less than 50 feet from the sidewalk on the east side of 16<sup>th</sup> Street. These artificial dead ends are easy to fix since neighborhood streets are at an elevation similar to that of 16<sup>th</sup> Street (see figures 5 & 6). Adding a walkway over the railroad tracks at the station or creating a walkway or intersection with a neighborhood street closer to the station north of 16<sup>th</sup> Street would increase its walking radius and connectivity. MTA has planned some walkways.<sup>xiii</sup>

Figure 4. Walking route from Woodside Station to Second Avenue

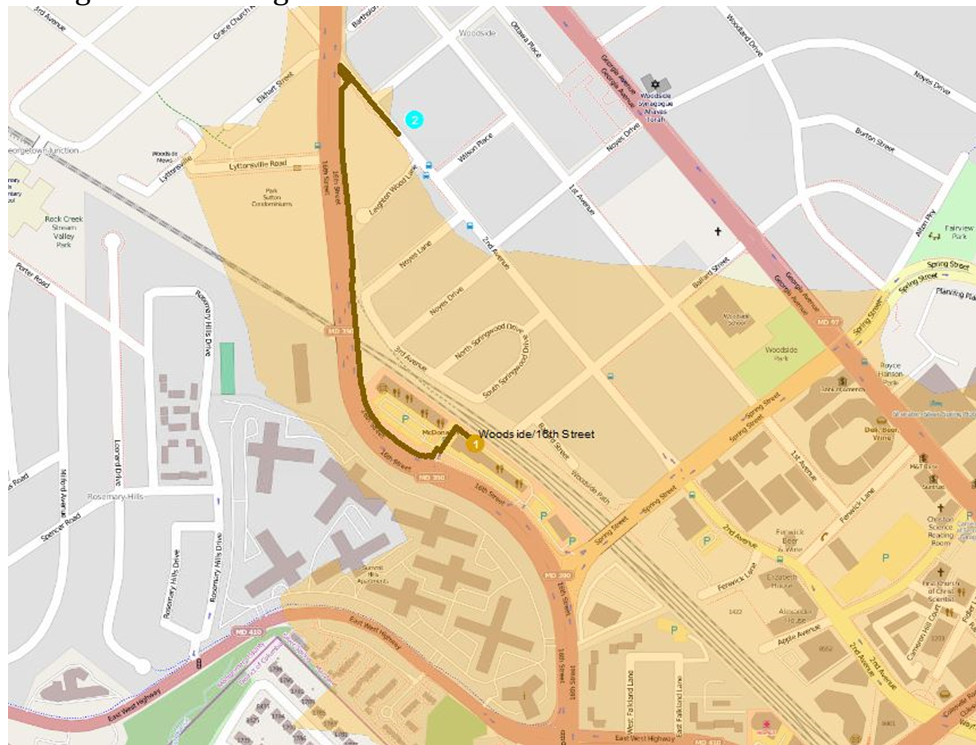




Figure 5. View of 16<sup>th</sup> Street from Noyes Lane

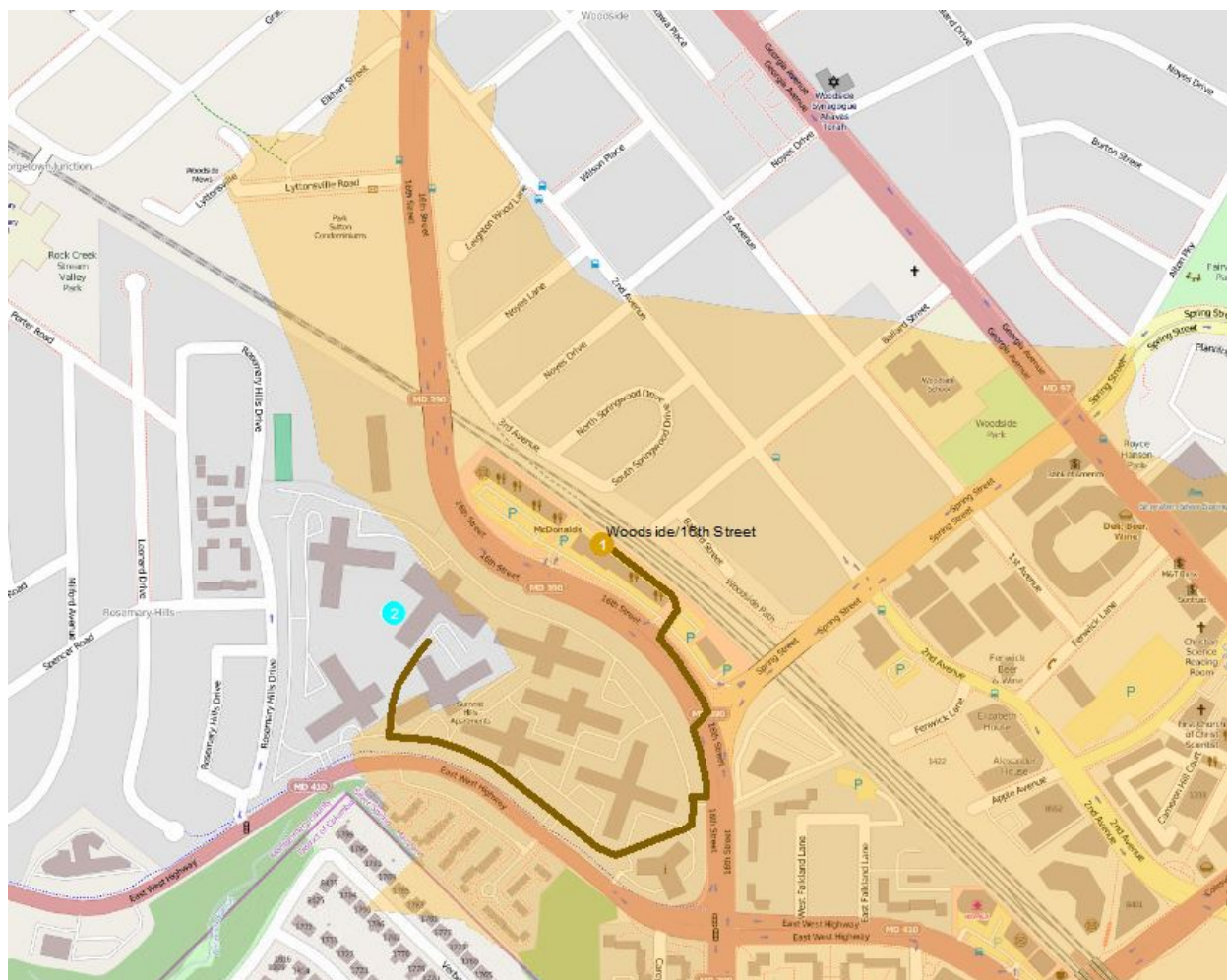


Figure 6. View of Noyes Lane from 16<sup>th</sup> Street



To the south of the Woodside Station site and 16<sup>th</sup> Street is Summit Hills, an apartment complex accommodating about 1,400 tenants. As the brown line shows, one must walk more than ½ mile to get from Woodside Station to the complex, since the entrance to the complex is farther down 16<sup>th</sup> Street. Today, there is no sidewalk on the west side of 16<sup>th</sup> Street across from the planned Woodside Station location. The road is lined with trees and a guardrail, and the roadway looping around the apartment complex is at a much lower elevation than 16<sup>th</sup> Street at the point closest to the future station. These factors all make access to the apartments impossible at any closer point. With a more direct connection from the station across 16<sup>th</sup> Street to the apartments, more of the residences would be located within the buffer.

Figure 7. Current walking route from Woodside Station to Summit Hills

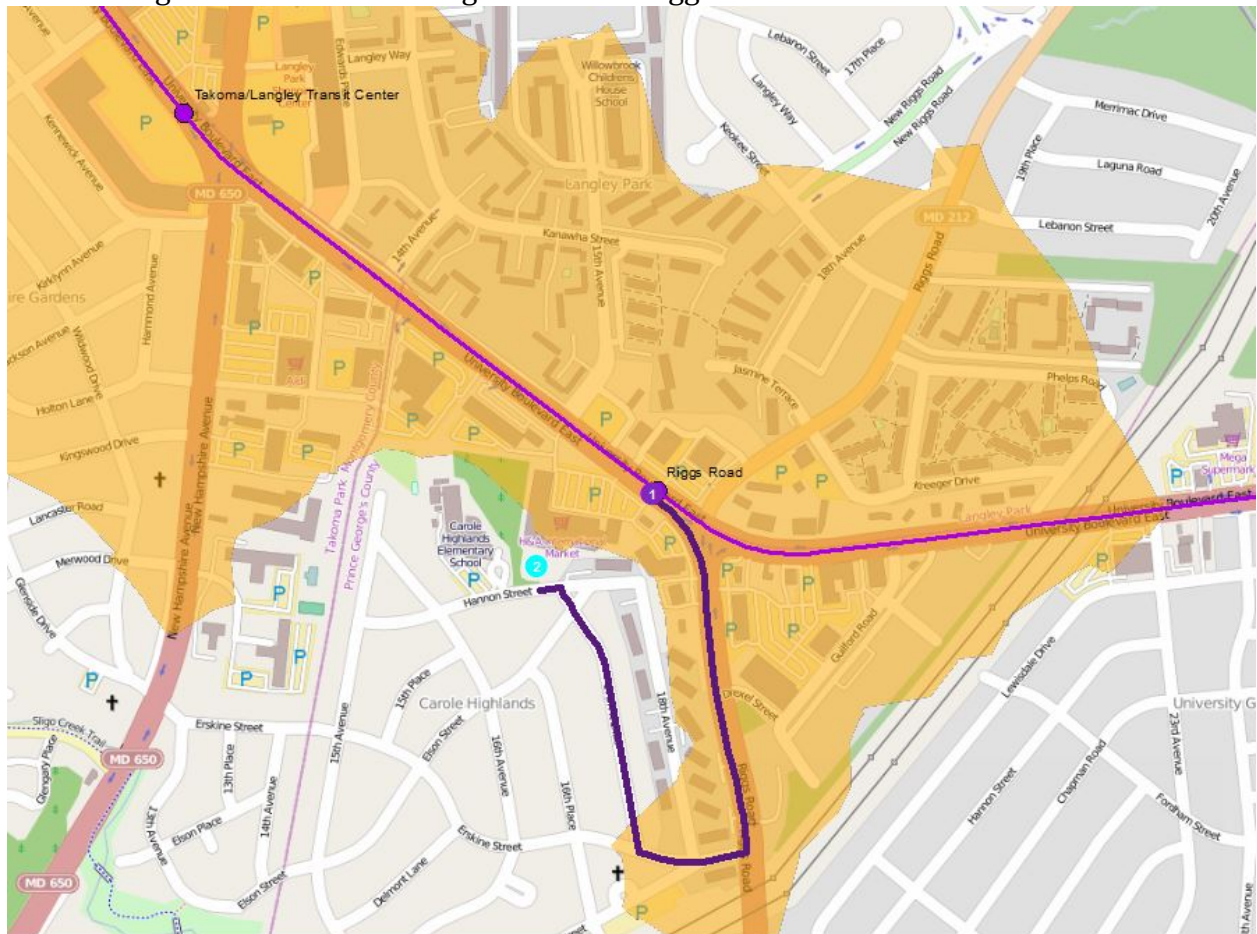




## Example 2. Riggs Road

The residential units located south of the proposed Riggs Road station are currently difficult for the future Purple Line riders to access. This is due to strip malls along the southern side of Riggs Road that do not connect to the residential area road network. The blue dot on the map illustrates residences about ¼ mile away from the proposed station. To access the future purple line station with the current arrangement, residents must walk about one mile along Riggs Road, Erskine Road, 17<sup>th</sup> Avenue, and then Hannon Street, as illustrated by the dark purple line. Additionally, there are many trees and an elevation change in the area between the back of the strip malls and Hannon Street, the first residential street in the residential neighborhood. Therefore, a direct connection for pedestrians from Hannon Street down the hill to the commercial strip on Riggs Road would increase the area of the neighborhood that is within walking distance of the station.

Figure 8. Current walking route from Riggs Road Station to Hannon Street



## Policy Suggestion 2. Enhancing Bus Service

Expanding the existing bus network and introducing new bus service to places in need is an important solution to the last-/first-mile problem. Many cities work to revamp bus options in conjunction with the opening of new light rail lines. Minneapolis conducted a survey of all bus routes that operated in or across the same corridor as the METRO Green Line prior to the June 2014 opening of that line.<sup>xiii</sup> In the Los Angeles area, phase two of the Expo Line will bring light rail to Santa Monica in 2015, and the Santa Monica Blue Bus is already working with the community to reconfigure bus service to feed and complement the new light rail line.<sup>xiv</sup> In both Minneapolis and Santa Monica, the goal of the bus reorganization has been to eliminate bus routes that parallel the new light rail line so that those resources can be redeployed to enhance existing or create new feeder routes that connect to the light rail. Because these feeder routes are often shorter than the routes discontinued during such route reorganizations, it is often possible to provide frequent service over a large span of service every day of the week while using no additional financial resources.

The various bus operators in the Purple Line corridor (WMATA, MTA, Montgomery *RideOn*, and Prince George's county bus system *TheBus*) should undertake a coordinated study to evaluate current and future bus service along the entire corridor. Such a study should include a comprehensive bus stop location analysis to examine where bus stops should be added or eliminated, considering the distribution of households and employers throughout the corridor and current ridership patterns. This independent analysis should be done with an eye toward closing last-mile/first-mile gaps wherever possible. Areas in the Purple Line corridor with large clusters of businesses that do not close the last-mile gap with bus service are shown in images below

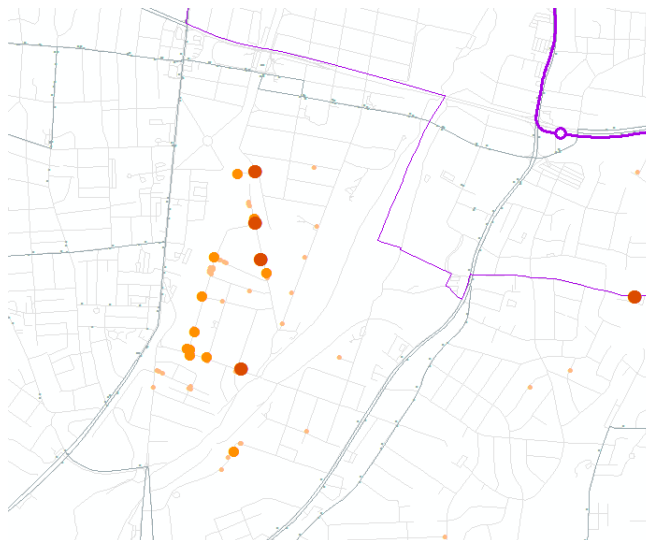
### Example 1. Riverdale Park Station

Several sections of Riverdale, both to the east and west of the proposed Riverdale Park Station, may face last-mile/first-mile gaps. Today, the primary bus service in Riverdale is Metrobus F4, an arterial route that operates from Silver Spring to New Carrollton via Takoma Park and Prince George's Plaza. Prince George's County's *TheBus* service also operates in the area, although less frequently than the F4. Finally, a MARC Camden Line station is served by trains operating between Washington and Baltimore during weekday rush hours.

This would be an excellent area in which to consider introducing circulator-type bus service to feed the Purple Line and the MARC train, and also to provide connections to the F4 bus route, for those living and working at the far reaches of the neighborhood where walking to or from the Purple Line would not be practical. Employers to the west of the Riverdale Park Station, near the Camden Line, will find themselves outside of the last-mile buffer for both the Purple Line and existing bus routes. People who work in Riverdale could take the Purple Line, MARC train, or F4 bus to the transfer point and then take the circulator to a bus stop closer to their employment. This circulator route would close the

last-mile/first-mile gap for homes and businesses along such a bus route, enhancing their transit options.

Figure 9. Riverdale: businesses with last-mile problem by employment size



Fixing the last-/first-mile issue will help to create an equitable transit corridor by increasing access to public transportation for minority groups. East Riverdale, to the east of the proposed Riverdale Park Station, is home to minority groups. As Figure 10 and Figure 11 show, the neighborhood consists of census block groups with more than 15 percent Hispanic population (highlighted in blue) and 17 percent African American population (in green). As on the west side of the Purple Line, the first-mile gap here can be bridged with a circulator bus route so that residents could board buses that would take them from near their homes to the Purple Line station, MARC train, or F4 bus, at which point they can transfer to these arterial services to continue to their destinations. These circulators will better connect all parts of Riverdale and lead to a more equitable and sustainable corridor.

Figure 10. East Riverdale: Hispanic population and housing with first-mile gap

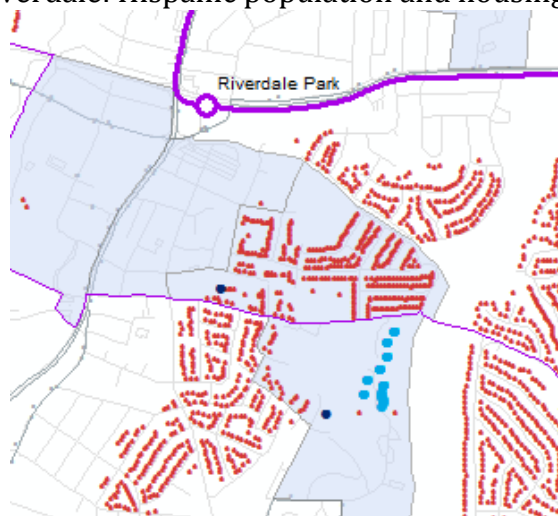
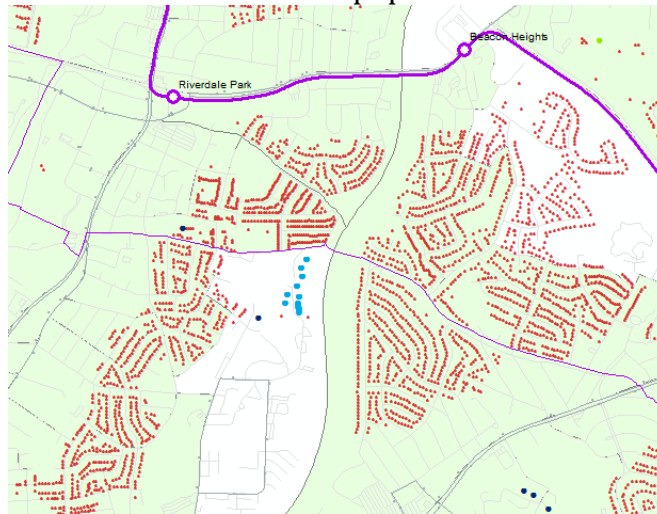


Figure 11: East Riverdale: African American population and housing with first-mile gap



### Example 2. International Corridor

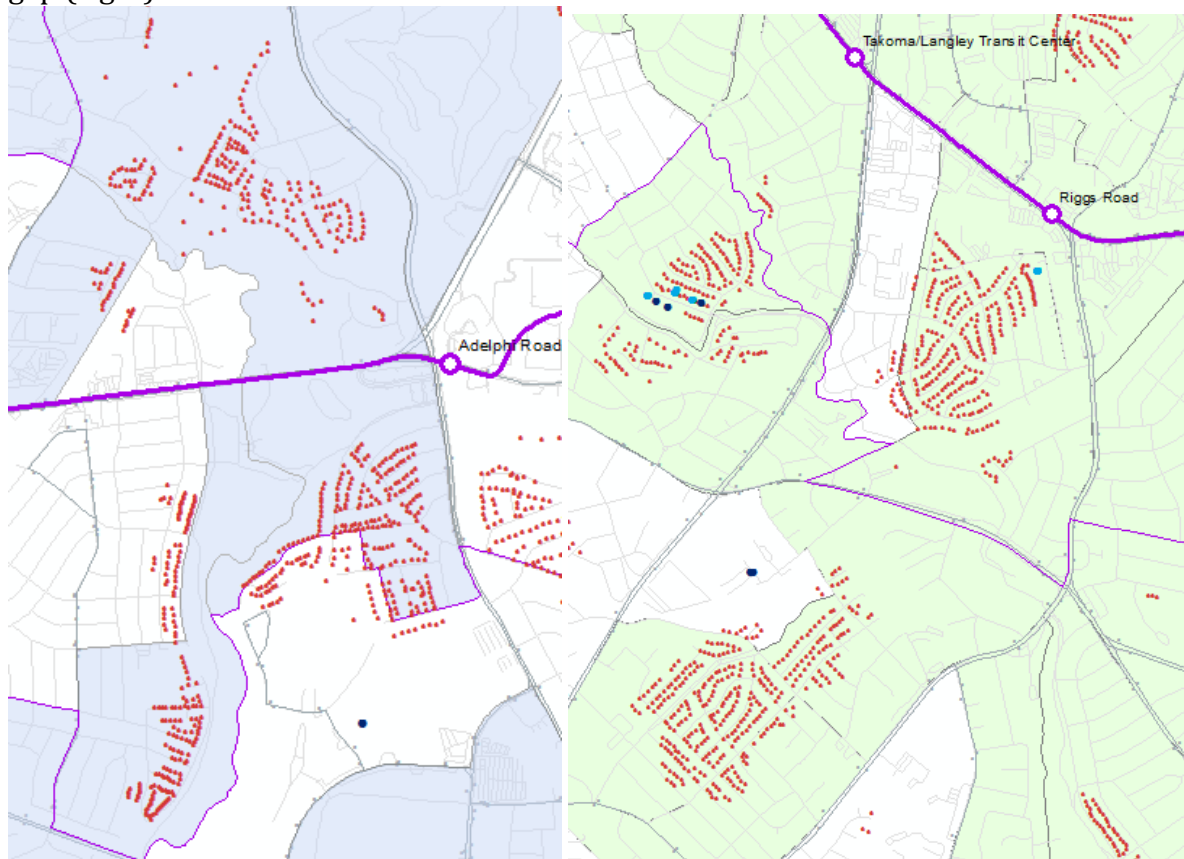
Today, Langley Park bus stops register some of the highest ridership numbers in neighborhoods without Metrorail service in the metropolitan area, in terms of both fares paid and transfers made. According to census data, the neighborhood population is 83 percent Hispanic, and nearly 12 percent of the population lives below the poverty line. The area is also among one of the most dangerous corridors for pedestrians in all of Maryland.<sup>xv</sup> Therefore, it is critical that easy and safe access is provided to the neighborhood's two planned stops from the day the Purple Line opens.

Planners will confront several challenges in this area. University Boulevard, New Hampshire Avenue, and Riggs Road are all state highways with four to six lanes for automobile traffic, often lined with strip malls on each side. Safe walking routes will be restricted, and last-/first-mile gaps will remain if there is a lack of safe places to cross these major thoroughfares to access the Purple Line stations or transfer between buses. Furthermore, the residential neighborhood south of University Boulevard between New Hampshire Avenue and Riggs Road faces additional challenges for transit access, since it is at a higher elevation than University Boulevard itself. Without the construction of additional walking routes to connect the neighborhood to the Purple Line stations, residents here especially will face first-mile gap issues as they attempt to start transit journeys.



Figure 12. International Corridor: Hispanic population and housing with first-mile gap (left)

Figure 13. International Corridor: African-American population and housing with first-mile gap (right)



### Policy Suggestion 3. Adding Bicycling/Bikesharing as an Alternative to Public Transportation

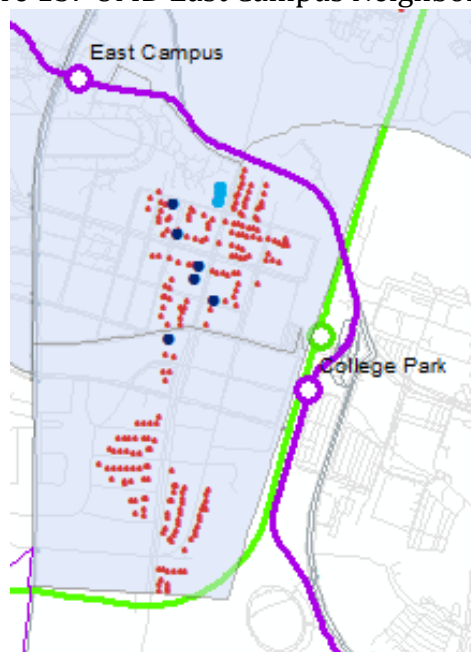
Bicycle infrastructure and accommodation is one way to increase the number of businesses and households that can be reached from public transportation. In the Purple Line corridor, since the route will parallel the Georgetown Branch Trail and run near the Anacostia Tributary Trail system, as well as UMD, encouraging bicycling wherever possible can provide a sustainable and low-cost fix for the first-/last-mile problem. Compared to adding bus service, a bicycle sharing or incentive program is not applicable to all communities. Generally speaking, neighborhoods with a younger population and a bike-friendly environment tend to be more suitable. Terrain/slope issues—for example, in the Riverdale-New Carrollton subarea—can be significant barriers to bicycling activities.

### Example: East Campus

The UMD East Campus neighborhood, located at Baltimore Avenue, has become a home to a lot off-campus housing. The area accommodates both undergraduate and graduate UMD students in apartments and rental units converted from single family housing. With close proximity to both the university campus and downtown College Park, the neighborhood is a mix of commercial and retail and has become a vibrant place.

The neighborhood's last-mile/first-mile problem can be addressed to some extent by introducing a bikesharing program. East Campus is within reasonable cycling distance of the College Park Metro Station, proposed East Campus Purple Line Station, the University of Maryland campus, and the Route 1 Commercial Corridor. If there are bikesharing stations at each of these locations, as well as within the East Campus neighborhood itself, such that all the bikesharing stations are within 300 meters of each other per the standard industry practice, the bikesharing network has the potential to serve several purposes. First, it provides a means to East Campus residents to reach the Green and Purple lines at College Park Station, or the Purple Line at East Campus station. What's more, bikesharing can be used by neighborhood residents to reach other nearby points of interest, such as the university, leaving space on buses and the Purple Line for those commuting to and from points farther away from the campus.

Figure 13: UMD East Campus Neighborhood



However, it is important to ensure that barriers to cycling are minimized or removed in order to encourage it fully. For example, bicyclists are concerned with safety of their bikes, so the proper equipment to lock bikes at stations, including covered storage, should be provided. Also, all efforts should be made to allow bicyclists to bring their bikes on the Purple Line trains (similar to WMATA's *Bikes on Metrorail* program). According to MTA,

Purple Line rail cars will provide 8 spaces per train for bike transport. Meeting infrastructure goals for bicyclists could lead to increased ridership overall on public transit and also would reduce road congestion and air pollution as a result.<sup>xvi</sup>

#### Policy Suggestion 4. Innovative Transit Connection Programs

Current technology and lifestyle trends enable planners to think ahead about innovative programs to connect people to the Purple Line. For example, Uber has emerged as a new way to share rides, and has great potential in fixing the last-/first-mile problem. Dallas Area Rapid Transit (DART) has developed a partnership with Uber to include Uber ride request in its GoPass Mobile Ticketing Application.<sup>xvii</sup> With the smart phone application, a transit rider takes an Uber car to their destination after getting off transit. Similarly, Zipcar in both transit station parking lots/garages and employment centers/neighborhoods provides another option for transit riders to complete the last/first mile.

Another innovative transit connection program worth exploring is a drop-off program. Different from a car pool, a drop-off program provides a ride to a transit station with a person who does not take transit. For example, a husband may drop his wife at a transit station in the morning on his way to work. Drop-off program works best for large families or close neighborhoods with commuters working in different places. Drop-off programs provide a sustainable and convenient alternative to carpooling, which is very common among the Hispanic population in the Purple Line corridor. With well-designed facilities at Purple Line stations and appropriate incentives, the Purple Line can attract the Hispanic population to take transit.

Pursuing any of the suggested solutions in this report could help improve access to the proposed Purple Line stations and the transit ridership. However, we suggest taking them together instead of separately. Removed physical barriers would improve the walking environment and enhance a walking-transit multimodal commute; newly added and extended bus services and improved bicycling facilities would attract bus riders and bikers to take the Purple Line; and innovative connection programs would encourage carpooler to use transit service. They work together to serve and meet the needs of the diverse population along the Purple Line transit corridor. Through these strategies, the Purple Line transit corridor can grow beyond the tracks into a complete corridor with seamless connections to various destinations, and an equitable and sustainable corridor livable and enjoyable by all.

## Endnotes

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- <sup>i</sup> <http://www.futureagenda.org/pg/cx/view#411>
- <sup>ii</sup> <http://www.futureagenda.org/pg/cx/view#411>
- <sup>iii</sup> <http://escholarship.org/uc/item/4q36r9c8>
- <sup>iv</sup> [http://publictransport.about.com/od/Transit\\_Planning/a/The-Last-Mile-Problem.htm](http://publictransport.about.com/od/Transit_Planning/a/The-Last-Mile-Problem.htm)
- <sup>v</sup> The Central Maryland Transportation Alliance. The Last Mile. May 1. 2014.
- <sup>vi</sup> <http://www.futureagenda.org/pg/cx/view#411>
- <sup>vii</sup> [http://publictransport.about.com/od/Transit\\_Planning/a/The-Last-Mile-Problem.htm](http://publictransport.about.com/od/Transit_Planning/a/The-Last-Mile-Problem.htm)
- <sup>viii</sup> <http://nationalcenterformobilitymanagement.org/wp-content/uploads/2014/01/Info-Brief-Shared-Use-and-Transit.pdf>
- <sup>ix</sup> [http://publictransport.about.com/od/Transit\\_Planning/a/The-Last-Mile-Problem.htm](http://publictransport.about.com/od/Transit_Planning/a/The-Last-Mile-Problem.htm)
- <sup>x</sup> Montgomery County's report can be accessed from <http://www.pgplanning.org/Page38934.aspx>, and Prince George's County's from <http://mcatlas.org/purple/>
- <sup>xi</sup> <http://rns.trb.org/dproject.asp?n=36274>
- <sup>xii</sup> Note that connection to the trail is planned on the north side of the CXS tracks from 16<sup>th</sup> street, by 3<sup>rd</sup> avenue. MTA has also planned a crosswalk on 16<sup>th</sup> street directly across from the station with a set of stairs and a ramp down to the apartment complex Summit Hills, to the south. MTA will also build a sidewalk on the west side of 16<sup>th</sup> from the crosswalk north to Suburban Towers.
- <sup>xiii</sup> <http://www.metrotransit.org/central-transit-study>
- <sup>xiv</sup> <http://expo.bigbluebus.com/home/>
- <sup>xv</sup> <http://katana.hsrb.unc.edu/cms/downloads/OTH.PedestrianSafetyInitiative.pdf>
- <sup>xvi</sup> <http://ntl.bts.gov/lib/51000/51400/51432/1104-bicycle-policy-transit-accessibility-first-last-mile.pdf>
- <sup>xvii</sup> <http://transportationblog.dallasnews.com/2015/04/dallas-area-rapid-transit-uber-partner-in-an-effort-to-fill-in-riders-first-mile-last-mile-gap.html/>