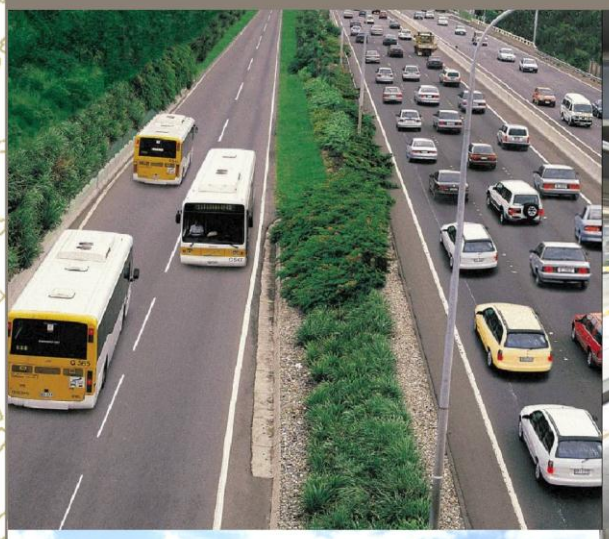
Planning Board Draft

Countywide Transit Corridors Functional Master Plan

July 2013



Montgomery County Planning Department
M-NCPPC
MontgomeryPlanning.org

Abstract

This document contains an examination of and recommendations for transit, bicycle, and pedestrian infrastructure that will help create complete transportation options. With the approval and adoption of this functional plan, the *Master Plan of Highways* will become the *Master Plan of Highways and Transitways.*

Source of Copies
The Maryland-National Capital Park and Planning Commission
8787 Georgia Avenue
Silver Spring, MD 20910

Online at: MontgomeryPlanning.org/transportation/highways/brt

Planning Board Draft

Countywide Transit Corridors Functional Master Plan

prepared by
Montgomery County Planning Department
July 2013

Contents

Introduction 8

- Planning Context 9
- Summary Recommendations 15
- Background 17

Vision 19

- Why Bus Rapid Transit? 19
- Fitting BRT into the County's Transportation Network 19

Guiding Principles 22

Determining BRT Treatments 23

- Dedicated Lanes 23
- Median vs. Curb Lanes 24
- Lane Repurposing 25

Recommended Corridors and Treatments 27

Recommended Corridors 31

- Corridor 1: Georgia Avenue North 32
- Corridor 2: Georgia Avenue South 35
- Corridor 3: MD 355 North 38
- Corridor 4: MD 355 South 41
- Corridor 5: New Hampshire Avenue 44
- Corridor 6: North Bethesda Transitway 47
- Corridor 7: Randolph Road 50
- Corridor 8: University Boulevard 53
- Corridor 9: US 29 56
- Corridor 10: Veirs Mill Road 59

Setting Implementation Priorities for Transit Corridor Improvements 62

Implementation 63

Bicycle and Pedestrian Accommodation and Safety 64

- Ensuring Pedestrian Safety and Accessibility 64
- Bike Accommodation 64

Bicycle-Pedestrian Priority Areas 65

MARC Brunswick Line Expansion 72

Carbon Emission Analysis 74

Maps and Illustrations

Map 1 Recommended BRT Corridors 15
Map 2 Recommended Transit Corridor Network 28
Map 3 Georgia Avenue North Corridor 33
Map 4 Georgia Avenue South Corridor 36
Map 5 MD 355 North Corridor 39
Map 6 MD 355 South Corridor 42
Map 7 New Hampshire Avenue Corridor 45
Map 8 North Bethesda Transitway 48
Map 9 Randolph Road Corridor 51
Map 10 University Boulevard Corridor 54
Map 11 US 29 Corridor 57
Map 12 Veirs Mill Road Corridor 60
Map 13 Recommended Bicycle-Pedestrian Priority Areas 65
Map 14 Montgomery Mall/Rock Spring BPPA 67
Map 15 Piney Branch/University Boulevard Purple Line Station Area BPPA 67
Map 16 Medical Center Metro Station Area BPPA 68
Map 17 Veirs Mill Road/Randolph Road BPPA 68
Map 18 Aspen Hill BPPA 69
Map 19 Colesville BPPA 69
Map 20 Forest Glen Metro Station Area BPPA 70
Map 21 Silver Spring CBD West BPPA 71
Map 22 Four Corners BPPA 71
Map 23 MARC Brunswick Line Expansion 73

Illustration 1 Emerald Express (EmX), Eugene, Oregon 13
Illustration 2 Healthline, Cleveland, Ohio 14
Illustration 3 *Master Plan of Highways*, 1955 17
Illustration 4 Proposed White Flint Street Grid 24
Illustration 5 Recommended Corridor Segment Treatment: Two-Lane Median Busway 29
Illustration 6 Recommended Corridor Segment Treatment: Two-Lane Side Busway 29
Illustration 7 Recommended Corridor Segment Treatment: One-Lane Median Busway 29
Illustration 8 Recommended Corridor Segment Treatment: Managed Lanes 30
Illustration 9 Recommended Corridor Segment Treatment: Curb Lanes 30
Illustration 10 Recommended Corridor Segment Treatment: Mixed Traffic 30

Tables

Table 1 Montgomery County Demographic and Travel Forecast 8
Table 2 Transit Service Typology 10
Table 3 Corridor Recommendations, Georgia Avenue North 34
Table 4 Corridor Recommendations, Georgia Avenue North Cycle Track 34
Table 5 Corridor Recommendations, Georgia Avenue South 37
Table 6 Corridor Recommendations, MD 355 North 40
Table 7 Corridor Recommendations, MD 355 South 43
Table 8 Corridor Recommendations, New Hampshire Avenue 46
Table 9 Corridor Recommendations, North Bethesda Transitway 49
Table 10 Corridor Recommendations, Randolph Road 52
Table 11 Corridor Recommendations, University Boulevard 55
Table 12 Corridor Recommendations, US 29 58
Table 13 Corridor Recommendations, Veirs Mill Road 61
Table 14 Carbon Emissions Analysis 74

Plan Appendix

Appendix A: Enhanced BRT Treatments to be Considered in Future Master Plan Updates 78

Appendix B: Impacts on Vehicle Miles Traveled and Vehicle Hours Traveled 79

- modeling results for build alternatives analyzed

Appendix C: Corridor Descriptions 88

- detailed descriptions of the specific conditions in each corridor, the rationale behind the treatment recommended, and the changes from existing master plans

Appendix D: Travel Time Comparison 114

- A comparison of travel times on sample corridors via BRT, local bus, and BRT

Appendix E: 2040 Forecasts 117

- employment and housing densities by transportation analysis zone

Appendix F: Bikeway Accommodation 119

- an analysis of whether additional bikeway recommendations should be included in the Functional Plan

Appendix G: Recommended Elements of a Plan of Improvements for Bicycle-Pedestrian Priority Areas 127

- baseline improvements for bicyclists and pedestrians
- further improvements for bicyclists and pedestrians in Business and Urban Districts
- baseline improvements for bicyclists and pedestrians in Bicycle-Pedestrian Priority Areas

Online Appendix

(available online at MontgomeryPlanning.org/transportation)

Appendix 1: Decision Approaches

- a discussion of the travel demand forecasting model
- a discussion of the scenarios tested

Appendix 2: Findings
- regionwide assessment of a BRT system
- countywide assessment of a BRT system
- corridor-level assessment of a BRT system
- link-level assessment of a BRT system

Appendix 3: Lane Repurposing Analysis
- person-throughput analysis
- traffic lane capacity
- person throughput rationale
- traffic impacts

Appendix 4: Analysis of Corridors Not Recommended for Inclusion in the Functional Plan
- description and analysis of eight corridors studied but not recommended

Appendix 5: Potential Impacts to County-Listed Historic Resources
- potential impacts to County-listed historic resources

Appendix 6: Potential Impacts to M-NCPPC Parks
- potential impacts to M-NCPPC parks

Consultant Memorandums

Appendix 7: Travel Demand Forecasting Model Documentation
- discussion of the MDAAII model (also used for the Purple Line and Corridor Cities Transitway)
- non-included attributes of bus rapid transit
- modeling scenarios
- appendices from the Purple Line travel demand forecasting documentation

Appendix 8: Initial Recommendations from the Consultant
- theoretical traffic lane capacity
- guidance from the *Transit Capacity and Quality of Service Manual*
- minimum link ridership for dedicated lanes
- district level analysis
- traffic analysis testing lane repurposing on Georgia Avenue
- traffic analysis testing median transitway on Rockville Pike

Appendix 9: BRT Typical Sections
- typical sections based on location (intersection, intersection with station, mid-block)
- typical sections based on lane dedication (concurrent flow curb lanes, reversible one-way median, two-way median)
- typical sections based on area type (urban, suburban)
- typical sections based on availability of right-of-way (preferred, constrained)

Appendix 10: BRT Corridor Function Assessment
- an assessment of the corridor types, including activity center corridors and commuter/express corridors

Appendix 11: BRT Station Typology
- a description of the different types of BRT stations

Appendix 12: Stormwater Management
- an overview of various types of stormwater management

Introduction

The Washington, D.C. region is consistently rated among the most congested in the nation, with average commute times exceeding 35 minutes.

Growth is expected to continue in Montgomery County, largely through redevelopment, so options for building new roads or expanding existing ones are limited. Population and employment are forecast to grow significantly, while lane-miles of roadway will not. Even as the County urbanizes, the growth in vehicle trips will outpace the growth in transit trips for commuters. An expansion of frequent, reliable transit service will be needed to move greater numbers of people to and from jobs, homes, shopping, and entertainment areas, reducing the gap between transportation demand and supply and providing County residents a viable and reliable alternative to travel by auto on congested roadways. If this service is not provided, auto congestion will be significantly worse, degrading the quality of life and economic vitality of the County.

To accomplish this, a more efficient use of our public rights-of-way is essential. This Plan provides enhanced opportunities for travel by transit to support our economic development and mobility goals in an environmentally sustainable way, and in a way that preserves our existing communities.

Table 1 Montgomery County Demographic and Travel Forecast

	2013	2040	difference	percent difference
Population	997,884	1,203,643	205,759	21%
Employment	529,267	737,364	208,097	39%
Transit work trips	165,121	198,513	33,392	20%
Vehicle work trips	376,269	461,248	84,979	23%
Truck trips	83,024	100,344	17,320	21%
VMT	21,952,932	26,795,176	4,842,244	22%
VMT per capita	22.0	22.3	0.3	1%
Lane-miles*	2,592	2,721	129	5%
Lane-miles of congestion	376	639	263	70%

Source: MWCOG

* Modeled lane miles include freeways, arterials, and many collectors, but few local roads.

By 2040, the Metropolitan Washington Council of Governments (MWCOG) projects the region's population to increase by 30 percent and employment to grow by 39 percent.[1] Within Montgomery County, significant changes at the Walter Reed National Military Medical Center, White Flint, U.S. Food and Drug Administration (FDA), the Life Sciences Center, and other commercial and employment centers are expected to impact travel conditions for many.

[1] *Growth Trends to 2040: Cooperative Forecasting in the Washington Region*, 2010

Planning Context

Making more efficient use of our existing rights-of-way is not a new approach. Almost 40 years ago, the U.S. Department of Transportation (USDOT) directed Metropolitan Planning Organizations to develop Transportation System Management (TSM) Plans to provide guidance on ways to better utilize existing rights-of-way through means that are less capital intensive and have less impact than building new roads or lanes of traffic. Analysis of a "TSM alternative" is a requirement for major capital projects in urban areas with a population of greater than 200,000.

There are a number of locations within the County today where TSM improvements are in place and providing more efficient use of the right-of-way, such as:

- HOV lanes on I-270
- managed lanes on Colesville Road in Silver Spring north of the CBD and on Georgia Avenue in Montgomery Hills
- off-peak parking on Colesville Road and Georgia Avenue in the Silver Spring CBD and Wisconsin Avenue in the Bethesda CBD that restricts roadway capacity to support economic activity
- longer traffic signal cycles during peak hours to accommodate commuters on the major roadways
- the recent introduction of traffic-signal priority on portions of MD355 to facilitate transit service.

Enhanced transit service—including service consisting of many elements of BRT, but short of dedicated lanes requiring heavy construction—is also a recognized TSM strategy. Examples include the MetroExtra service operated by WMATA (which provides limited stop service in mixed traffic), other related near-term improvements planned as part of the WMATA Priority Corridor Network program, and the Ride On Route 100 non-stop service operating via the I-270 HOV lanes.

The provision of dedicated lanes for enhanced transit service is the focus of this update to the County's Master Plan of Highways. This Plan used as its starting point for evaluation the 150-mile bus rapid transit (BRT) network described in the *MCDOT Feasibility Study Report*, completed in August 2011, as well as the later recommendations of the County Executive's Transit Task Force, whose final recommendations were delivered in May 2012. This Plan uses an expanded approach to meeting transportation challenges however, addressing primarily the needs of a BRT system, but also the designation of bicycle-pedestrian priority areas and the need for expanded MARC commuter rail service to support a transportation network that is better integrated.

BRT service can be provided via a variety of transitway treatments: a dedicated two-lane median or side transitway, a dedicated one-lane median transitway, dedicated curb lanes, or running in mixed traffic. Dedicated lanes can be achieved either by expanding the right-of-way and pavement or by repurposing existing travel lanes.

Frequent, reliable bus service is most easily provided on a network of dedicated bus lanes, and the attractiveness of transit to the potential patron depends on how well his or her entire trip can be made, but the optimal size of this network must be weighed against physical and right-of-way impacts. This Plan identifies additional rights-of-way for certain corridor segments, where needed, to ensure a good balance between overall transit network integrity and impacts on adjacent properties. It recommends the more efficient use of existing rights-of-way along other corridor segments by repurposing existing travel lanes for transit where the value of doing so is confirmed through more detailed facility studies and operational planning. This Plan does not envision that full-time dedicated bus lanes will be implemented as a first step in most locations.

Since a large part of the initial ridership for BRT service will come from existing transit users whose numbers do not warrant a high level of treatment at this time, it is likely that there will be an incremental introduction of priority treatments and features that, with actual operating and ridership experience, ultimately lead to the maximum level of treatment appropriate for the specific corridor in question.

Task Force report:
http://www.montgomeryplanning.org/viewer.shtm#http://www.montgomerycountymd.gov/content/dot/MCBRTStudyfinalreport110728.pdf
MCDOT report:
http://www6.montgomerycountymd.gov/Apps/cex/transit/reportfinal.asp

Table 2 Transit Service Typology

Service	Market	Examples	Speed	Frequency	Span	Stop Spacing
Commuter rail	commuters	MARC Brunswick Line	very high	low	peak period	very high
Metrorail	all trips	Red Line	high	high	all day	high
Light rail	all trips	Purple Line	moderate	high	all day	moderate
BRT—Activity Center Corridor	all trips	Corridor Cities Transitway	moderate	high	all day	moderate
BRT—Express Corridor	commuters	US 29	high	moderate	peak period	high
BRT—Commuter Corridor	all trips	K9 MetroExtra route	moderate	moderate	peak period	moderate
Local bus	all trips	Metrobus, Ride On	low	low	varies	low

Travelers in Montgomery County currently have the following transit options:

- high-speed/high-capacity heavy rail systems (Metrorail or MARC) largely built for commuters
- local and regional bus services that connect commuters from residential areas to employment centers via express buses along the interstates (MTA express bus and commercial commuter buses)
- local buses that move slowly along increasingly congested roadways and make frequent stops (Metrobus and Ride On).

Plans are underway to create two additional high-capacity transit corridors—the Purple Line and Corridor Cities Transitway (CCT)—where high development densities and a mix of land uses are either present or planned. However, much of the County will still lack reliable, high-quality transit service that provides a viable alternative to driving an automobile and that provides connectivity among multiple County activity centers.

BRT service on the recommended transit corridor network will provide service between dense redeveloping areas inside the Beltway, emerging mixed-use activity centers, and commuter corridors. BRT is a flexible service with a number of potential combinations of attributes. Some BRT corridors include an exclusive transitway with little or no conflicts with other vehicles. Other corridors may take advantage of off-board fare payment, traffic signal priority, and/or increased distance between stops, but not other attributes most often associated with BRT. A single corridor may evolve over time from

one with fewer attributes to one with an exclusive transitway as facilities are designed and tested over time.

The transit corridors recommended in this Plan are intended to facilitate the following three types or levels of BRT service.

- BRT—Activity Center Corridor, defined by moderate-speed, high-frequency, all-day transit service. It is most appropriate on activity center corridors that connect multiple dense mixed-use areas.
- BRT—Express Corridor, defined by high-speed, moderate-frequency, peak-period service. It is most appropriate on access-controlled express corridors that connect commuters at park-and-ride lots to employment centers.
- BRT—Commuter Corridor, defined by moderate-speed, moderate-frequency, limited-stop transit service during peak periods. It is most appropriate on commuter corridors that connect moderate density residential areas to employment centers.

This Plan recommends an extensive network of enhanced transit corridors based on a broad analysis of travel patterns countywide. The rights-of-way recommended for these corridors reflect the footprint required by the typical roadway sections developed for various levels of transit treatment, and by specific corridor segment locations in urban or suburban areas of the County.

More detailed analysis is required to determine the final treatment and typical section, the slope impacts required to build that typical section, and the number of travel lanes and turn lanes required to provide an adequate level of traffic service. The final rights-of-way required for the recommended transit corridors must be determined during facility planning and design for individual corridors, at which time the cost of construction must also be determined.

The County's Service Planning and Integration Study will determine the general relationship between BRT and local bus service; incorporating that study's recommendations may require that additional stations be added during facility planning. More detailed analysis is required after the completion of that study to determine the specific location and size of transit stations.

Most of the BRT corridors pass through residential areas and in addition to serving the transportation function of moving people, the system should be implemented in such a way that it enhances the surrounding area to the extent possible. Overhead signage should be kept to the minimum necessary and minimize obtrusiveness. Stations must be identifiable but should be designed to complement the surrounding neighborhood.

A transit corridor network that supports high-quality bus service will improve accessibility and mobility to serve the development envisioned by the County's adopted land use plans. Implementing this Functional Plan will help further the General Plan's transportation goal, which is to:

> "Enhance mobility by providing a safe and efficient transportation system offering a wide range of alternatives that serve the environmental, economic, social, and land use needs of the County and provide a framework for development." (page 63)

This Plan recommends a transit corridor network with a variety of transitway treatments, including dedicated median and curb bus lanes as well as mixed traffic operations, and makes recommendations for stations (located by the nearest intersection) to accommodate BRT service. The Plan recommends

rights-of-way to accommodate these facilities and in some cases, changes in the number of travel lanes to achieve this transit corridor network.

There are many other elements of BRT service however that are beyond the scope of the Plan but are important to its future success, including:

- implementing treatments such as queue-jumpers and/or transit signal priority to improve vehicle operating speeds along selected segments of the network
- providing express and limited stop service to and from key activity centers; the greater spacing of stops reduces the amount of time buses must stop to pick up and drop off customers
- providing off-board fare collection and level boarding to reduce the time it takes passengers to enter and exit a bus
- multiple bus doors that are level with the station platform to reduce the dwell time at stops by allowing riders—including children, the elderly, and persons with disabilities—to enter and exit more quickly.

This Plan also makes no recommendations regarding the operation of BRT such as the frequency, hours, and span of service; fare structure and system financing; bus size and fuel source; details of the station design; transfers with other transit services; and the potential redeployment of local buses.

The County is focusing new planned development in compact, mixed-use areas that reduce the need for driving and enhance its pedestrian, bicycle, and transit network with sustainable, cost-effective solutions. A key support for this development pattern is a high-quality, reliable transit system that enables people to leave their cars at home. This system will connect these activity centers with existing and other planned development. While light rail is an appropriate system to connect high-density activity centers, such as the Purple Line between Bethesda and Silver Spring, it is not cost-effective for most of the County's transit corridors.

BRT works where development densities may be lower than those that warrant light rail, but where greater transit speed and efficiency is needed beyond what standard local bus service can provide. This Plan recommends a network of additional BRT transit corridors that will be integrated with the Corridor Cities Transitway (CCT), now in preliminary design as a BRT facility. This Plan anticipates that the recommended transit network also can be adapted and will therefore evolve over time to meet the particular transit needs and operating characteristics of each corridor segment and activity center.

To support this changing land use policy direction, transportation success must be measured differently. For example, rather than focusing on the number of cars that can move through an intersection, a typical transportation system performance assessment, the County should focus on person-throughput: providing as many people as possible with reliable travel options along its major transportation corridors and where feasible, providing a travel advantage to those who use transit and reducing the growth of traffic congestion into the future.

person-throughput: the number of persons that can be carried in a particular lane or roadway in one hour
corridor: a public right-of-way for transportation that contains one or more of the following: a roadway, transitway, bikeway, or pedestrian facilities
transit corridor treatment: the physical space in the public right-of-way intended to be used by BRT service
bus route: a designated set of roadway segments used by a regularly scheduled bus service

Nationwide, BRT systems have proved to be beneficial for travelers, reducing travel time and increasing service reliability. The experience of those systems was used to determine where additional right-of-way should be identified and protected for the construction of future transitways and transit stations. Two successful examples of BRT lines, the EmX in Eugene, Oregon and the Healthline in Cleveland, Ohio are discussed below.

EmX (Eugene, OR)

The Lane Transit District (LTD) system currently operates the Emerald Express (EmX) BRT service within the Eugene-Springfield metropolitan area of Lane County, Oregon. After receiving approval in 2001, the first portion of the route—the Green Line—opened in 2007. This pilot corridor links downtown Eugene and downtown Springfield via popular destinations such as the University of Oregon and Sacred Heart Medical Center.

Illustration 1 Emerald Express (EmX), Eugene, Oregon

Photo credit: www.klcc.org

The EmX, 60 percent of which features dedicated bus lanes, also includes 60-foot articulated vehicles, hybrid electric propulsion, double-sided boarding, on-board wheelchair and bicycle space, as well as both median and curbside stations that provide weather protection for riders.

Within a year of the Green Line's opening, ridership along the corridor had doubled, a statistic largely driving the City's honorable mention recognition for a 2008 Sustainable Transport Award. The continued success of the EmX pushed LTD's decision to expand service to connect Eugene and Springfield to the region's Gateway area via the Gateway Line extension, which opened in 2011.

HealthLine (Cleveland, OH)

The Greater Cleveland Regional Transit Authority (RTA) operates the HealthLine BRT service (formerly referred to as both the Silver Line and Euclid Corridor Transportation Project). Opened in 2008 and

subsequently renamed as a result of a partnership with the Cleveland Clinic and University Hospital, the system runs along Cleveland's Euclid Avenue from the downtown area's Public Square to East Cleveland's University Circle.

Illustration 2 Healthline, Cleveland, Ohio

Photo credit: www.flickriver.com

The line covers 58 stations and contains dedicated bus lanes (with advanced signal technology to coordinate with cars), off-board fare collection (at both median and curbside stations), diesel-electric hybrid motors on articulated vehicles, and adjacent bike lanes along the route.

Originally billed as a link between hotels, employers, cultural institutions, and other popular destinations, within a year of the project's opening, the HealthLine's success was evident; indeed, ridership had risen by nearly 50 percent over that of the Route 6 Euclid Avenue bus, which was formerly the most heavily used route in the RTA system.

Summary Recommendations

Functional plans provide the intermediate level of planning detail between the General Plan and area master plans, in this case, providing the legal basis for securing adequate rights-of-way to accommodate the desired facilities. This Plan's focus is to**:**

- identify the corridors needed to accommodate the desired BRT network, facilitating superior transit service along many of the County's major roadways
- recommend a minimum public right-of-way for each affected roadway and any changes to the planned number of travel lanes
- identify recommended station locations by the nearest intersection.

This Plan recommends a network of ten transit corridors (see Map 1), with specified rights-of-way and treatments.

Map 1 Recommended BRT Corridors

Corridor 1: Georgia Avenue North
Corridor 2: Georgia Avenue South
Corridor 3: MD 355 North
Corridor 4: MD 355 South
Corridor 5: New Hampshire Avenue
Corridor 6: North Bethesda Transitway
Corridor 7: Randolph Road
Corridor 8: University Boulevard
Corridor 9: US 29
Corridor 10: Veirs Mill Road
Corridor CCT: Corridor Cities Transitway

The Plan also recommends:

- designating Bicycle-Pedestrian Priority Areas around major stations to promote safe, convenient access for transit patrons
- adding a third track on a portion of the MARC Brunswick Line to promote regional transit service improvements.

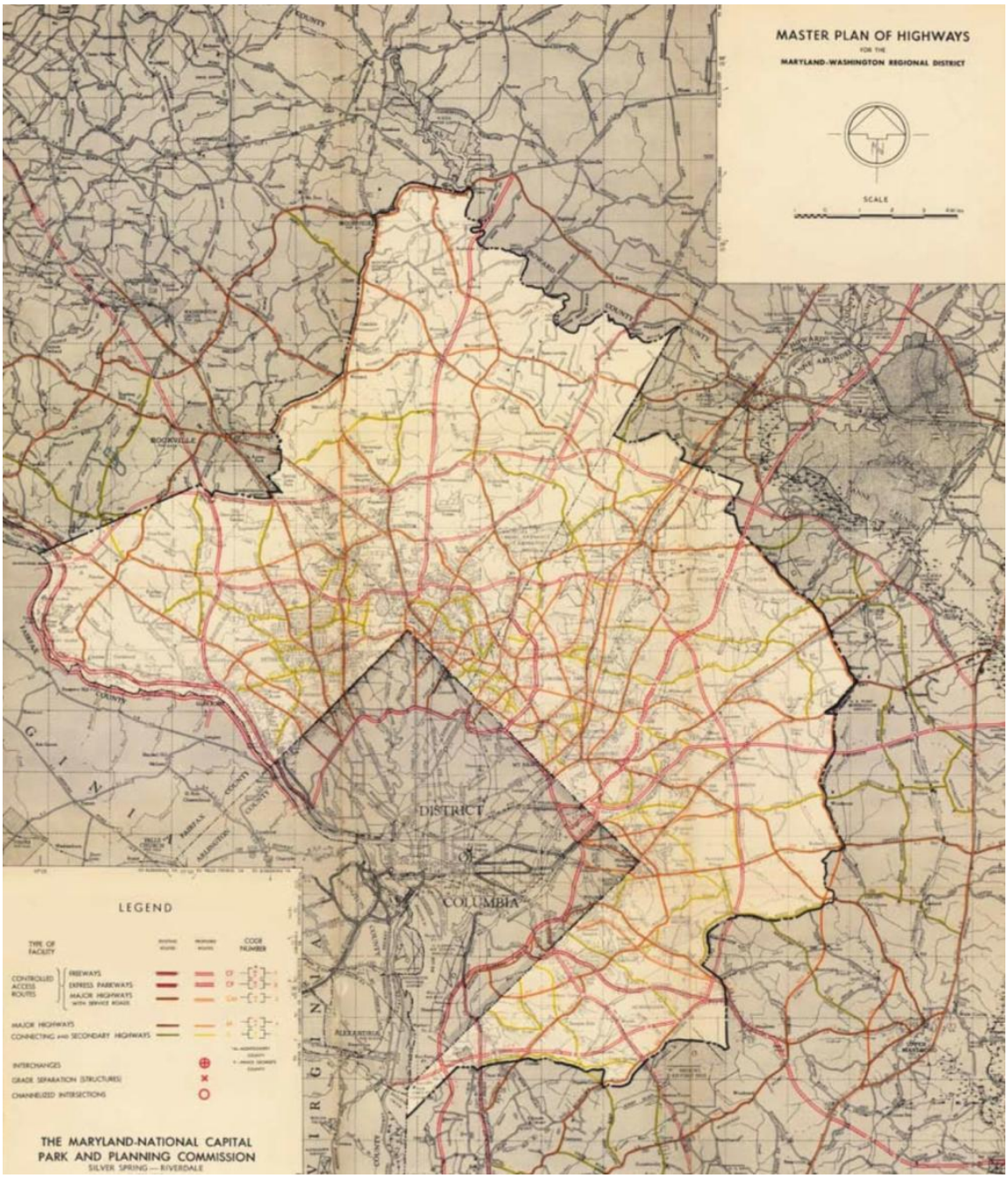
This Plan's recommended transit corridor network is intended to serve current and planned land use in adopted master and sector plans. No changes to land use or zoning are recommended in this Functional Plan.

This Plan establishes the direction for more detailed work to be done in project planning along individual transit corridors. The corridor segment treatment, length, and station locations are all subject to modification during these more detailed planning and engineering phases of project development and implementation, bearing in mind that the goal is to create a high-quality BRT system that will offer frequent, reliable service.

Background

The first *Master Plan of Highways* (MPOH) was approved and adopted in 1931, shortly after the creation of the Maryland-National Capital Park and Planning Commission in 1927. The last comprehensive update to the MPOH was approved and adopted in 1955 (see Illustration 1). It covered the Maryland-Washington Regional District as it existed at the time, Montgomery County's portion of which was about one-third of the County's current area—east of Georgia Avenue, east and south of the City of Rockville, and the southeast portion of Potomac.

Illustration 3 ***Master Plan of Highways*****, 1955**



Rather than a comprehensive update, the MPOH has been updated periodically, focusing on specific projects or geographic areas. Area master plans were revised in the 1970s to include the Metrorail Red Line, but the MPOH map was not revised to include transitways until 1986. Transitways now included in the MPOH are:

- Purple Line Transitway
- Corridor Cities Transitway
- North Bethesda Transitway
- Georgia Avenue Busway.

Since 1955, there have been updates and amendments to the MPOH through various approved and adopted functional, master, and sector plans. The most significant countywide update since 1955 was the creation of the *Rustic Roads Functional Master Plan* (RRFMP) in 1996, which sought to preserve many of the roads in the rural area of the County to reflect and further the goals of the 1980 *Functional Master Plan for the Preservation of Agricultural and Rural Open Space*.

This Plan complements the RRFMP by reflecting the growing urbanization of the I-270 corridor and the down-County area. It will provide the mobility needed to accommodate that growth while minimizing the adverse impacts on quality of life for those who live, work, and patronize the businesses along major roadways.

The General Plan recommends "an interconnected transportation system that provides choices in the modes and routes of travel." A BRT system would better enable transit riders to travel on a network of corridors with few transfers and with reliable service, helping to fulfill the General Plan's transportation vision.

Vision

This Plan will greatly increase the extent of high-quality transit service to the County's most densely developed areas, areas planned for redevelopment, and areas planned for new dense development. As parts of the County urbanize, BRT will provide the transit service needed to move more people to and from jobs, homes, shopping, and entertainment areas. Transit's more efficient use of public rights-of-way will support economic development in an environmentally sustainable way and in a way that preserves existing communities.

Why Bus Rapid Transit?

With exclusive or dedicated lanes, signal priority, and greater spacing between stops, BRT will:

- provide better service to existing transit passengers whose travel time would be reduced
- provide a fast, convenient, reliable alternative to the single-occupant vehicle and increasingly congested roads
- move more people in the same space as a general purpose lane at a higher average level of service
- act as a bridge between rail transit and extensive local bus service
- intercept many non-County residents before they reach the County's more heavily developed areas, allowing roadway capacity to better serve planned development within the County.

BRT can be implemented more easily and quickly than light rail, at a lower capital cost, and is far more flexible. BRT routes can use a single transit corridor or parts of multiple corridors, which can also accommodate local buses that are included in the County's bus service plan for the network.

This Plan makes recommendations for transit corridors within Montgomery County. These corridors are intended to accommodate transit services both within the county and those that extend beyond our borders. The recommended transit corridors are not intended to be viewed as bus routes that terminate at the county line.

Finally, BRT can be implemented in phases, integrating improvements in vehicles, stations, and runningways as operating and capital funds become available, and as the related varying levels of transit-supportive densities materialize along segments of the corridors.

Fitting BRT into the County's Transportation Network

Metrorail is the backbone of the County's transit network, providing transit service via the Red Line within the County and to downtown Washington, D.C. It provides service to about three-quarters of a million passengers system-wide on an average weekday, significantly reducing the peak-hour travel burden on the region's roadway network.

The Purple Line, planned as Light Rail Transit (LRT) will provide the next layer of transit service, connecting down-County activity centers, the two Red Line corridors, and Montgomery County with Prince George's County. Bus rapid transit would form the next layer of transit service. Local, circulator or shuttle, limited-stop, and commuter/express bus routes and MARC commuter rail complete the network.

In addition to serving activity centers directly, BRT on the recommended transit corridors will serve as feeders to Metrorail and MARC stations, and local bus service and shuttles will feed into the

recommended corridors. Montgomery County has one of the largest suburban bus services in the country, providing thirty million trips per year. Ride On's extensive network of local routes will continue to provide access to both the BRT and Metrorail systems, as will the Metrobus network.

This Plan recommends that segments of MD355 and Georgia Avenue that are already served by Metrorail also be served by the recommended transit corridors. One-half of the forecast BRT patrons are expected to be new transit riders. Since BRT will serve as an intermediate level of transit service between Metrorail and local buses, the other half will migrate from other transit services because of the greater service area, the potential for one-seat rides, and connections to the Purple Line.

The introduction of extensive high-quality transit service on the County's roadways will provide an attractive alternative to private automobiles. In addition to recommendations in the General Plan and many master plans to increase the percentage of residents using transit, specific mode share goals of up to 50 percent non-single-occupant vehicle travel are already in place in several areas of the County. The recommended transit network would provide the superior transit facilities necessary to help achieve these goals.

At the same time, BRT service on the transit corridor network recommended by this Plan would improve the overall operation of the roadway network for drivers still using the roads by increasing average travel speeds and reducing the growth in congestion countywide. (Appendix B shows the results for the three transit corridor networks modeled.) The impacts on individual corridors will depend greatly on the final transit corridor treatment selected by the implementing agency and must be determined during detailed project planning and service planning following the adoption of this Functional Plan.

This Plan makes no recommendations for adding park-and-ride facilities, so BRT access would be via existing parking facilities, biking, and walking. While adding park-and-ride lots could increase ridership, the locations of these lots should be carefully considered to match the function of each recommended BRT corridor:

- BRT—Activity Center Corridors: because these corridors connect multiple dense, mixed-use areas, all station areas should prioritize pedestrian, bicycle, and transit access; park-and-ride lots should be discouraged.
- BRT—Express Corridors: because these corridors connect park-and-ride lots to employment centers, park-and-ride BRT stations should prioritize vehicular and transit access, though pedestrian, bicycle, and transit access should be the focus at all other stations.
- BRT—Commuter Corridors: because these corridors connect moderate density residential areas to employment centers, most station areas should prioritize pedestrian, bicycle, and transit access. Park-and-ride lots may be appropriate at some locations, especially end-of-the-line stations and connections to interstates and expressways, but multi-modal access should be provided.

This Plan recommends that additional park-and-ride lots be considered in future area master plans:

- as an interim use where transit-oriented redevelopment is an appropriate long term goal, or
- as a long-term use where transit-oriented development would not be feasible or would otherwise be inconsistent with the master plan's objectives.

The Plan recommends sufficient rights-of-way for safe, adequate access along the transit corridors, improvements to existing bicycle and pedestrian facilities in the areas around recommended stations, and the designation of Bicycle-Pedestrian Priority Areas at major transit stations.

The need for additional bus storage and maintenance facilities will need to be explored in a future master plan once the County's bus service plan is complete, but it is likely that such a facility will be needed in the eastern part of the county.

Guiding Principles

The 1993 General Plan Refinement shifted the County's transportation goal toward meeting travel demand by providing good alternatives to the single-occupant vehicle:

The 1969 Circulation Goal was to "provide a balanced circulation system which most efficiently serves the economic, social, and environmental structures of the area." The General Plan Refinement renames the goal to the Transportation Goal. One important conceptual change in this goal is the movement away from accommodating travel demand and toward managing travel demand and encouraging the availability of alternatives to the single-occupant vehicle. The Refinement effort thus abandons phrases such as "carry the required volume" and "accommodate travel demand" because the demand for single-occupant vehicle travel will usually outstrip the County's ability to meet it. (page 61)

The Refinement further recommends:

"Making better use of the transportation system already in place, getting more people into trains, cars, and buses in future right-of-way, and creating an environment conducive to walking and biking are all necessary elements to achieve an affordable balance between the demand for, and supply of, transportation." (page 60)

"A key aspect of making the County more accessible by transit and walking is that it can reduce travel by car. Favoring transit can make more efficient use of the existing roadway network and can reduce air pollution." (page 17)

To further the transportation goal, this Plan recommends:

- designating exclusive or dedicated bus lanes, wherever there is sufficient forecast demand to support their use, to promote optimal transit speeds in urban areas and surrounding suburban areas
- implementing transit facilities and services where and when they would serve the greatest number of people on individual corridors and where there would be an improvement to the overall operation of the county's transportation network
- expanding regional rail transit service
- supporting policies and programs that increase the comfort and safety of pedestrians and bicyclists traveling to and from transit facilities.
- minimizing the construction of additional pavement to limit impacts on the environment and on adjacent communities.

A strong transit network is essential to support economic development in planned growth areas. The recommended transit corridors will facilitate BRT and other high-quality transit services as well as potentially accommodate other bus services such as Metrobus and Ride On and provide connections to Metrorail, the Purple Line, and MARC.

Determining BRT Treatments

The transit corridors in MCDOT's Feasibility Study Report and those recommended by the County Executive's Transit Task Force were analyzed to consider:

- forecast transit ridership
- general traffic volumes and patterns
- existing roadside development
- planned land use.

This Plan's corridor treatment recommendations are tailored to reflect the specific conditions for each corridor segment and include the following decisions.

- Are dedicated lanes warranted?
- Should the dedicated lanes be at the curb or in the median?
- Can existing travel lanes be repurposed as dedicated bus lanes?
- What segments of the recommended transit network can be implemented without adversely affecting current planned land use or general traffic operations? What segments require further study as part of an area master plan effort?

Appendix C includes a detailed description of the specific conditions in each corridor and the rationale behind the treatment recommended. The following discussion summarizes the basis for these decisions.

Dedicated Lanes

The ridership used to determine when a dedicated bus lane is warranted can vary nationally depending on the jurisdiction but is typically around 1,200 passengers per peak hour in the peak direction (pphpd). This Plan's recommendations are based on a lower threshold of 1,000 pphpd to reflect:

- the high level of analysis of the large network studied
- the long time frame of the Functional Plan, which accommodates build-out of current planned land use beyond the 2040 forecast year
- hard-to-measure model attributes that may significantly increase forecast ridership. Preliminary modeling work done for the Veirs Mill Road Corridor indicated that the forecast ridership could be undercounted by up to 30 percent because of these attributes, which include:
  - service branding
  - reliability
  - span of service hours
  - comfort
  - protection from weather
  - the chances of finding a seat
  - other passenger amenities.

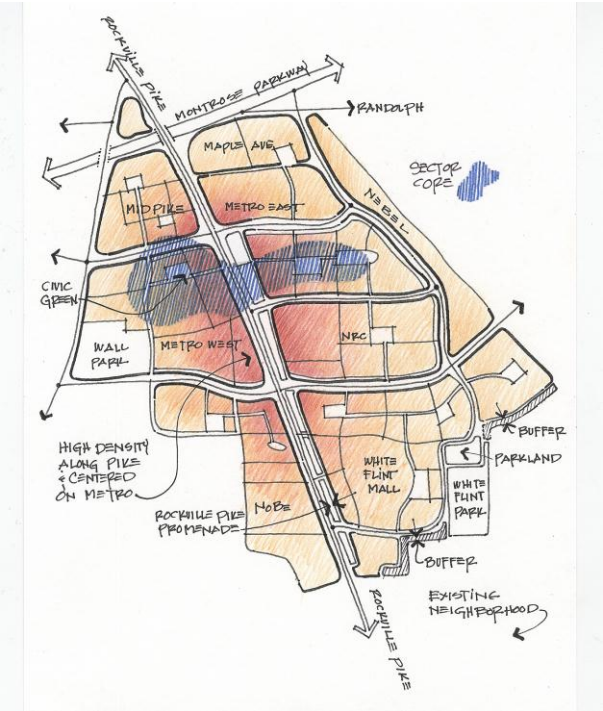
Where forecast BRT ridership was less than the 1,000 pphpd threshold, it was combined with forecast local bus ridership to identify corridor segments where dedicated lanes could improve bus travel for all transit users. Corridor segments that fell below 1,000 pphpd in combined BRT and local bus ridership were generally not recommended for inclusion in the Plan. In select cases, largely because of network integrity considerations, some lower-ridership segments were retained, most often as mixed traffic operations.

Median vs. Curb Lanes

Median busways have exclusive rights-of-way and provide the highest level of BRT accommodation. They are recommended where the peak hour forecast ridership is very high. For example, the *Transit Capacity and Quality of Service Manual* sets consideration of a median busway at 2,400 people in the peak hour in the peak direction, however some jurisdictions have set that threshold between 1,500-1,700 pphpd for policy reasons. This is a reasonable approach for Montgomery County to consider as well, for the same reasons outlined in Dedicated Lanes above, and this Plan uses a threshold of 1,600 pphpd to determine where median busways are desirable.

Higher bus ridership forecasts make a median busway more desirable since it provides the highest level of service for riders, even though it requires a wider right-of-way and makes left-turns for general traffic more difficult. A supporting street grid however, makes accommodating a median busway easier by giving options for parallel routes and turning movements, e.g. the White Flint Sector Plan area.

Illustration 4 Proposed White Flint Street Grid



The existing and proposed street grid in White Flint provides alternative routes to MD 355. Proposed redevelopment will add mixed-uses, open spaces, and travel options.

Future area master plan updates, particularly in station areas, should consider ways to enhance the street grid at critical locations. More detailed planning will be required during implementation to determine location-specific solutions to the traffic challenges posed by a median busway.

Corridors with lower forecast BRT ridership but with high combined BRT and local bus ridership are better suited to curb lane operations. Dedicated curb lanes may be shared with express and limited-stop bus services, as well as other bus services, to provide faster, more dependable bus service for all transit patrons in the corridor. Dedicated curb lanes may also be the best interim treatment where a median

busway is desired but where obtaining sufficient right-of-way is not possible in the near term without excessively adverse impacts.

Dedicated curb lanes would be open to use by emergency vehicles and would likely be open to use by right-turning vehicles and by on-road bicyclists who do not otherwise have dedicated space in the roadway.

The treatments recommended in this Plan are intended to determine the rights-of-way necessary to facilitate the development of a network of dedicated transit lanes. This Plan recognizes however, that the final decision on treatment in each transit corridor must be made at the time of implementation when a transit service plan is in place and:

- the benefits of accommodating BRT and/or other bus services in the dedicated lanes can be quantified
- the traffic impacts of implementing curb lanes vs. a median busway can be more closely studied
- the impacts on adjacent properties can be determined.

This Plan is intended to provide flexibility for the implementing agency to make the choice of a curb or median busway as the best way to achieve dedicated lanes.

Lane Repurposing

After determining whether dedicated median or curb lanes are warranted on a corridor, the next step is to determine how to achieve them: whether to repurpose existing travel lanes, use the median where it's wide enough to accommodate the desired treatment, or identify additional right-of-way.

An important goal of this Plan is to increase person-throughput, the number of people that can be accommodated within our often constrained public rights-of-way. Lane-repurposing—designating an existing travel lane for bus use only—provides the most efficient use of available transportation facilities. In addition to Central Business District areas where constructing additional lanes is most often not practical, lane repurposing is recommended where the number of forecast transit riders exceeds the general purpose lane capacity and/or where general traffic demand would not exceed capacity.

In many segments of the proposed BRT corridors, the 2040 forecast bus ridership surpasses, and in some cases far surpasses, the person-throughput of a single general purpose traffic lane. Implementing necessary and more efficient transit facilities should reflect the priority given to transit in the General Plan (see Guiding Principles, page 22).

Where bus rapid transit would move people most efficiently in a corridor, the dedicated space needed to accommodate transit should be provided; the remaining lanes would continue to be available for general traffic. The recommended bus lanes would provide a greater level of person-throughput, potentially at a higher average level of service for all users of the road.

Where lane repurposing is recommended, a thorough traffic analysis should be performed as part of facility planning to identify what transportation improvements could be implemented to mitigate the impacts of lane repurposing, ensuring that the overall operation of the transportation network will operate acceptably. This analysis should not be confined to the specific transit corridor only, but should

also consider what changes are needed, if any, in the surrounding area to ensure an acceptable operation for traffic that would be diverted from the corridor being studied.

Because of heavy traffic demands, future congestion may still be unacceptably high in the remaining lanes. The desirability of providing additional general traffic lanes should then be considered along with the impacts associated with constructing the additional pavement. Should additional travel lanes be needed, an Amendment to this Plan or to the appropriate Area master plan should be pursued.

The desire to reduce congestion by providing more roadway capacity must be weighed against the benefits of increasing transit ridership. However, the transportation modeling performed for this Plan forecasts an overall improvement in traffic speeds with the introduction of BRT over the no-build condition. More detailed planning will be required during implementation to determine location-specific impacts on traffic in areas where lane-repurposing is recommended.

In addition to the person-throughput measure of whether a bus lane or a general traffic lane can move the most people, lane-repurposing should also be considered where it would result in the greatest improvement in level-of-service for all users of the roadway. Where the forecast BRT ridership on a congested roadway is greater than the capacity of a general traffic lane, the lane-repurposing test is met. But while the general traffic lanes may experience the same poor level of service, the bus lane carries a greater number of people in fewer vehicles with a far higher level of service, significantly increasing the average level of service for all users of the roadway.

This Plan recommends that the facility planning process for individual transit corridor projects should consider improvements in the weighted average level of service for all users of the roadway when evaluating the costs and benefits of constructing additional pavement to achieve the recommended transit facilities.

Recommended Corridors and Treatments

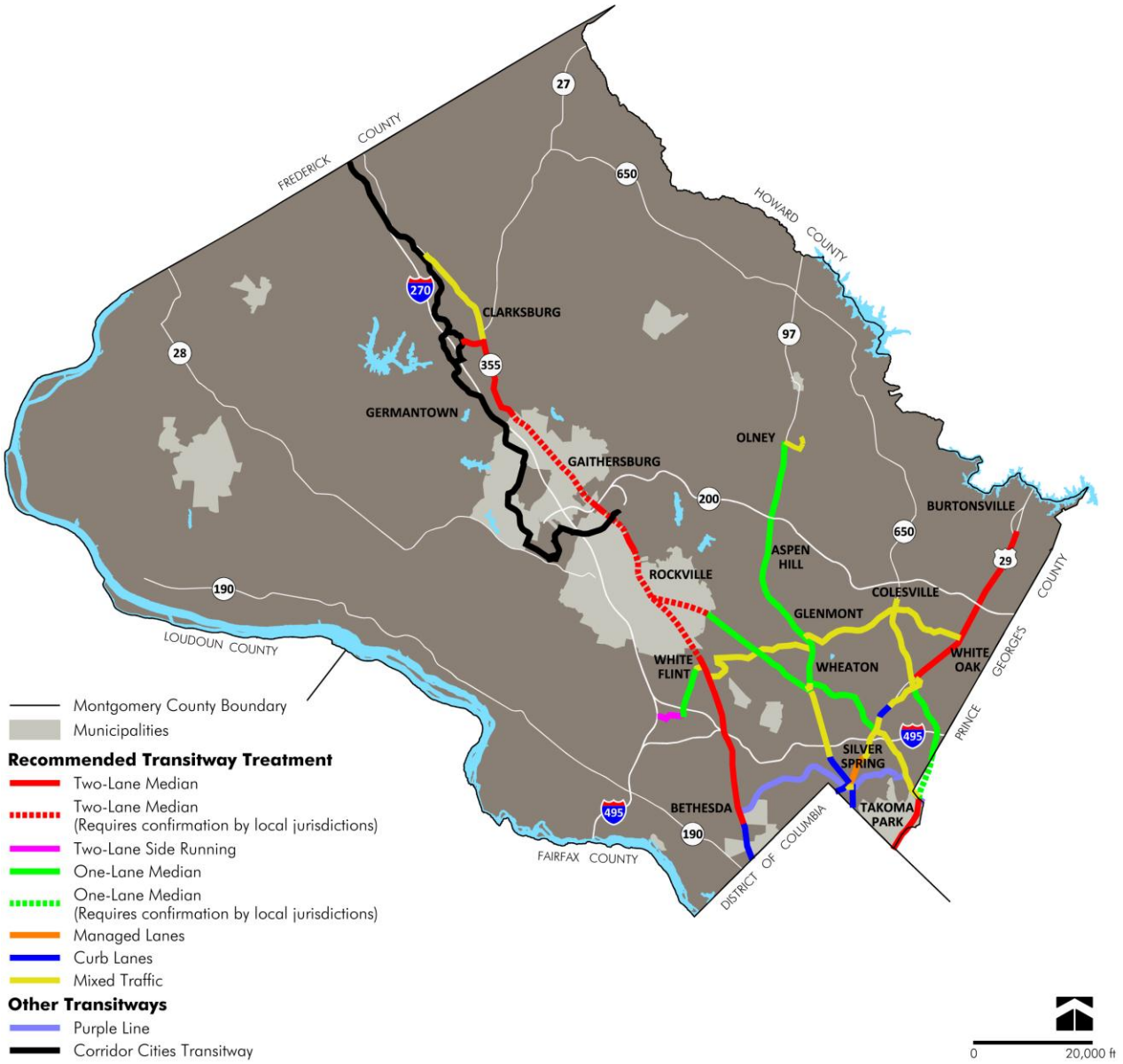
This Plan makes recommendations for a network of 81 miles of transit corridors and includes treatments warranted by current zoning and related 2040 forecast bus ridership that can be accomplished without major impacts on existing development, such as requiring the removal of buildings, slope impacts within ten feet of buildings, or eliminating off-street parking for residential properties.

Appendix A identifies greater corridor treatments that may be warranted if pursued in conjunction with potential land use changes in future area master or sector plan updates. These treatments require additional study to confirm the recommended treatment and right-of-way in these master and sector plan updates. The potential impacts of these greater corridor treatments can be determined in detail as part of an area master plan.

Recommendations within Prince George's County and the Cities of Rockville and Gaithersburg are offered as policy guidance for future area master or sector plan updates in these jurisdictions, which must pursue their own master plan processes to determine the ultimate recommended rights-of-way and number of travel lanes.

Future area master or sector plan updates should consider the relationship of building locations and heights to the ultimate roadway width to ensure a transit-oriented development pattern that promotes pedestrian safety. The concurrent creation of urban design guidelines should be considered for all recommended transit corridors with greater than six lanes to establish minimum building heights and build-to requirements.

Map 2 Recommended Transit Corridor Network
(includes right-of-way and lane changes to be made as part of this Functional Plan)



(Typical sections of transit corridor treatments on a six-lane roadway are shown in Illustrations 3 through 8.)

Illustration 5 Recommended Corridor Segment Treatment: Two-Lane Median Busway
One lane dedicated to BRT service on either side of the roadway median, with a two-foot-wide striped buffer separating the bus lanes from general traffic

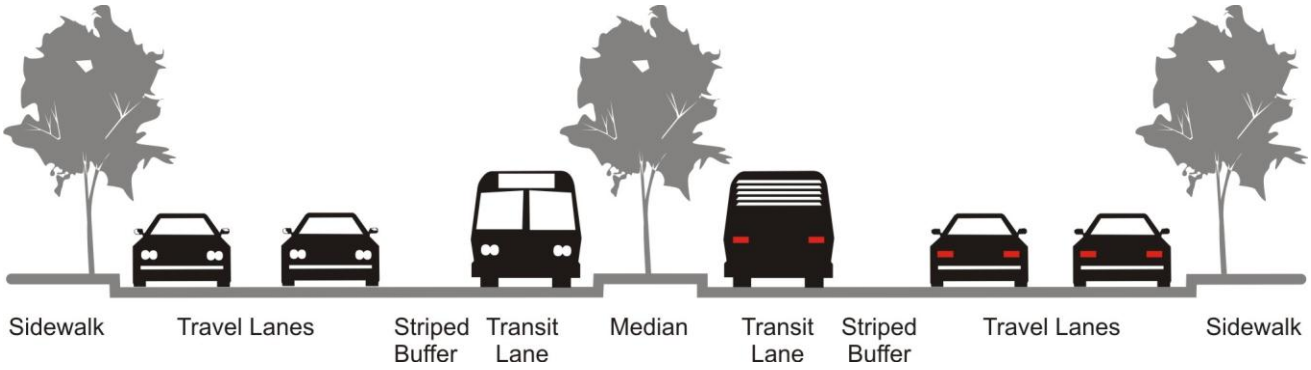


Illustration 6 Recommended Corridor Segment Treatment: Two-Lane Side Busway
A two-lane busway to serve BRT on one side of the roadway, with a landscaped buffer and sidewalk separating the bus lanes from general traffic

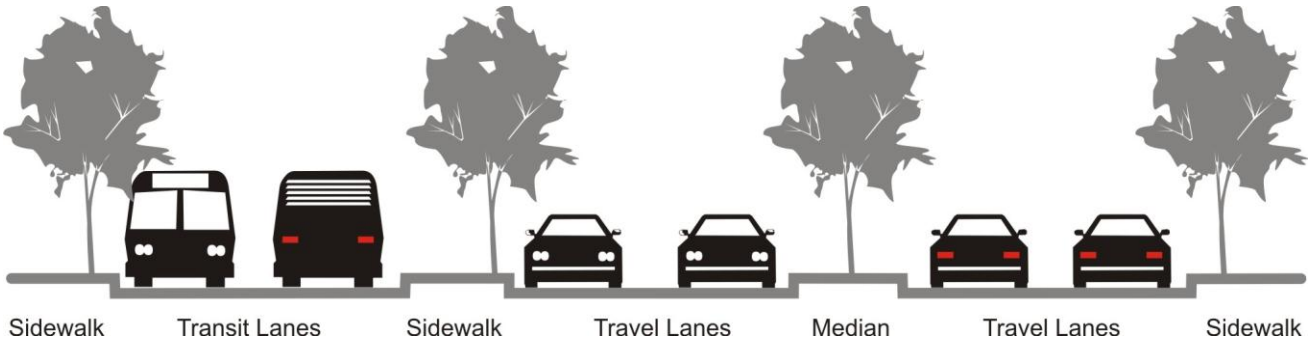


Illustration 7 Recommended Corridor Segment Treatment: One-Lane Median Busway
One lane dedicated to BRT service in the center of the roadway separated from general traffic by a median on either side. This lane would in most cases accommodate BRT service in one direction only, but could accommodate bi-directional BRT service if provided with adequate passing lanes

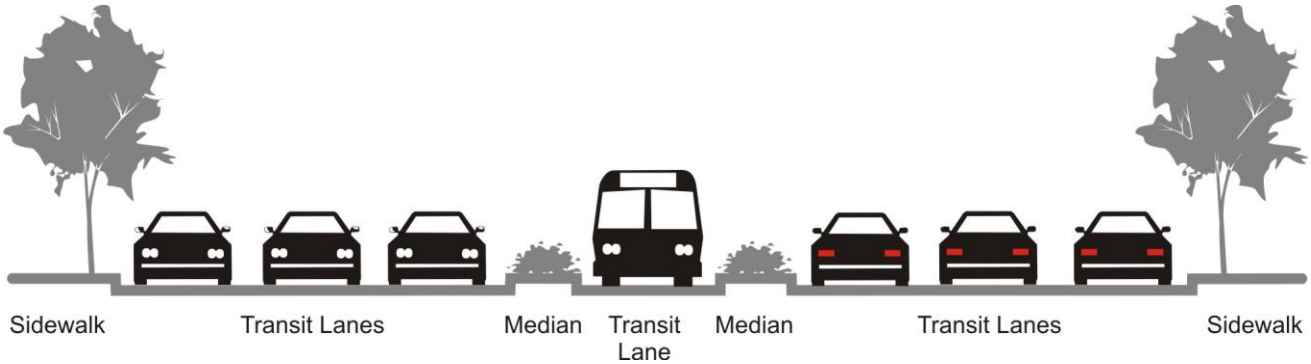


Illustration 8 Recommended Corridor Segment Treatment: Managed Lanes
One lane dedicated to BRT service during peak hours in the peak direction of travel only on roads that have a reversible-lane operation

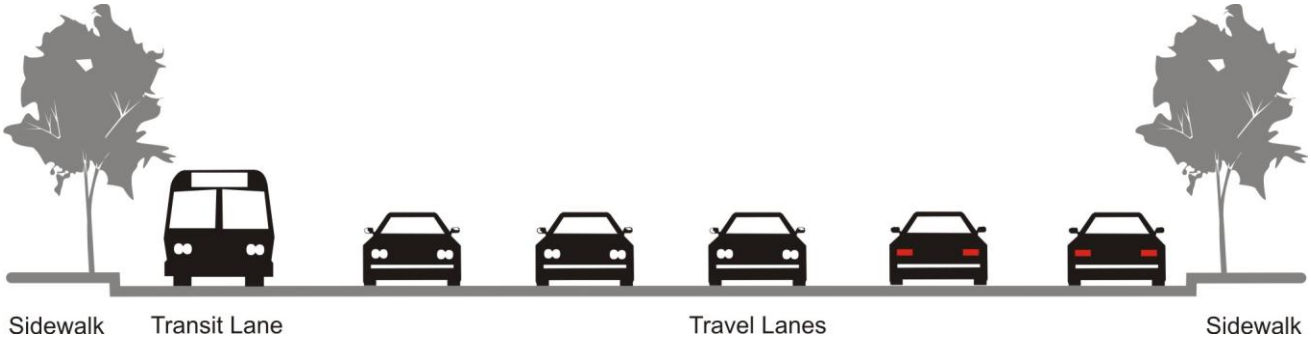


Illustration 9 Recommended Corridor Segment Treatment: Curb Lanes
Outside lanes adjacent to the curb (nearest the sidewalk) dedicated to BRT service, either during peak hours or all day

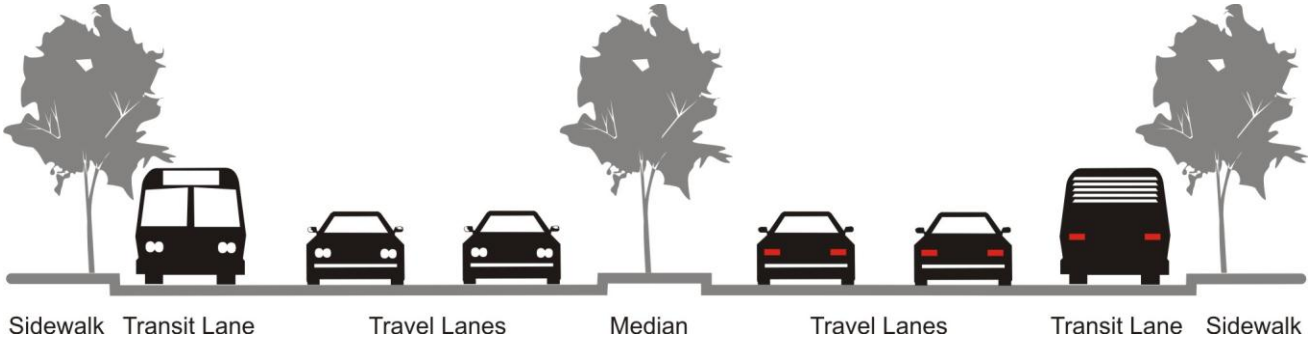
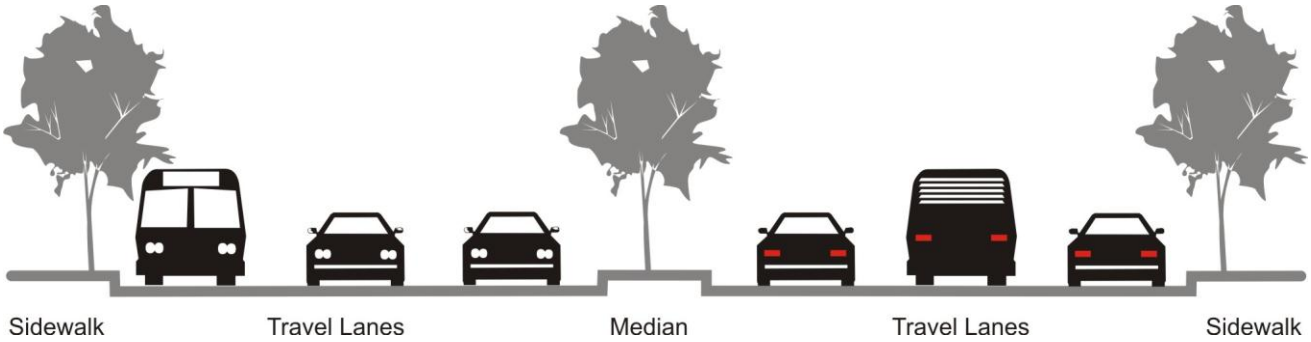


Illustration 10 Recommended Corridor Segment Treatment: Mixed Traffic
No dedicated space provided for BRT service. Buses would typically operate as they do now but some additional accommodation at intersection could be provided, such as queue jumpers (short passing lanes) and/or traffic-signal priority



Recommended Corridors

This Plan recommends the following ten corridors:
Corridor 1: Georgia Avenue North
Corridor 2: Georgia Avenue South
Corridor 3: MD 355 North
Corridor 4: MD 355 South
Corridor 5: New Hampshire Avenue
Corridor 6: North Bethesda Transitway
Corridor 7: Randolph Road
Corridor 8: University Boulevard
Corridor 9: US 29
Corridor 10: Veirs Mill Road

The recommendations for each corridor include:

- dedicating public rights-of-way for several transit corridors
- specific treatments for each corridor segment
- changes in the number of master planned travel lanes
- intersections at which transit stations should be located.

Stations are identified by the station type and right-of-way, but the specific location of the station and associated right-of-way should be determined during facility planning. The number of stations may also be increased or decreased during facility planning.

Recommended rights-of-way should be considered minimum rights-of-way and additional right-of-way will also be required at some intersections to accommodate turn lanes. The typical rights-of-way associated with stations and turn lanes at intersections are shown in Online Appendix 11.

Within jurisdictions that have independent planning authority, the widths of public rights-of-way, number of travel lanes, transit corridor treatments, and the number of transit stations and their locations should be included in the appropriate local master plan, in consultation with the appropriate Executive agencies.

This Plan is anticipated to be reviewed by the County Council at the same time as the White Oak Science Gateway Master Plan (WOSG). Land use decisions made as part of the approval of WOSG may require an upgrade in treatment on portions of the following corridors: US29, New Hampshire Avenue, and Randolph Road, including an extension of the last along Cherry Hill Road. Any upgrades or extensions should be reflected in the final approved Functional Plan.

Plan Appendix C contains a summary of the changes in recommended rights-of-way and number of travel lanes from the current master plan, as well as the forecast ridership for each recommended corridor.

Plan Appendix E shows the relationship of the recommended transit corridor network to 2040 forecast jobs and housing.

Corridor 1: Georgia Avenue North

Georgia Avenue North is a commuter corridor, with most traffic flowing southbound in the morning and northbound in the evening. The corridor has several activity nodes, notably the commercial centers at Wheaton and Glenmont, and their respective Metrorail stations. Aspen Hill and Olney are at the northern end, with residential uses in between.

The corridor includes the Georgia Avenue Busway, a long-planned transitway in the wide median between Glenmont and Olney recommended in the 1997 *Glenmont Sector Plan*, 1994 *Aspen Hill Master Plan*, and 2005 *Olney Master Plan*.

Since congestion tends to occur in the peak direction of traffic, a single dedicated transit lane is sufficient for achieving a travel speed consistent with commuter BRT service.

Corridor treatment recommendations, from north to south:

- Along Prince Phillip Drive from the planned Olney Transit Center to Olney-Sandy Spring Road, a mixed traffic transitway.
- Along Olney-Sandy Spring Road from Prince Phillip Drive to Georgia Avenue, a mixed traffic transitway.
- Along Georgia Avenue from Olney-Sandy Spring Road in Olney to Reedie Road in Wheaton, a reversible one-lane median transitway.
- Along Reedie Road from Georgia Ave to Veirs Mill Road, a mixed traffic transitway.

This Plan also recommends implementing a cycle track in the median to achieve a bicycle facility that avoids the driveway interruptions of the more typical location at the side of the roadway and permit cyclists to travel safely at a higher speed. The higher quality of such a path negates the need for on-road bike lanes. The cycle track will end at Glenallan Avenue where users can transfer to the Glenmont Metro Station or the Glenmont Greenway.

Station Locations

Montgomery General Hospital
MD 108 and MD 97
MD 97 and Hines Road
ICC park-and-ride
MD 97 and Norbeck Road park-and-ride
MD 97 and Bel Pre Road
MD 97 and Rossmoor Boulevard
MD 97 and MD 185
MD 97 and Hewitt Avenue
Glenmont Metro Station
MD 97 and Randolph Road
MD 97 and Arcola Avenue
Wheaton Metro Station

Map 3 Georgia Avenue North Corridor

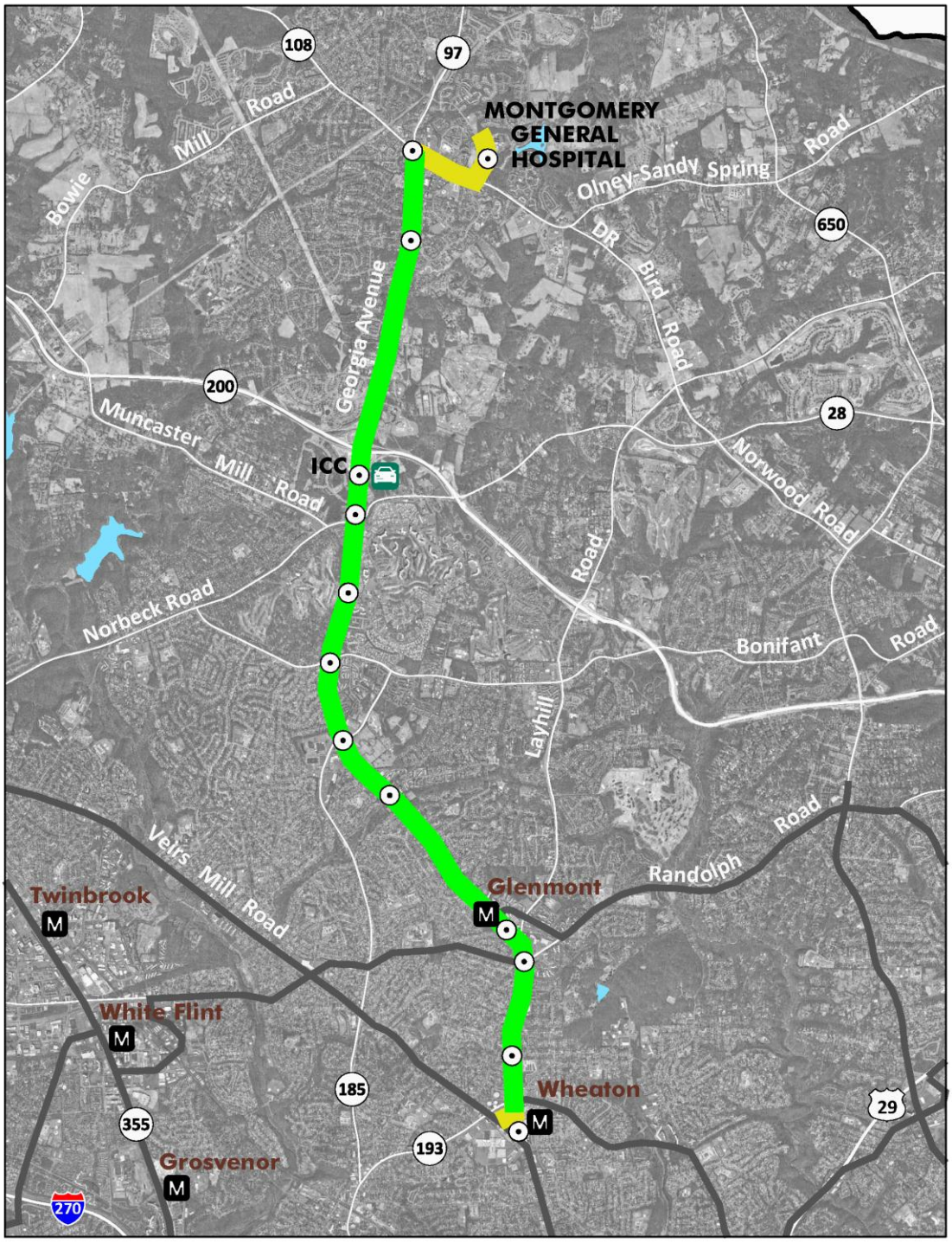


Table 3 Corridor Recommendations, Georgia Avenue North

Road	from	to	Treatment	R.O.W.	Lanes
Prince Phillip Dr	Brooke Farm Dr	MD 108	Mixed Traffic	80	4
Olney Sandy Spring Rd	Prince Phillip Dr	Georgia Ave		150	4
Georgia Avenue	MD 108	Spartan Rd	Reversible One-Lane Median	121	4 + 1 bus
Georgia Avenue	Spartan Rd	Old Baltimore Rd		150	4 + 1 bus
Georgia Avenue	Old Baltimore Rd	Emory Ln		150	4 + 1 bus
Georgia Avenue	Emory Ln	MD 28		150	6 + 1 bus
Georgia Avenue	MD 28	Matthew Henson State Park		150	6 + 1 bus
Georgia Avenue	Matthew Henson State Park	Weller Rd		130	6 + 1 bus
Georgia Avenue	Weller Rd	Denley Rd		135	6 + 1 bus
Georgia Avenue	Denley Rd	Layhill Rd		145	6 + 1 bus
Georgia Avenue	Layhill Rd	500 ft south of Randolph Rd		170	6 + 1 bus
Georgia Avenue	500 ft south of Randolph Rd	Mason St		124	6 + 1 bus
Georgia Avenue	Mason St	400 ft north of Blueridge Ave		120	6 + 1 bus
Georgia Avenue	400 ft north of Blueridge Ave	Reedie Rd		129	6 + 1 bus
Reedie Road	Georgia Ave	Veirs Mill Rd	Mixed Traffic	70	2

Table 4 Corridor Recommendations, Georgia Avenue North Cycle Track

Route Number	Name	Type	Limits
CT-2	Georgia Ave	Cycle Track	Queen Mary Dr to Glenallen Ave

Corridor 2: Georgia Avenue South

Like the segment to the north, the Georgia Avenue South is a commuter corridor, with most traffic (and congestion) flowing southbound in the morning and northbound in the evening. The corridor has several activity nodes, notably the Wheaton and Silver Spring CBDs with their respective Metrorail stations, the Forest Glen Metrorail station, and the Montgomery Hills commercial center, with residential uses in between.

Corridor treatment recommendations, from north to south:

- Along Georgia Avenue from Veirs Mill Road to 16th Street, a mixed traffic transitway.
- Along Georgia Avenue from 16th Street to Colesville Road, dedicated curb lanes.
- Along Wayne Avenue from Georgia Avenue to Colesville Road, a mixed traffic transitway.
- Along Georgia Avenue from Wayne Avenue to the DC line, a two-lane median transitway. This transitway could accommodate BRT and/or an extension of the DC streetcar line planned for Georgia Avenue.

Station Locations

Wheaton Metro Station
MD 97 and Dexter Avenue
Forest Glen Metro Station
MD 97 and Seminary Road
MD 97 and Cameron Street
Silver Spring Transit Center
MD 97 and East West Highway
MD 97 and Eastern Avenue/Burlington Avenue/Montgomery College – Silver Spring/Takoma Park Campus

Map 4 Georgia Avenue South Corridor

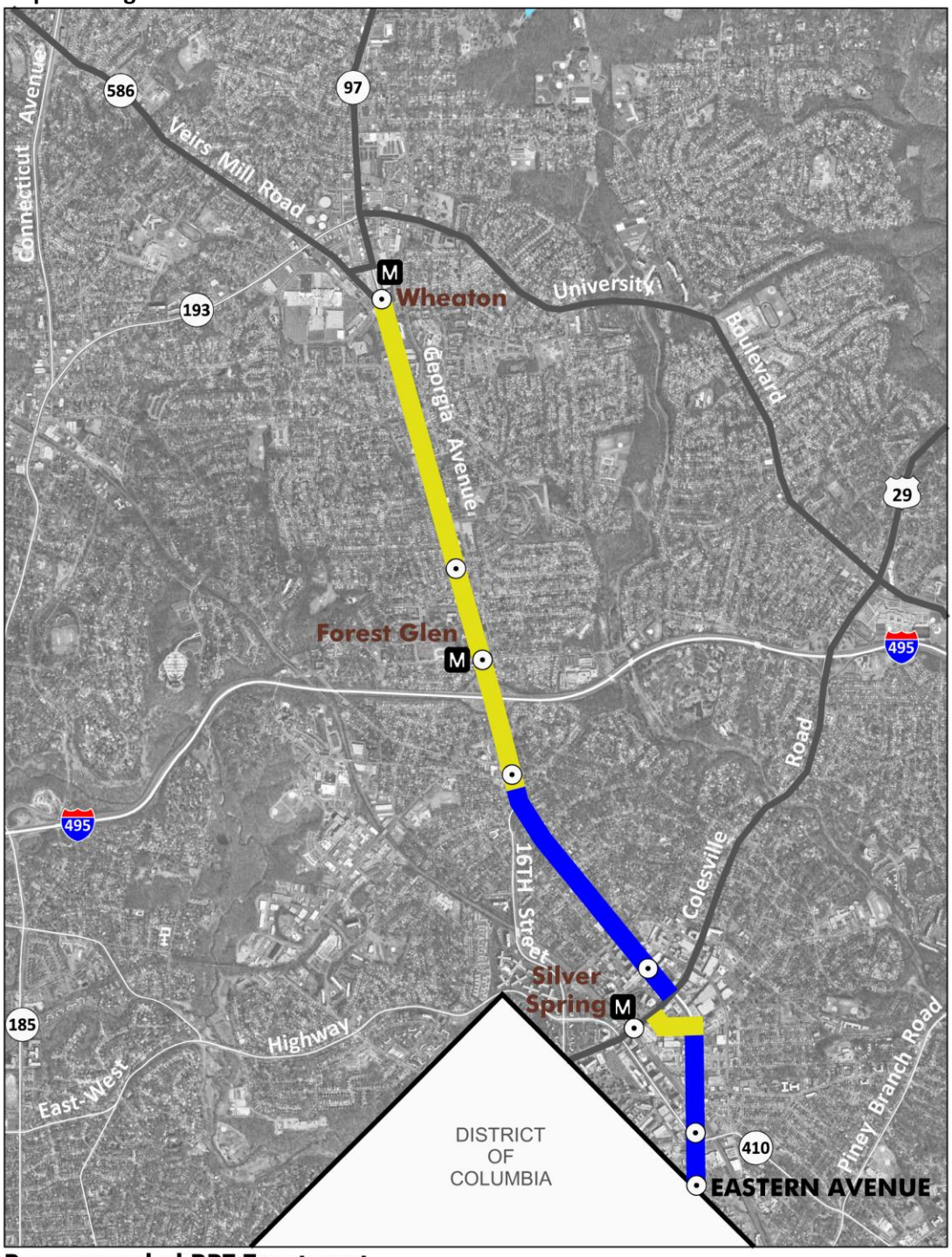


Table 5 Corridor Recommendations, Georgia Avenue South

Road	from	to	Treatment	R.O.W.	Lanes
Georgia Avenue	Veirs Mill Rd	Dennis Ave	Mixed Traffic	120	6
Georgia Avenue	Dennis Ave	I-495		110	6
Georgia Avenue	I-495	Flora Ln		120	6
Georgia Avenue	Flora Ln	16th St		120	7
Georgia Avenue	16th St	Spring St	Curb Lanes	122	4 + 2 bus
Georgia Avenue	Spring St	Colesville Rd		126	4 + 2 bus
Wayne Avenue	Colesville Rd	Georgia Ave	Mixed Traffic	120	4
Georgia Avenue	Wayne Ave	Blair Mill Rd	Curb Lanes	125-140	4 + 2 bus
Georgia Avenue	Blair Mill Rd	DC Line		125	4 + 2 bus

Corridor 3: MD 355 North

MD 355 North is an activity center corridor planned for a high level of development that will support all-day travel throughout the corridor. The corridor has several major existing and planned activity nodes, including Rockville and Gaithersburg. It is also characterized by heavy congestion and high transit ridership potential.

Corridor treatment recommendations, from north to south:

- Along MD355 from Redgrave Place to Shakespeare Boulevard, a mixed traffic transitway is recommended.

A two-way median transitway is recommended:

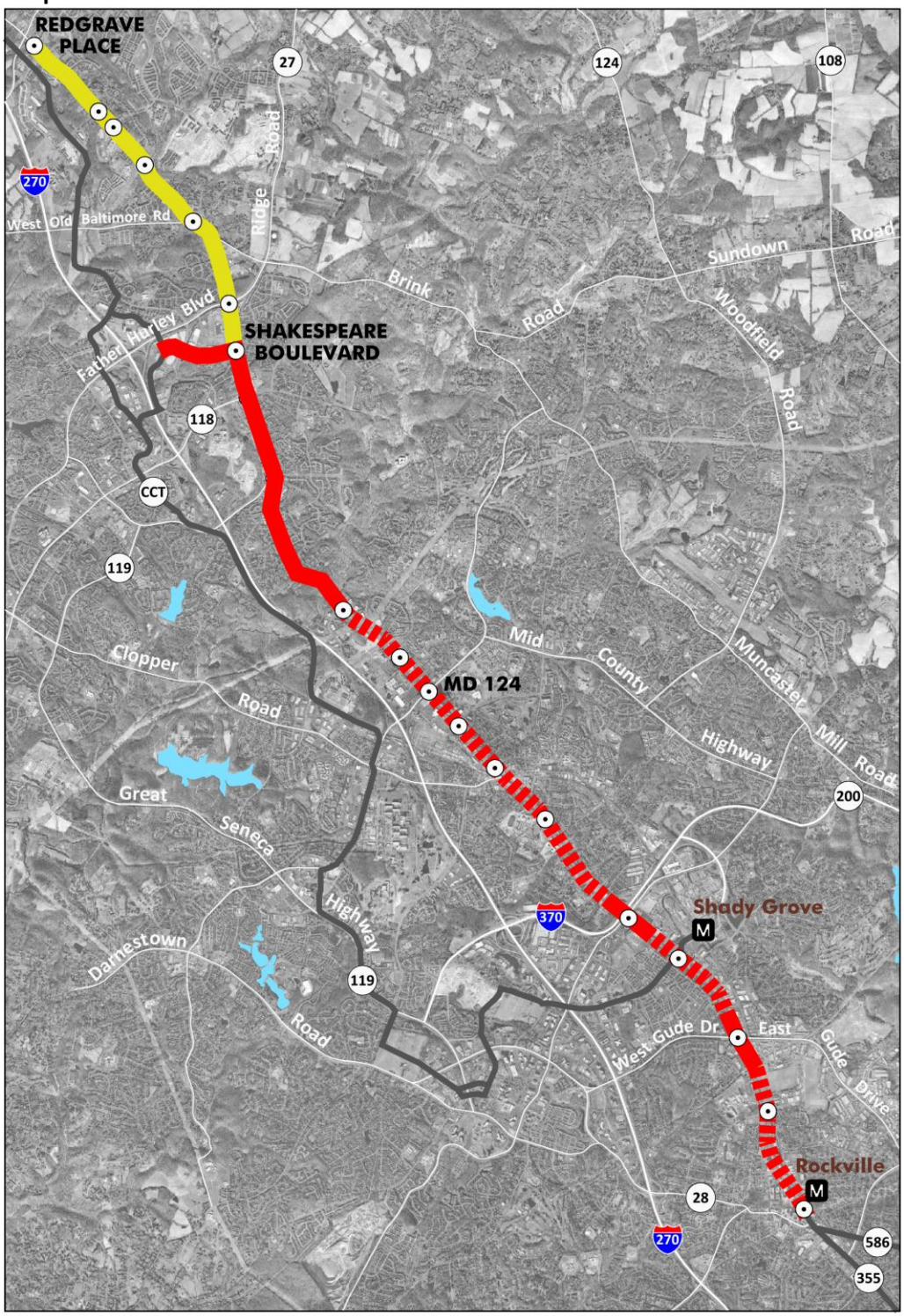
- Along Seneca Meadows Parkway from the Corridor Cities Transitway to Observation Drive.
- Along Shakespeare Boulevard from Observation Drive to MD 355.
- Along MD 355 from Shakespeare Boulevard to Rockville Metro station.

Station Locations

MD355 and Redgrave Place
MD355 and Shawnee Lane
MD355 and Foreman Boulevard
MD355 and Little Seneca Parkway
MD355 and West Old Baltimore Road
MD355 and Ridge Road
MD 355 and Shakespeare Boulevard
MD 355 and MD 118
MD 355 and Middlebrook Road/Montgomery College – Germantown Campus
MD 355 and Professional Drive
MD355 and Watkins Mill Road
MD 355 and MD 124
MD 355 and Odendhal Avenue
MD 355 and Brookes Avenue
MD 355 and Education Boulevard
MD 355 and Shady Grove Road
MD 355 and King Farm Boulevard
MD 355 and Gude Drive
MD 355 and Mannakee Street/Montgomery College – Rockville Campus
Rockville Metro Station

Note that stations within the Cities of Gaithersburg and Rockville must be confirmed in their respective master plans.

Map 5 MD 355 North Corridor



Recommended BRT Treatment

- Two-Lane Median
- Two-Lane Median (Requires confirmation by Cities of Gaithersburg and Rockville)
- Mixed Traffic
- Other BRT Corridors
- BRT Station
- Metro Station

0 5000 ft

Table 6 Corridor Recommendations, MD 355 North

Road	from	to	Treatment	R.O.W.	Lanes
MD355	Redgrave Place	Little Seneca Creek	Mixed Traffic	4	120
MD355	Little Seneca Creek	Shakespeare Blvd		6	250
Seneca Meadows Pkwy	Corridor Cities Transitway	Observation Dr	Two-Lane Median	130	4 + 2 bus
Shakespeare Blvd	Observation Dr	MD 355		123	4 + 2 bus
MD 355	Shakespeare Blvd	Game Preserve Rd		250	4 + 2 bus
MD 355	Game Preserve Rd	Just south of O'Neil Dr	Two-Lane Median *		
MD 355	just south of O'Neil Dr	1,250 ft south of Shady Grove Rd	Two-Lane Median	150	4 + 2 bus
MD 355	1,250 ft south of Shady Grove Rd	Ridgemont Ave	Two-Lane Median *		
MD 355	Ridgemont Ave	Indianola Rd	Two-Lane Median	123	4 + 2 bus
MD 355	Indianola Rd	1,000 ft south of Indianola Rd	Two-Lane Median *		
MD 355	1,000 ft south of Indianola Rd	270 ft north of N. Campus Dr	Two-Lane Median	150	4 + 2 bus
MD 355	270 ft north of N. Campus Dr	Church St	Two-Lane Median *		

* 2040 forecast ridership for the segments of MD355 within the Cities of Rockville and Gaithersburg warrants a two-lane median busway, however this Functional Plan cannot make changes or require dedication within those jurisdictions. The median busway recommendation can only become effective upon master plan changes made by those jurisdictions that would include recommendations on the right-of-way and the number of travel lanes.

Corridor 4: MD 355 South

MD 355 South is an activity center corridor planned for a high level of development that will support all-day travel throughout the corridor. It is characterized by shorter trips representing a wide variety of travel purposes (shopping and recreation, in addition to commuting). The corridor has several planned or existing activity nodes, including Rockville, Twinbrook, White Flint, NIH/WRNMMC, Bethesda CBD, and Friendship Heights CBD. It is also characterized by very heavy congestion and high transit ridership potential.

Corridor treatment recommendations, from north to south:

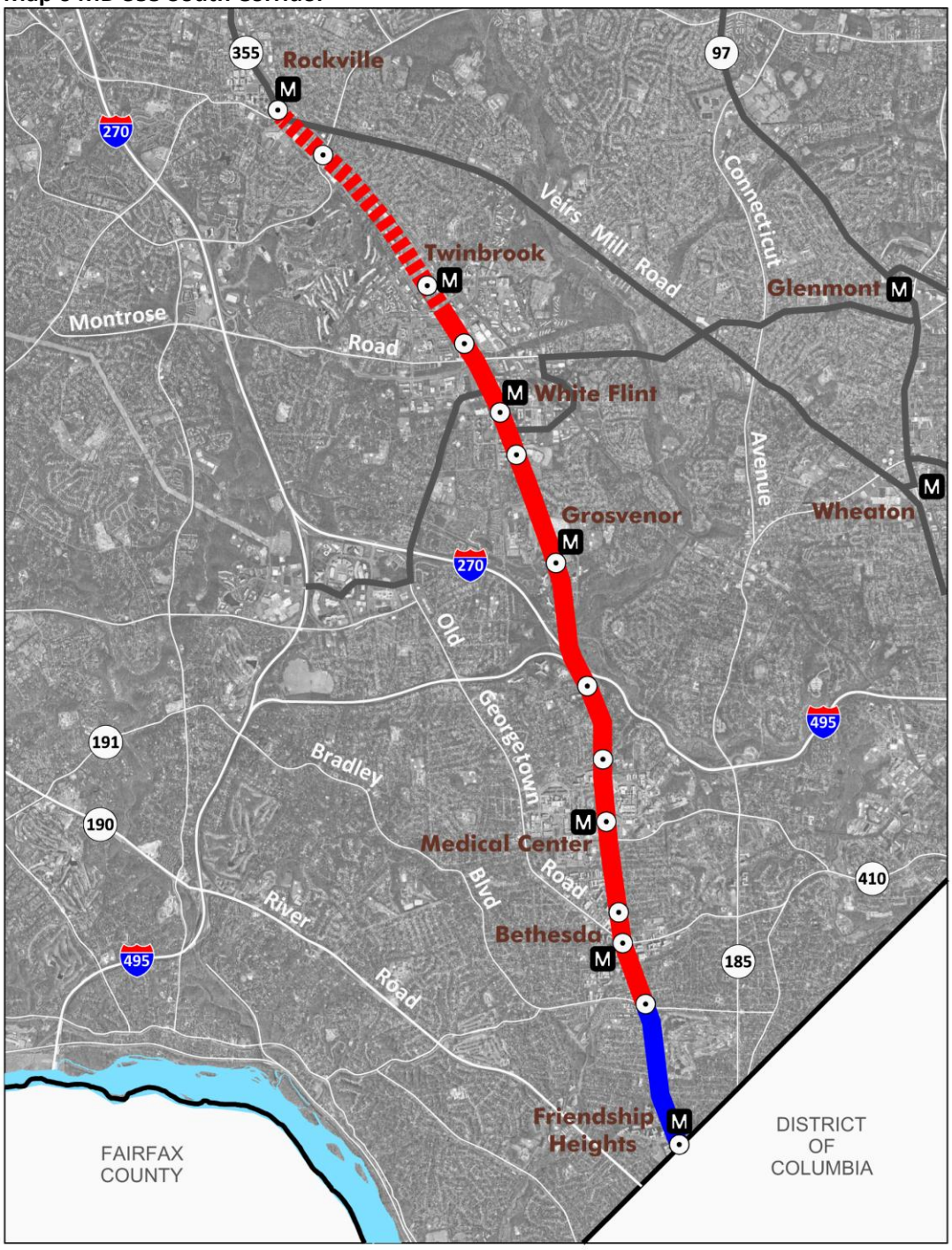
- From Rockville Metro station to Bradley Boulevard, a two-way median transitway.
- From Bradley Boulevard to Western Avenue, a curb lane transitway.

Station Locations

Rockville Metro Station
MD 355 and Edmonston Drive
MD 355 and Halpine Road
MD 355 and Hubbard Drive
White Flint Metro Station
MD 355 and Security Lane
Grosvenor Metro Station
MD 355 and Pooks Hill Road
MD 355 and Cedar Lane
Medical Center Metro Station
MD 355 and Cordell Avenue
Bethesda Metro Station
Bradley Boulevard and MD 355
Friendship Heights Metro

Stations within the City of Rockville must be confirmed in the City's master plan.

Map 6 MD 355 South Corridor



Recommended BRT Treatment

- County Line
- Two-Lane Median
- Two-Lane Median (Requires confirmation by City of Rockville)
- Curb Lanes
- Other BRT Corridors
- BRT Station
- Metro Station

0 5000 ft

Table 7 Corridor Recommendations, MD 355 South

Road	from	to	Treatment	R.O.W.	Lanes
MD 355	Church Street	Halpine Rd	Two-Lane Median *		
MD 355	Halpine Rd	250 ft south of Twinbrook Pkwy			
MD 355	250 ft south of Twinbrook Pkwy	200 ft south of Hoya St	Two-Lane Median	150 (162)**	6 + 2 bus
MD 355	200 ft south of Hoya St	Edson Ln		150 (162)**	6 + 2 bus
MD 355	Edson Ln	Hillery Wy		150 (162)**	6 + 2 bus
MD 355	Hillery Wy	Grosvenor Ln		150	6 + 2 bus
MD 355	Grosvenor Ln	I-495		200	6 + 2 bus
MD 355	I-495	Cedar Ln		120	4 + 2 bus
MD 355	Cedar Ln	Woodmont Ave		123	4 + 2 bus
MD 355	Woodmont Avenue	Chestnut St		120	4 + 2 bus
MD 355	Chestnut Street	Bradley Blvd		122	4 + 2 bus
MD 355	Bradley Blvd	Nottingham Dr	Curb Lanes	122	4 + 2 bus
MD 355	Nottingham Dr	Oliver St		120	4 + 2 bus
MD 355	Oliver St	Western Ave		122	4 + 2 bus

* 2040 forecast ridership for the segments of MD355 within the City of Rockville warrant a two-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The median busway recommendation can only become effective upon adoption of the current draft Rockville's Pike Plan or a subsequent City master plan update that would include recommendations on the right-of-way and the number of travel lanes.
** The Rockville Pike 150-foot right-of-way can be expanded to 162 feet (additional space to be obtained through reservation).

Corridor 5: New Hampshire Avenue

New Hampshire Avenue is a commuter corridor, with most traffic flowing southbound in the morning and northbound in the evening. Activity centers are located at Takoma / Langley Crossroads and the emerging mixed-use center at White Oak. The City of Takoma Park has been advancing a concept plan adopted locally in 2008 to convert New Hampshire Avenue, from University Boulevard to Eastern Avenue, into a more pedestrian-friendly, multi-way boulevard that accommodates multiple modes of transportation, while serving as a destination.

Corridor treatment recommendations, from north to south:

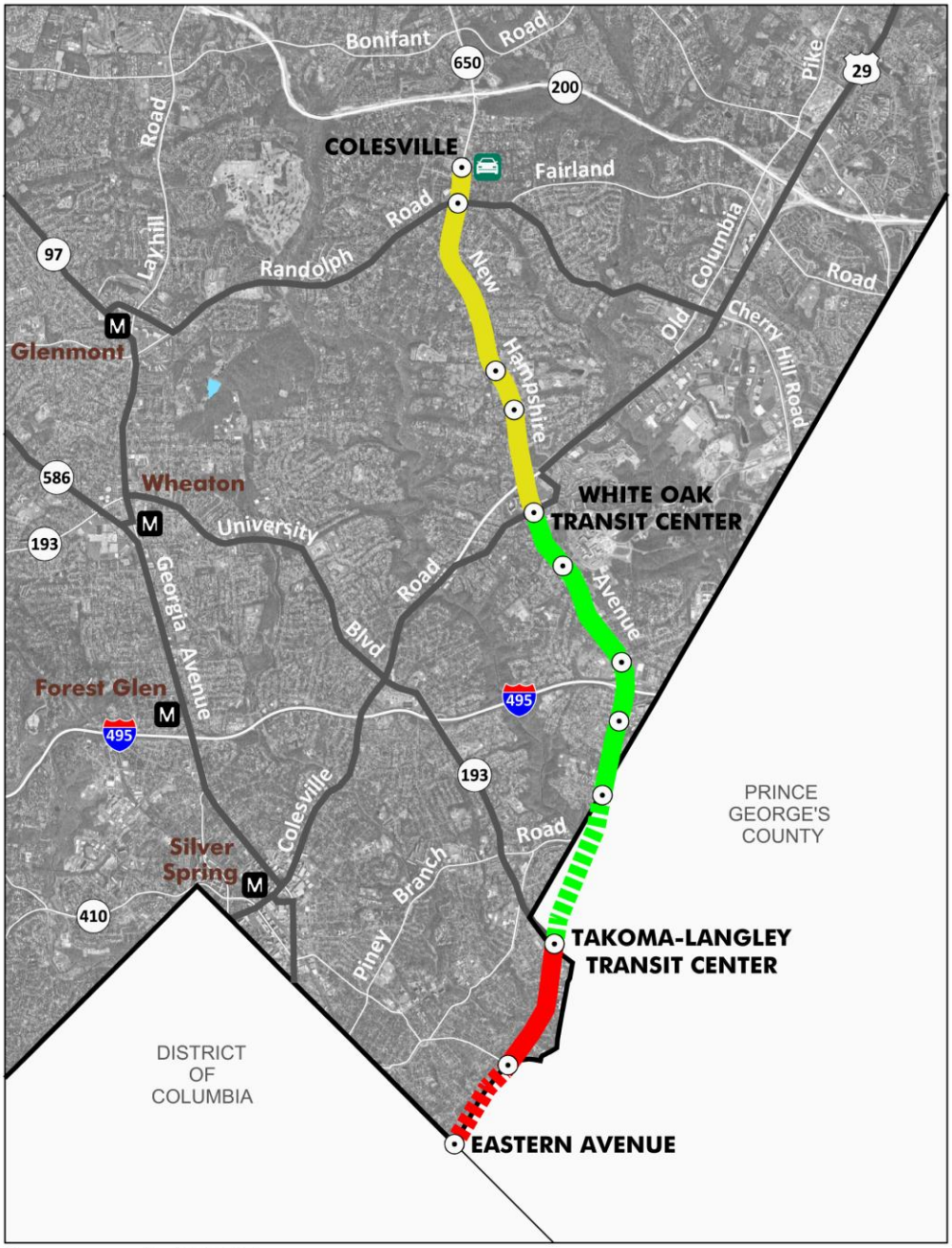
- From Colesville park-and-ride to Lockwood Drive, a mixed traffic transitway.
- From Lockwood Drive to University Boulevard, a reversible one-lane median transitway.
- From University Boulevard to the District line, a two-lane median transitway. During facility planning, however, curb lanes or mixed traffic treatments should be considered from Sligo Creek Parkway to the District line, as outlined in the City of Takoma Park's *New Hampshire Avenue Corridor Concept Plan*.

Station Locations

Colesville park-and-ride
MD 650 and Randolph Road
MD 650 and Valleybrook Drive
MD 650 and Jackson Road
White Oak Transit Center
FDA White Oak Campus
MD 650 and Powder Mill Road
MD 650 and Oakview Drive
MD 650 and Northampton Drive
Takoma/Langley Park Transit Center
MD 650 and MD 410
MD 650 and Eastern Avenue

Stations within Prince George's County must be confirmed in that County's master plan.

Map 7 New Hampshire Avenue Corridor



Recommended BRT Treatment

- County Line
- Two-Lane Median
- Two-Lane Median (Requires confirmation by Prince George's County)
- One-Lane Median
- One-Lane Median (Requires confirmation by Prince George's County)
- Mixed Trafffic
- Other BRT Corridors
- BRT Station
- M Metro Station
- Park-and-Ride Station

0 5000 ft

Table 8 Corridor Recommendations, New Hampshire Avenue

Road	from	to	Treatment	R.O.W.	Lanes
New Hampshire Ave	Colesville park-and-ride	Lockwood Dr	Mixed Traffic	120	6
New Hampshire Ave	Lockwood Dr	Oaklawn Drive	Reversible One-Lane Median	130*	6 + 1 bus
New Hampshire Ave	Oaklawn Drive	Powder Mill Road		120-130*	6 + 1 bus
New Hampshire Ave	Powder Mill Road	I-495		130*	6 + 1 bus
New Hampshire Ave	I-495	Northampton Dr		150	6 + 1 bus
New Hampshire Ave	Northampton Dr	University Blvd	Reversible One-Lane Median **		
New Hampshire Ave	University Blvd	East West Highway	Two-Lane Median***	150	4 + 2 bus
New Hampshire Ave	East West Highway	D.C. Line	Two-Lane Median****	150 in MC	4 + 2 bus

* A bi-directional cycle track plus sidewalk should be considered on the east side in place of on-road bike lanes plus shared use path. In areas where severe right-of-way constraints exist however, consideration should be given to accommodating cyclists and pedestrians via a shared use path only.

**2040 forecast ridership for the segments of MD650 within Prince George's County warrant a one-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The median busway recommendation can only become effective upon adoption of a subsequent master plan update that would include recommendations on the right-of-way and the number of travel lanes.

*** The design of the typical section in this segment should be coordinated with the City of Takoma Park to ensure consistency with its New Hampshire Avenue Corridor Concept Plan to the extent possible.

**** The existing right-of-way for this segment is in Prince George's County, but the Takoma Park Master Plan's 150-foot right-of-way extends into Montgomery County. The lesser Prince George's County right-of-way would need to be revised in their Master Plan to implement the ultimate typical section, which should be coordinated with the City of Takoma Park to ensure consistency with its New Hampshire Avenue Corridor Concept Plan to the extent possible.

Corridor 6: North Bethesda Transitway

The North Bethesda Transitway was originally conceived as a spur from the Metrorail Red Line to the Rock Spring office park area and to Montgomery Mall in the 1992 North Bethesda/Garrett Park Master Plan. At its eastern end, the transitway terminates at the Grosvenor Metrorail station. At its western end, it terminates at a planned transit center at Montgomery Mall. Much of the right-of-way along Rock Spring Drive, Fernwood Road, and Tuckerman Lane is currently available through easements and dedications provided through the development review process.

The transfer point to the Red Line at the Grosvenor Metrorail station is in many ways similar to the Fort Totten Metrorail Station. It creates a major transfer at a rail station with relatively little land use and little opportunity for growth. Since the alignment of the transitway was originally identified, much has changed on the MD 355 corridor. White Flint has emerged as a major planned mixed use center, and to serve the travel demand emanating from this activity center and points to the north, the alignment of the North Bethesda Transitway should terminate at the White Flint Metrorail station instead of the Grosvenor Metrorail station.

Corridor treatment recommendations, from west to east:

- Along Old Georgetown Road between Rockville Pike and Executive Boulevard, a mixed traffic transitway.
- Along Old Georgetown Road between Executive Boulevard and Rock Spring Drive, a reversible one-lane median transitway.
- Along Rock Spring Drive, Fernwood Road, and Westlake Terrace, between Old Georgetown Road and I-270, a two-lane side running transitway.

While previous attempts at providing a transit service between the I-270 corridor and Tysons Corner were unsuccessful, a freeway-based BRT corridor now appears more feasible due to the changing land use in Tysons Corner and the opening of the High Occupancy Toll (HOT) lanes on I-495 in northern Virginia. The North Bethesda Transitway could become part of a significant transit link between Tysons Corner and White Flint. This link should be studied as part of any new HOV or HOT lane project on I-270 and I-495 in Maryland.

Station Locations

Montgomery Mall Transit Center
Rock Spring Drive and Fernwood Road
Rockledge Drive and Rock Spring Drive
Rock Spring Drive and MD 187
MD 187 and Tuckerman Lane
MD 187 and Edson Lane/Poindexter Lane
White Flint Metro Station

Map 8 North Bethesda Transitway

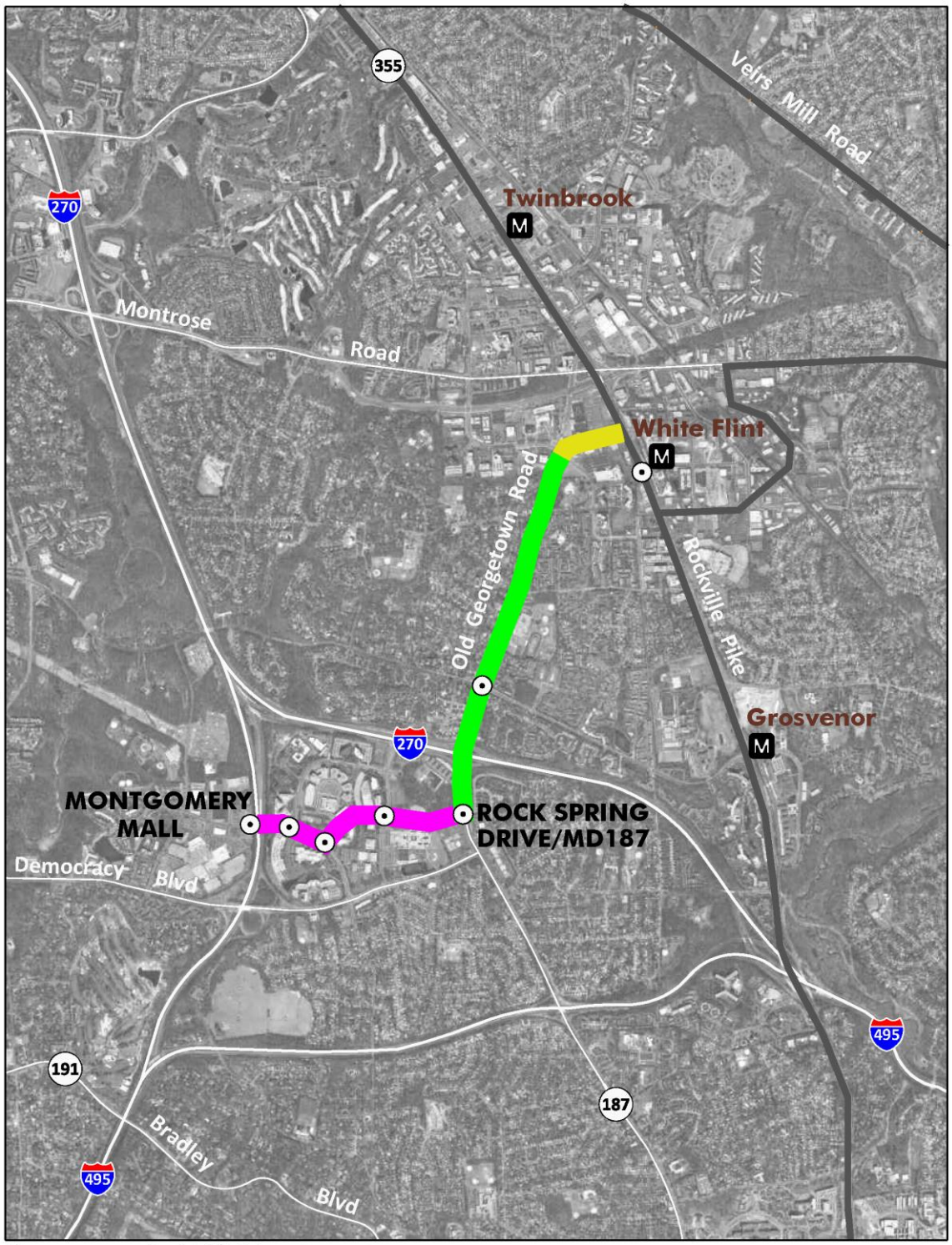


Table 9 Corridor Recommendations, North Bethesda Transitway

Road	from	to	Treatment	R.O.W.	Lanes
Old Georgetown Road	Rockville Pike	Executive Blvd	Mixed Traffic	120	4
Old Georgetown Road	Executive Blvd	Nicholson Ln	Reversible One-Lane Median	150	6 + 1 bus
Old Georgetown Road	Nicholson Ln	Tuckerman Ln		126	6 + 1 bus
Old Georgetown Road	Tuckerman Ln	I-270		130	6 + 1 bus
Old Georgetown Road	I-270	Rock Spring Dr		126	6 + 1 bus
Rock Spring Drive	Old Georgetown Rd	Fernwood Rd	Two-Lane Side-Running	80*	4 + 2 bus
Fernwood Road	Rock Spring Dr	Rockledge Dr		80*	4 + 2 bus
Westlake Terrace	Rockledge Dr	I-270		80*	4 + 2 bus

* Plus additional 40-foot-wide easement for side-running transitway

Corridor 7: Randolph Road

Randolph Road is a commuter corridor with traffic and congestion in the westbound direction in the morning and the eastbound direction in the evening. Major activity centers include White Flint, Glenmont, and the emerging mixed-use center at White Oak. Residential uses fill in the gaps between these areas.

While ridership forecasts are low for the corridor, it does provide important linkages to other BRT corridors. Therefore, because this corridor is important for the integrity of the BRT network, but the ridership potential is limited and the potential impacts to residential properties are high, this Plan recommends a mixed traffic transitway.

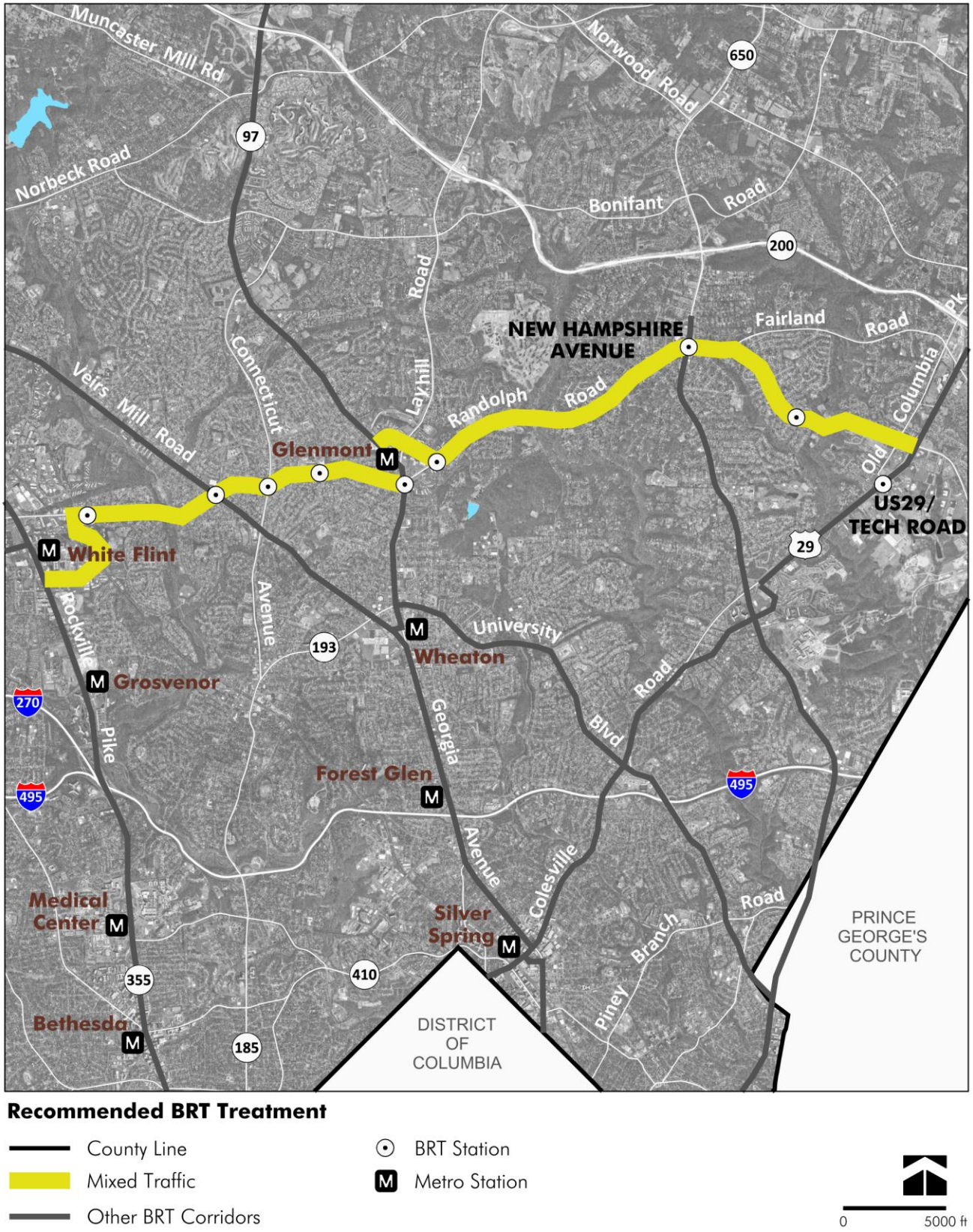
The westernmost corridor segment would serve the planning White Flint MARC commuter rail station in addition to the Metrorail station. During project planning, and alternative alignment along Nebel Street rather than Parklawn Drive should be considered if the at-grade Randolph Road crossing of the CSX tracks is retained.

This corridor has greater ridership potential if a higher level of land use is approved as part of the White Oak Science Gateway Master Plan.

Station Locations

White Flint Metro Station
Randolph Road and Lauderdale Drive
Randolph Road and MD 586
Randolph Road and MD 185
Randolph Rd and Bluhill Road
Randolph Road MD 97
Wheaton Metro Station
Randolph Road Glenallan Avenue
Randolph Road and MD 650
Randolph Road and Fairland Road
US 29 and Tech Road

Map 9 Randolph Road Corridor



Recommended BRT Treatment

- County Line
- Mixed Traffic
- Other BRT Corridors
- BRT Station
- Metro Station

0 5000 ft

Table 10 Corridor Recommendations, Randolph Road

Road	from	to	Treatment	R.O.W.	Lanes
Randolph Road	US 29	Fairland Rd	Mixed Traffic	80	4-5
Randolph Road	Fairland Rd	Glenallen Ave		120	6
Glenallen Avenue	Randolph Rd	Layhill Rd		80	2
Glenallen Avenue	Layhill Rd	Georgia Ave		90	2
Randolph Road	Georgia Ave	Judson Rd		140	6
Randolph Road	Judson Rd	Veirs Mill Rd		120	6
Randolph Road	Veirs Mill Rd	Dewey Rd		120	6
Randolph Road	Dewey Rd	Parklawn Dr		100	4
Parklawn Drive	Randolph Rd	Nebel St		80	4
Nicholson Lane	Nebel St	MD 355		90	4

Corridor 8: University Boulevard

University Boulevard is a commuter corridor, with traffic flowing westbound in the morning and eastbound in the evening. It has activity centers in Wheaton, Four Corners, Long Branch, and Takoma/ Langley Crossroads.

While University Boulevard does not have a very strong ridership, this corridor provides east-west connectivity that is important to the integrity of a network that has many corridors converging in Wheaton. Its duplication with the Purple Line between Piney Branch Road and New Hampshire Avenue is reasonable given the connection to a New Hampshire Avenue transitway and the location of the Takoma/Langley Transit Center at the intersection of New Hampshire Avenue and University Boulevard. Buses will likely not be permitted to share the Purple Line transitway since the benefits for the relatively low ridership on this corridor would likely not outweigh the adverse operational impacts on the Purple Line.

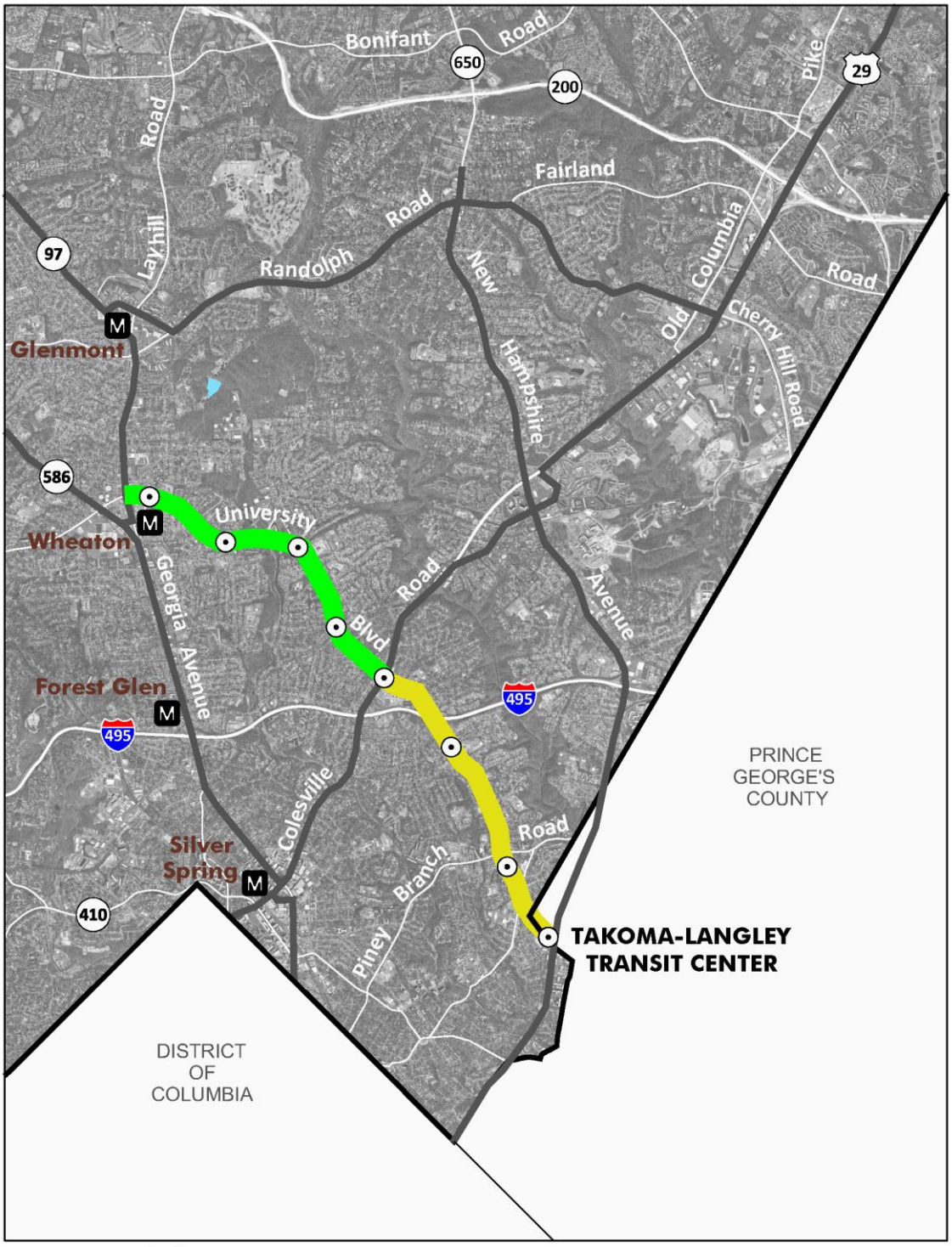
Corridor treatment recommendations, from west to east:

- Along University Boulevard from Georgia Avenue to Lorain Avenue, a one-lane median reversible transitway.
- Along University Boulevard from Lorain Avenue to New Hampshire Avenue, a mixed traffic transitway.

Station Locations

Wheaton Metro Station
MD 193 and Amherst Avenue
MD 193 and Inwood Avenue
MD 193 and Arcola Avenue
MD 193 and Dennis Avenue
MD 193 and US 29
MD 193 and E Franklin Avenue
MD 193 and Gilbert Street
Takoma/Langley Park Transit Center

Map 10 University Boulevard Corridor



Recommended BRT Treatment

- County Line
- One-Lane Median
- Mixed Traffic
- Other BRT Corridors
- BRT Station
- M Metro Station

0 5000 ft

Table 11 Corridor Recommendations, University Boulevard

Road	from	to	Treatment	R.O.W.	Lanes
University Boulevard	Georgia Ave	Amherst Ave	Reversible One-Lane Median	129	6 + 1 bus
University Boulevard	Amherst Ave	Dayton St		150	6 + 1 bus
University Boulevard	Dayton St	Easecrest Dr		124	6 + 1 bus
University Boulevard	Easecrest Dr	Lorain Avenue		124	6 + 1 bus
University Boulevard	Lorain Avenue	Piney Branch Rd	Mixed Traffic*	120	6
University Boulevard	Piney Branch Rd	Gilbert St		163**	5 + 2 LRT
University Boulevard	Gilbert St	Seek Ln		150**, ***	4 + 2 LRT
University Boulevard	Seek Ln	Bayfield St		141**, ****	4 + 2 LRT
University Boulevard	Bayfield St	Carroll Ave		142**	4 + 2 LRT
University Boulevard	Carroll Ave	Prince George's County line (east of 14th Avenue)		120 (150)** in Montgomery County	4 + 2 LRT

*The right-of-way of University Boulevard from approximately 100 feet east of Merrimac Drive to New Hampshire Avenue is divided between Montgomery and Prince George's Counties.
** Additional right-of-way requirements for the Purple Line will be determined either at the time of final design for the Purple Line or at the time of subdivision using latest project-level plans available for the Purple Line.
***Up to an additional 10 feet is needed to accommodate wider medians and/or turn lanes at the intersections of University Boulevard/Gilbert Street and University Boulevard/Seek Lane.
****Up to an additional 10 feet is needed for a median at the intersection of University Boulevard/Seek Lane.

Corridor 9: US 29

The US 29 corridor is an express corridor north of New Hampshire Avenue and a commuter corridor south of New Hampshire Avenue, with most traffic flowing southbound in the morning and northbound in the evening. Much of the traffic is long distance trips, passing through the corridor on the way to other places. For many people it is an alternative to I-95, drawing people from northern Montgomery County and Howard County to jobs in the I-270 corridor, the District of Columbia, and Northern Virginia.

US 29 north of the New Hampshire Avenue interchange is classified as a controlled major highway, with interchanges ultimately replacing all existing at-grade intersections. It has a wide median that can accommodate a busway, and the three existing interchanges —at Randolph Road/Cherry Hill Road, Briggs Chaney Road, and Spencerville Road (MD198)—can all accommodate a median busway. Activity centers in this corridor segment are located in Burtonsville and White Oak.

South of New Hampshire Avenue, US 29 is classified as a major highway and has a very different character, passing through very congested areas in Four Corners and the Silver Spring CBD with very limited opportunities to expand the right-of-way.

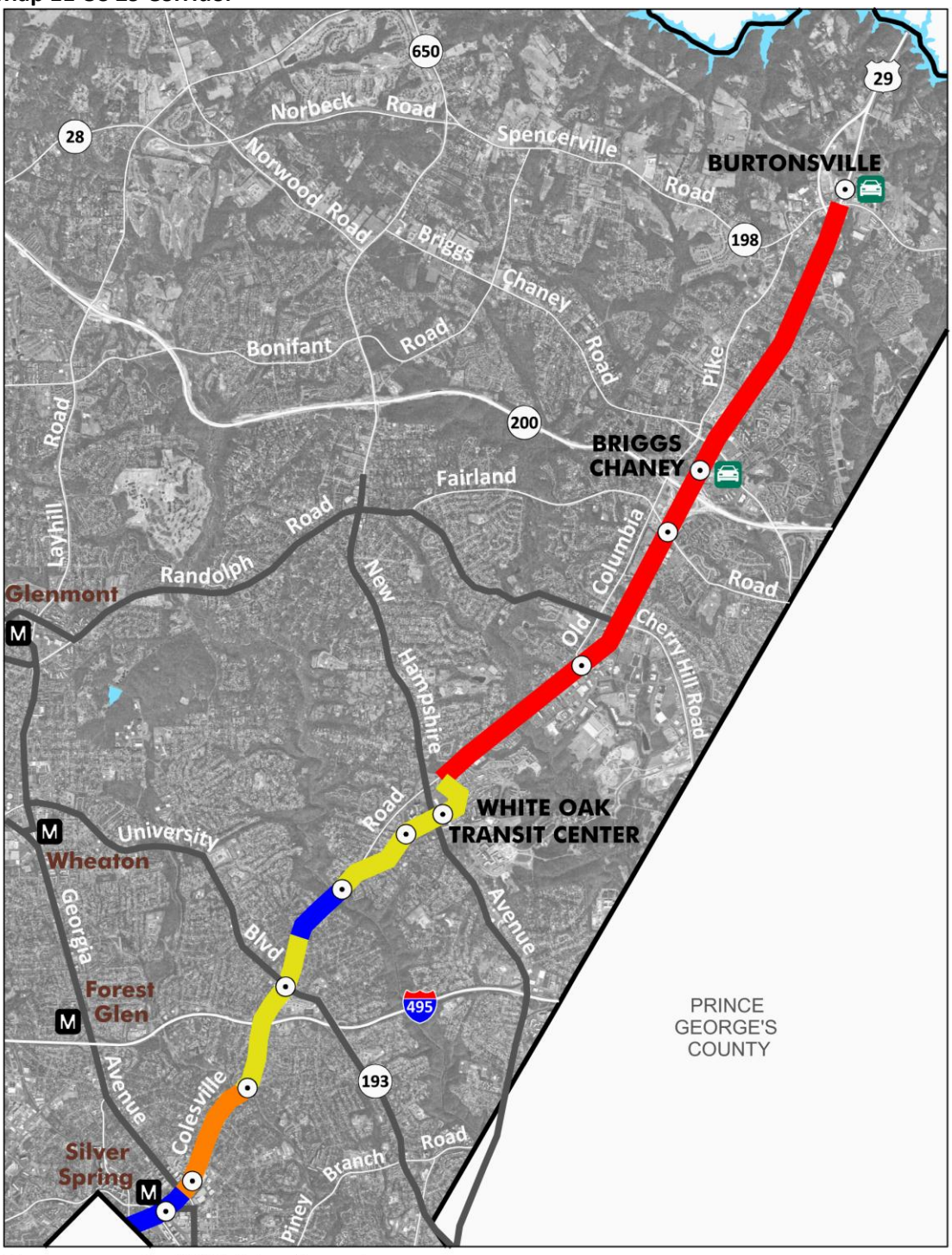
Corridor treatment recommendations, from north to south:

- Along US 29 from MD198 to Stewart Lane, a two-lane median busway.
- Along Stewart Lane and Lockwood Drive, a mixed traffic operation (A mixed traffic operation is recommended along Stewart Lane and Lockwood Drive, but this recommendations is not intended to inhibit the continuation of express bus service along US29 through the New Hampshire Avenue interchange.)
- Along US 29 from Lockwood Drive to Southwood Avenue, curb lanes via lane-repurposing.
- Along US 29 from Southwood Avenue to Sligo Creek Parkway, a mixed traffic operation. (A mixed traffic operation is recommended in this segment because of potential operational problems with curb bus lanes in the vicinity of the I-495 interchange, however the extension of dedicated lanes through this segment should be considered during facility planning.)
- Along US 29 from Sligo Creek Parkway to Georgia Avenue, managed lanes via lane-repurposing in the peak-hour peak-direction.
- Along US 29 from Georgia Avenue to Sixteenth Street, curb lanes via lane-repurposing.

Station Locations

Burtonsville park-and-ride
Briggs Chaney park-and-ride
US 29 and Fairland Road
US 29 and Tech Road
White Oak Transit Center
Lockwood Drive and Oak Leaf Drive
US 29 and Hillwood Drive
US 29 and MD 193
US 29 and Franklin Avenue
US 29 and Fenton Street
Silver Spring Transit Center

Map 11 US 29 Corridor



Recommended BRT Treatment

- County Line
- Two-Lane Median
- Managed Lanes
- Curb Lanes
- Mixed Traffic
- Other BRT Corridors
- BRT Station
- Metro Station
- Park-and Ride Station

0 5000 ft

Table 12 Corridor Recommendations, US 29

Road	from	to	Treatment	R.O.W.	Lanes
US 29	MD 198	Stewart Ln	Two-Lane Median	161-200	6 + 2 bus
Stewart Lane	US 29	Lockwood Drive	Mixed Traffic	80	2
Lockwood Drive	Stewart Ln	New Hampshire Ave		80	2
Lockwood Drive	New Hampshire Ave	US 29		80	2
US 29	Lockwood Dr	Southwood Ave	Curb Lanes	122	4 + 2 bus
US 29	Southwood Ave	Sligo Creek Pkwy	Mixed Traffic*	120	6
US 29	Sligo Creek Pkwy	Fenton St	Managed Lanes**	120	2 off-peak + 3 peak + 1 bus
US 29	Fenton St	Georgia Ave		100	2 off-peak + 3 peak + 1 bus
Colesville Road	Georgia Ave	East West Hwy	Curb Lanes	125	4 + 2 bus
Colesville Road	East West Hwy	16th St		125	4 + 2 bus

* Dedicated lanes are desirable in these segments and the potential for lane-repurposing to achieve dedicated lanes should be considered during facility planning.
**The six existing general purpose lanes in these segments currently operate during peak hours as four in the peak direction and two in the off-peak direction; in off-peak hours, they operate as three lanes in each direction. This Plan recommends that the operation in peak hours be changed to one dedicated bus lane in the peak direction, three general purpose lanes in the peak direction, and two general purpose lanes in the off-peak direction.

Corridor 10: Veirs Mill Road

Veirs Mill Road is a commuter corridor, with the flow of traffic largely balanced in the eastbound and westbound directions between the two, large central business districts, Wheaton and Rockville. Smaller commercial districts exist at Randolph Road and just west of Twinbrook Parkway. Residential uses fill in much of the rest of the corridor. Service roads that provide access to residential properties exist along many sections of the roadway, consuming a significant part of the right-of-way.

The Veirs Mill Road corridor experiences some of the highest existing transit volumes in Montgomery County and for that reason has long been considered for bus enhancements. However, opportunities to increase ridership are limited because development outside of the CBDs is constrained.

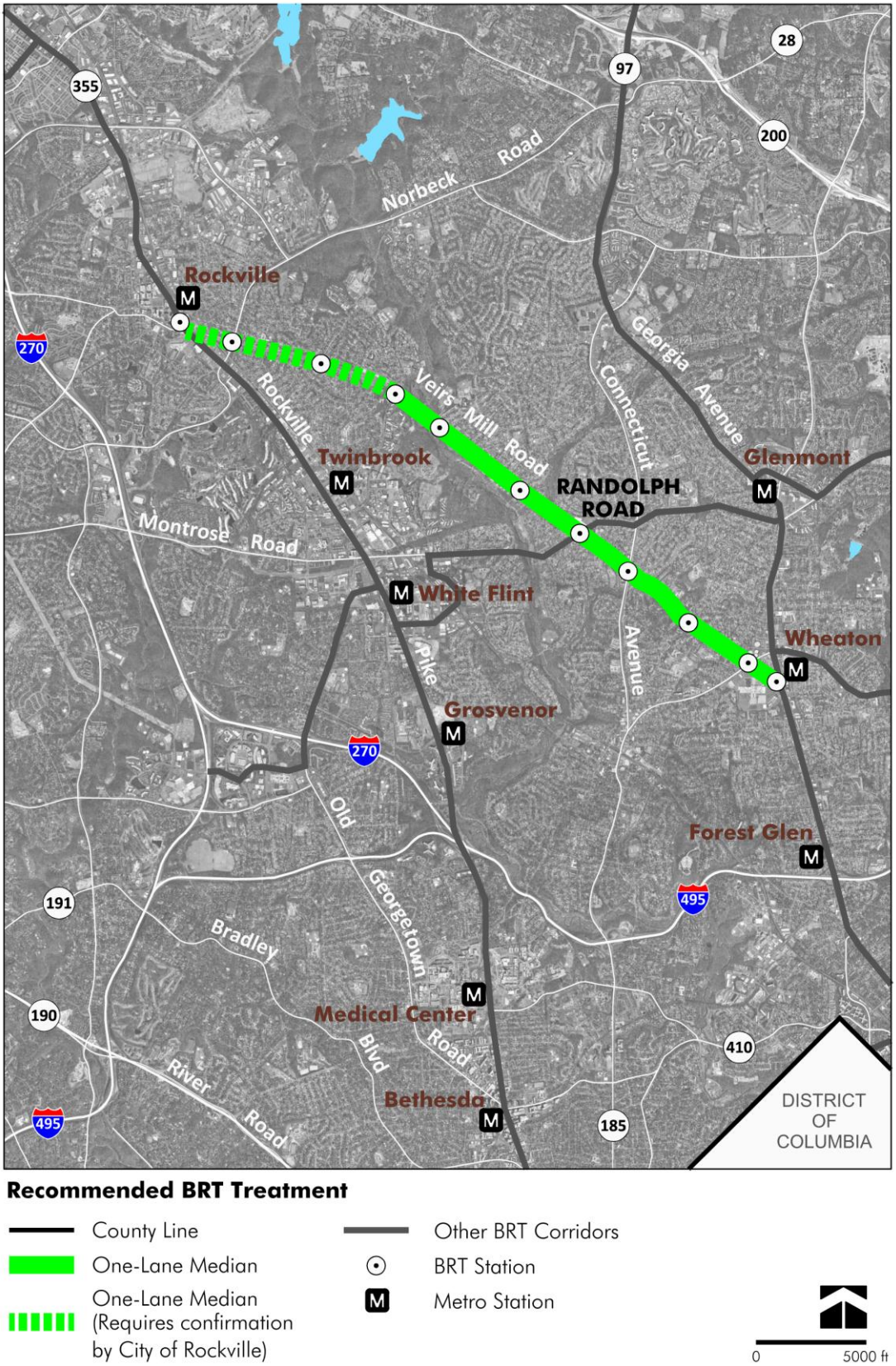
To accommodate a balanced flow of traffic in a constrained right-of-way, this Plan recommends a bi-directional one-lane median transitway. This recommended treatment is unique to this corridor, anticipating that bus travel will be accommodated in both directions in a single lane at the same time. Operational strategies must be determined by the implementing agency, but this plan envisions expanding to a two-way median transitway at stations and/or other designated areas where vehicles operating in opposite directions would be able to pass each other.

Station Locations

Rockville Metro Station
MD 586 and Norbeck Road
MD 586 and Broadwood Drive
MD 586 and Twinbrook Parkway
MD 586 and Aspen Hill Road
MD 586 and Parkland Drive
MD 586 and Randolph Road
MD 586 and MD 185
MD 586 and Newport Mill Road
MD 586 and MD 193
Wheaton Metro Station

Stations within the City of Rockville must be confirmed in the City's master plan.

Map 12 Veirs Mill Road Corridor



Recommended BRT Treatment

- County Line
- One-Lane Median
- One-Lane Median (Requires confirmation by City of Rockville)
- Other BRT Corridors
- BRT Station
- M Metro Station

0 5000 ft

Table 13 Corridor Recommendations, Veirs Mill Road

Road	from	to	Treatment	R.O.W.	Lanes
Veirs Mill Road	MD 355	Meadow Hall Dr	Bi-directional One-Lane Median*		
Veirs Mill Road	Meadow Hall Drive	Twinbrook Pkwy	Bi-directional One-Lane Median	150	4 to 6, + 1 bus
Veirs Mill Road	Twinbrook Pkwy	Parkland Dr		150	4 to 6, + 1 bus
Veirs Mill Road	Parkland Dr	Turkey Branch		150	4 to 6, + 1 bus
Veirs Mill Road	Turkey Branch	Gridley Rd		120	4 to 6, + 1 bus
Veirs Mill Road	Gridley Rd	Randolph Rd		120	4 to 6, + 1 bus
Veirs Mill Road	Randolph Rd	Ferrara Ave		120	4 to 6, + 1 bus
Veirs Mill Road	Ferrara Ave	Connecticut Ave		120	4 to 6, + 1 bus
Veirs Mill Road	Connecticut Ave	Newport Mill Rd		120	4 to 6, + 1 bus
Veirs Mill Road	Newport Mill Rd	Galt Ave		120	4 to 6, + 1 bus
Veirs Mill Road	Galt Ave	Ennalls Ave		129	4 to 6, + 1 bus
Veirs Mill Road	Ennalls Ave	Wheaton Metro Station		129	4 to 6, + 1 bus

* 2040 forecast ridership for the segment of Veirs Mill Road within the City of Rockville warrants a one-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The median busway recommendation can only become effective upon adoption of a subsequent City master plan update that would include recommendations on the right-of-way and the number of travel lanes.

Setting Implementation Priorities for Transit Corridor Improvements

This Plan does not change any recommended land uses and therefore does not include a staging amendment to set priorities for the public facilities needed to support them. Instead, this Plan recommends the following approach for prioritizing transit corridor improvements, as well as coordinating land use in future area master plans.

Existing bus ridership will provide the base for at least the initial phases of BRT service and is an important consideration in addition to future forecast ridership, achieving the mode share goals in area master plans, and the availability of right-of-way. Therefore, the highest priority for implementation in the near-term should be given to corridors with the highest existing bus ridership, particularly those where lane repurposing is recommended and corridor improvements can be constructed most quickly. These corridors are generally within the Urban Ring and their high ridership will provide the greatest immediate benefit to existing transit riders and accommodate latent demand, thereby providing support for future improvements and extensions. The southern segments of US 29 and New Hampshire Avenue best meet these criteria and are included in WMATA's Priority Corridor Network, which is a good indicator of the near-term viability of future BRT service and should guide the implementation prioritization of the corridors recommended in the Plan. The recent start of their MetroExtra service on New Hampshire Avenue is a precursor to BRT service along this corridor.

The other high priority transit corridor is MD 355, which has a high level of planned development and which, along with the Corridor Cities Transitway, serves the other major growth area defined by the General Plan, the I-270 Corridor. The MD 355 corridor has the highest 2040 forecast peak-hour BRT ridership and also has the highest potential for all-day BRT service. Where additional bus lanes are recommended along MD 355, more extensive facility planning should begin as soon as possible to define detailed right-of-way needs and facilitate coordination with the affected property owners. The MD 355 corridor has the greatest long-term potential for the County's BRT network, and WMATA is also studying the feasibility of providing MetroExtra service in this corridor in the near-term.

Where area master and sector plans are updated along the recommended transit corridors, consideration should be given to increasing the level of development density around station areas where employees and residents can most benefit from the BRT system and transit ridership. Close coordination between transit facilities and planned development will significantly reduce the transit subsidies needed to achieve high-quality transit service.

Implementation

The purpose of the transit corridor network is to facilitate a bus rapid transit service that supports the county's mobility, land use, and economic development goals. The recommended transit corridors and treatments represent what is needed to ensure network integrity and achieve the plan vision, which is to make transit a viable and reliable alternative to driving in the county's developed core, especially the I-270 corridor and Urban Ring, as defined in the General Plan.

Minimum performance standards must be created to guide the implementation of the proposed BRT network to ensure that it will be an attractive alternative to driving. BRT has the ability to greatly expand the people-moving capacity of a travel lane, either all-day or during peak periods, and can be a highly effective way to decrease dependence on single-occupant vehicles and the resultant congestion on our roads.

While this Plan addresses the essential elements of infrastructure that will influence speed and reliability in the choice of mode in trip-making, operational decisions such as the use of signal prioritization, off-board fare collection, and similar questions must also take performance quality standards into account.

More detailed facility planning may result in modifications to the recommended treatment in specific corridors or segments, but a guiding document is needed to ensure that the key objective of subsequent facility planning and detailed engineering should be that the resulting end-state transit corridor treatments (i.e., treatments generally attainable within the recommended rights-of-way) for individual corridors and the overall network should be consistent with the minimum level of service that would be provided by the recommended transit corridor treatments in this Plan.

These transit corridor treatments should support the operation of a BRT network that improves the performance of the overall transit network as measured by the Transportation Policy Area Review included in the Subdivision Staging Policy. The Subdivision Staging Policy should be amended to incorporate standards for transit service in the recommended BRT network area that are consistent with the minimum level of service that would be provided by this Plan's recommended transit corridor treatments.

Bicycle and Pedestrian Accommodation and Safety

Good bicycle and pedestrian access is needed to all BRT stations. The highest level of accommodation for pedestrians and bicyclists is needed in the areas where pedestrians are most prevalent, such as transit-oriented development areas, established or developing activity centers, areas around Metro stations, and transfer points between BRT routes.

Ensuring Pedestrian Safety and Accessibility

Safe and adequate pedestrian accommodation is needed both along and across the roadways included in the recommended transit corridors. The typical sections used to determine recommended rights-of-way:

- include six-foot-wide minimum sidewalks to ensure good pedestrian accommodation to and from all stops along transit corridors
- include landscape buffers of a sufficient width to achieve sidewalks and handicap ramps that can meet ADA Best Practices
- include a six-foot-wide median to accommodate a pedestrian refuge to ensure that transit patrons can safely cross the roadway to and from transit stops and that the general public can safely cross the roadway at all intersections.

While additional traffic signals are not specifically recommended in this Plan, it is likely that there will be more signalized crossings at BRT stops, which would assist all pedestrian crossings. The adequacy of pedestrian crossing times at stations should be evaluated and the need for advance walk signals that would give pedestrians a head start on traffic should be considered.

Bike Accommodation

This Plan supports the provision of on-road accommodation for bicyclists on all the recommended transit corridors, but right-of-way constraints limit the ability to achieve this goal on some corridor segments (see Appendix F).

- Where a facility for bicyclists is already recommended in a master plan, the appropriate space is included in the recommended right-of-way recommendations.
- Where on-road bicyclists can reasonably be accommodated on additional corridors, this Plan includes the appropriate space in the recommended right-of-way.
- Where constraints limit the ability to achieve the on-road bike accommodation beyond what is recommended in current master plans, this Plan identifies the alternative recommended bike accommodation for each corridor segment.

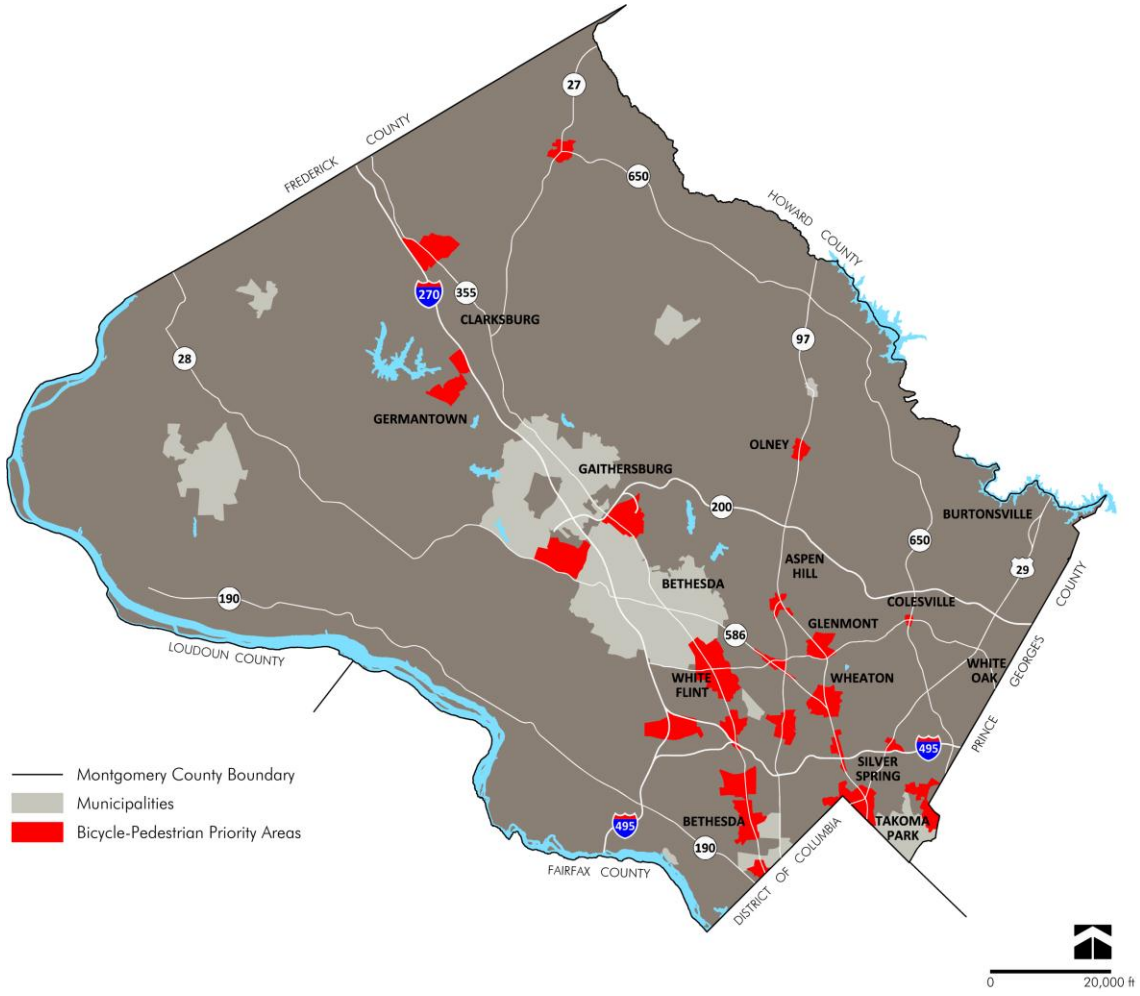
This plan also recommends designating new Bicycle-Pedestrian Priority Areas (BPPAs) to enhance the access to BRT.

Bicycle-Pedestrian Priority Areas

Section 2-604 of the Annotated Code of Maryland allows the designation of Bicycle-Pedestrian Priority Areas (BPPAs) in the State's *Bicycle-Pedestrian Master Plan*, if jointly agreed to by the State and local jurisdiction. BPPAs are defined in Section 8-101(d): "Bicycle and pedestrian priority area" means a geographical area where the enhancement of bicycle and pedestrian traffic is a priority.

The legislation is intended to promote better pedestrian and bicyclist accommodation in these priority areas. Appendix 6 details what accommodation should be provided in BPPAs. The White Flint and Wheaton CBD Sector Plan areas have been designated as BPPAs and White Flint has been confirmed by the State.

Map 13 Recommended Bicycle-Pedestrian Priority Areas



This Functional Plan designates all current Road Code-defined Urban areas as additional BPPAs:

- Silver Spring CBD Sector Plan area
- Twinbrook Sector Plan area
- Bethesda CBD Sector Plan area
- Friendship Heights Sector Plan area
- Glenmont Metro Station Policy area
- Grosvenor Metro Station Policy area
- Shady Grove Metro Station Policy area
- Olney Town Center
- Clarksburg Town Center
- Germantown Town Center
- Damascus Town Center
- Montgomery Hills
- Flower/Piney Branch
- Cloverleaf District
- LSC Central, LSC West, LSC North, and Belward Districts in the Great Seneca Science Corridor

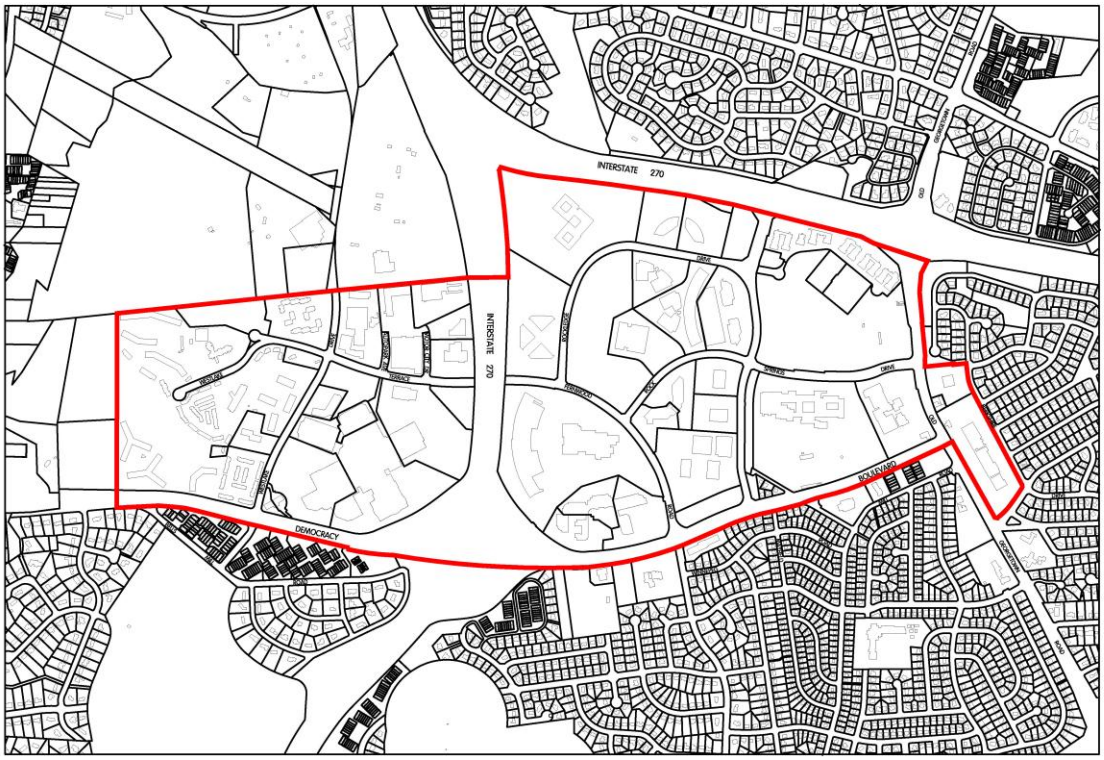
The Takoma/Langley Crossroads and Kensington Sector Plan areas are defined in their respective plans.

This Plan also designates proposed BRT station areas as BPPAs where there is sufficient planned density to generate significant pedestrian and bicyclist activity (see Maps 15 through 23):

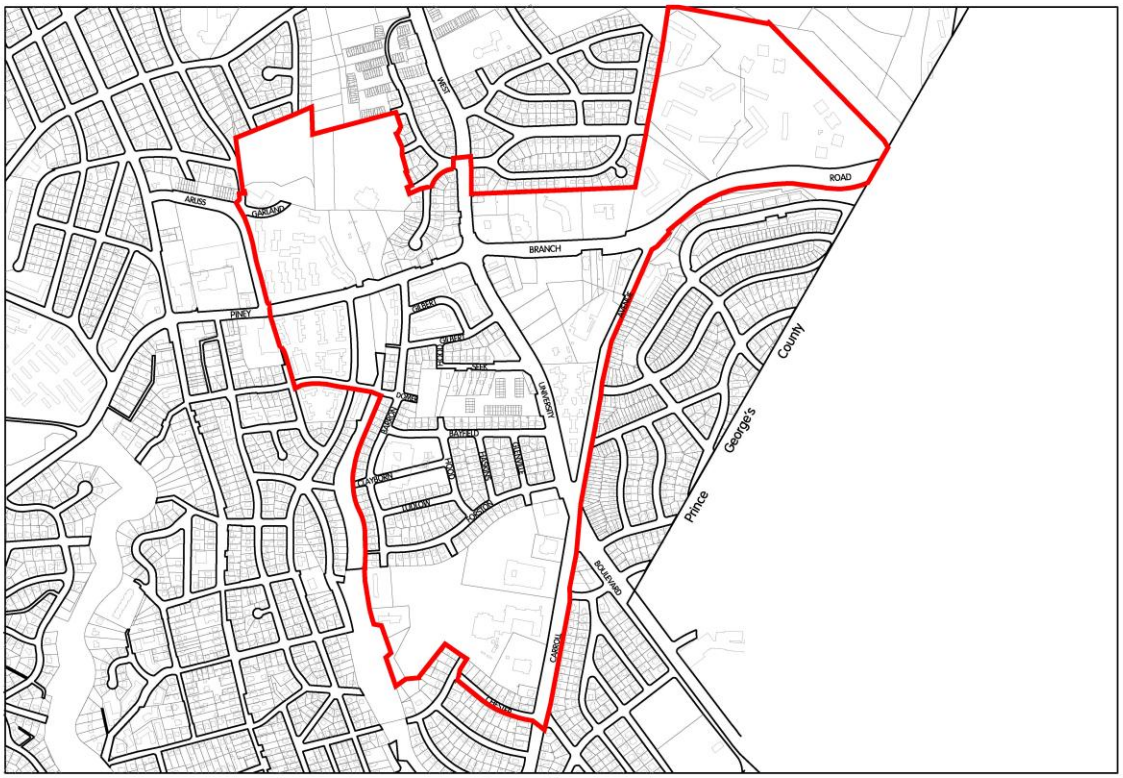
- Montgomery Mall/Rock Spring
- Piney Branch/University Boulevard Purple Line Station area
- Medical Center Metro Station area, including the NIH and NNMC campuses
- Veirs Mill Road/Randolph Road
- Aspen Hill (Georgia Avenue/Connecticut Avenue)
- Colesville (Randolph/New Hampshire)
- Forest Glen Metro Station area (contiguous with Montgomery Hills)
- Silver Spring CBD West (west of 16th Street to Rosemary Hills Drive, plus Spring Center)
- Four Corners

The designation of additional BPPAs should be considered as part of future master and sector plan updates.

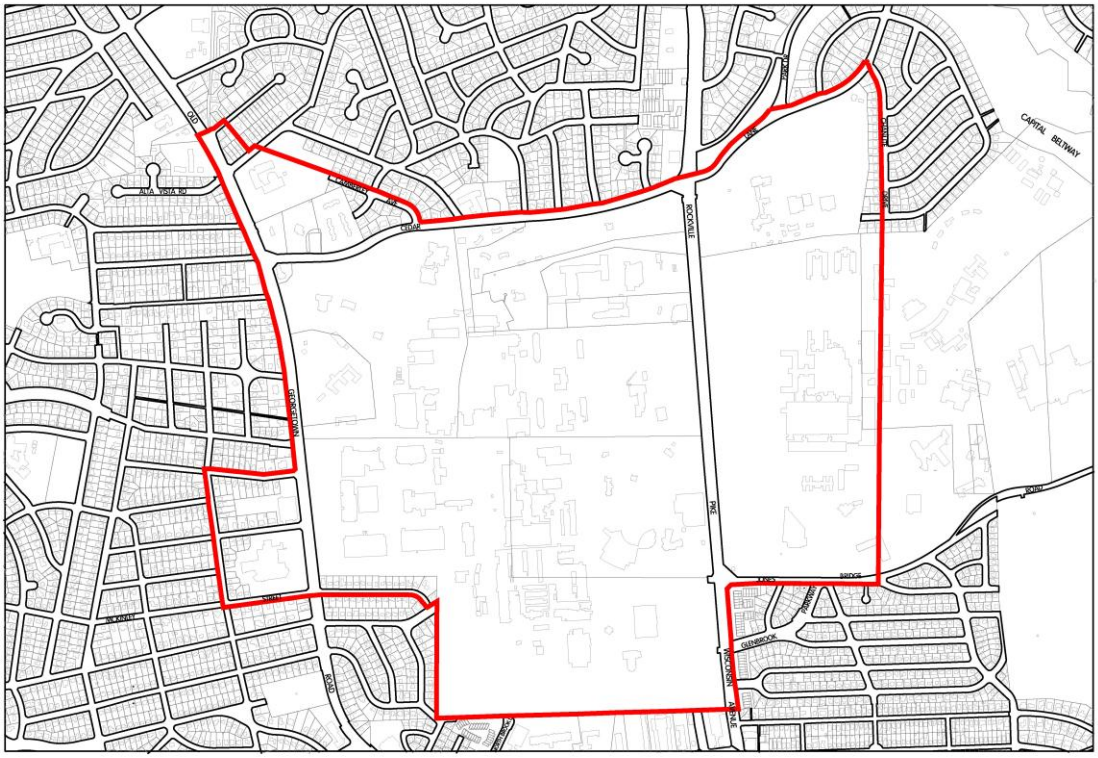
Map 14 Montgomery Mall/Rock Spring BPPA



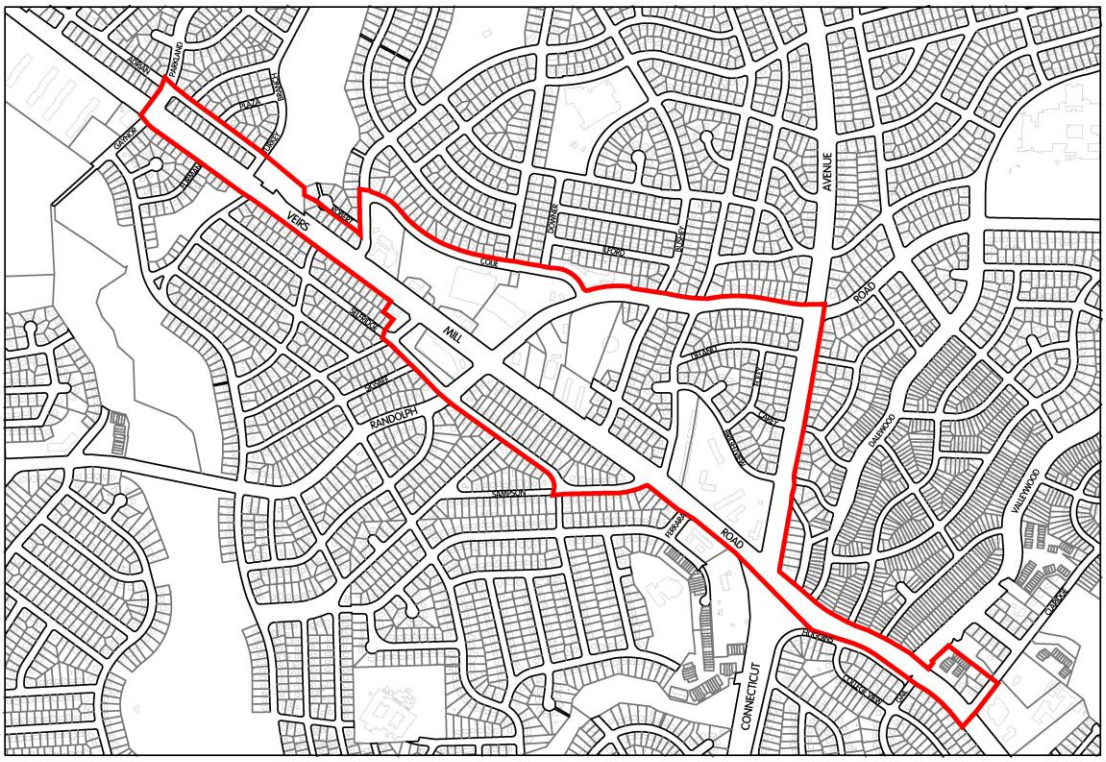
Map 15 Piney Branch/University Boulevard Purple Line Station Area BPPA



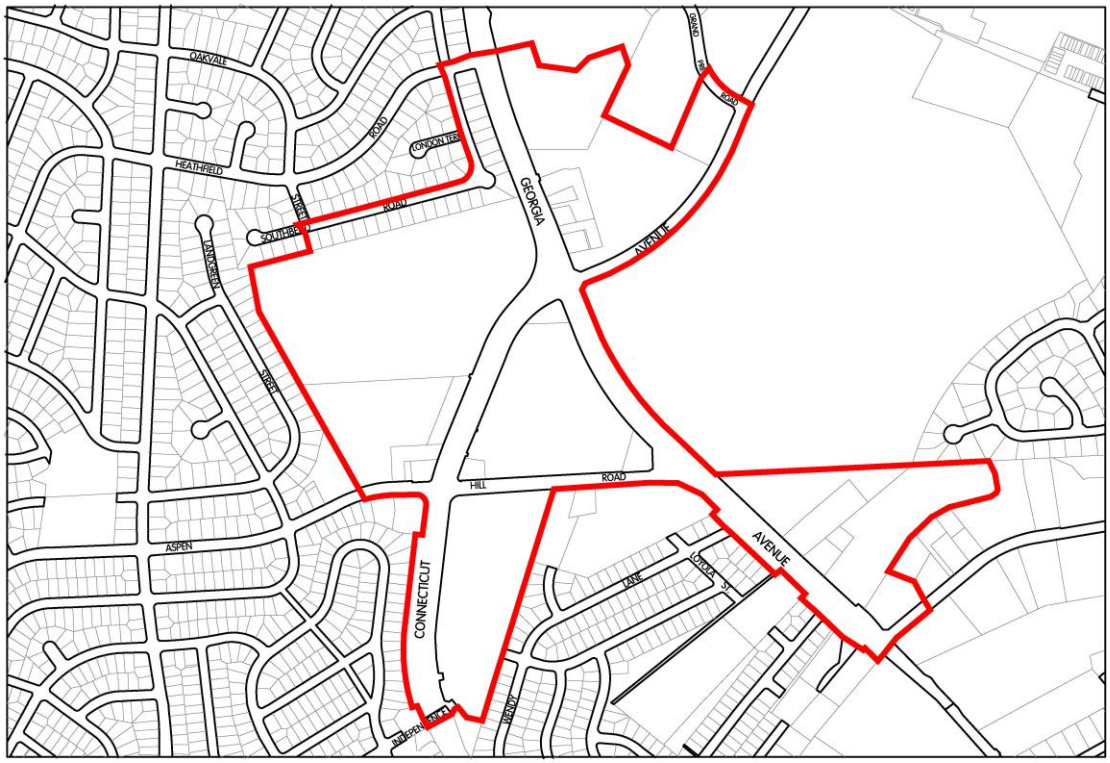
Map 16 Medical Center Metro Station Area BPPA (includes NIH and NNMC campuses)



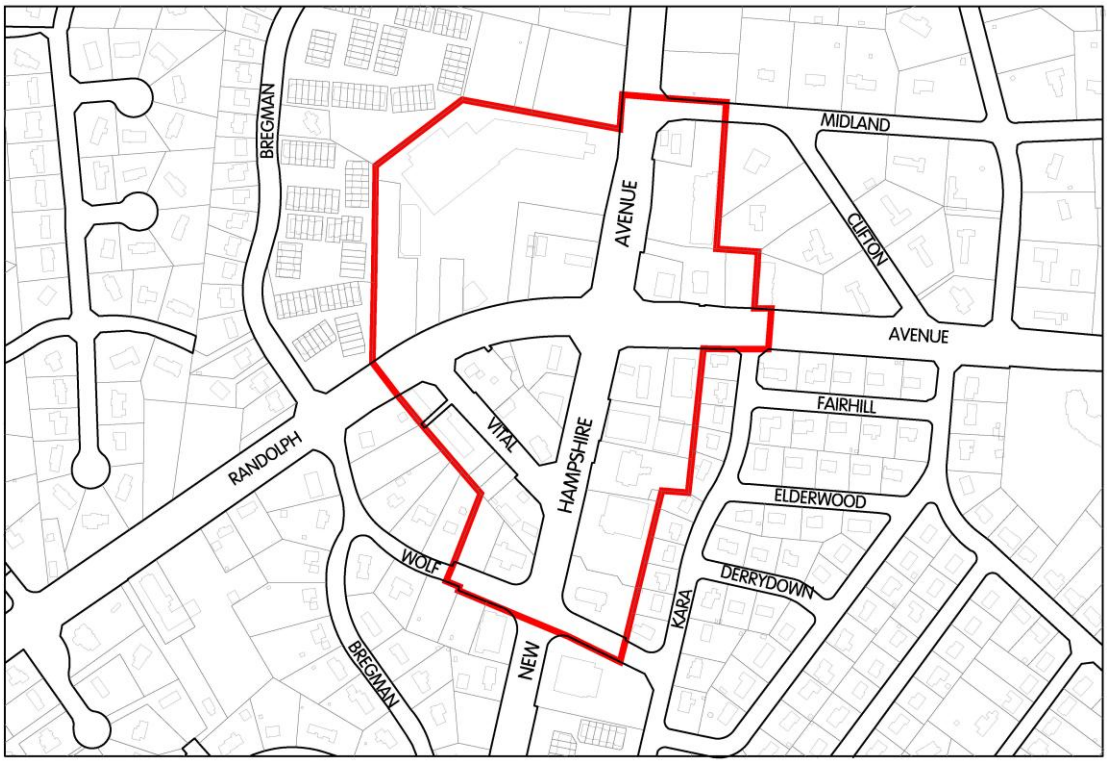
Map 17 Veirs Mill Road/Randolph Road BPPA



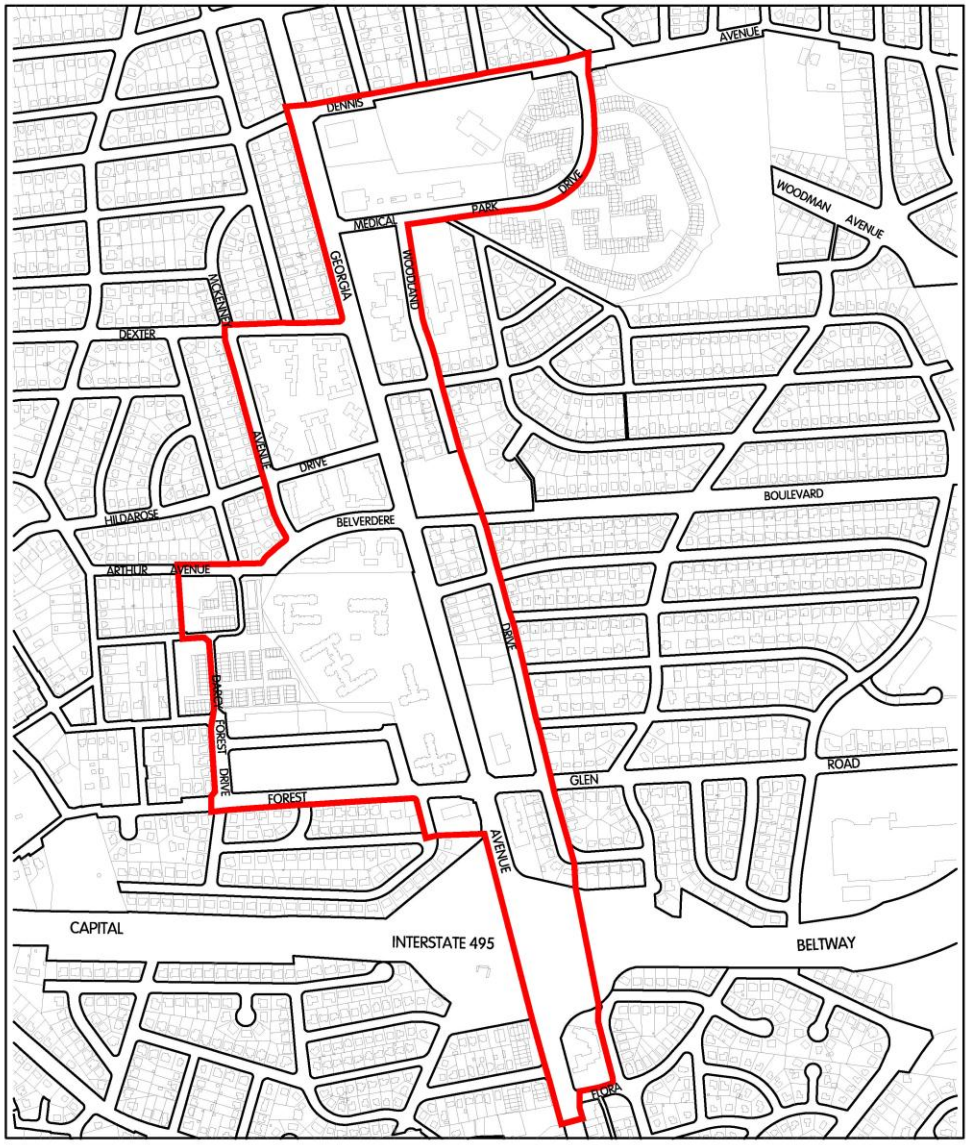
Map 18 Aspen Hill BPPA



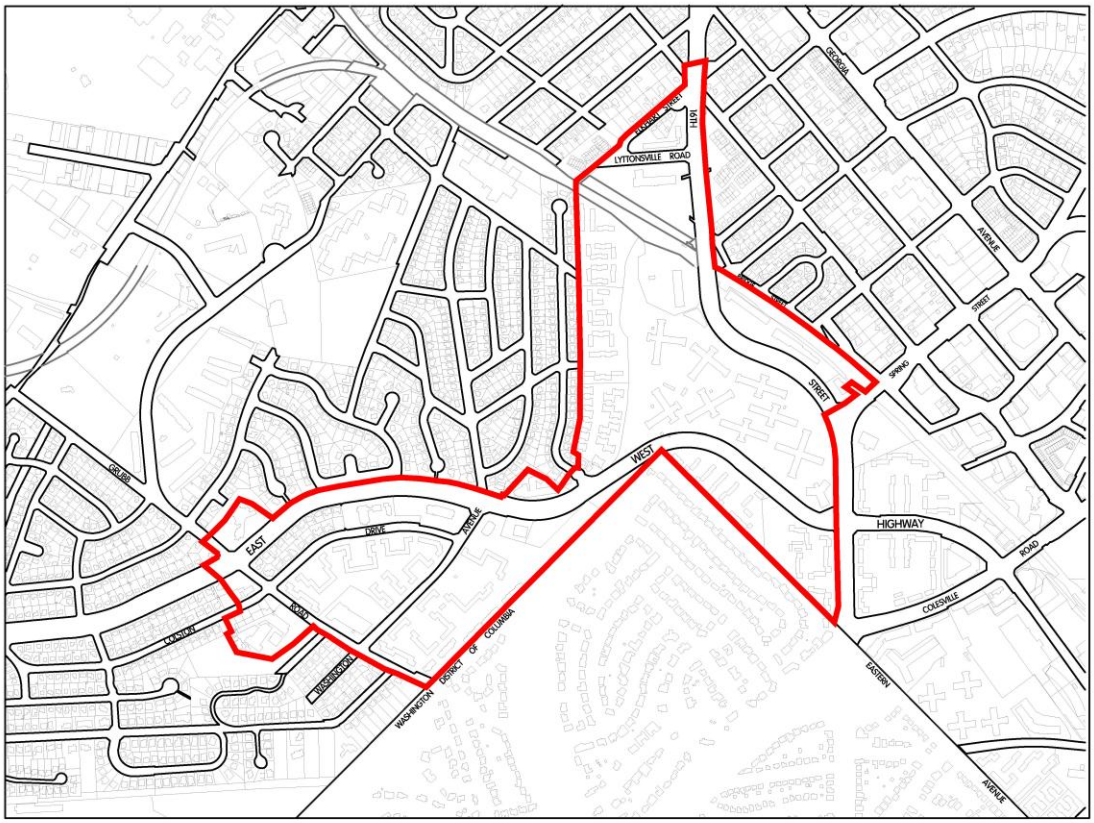
Map 19 Colesville BPPA



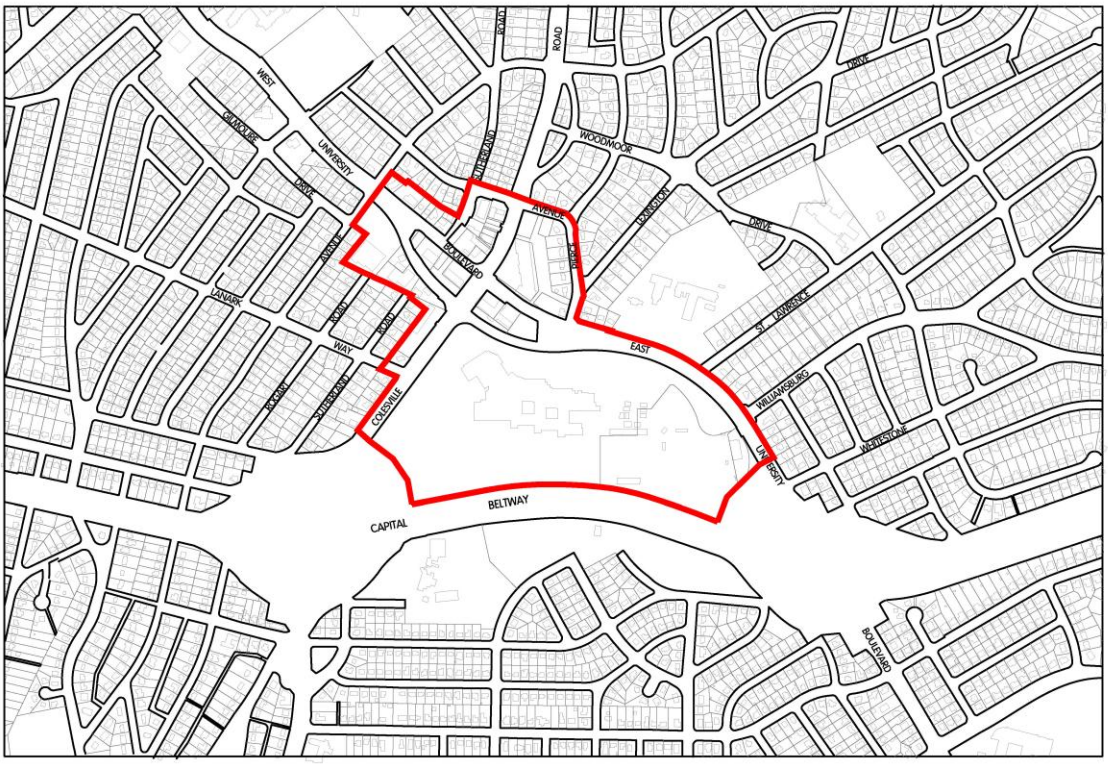
Map 20 Forest Glen Metro Station Area BPPA



Map 21 Silver Spring CBD West BPPA



Map 22 Four Corners BPPA



MARC Brunswick Line Expansion

MARC commuter rail's Brunswick Line serves the broadest regional transportation function of the County's transit network, performing a similar function as that of an interstate highway in the roadway network. It has 7,000 daily passengers and serves eleven stations in Montgomery County while connecting West Virginia and Frederick County, MD with Washington, D.C. The Brunswick Line also connects to five of the transit corridors recommended in this Plan—MD 355, Veirs Mill Road, Randolph Road, Georgia Avenue, and US29/Colesville Road—as well as to the Corridor Cities Transitway, Purple Line, and Metrorail Red Line.

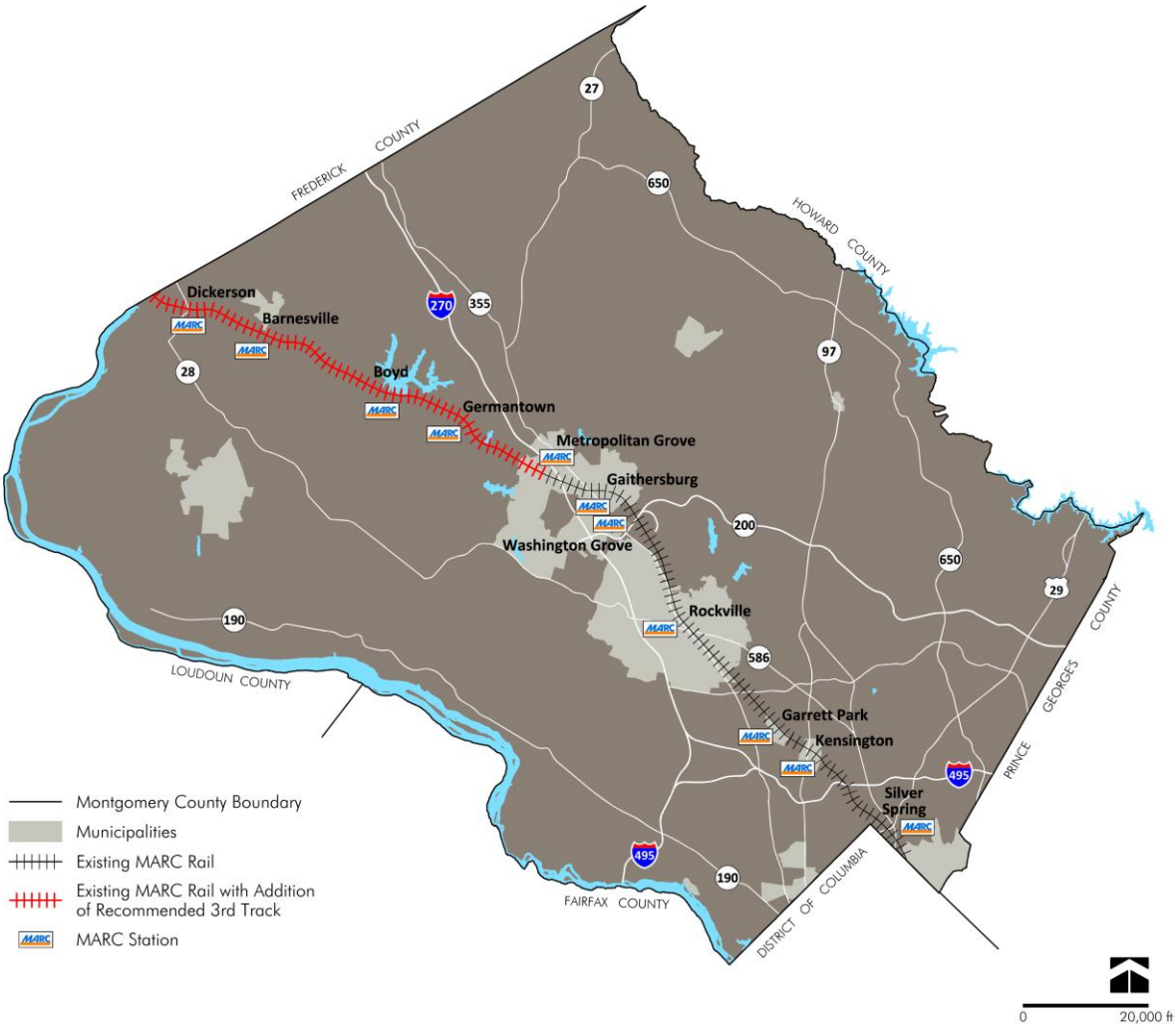
This Plan recommends that a third track be constructed on the Brunswick Line between the Frederick County line and the Metropolitan Grove station to reduce conflicts with freight service and enabling the expansion of MARC service. This additional capacity would accommodate a tripling of ridership and include:

- more frequent service
- all-day service
- weekend service
- one-seat rides to Northern Virginia
- service to planned MARC stations at Shady Grove and White Flint.

This MARC expansion to full-time service will improve east-west connectivity across the County, connecting with the rest of the transit network recommended by this Plan and increasing its utility for County residents and commuters.

This Plan recommends that implementation of a third track, but the right-of-way necessary to accommodate this expansion should be determined during project planning and confirmed in a future area or functional master plan update.

Map 23 MARC Brunswick Line Expansion



Carbon Emission Analysis

Montgomery County Bill number 32-07 establishes a goal to stop increasing greenhouse gas (GHG) emissions by the year 2010, and to reduce emissions to 20 percent of 2005 levels by the year 2050. Another Montgomery County law (Bill number 34-07) requires the Planning Board to estimate the carbon footprint of master plan recommendations, and to make recommendations for carbon emissions reductions.

Staff evaluated the peak-hour carbon emissions reductions of the three BRT build alternatives, compared against the no-build scenario. VMT reduction estimates were converted to gallons of gasoline saved and carbon dioxide equivalent amounts (CO2e) based on factors used in the King County, Washington Greenhouse Gas Emissions Worksheet version 1.7. This model has been adapted by the Planning Department to estimate GHG emissions for its master plan work. The results are presented in the table below.

Table 14 Carbon Emissions Analysis
Annual Peak Hour Estimated Gasoline Savings and Green House Gas (GHG) Emissions Reductions of Three BRT Scenarios (Year 2040 Projections)

Energy and GHG Benefit vs. No-Build	BRT Alternative		
	Build 1	Build 2	Build 2A
gasoline savings (gal/yr)	3,400,328	4,046,004	2,510,768
CO2e reduction (lbs/yr)	82,627,960	98,317,893	61,011,667
CO2e reduction (metric tons/yr)	37,473	44,589	27,670

This methodology assumes that all vehicles are gasoline-powered. Changes in automotive technology and the fuel chosen for the BRT vehicles will affect the results.

Achieving the County's GHG reduction goals will be challenging. Estimates from Montgomery County's Climate Protection Plan[2] project a need to reduce overall countywide GHG emissions by 10.995 million metric tons by 2040 compared to baseline (2005) emissions.

The Climate Protection Plan also shows that emissions from transportation form the largest percent share of current emissions. Staff analysis indicates that reductions from a broad range of activities must play a part in achieving the County's GHG reduction goals. As shown above, implementing BRT in the County can contribute significant GHG reductions.

[2] Montgomery County, Maryland Climate Protection Plan. Prepared by the Montgomery County Sustainability Working Group, January, 2009.

BRT would accomplish all or part of two transportation goals identified in the Climate Protection Plan: T-3 (Support the Ridership Growth Initiative by 2020 by implementing bus rapid transit on Veirs Mill Road and Georgia Avenue, and study and implement, where appropriate, light rail transit and bus rapid transit systems in other corridors) and T-7 (Explore ways to reduce vehicle travel to schools by expanding walking, bicycling, and use of buses).

Plan Appendix

Appendix A: Enhanced BRT Treatments to be Considered in Future Master Plan Updates

Appendix B: Impacts on Peak-Period Vehicle Miles Traveled and Vehicle Hours Traveled
- modeling results for build alternatives analyzed

Appendix C: Corridor Descriptions
- detailed descriptions of the specific conditions in each corridor, the rationale behind the treatment recommended, and the changes from existing master plans

Appendix D: Travel Time Comparison
- A comparison of travel times on sample corridors via BRT, local bus, and BRT

Appendix E: 2040 Forecasts
- employment and housing densities by transportation analysis zone

Appendix F: Bikeway Accommodation
- an analysis of whether additional bikeway recommendations should be included in the Functional Plan

Appendix G: Recommended Elements of a Plan of Improvements for Bicycle-Pedestrian Priority Areas
- baseline improvements for bicyclists and pedestrians
- further improvements for bicyclists and pedestrians in Business and Urban Districts
- baseline improvements for bicyclists and pedestrians in Bicycle-Pedestrian Priority Areas

Appendix A
Enhanced BRT Treatments to be Considered in Future Master Plan Updates

Corridor 2: Georgia Avenue South

- Provide a two-way median transitway on Georgia Avenue from Veirs Mill Road to 16th Street, either by repurposing lanes or adding lanes.

Corridor 3: MD 355 North

- Provide additional travel lanes to replace repurposed lanes if found to be necessary to provide a desirable level of traffic service on the following segments of MD355:
  - from Shakespeare Boulevard to Game Preserve Road
  - from just south of O'Neil Drive to 1,250 feet south of Shady Grove Road
  - from Ridgemont Avenue to Indianola Road
  - from 1,000 feet south of Indianola Road to 270 feet north of North Campus Drive.

Corridor 4: MD 355 South

- Provide additional travel lanes from Church Street to just south of Hubbard Drive in the City of Rockville to replace repurposed lanes if found to be necessary to provide a desirable level of traffic service.
- Provide a two-way median transitway from Bradley Boulevard to Western Avenue via repurposed lanes.

Corridor 7: Randolph Road

- Provide a reversible one-lane median transitway along Randolph Road from US 29 to Glenallan Avenue.
- Provide a reversible one-lane median transitway along Randolph Road from Georgia Avenue to Parklawn Drive.

Corridor 9: US 29

- Provide dedicated curb lanes along Lockwood Drive and Stewart Lane.

Appendix B
Impacts on Vehicle Miles Traveled and Vehicle Hours Traveled

The modeling results were analyzed for a no-build alternative and for the three build alternatives:

- No-Build: existing transportation network plus new transportation facilities included in the Constrained Long Range Plan, including the Corridor Cities Transitway and Purple Line
- Build 1: 152-mile BRT network of median busways
- Build 2: 152-mile BRT network with mostly median busways and some curb lanes
- Build 2A: 87-mile network with a mix of treatments

The following maps compare vehicle miles traveled (VMT) and vehicle hours traveled (VHT) of the no-build alternative with each of the three build alternatives.

The transit corridor network recommended by this Plan is expected to have impacts that are between the Build 2 and Build 2A results.

The following sections provide analysis at the region-wide, countywide.

Region-wide Assessment

Table B-1 shows the 2040 weekday ridership for a variety of transit services in the region for each of the four scenarios. In the No-Build scenario there are approximately 2.6 million transit trips. This increases by about 140,000 transit trips (or 5.4 percent) with Build 1, 134,000 transit trips (or 5.2 percent) with Build 2, and 73,000 transit trips (or 2.8 percent) with Build 2A. BRT ridership increases by a greater amount than overall transit trips indicating that some of the additional BRT ridership is switching from other transit services.

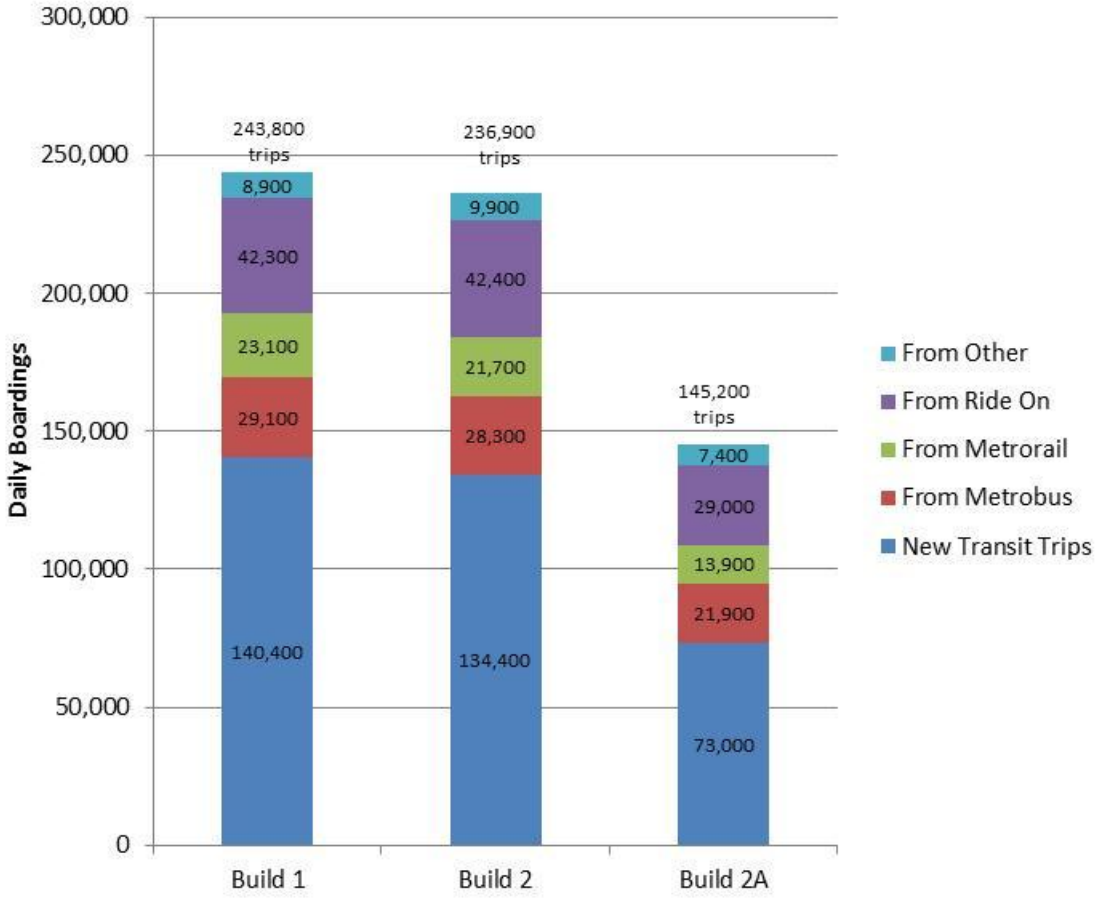
Table B-1: 2040 Weekday Ridership for Regional Transit Services by Scenario

Type	No Build	Build 1A	Build 2	Build 2A
Montgomery County BRT*	39,200	283,000	276,100	184,400
WMATA Local Bus	576,300	547,500	548,500	554,800
WMATA Express Bus	60,200	59,900	59,700	59,800
WMATA Metrorail	1,575,700	1,552,600	1,554,000	1,561,800
MARC Commuter Rail	42,300	41,200	40,800	41,400
Purple Line	77,300	69,700	69,700	71,800
Ride On	167,700	125,400	125,300	138,700
Commuter Bus	27,600	27,400	26,700	26,600
Other Local Bus	28,800	28,800	28,900	28,800
Total	2,595,100	2,735,500	2,729,500	2,668,100
Growth		140,400	134,400	73,000
% Growth		5.4%	5.2%	2.8%

* Includes Corridor Cities Transitway

About half of all unlinked BRT trips are new trips. The remaining growth in BRT ridership comes from other transit services. Between 30,000 and 42,000 trips switch from Ride On, between 14,000 and 23,000 trips switch from Metrorail, and between 22,000 and 29,000 switch from Metrobus on a typical weekday.

Figure B-1: Source of Unlinked BRT Trips per Weekday in Montgomery County



Countywide Traffic Assessment

To understand the impacts of BRT on traffic, Montgomery County was divided into 19 districts, which are combinations of TAZs, and evaluated based on vehicle miles traveled, vehicle hours traveled, and average speed on a typical weekday in 2040.

Note that this traffic assessment considers vehicles only and does not consider the impacts of the recommended transit network on transit users, which is addressed online in Appendix 2.

Vehicle Miles Traveled

Overall, VMT is reduced in each of the Build scenarios (see Figures B-2, B-3, B-4).

While all districts experience reductions in VMT, in percentage terms the greatest reductions in VMT (between 1.0 percent and 3.0 percent) occur in the middle of the County in the Build 1 scenario. With

the introduction of lane repurposing in the Build 2 and Build 2A scenarios, the greatest reductions in VMT (between 4.0 percent and 6.0 percent) occur inside the Beltway.

Table B-2, the greatest reductions in VMT occur with Build 2, resulting in a reduction in VMT of 231,000 miles per weekday (or 1.9 percent), and the lowest reductions occur with Build 1, resulting in a reduction in VMT of 143,000 miles per weekday (or 1.2 percent).

All districts experience a reduction in VMT. The greatest VMT reductions are:

- Build 1: White Flint (District 12)
- Build 2: Silver Spring (District 14), and to a lesser extent East Silver Spring (District 15) the Bethesda (District 17)
- Build 2A: White Oak (District 9), and to a lesser extent North Bethesda (District 11) and White Flint (District 12)

While all districts experience reductions in VMT, in percentage terms the greatest reductions in VMT (between 1.0 percent and 3.0 percent) occur in the middle of the County in the Build 1 scenario. With the introduction of lane repurposing in the Build 2 and Build 2A scenarios, the greatest reductions in VMT (between 4.0 percent and 6.0 percent) occur inside the Beltway.

Table B-2: Vehicle Miles Traveled (Average Weekday in 2040)

District	Vehicle Miles Traveled (VMT)				Change in VMT from No-Build		
	No-Build	Build 1	Build 2	Build 2A	Build 1	Build 2	Build 2A
1	223,000	217,600	216,800	219,800	-2.4%	-2.8%	-1.4%
2	315,100	310,500	310,900	313,200	-1.5%	-1.3%	-0.6%
3	478,400	467,500	468,800	474,500	-2.3%	-2.0%	-0.8%
4	404,400	397,400	398,700	402,300	-1.7%	-1.4%	-0.5%
5	245,700	239,000	239,700	243,100	-2.7%	-2.4%	-1.1%
6	370,700	365,300	367,000	368,700	-1.5%	-1.0%	-0.5%
7	466,600	455,900	457,700	462,200	-2.3%	-1.9%	-0.9%
8	229,600	223,800	224,100	227,100	-2.5%	-2.4%	-1.1%
9	499,300	490,500	488,800	492,000	-1.8%	-2.1%	-1.5%
10	529,000	520,700	521,100	525,100	-1.6%	-1.5%	-0.7%
11	338,200	329,800	328,500	332,200	-2.5%	-2.9%	-1.8%
12	203,500	197,000	197,100	199,700	-3.2%	-3.1%	-1.9%
13	442,900	436,000	436,400	439,600	-1.6%	-1.5%	-0.7%
14	765,500	753,000	720,300	725,300	-1.6%	-5.9%	-5.3%
15	352,500	346,700	335,400	337,700	-1.6%	-4.9%	-4.2%
16	484,500	479,500	478,300	482,000	-1.0%	-1.3%	-0.5%
17	591,400	581,600	567,400	571,500	-1.7%	-4.1%	-3.4%
18	346,700	340,500	341,000	343,700	-1.8%	-1.6%	-0.9%
19	4,784,800	4,725,700	4,743,200	4,769,000	-1.2%	-0.9%	-0.3%
Total	**12,071,800**	**11,878,000**	**11,841,200**	**11,928,700**	**-1.6%**	**-1.9%**	**-1.2%**
Change		**-193,800**	**-230,600**	**-143,100**			

Figure B-2: Change in Vehicle Miles Traveled from No-Build to Build 1 (2040)

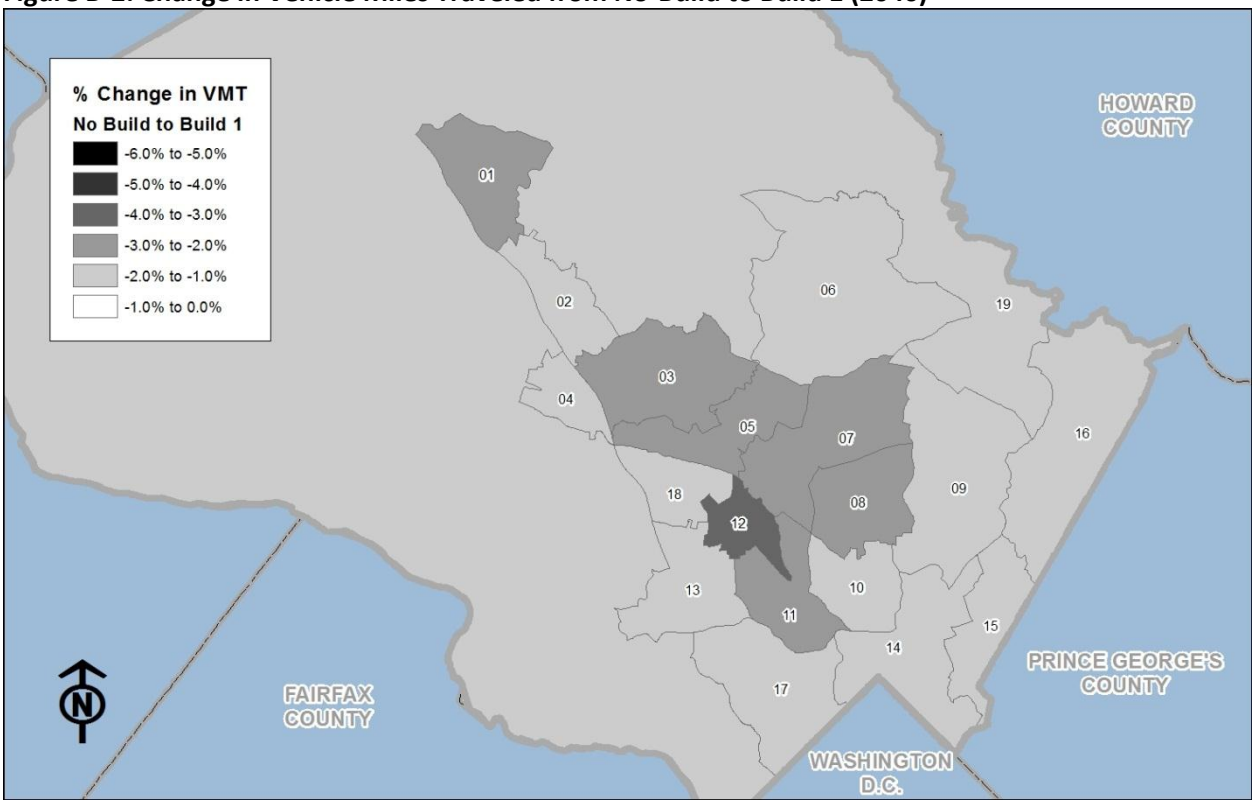


Figure B-3: Change in Vehicle Miles Traveled from No-Build to Build 2 (2040)

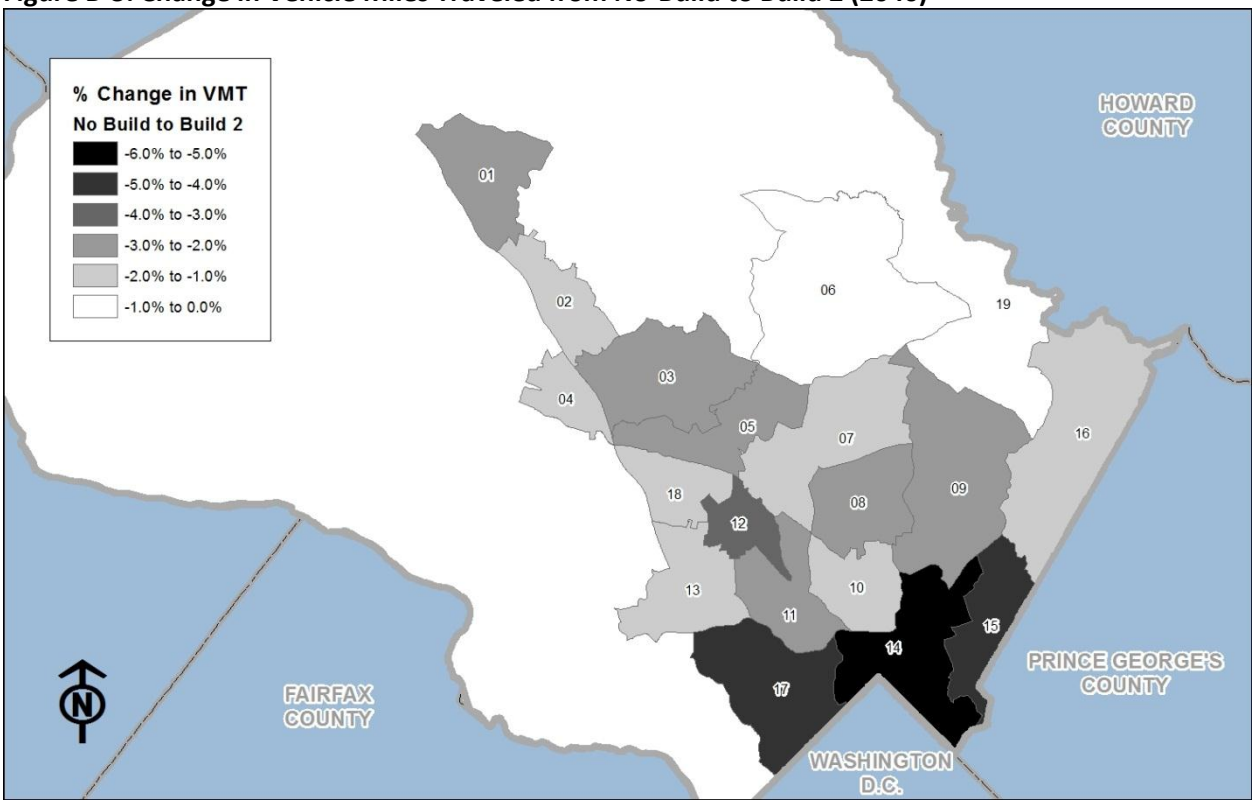
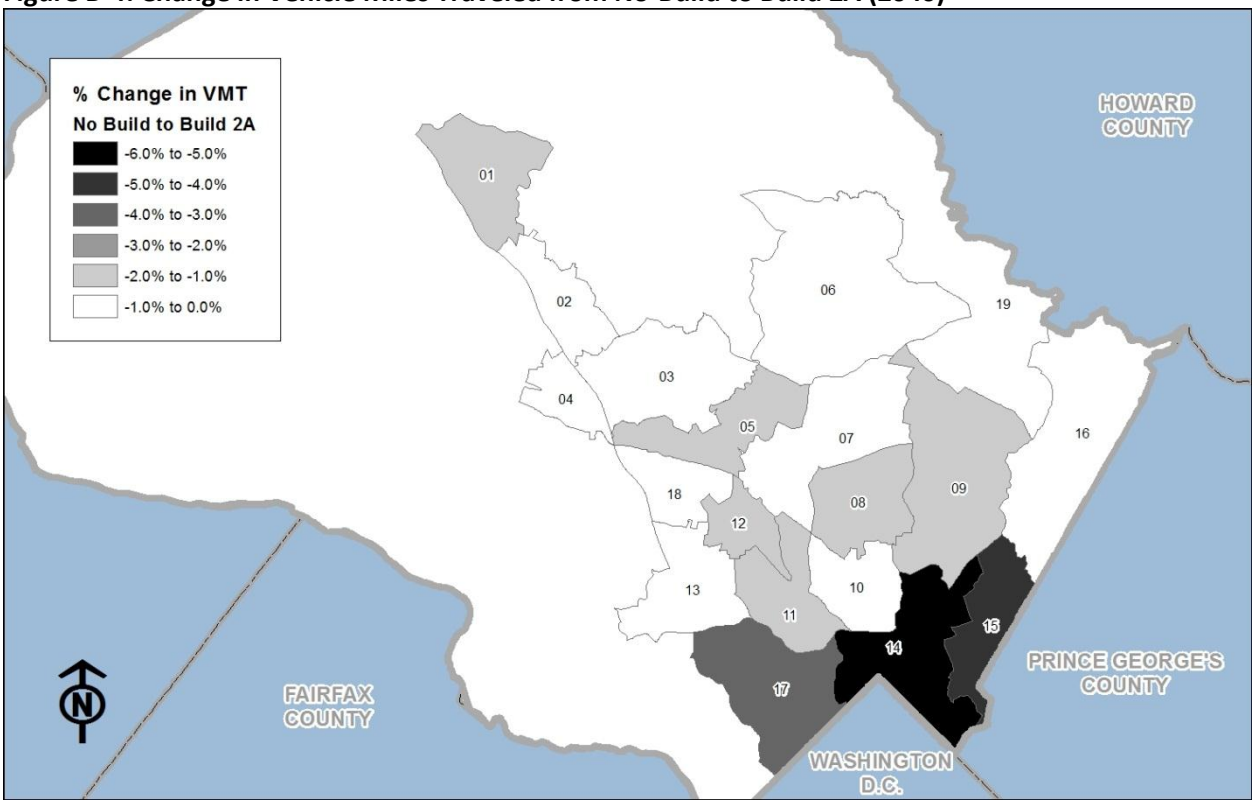


Figure B-4: Change in Vehicle Miles Traveled from No-Build to Build 2A (2040)



Vehicle Hours Traveled

In terms of VHT, the greatest reductions occur with Build 1, with a reduction of 70,000 hours (or 6.5 percent), and the lowest reductions occur with Build 2A, resulting in a reduction in VHT of 29,000 hours (or 2.7 percent). All districts experience a reduction in VHT with the exception of Bethesda (District 17) in Build 2A. The greatest VHT reductions are:

- Build 1: Aspen Hill (District 7), Glenmont (District 8), and White Flint (District 12)
- Build 2: White Oak (District 9), North Bethesda (District 11) and White Flint (District 12)
- Build 2A: Silver Spring (District 14) and East Silver Spring (District 15)

Table B-3: Vehicle Hours Traveled (Average Weekday in 2040)

DISTRICT	Vehicle Hours Traveled (VHT)				Change in VHT from No-Build		
	No-Build	Build 1	Build 2	Build 2A	Build 1	Build 2	Build 2A
1	11,100	10,500	10,500	10,800	-5.4%	-5.4%	-2.7%
2	40,400	37,700	38,000	39,400	-6.7%	-5.9%	-2.5%
3	45,600	41,500	41,800	43,800	-9.0%	-8.3%	-3.9%
4	32,100	29,900	30,300	31,300	-6.9%	-5.6%	-2.5%
5	27,000	24,400	24,700	26,000	-9.6%	-8.5%	-3.7%
6	25,000	23,700	23,900	24,400	-5.2%	-4.4%	-2.4%
7	35,900	32,100	32,400	34,000	-10.6%	-9.7%	-5.3%
8	21,400	19,100	19,400	20,500	-10.7%	-9.3%	-4.2%
9	30,600	27,700	27,100	27,900	-9.5%	-11.4%	-8.8%
10	45,800	42,200	42,700	44,400	-7.9%	-6.8%	-3.1%
11	39,200	35,500	34,700	36,400	-9.4%	-11.5%	-7.1%
12	28,400	25,400	25,400	26,500	-10.6%	-10.6%	-6.7%
13	42,400	38,900	39,000	40,400	-8.3%	-8.0%	-4.7%
14	82,800	77,600	78,300	80,300	-6.3%	-5.4%	-3.0%
15	41,900	38,900	39,200	40,300	-7.2%	-6.4%	-3.8%
16	40,600	39,300	39,000	39,900	-3.2%	-3.9%	-1.7%
17	82,200	77,500	80,100	82,300	-5.7%	-2.6%	0.1%
18	35,800	32,400	32,800	34,300	-9.5%	-8.4%	-4.2%
19	367,200	351,500	357,400	363,900	-4.3%	-2.7%	-0.9%
Total	**1,075,400**	**1,005,800**	**1,016,700**	**1,046,800**	**-6.5%**	**-5.5%**	**-2.7%**
Change		**-69,600**	**-58,700**	**-28,600**			

Figure B-5: Change in Vehicle Hours Traveled from No-Build to Build 1 (2040)

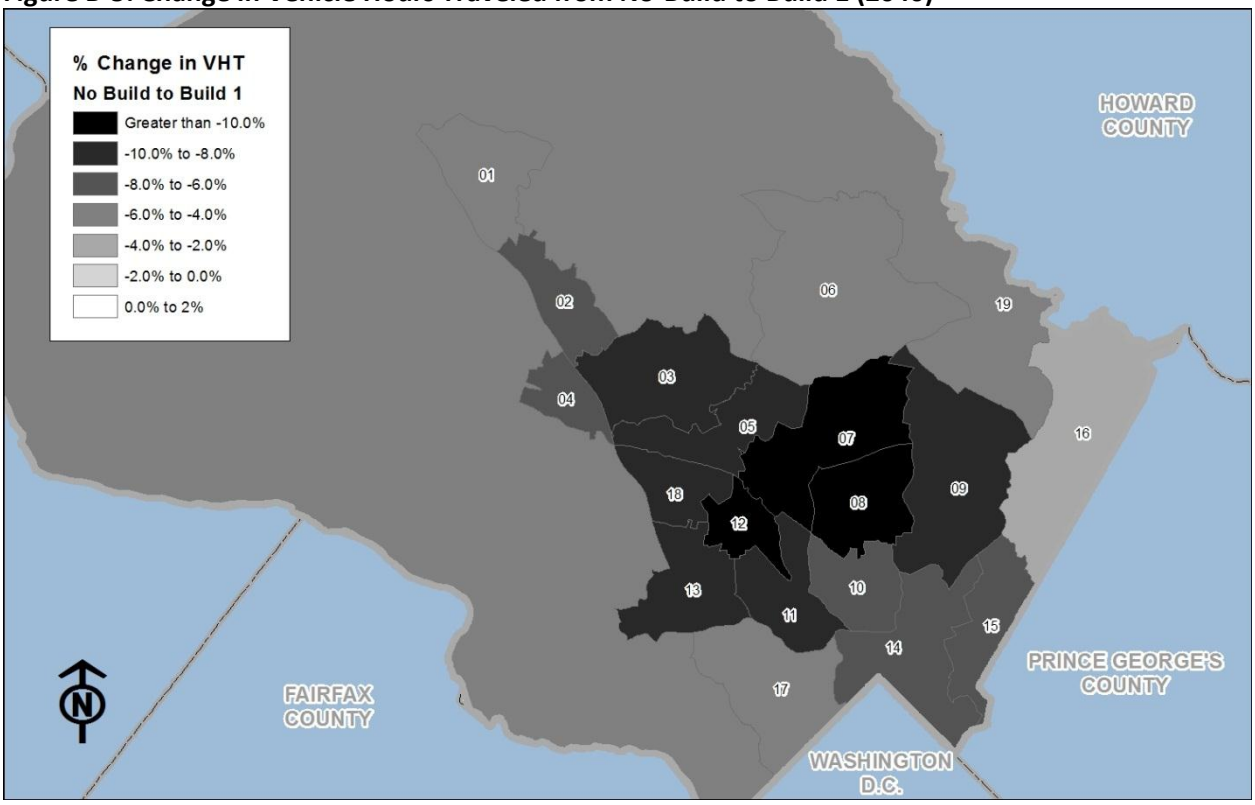


Figure B-6: Change in Vehicle Hours Traveled from No Build to Build 2 (2040)

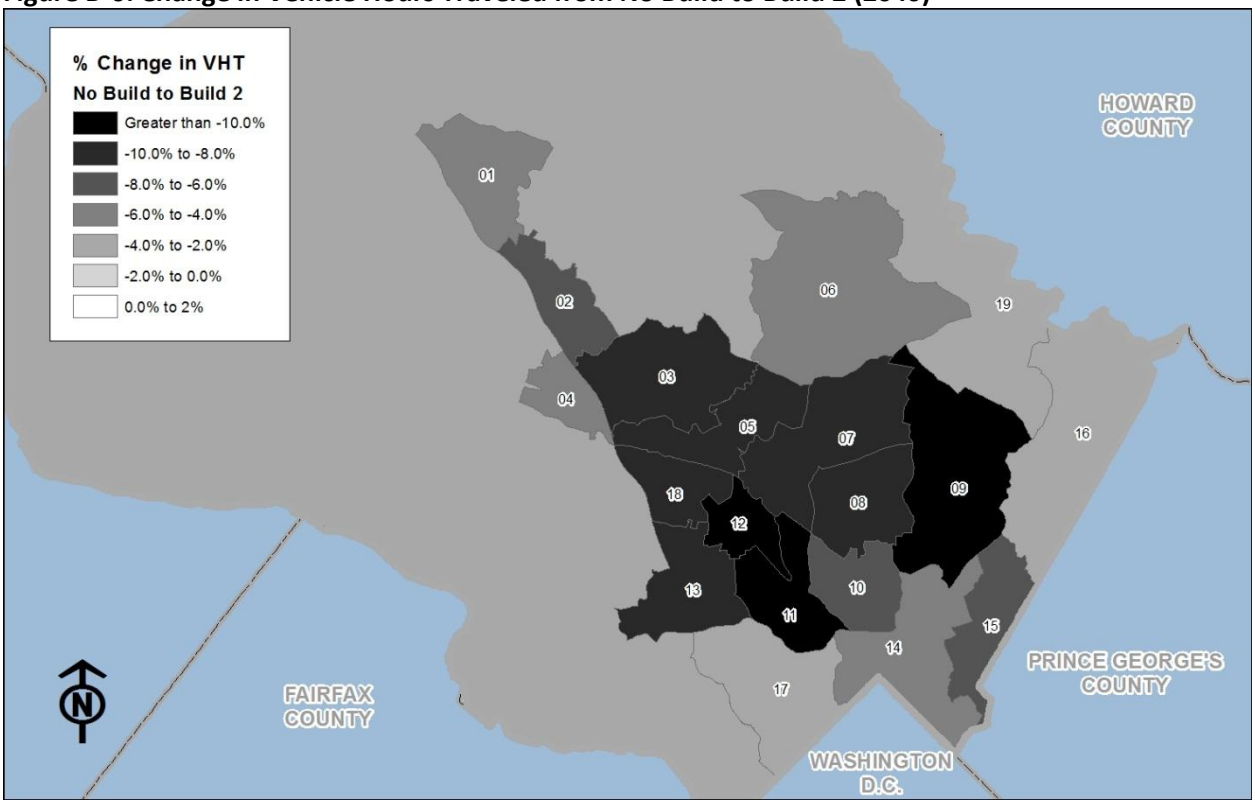
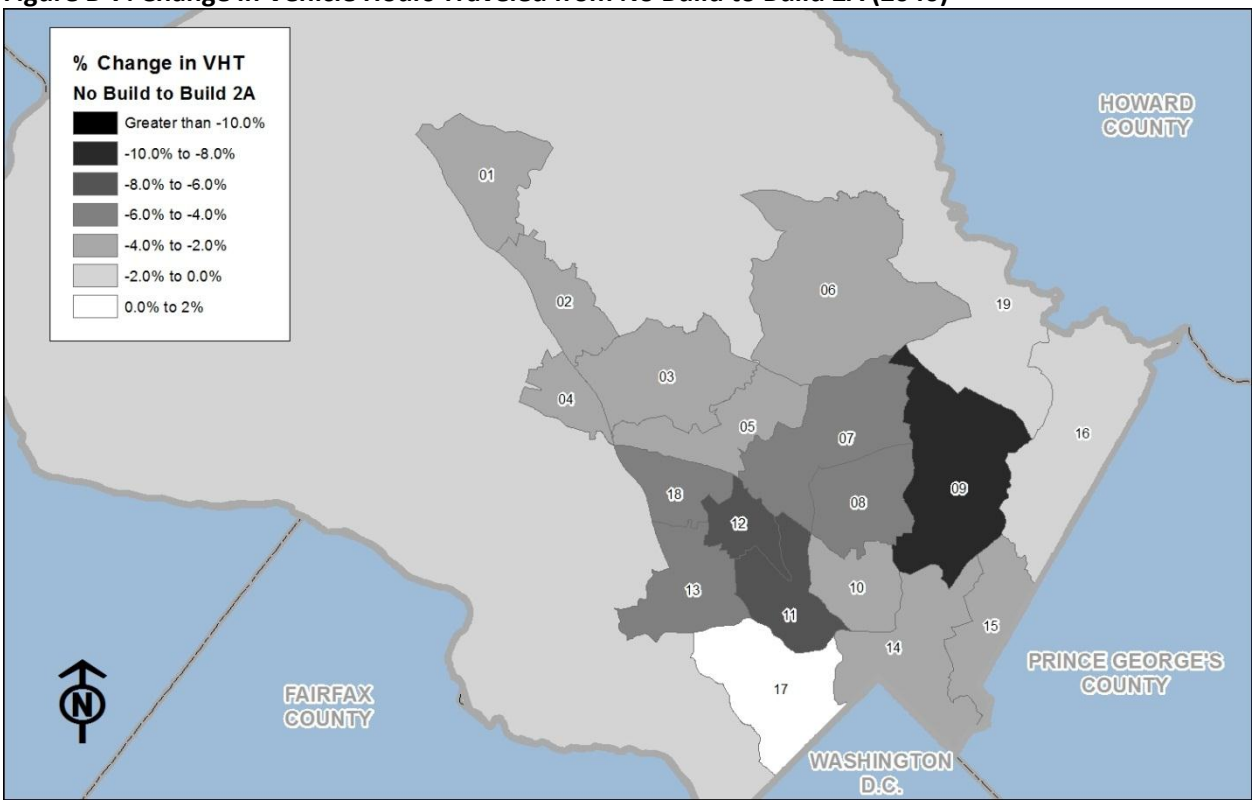


Figure B-7: Change in Vehicle Hours Traveled from No Build to Build 2A (2040)



There are slight improvements in traffic speeds for each build scenario, ranging from 1.5 percent in Build 2A to 5.2. Traffic speeds improve in all districts except for Silver Spring (District 14) and Bethesda (District 17) in Build 2 and Build 2A and East Silver Spring (District 15) in Build 2A. The reductions in average speeds probably reflect the conversions of traffic lanes to dedicated bus lanes in these areas. The small decreases in traffic speeds must be weighed against the transit user benefits in these three districts.

Table B-4: Traffic Speeds (Average Weekday in 2040)

DISTRICT	Average Speed (mph)				Change in Average Speed from No-Build		
	No-Build	Build 1	Build 2	Build 2A	Build 1	Build 2	Build 2A
1	20.1	20.7	20.6	20.3	3.0%	2.6%	1.1%
2	7.8	8.2	8.2	8.0	5.7%	5.0%	2.1%
3	10.5	11.3	11.2	10.8	7.4%	6.9%	3.2%
4	12.6	13.3	13.2	12.9	5.6%	4.5%	2.0%
5	9.1	9.8	9.7	9.3	7.7%	6.6%	2.7%
6	14.8	15.4	15.4	15.1	4.0%	3.8%	1.8%
7	13.0	14.2	14.1	13.6	9.4%	8.6%	4.5%
8	10.7	11.7	11.6	11.1	9.1%	7.8%	3.4%
9	16.3	17.7	18.1	17.6	8.4%	10.6%	8.0%
10	11.5	12.3	12.2	11.8	6.8%	5.8%	2.4%
11	8.6	9.3	9.5	9.1	7.6%	9.6%	5.8%
12	7.2	7.8	7.8	7.5	8.1%	8.3%	5.0%
13	10.5	11.2	11.2	10.9	7.1%	7.1%	4.0%
14	9.2	9.7	9.2	9.0	5.1%	-0.5%	-2.2%
15	8.4	8.9	8.6	8.4	6.1%	1.7%	-0.4%
16	11.9	12.2	12.3	12.1	2.1%	2.7%	1.1%
17	7.2	7.5	7.1	6.9	4.4%	-1.5%	-3.4%
18	9.7	10.5	10.4	10.0	8.7%	7.3%	3.5%
19	13.0	13.4	13.3	13.1	3.2%	1.8%	0.6%
Total	**11.2**	**11.8**	**11.6**	**11.4**	**5.2%**	**3.8%**	**1.5%**

Highway trips are forecast to drop by between 0.9 percent (Build 2A) and 1.6 percent (Build 1 and Build 2), compared with the No-Build scenario for a typical weekday.

Table B-5: 2040 Highway Trips per Weekday in Montgomery County

	No-Build	Build 1	Build 2	Build 2A
# of highway trips	3,848,000	3,784,000	3,785,000	3,811,000
reduction in highway trips	--	64,000	63,000	37,000
% reduction in highway trips	--	1.6%	1.6%	0.9%

There are between 37,000 (Build 2A) and 64,000 (Build 1) new linked transit trips and between 73,000 (Build 2A) and 140,000 (Build 1) new transit boardings in Montgomery County.

Table B-6: 2040 Transit Trips per Weekday

	Build 1	Build 2	Build 2A
new linked transit trips in Montgomery County	63,800	62,500	37,100
new transit boardings in Montgomery County	140,400	134,400	73,000
new linked transit trips in region	74,400	71,700	41,500

Plan Appendix C
Corridor Descriptions

The following detailed descriptions of the specific conditions in each corridor include the rationale behind the treatment recommended, as well as the recommended changes from existing master plans. The ridership forecasts below reflect BRT forecasts only. Local bus ridership after the implementation of BRT was assumed for the purposes of this Plan to be an additional 20 percent of the BRT ridership.

Corridor 1: Georgia Avenue North

The Georgia Avenue North corridor extends from the Wheaton Metrorail Station to Olney. It includes the Georgia Avenue Busway, a master planned BRT facility between Glenmont and Olney, which is currently undergoing an extensive multi-year alternatives analysis under a partnership between Montgomery County and the State of Maryland.

Even under the most ambitious scenario (Build 1 and Build 2), much of the corridor is below the 1,000 pphpd threshold, though if additional land use is recommended in the ongoing Glenmont Sector Plan, the links south of Glenmont would likely see a slight increase in ridership. Ridership drops substantially with the Build 2A scenario because the portion of the corridor between Glenmont and Wheaton was tested with mixed traffic, and because other connecting corridors were also evaluated with runningway treatments that have the lower speeds associated with more curb lane and mixed traffic operations.

Therefore, because this corridor has relatively good existing bus ridership and because it links to three other corridors that will be recommended for enhanced treatments beyond those evaluated in the Build 2A scenario, this Plan recommends including Georgia Avenue North in the transit corridor network.

Table C-7 Link Ridership Forecast by Peak Hour/Peak Direction (2040) for Georgia Avenue North Corridor

From	To	Build 1	Build 2	Build 2A
Montgomery General Hospital	MD 108 and MD 97	0	0	0
MD 108 and MD 97	MD 97 and Hines Rd	150	150	75
MD 97 and Hines Rd	ICC park-and-ride	300	275	175
ICC park-and-ride	Park-and-ride lot—MD 28 and MD 97	550	525	200
Park-and-ride lot—MD 28 and MD 97	MD 97 and Rossmoor Blvd	700	650	225
MD 97 and Rossmoor Blvd	MD 97 and Bel Pre Rd	1,050	1,025	500
MD 97 and Bel Pre Rd	MD 97 and MD 185	1,050	925	525
MD 97 and MD 185	MD 97 and Hewitt Ave	975	925	525
MD 97 and Hewitt Ave	Glenmont Metro Station	1,200	1,150	725
Glenmont Metro Station	MD 97 and Randolph Rd	800	725	300
MD 97 and Randolph Rd	MD 97 and Arcola Ave	875	850	350
MD 97 and Arcola Ave	Wheaton Metro Station	900	875	350

Red = two-way median Busway Yellow = mixed traffic

The *Countywide Transit Corridors Functional Master Plan* recommends as a median busway because the right-of-way is available in the median for most of the corridor between Olney and Glenmont and because some of the connecting corridors are recommended for enhanced treatments that will increase their speeds over the Build 2A assumptions.

Several changes to existing master plan recommendations are recommended:

1. Extend the Georgia Avenue Busway with a one-lane median reversible busway between Glenmont and Wheaton to tie into the Veirs Mill Road and University Blvd corridors and to reflect the highly directional travel patterns in this corridor. Despite the duplication of Metrorail Red Line service in this segment, it is important from a network integrity standpoint to extend high-quality BRT service to the Wheaton Metro Station so that only a single transfer is needed to the other three transit corridors recommended in this Plan.
2. Change the current master plan recommendation from a two-lane median busway to a one-lane median busway between Spartan Road and Norbeck Road in the Olney Master Plan, to reflect travel patterns that are largely southbound in the morning and northbound in the evening.
3. Extend the Georgia Avenue Busway from Spartan Road to the planned transit center at Montgomery General Hospital. The section from Spartan Road to MD 108 would be a one-lane median busway, while the section on MD 108 and Prince Phillip Drive would operate in mixed traffic.

Table C-8 Corridor Recommendations for Georgia Avenue North

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan	
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes
Prince Phillip Drive	Brooke Farm Dr	MD 108	2	80	4	Mixed Traffic	80	4	0	0
Olney Sandy Spring Road	Prince Phillip Dr	Georgia Ave	4	150	4		150	4	0	0
Georgia Avenue	MD 108	Spartan Rd	4	120	4	Reversible One-Lane Median	121	4 + 1 bus	+1	+1 bus
Georgia Avenue	Spartan Rd	Old Baltimore Rd	4	150	4 + 2 bus		150	4 + 1 bus	0	-1 bus
Georgia Avenue	Old Baltimore Rd	Emory Ln	4 - 5	150	4 + 2 bus		150	4 + 1 bus	0	-1 bus
Georgia Avenue	Emory Ln	MD 28	5 - 6	150	6 + 2 bus		150	6 + 1 bus	0	-1 bus
Georgia Avenue	MD 28	Matthew Henson State Park	6	150	6 + 1 bus		150	6 + 1 bus	0	0
Georgia Avenue	Matthew Henson State Park	Weller Rd	6	120	6		130	6 + 1 bus	+10	+1 bus
Georgia Avenue	Weller Rd	Denley Rd	6	135	6 + 1 bus		135	6 + 1 bus	0	0
Georgia Avenue	Denley Rd	Layhill Rd	6	145	6 + 1 bus		145	6 + 1 bus	0	0
Georgia Avenue	Layhill Rd	500 ft south of Randolph Rd	6	170	6		170	6 + 1 bus	0	+1 bus
Georgia Avenue	500 ft south of Randolph Rd	Mason St	6	120	6		124	6 + 1 bus	+4	+1 bus
Georgia Avenue	Mason Street	400 ft north of Blueridge Ave	6	120	6		120	6 + 1 bus	0	+1 bus
Georgia Avenue	400 ft north of Blueridge Ave	Reedie Rd	6	120	6		129	6 + 1 bus	+9	+1 bus
Reedie Rd	Georgia Avenue	Veirs Mill Rd	2	70	2	Mixed Traffic	70	2	0	0

Corridor 2: Georgia Avenue South

In the Build 1 scenario, the Georgia Avenue South corridor was evaluated as a two-lane median busway for its entire alignment between Wheaton and the DC line. The link between Wheaton and the Silver Spring Transit Center generally resulted in ridership levels that exceed the 1,000 pphpd threshold. South of the transit center, ridership levels were generally well below this threshold.

Providing additional lanes for median BRT between Spring Street and the DC Line is infeasible due to right-of-way constraints and the existence of large buildings. Since there is additional capacity on 16th Street, which runs parallel to Georgia Avenue, the Build 2 scenario converted two existing general purpose lanes to bus curb lanes between 16th Street and the DC Line. This resulted in ridership that was slightly less than the Build 1 scenario. Initial evaluations show that while Georgia Avenue between Plyers Mill Road and Philadelphia Avenue will be heavily congested in 2040, the impacts associated with "lane repurposing" are minimal (see Appendix 3).

In the Build 2A scenario, the Georgia Avenue South corridor was evaluated with curb lanes for its entire length. Coupled with the removal of several BRT corridors in the proposed 150-mile network and a reduction in the speed assumptions for some portions of the corridors that were retained, the ridership on this corridor dropped substantially in the Build 2A scenario.

The corridor north of the Silver Spring Transit Center partially duplicates Metrorail Red Line service but retention of this segment in the network is important to maintain its integrity.

Table C-9 Link Ridership Forecast by Peak Hour/Peak Direction (2040) for Georgia Avenue South Corridor

From	To	Build 1	Build 2	Build 2A
Wheaton Metro Station	MD 97 and Dexter Ave	1,275	1,250	450
MD 97 and Dexter Ave	Forest Glen Metro Station	1,300	1,250	475
Forest Glen Metro Station	MD 97 and Seminary Rd	1,350	1,325	600
MD 97 and Seminary Rd	MD 97 and Cameron St	1,300	1,275	550
MD 97 and Cameron St	Silver Spring Transit Center	800	775	325
Silver Spring Transit Center	MD 97 and East West Hwy	450	400	100
MD 97 and East West Hwy	MD 97 and Eastern Ave	425	375	75

Red = two-way median busway Blue = curb lane

Therefore, since the ridership on the Georgia Avenue South corridor will likely be somewhere between the Build 2 and Build 2A corridors, the *Countywide Transit Corridors Functional Master Plan* recommends the following:

- Wheaton Station and 16th Street: While there is good ridership forecast for this segment, the very high traffic volumes make it difficult to meet the lane-repurposing test. And the roadside development makes it difficult to expand the roadway without removing the off-street parking for many of the single-family homes in this segment. Given the additional consideration of duplication of Metrorail service, we believe that it would be best to implement BRT service in the near term as a mixed traffic operation, but consider a median busway as part of an area master plan update, at which time additional issues such as pedestrian safety, aesthetics, poor sidewalk and bikeway facilities can be considered in more detail.
- 16th Street and Colesville Road: Curb lanes achieved by repurposing existing lanes because:
  - Capacity of Traffic Lane: The lane capacity in this section is estimated to be 800 vehicles per hour.
  - Forecast Transit Ridership: The ridership is likely to be somewhere between the Build 2 and Build 2A ridership and would be higher with the potential future implementation of a median busway between Wheaton Station and 16th Street, as discussed above. In addition, if this segment is implemented as a curb lane busway, then the local bus ridership would further increase ridership in the bus lanes.
  - Parallel Corridor: There is excess capacity on 16th Street for through traffic displaced from Georgia Avenue.
- Wayne Avenue and the DC line: This corridor segment currently accommodates MetroExtra express bus service to downtown Washington DC; dedicated bus lanes would facilitate that service in the near- to mid-term in either the median or on the curb lanes. In the long term, the District of Columbia is planning streetcar service on Georgia Avenue. Their current plan is for the line to turn at Butternut Street at the entrance to the former Walter Reed hospital and serve the Takoma Metro Station. Their consultant has recommended that the line be extended instead up to the Silver Spring

Transit Center, as the Montgomery County Council has requested. Should the streetcar line be extended to Silver Spring, the repurposed travel lanes recommended by this Plan could be used to facilitate that service.

Table C-10 Corridor Recommendations for Georgia Avenue South

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
Georgia Avenue	Veirs Mill Rd	Dennis Ave	6	120	6	Mixed Traffic	120	6	0	0	N
Georgia Avenue	Dennis Ave	I-495	6	110	6		110	6	0	0	N
Georgia Avenue	I-495	Flora Ln	7	120	6		120	6	0	0	N
Georgia Avenue	Flora Ln	16th St	7	120	7		120	7	0	0	N
Georgia Avenue	16th St	Spring St	6	120	6	Curb Lanes	122	4 + 2 bus	2	-2 general +2 bus	Y
Georgia Avenue	Spring St	Colesville Rd	6	126	6		126	4 + 2 bus	0	-2 general +2 bus	Y
Wayne Avenue	Colesville Rd	Georgia Ave	2	120	4	Mixed Traffic	120	4	0	0	N
Georgia Avenue	Wayne Ave	Blair Mill Rd	6	120-140	6	Curb Lanes	125-140	4 + 2 bus	5 max.	-2 general +2 bus	Y
Georgia Avenue	Blair Mill Rd	DC Line	6	125	6		125	4 + 2 bus	0	-2 general +2 bus	Y

Corridor 3: MD 355 North

The MD 355 North corridor is the second highest daily ridership corridor evaluated in this Plan. For the Build 1 scenario, it was evaluated as two-lane median busway, and resulted in a corridor-wide daily ridership of 34,000 riders, with ridership for most of the corridor above 1,000 pphpd, and over 2,000 pphpd south of Gaithersburg. Ridership drops slightly in the Build 2 scenario, which evaluated portions of the corridor between Ridge Road and Middlebrook Road as curb lanes.

For the Build 2A scenario, the portion of the corridor north of Shakespeare Blvd was dropped because of low forecast ridership. Tying instead into the Corridor Cities Transitway (CCT) should increase the need for Phase 3 of the CCT up to Clarksburg Town Center. Under this scenario daily ridership dropped to 21,500, and the link volumes also dropped, but to levels that still warrants BRT service for most of the corridor.

Table C-11 Link Ridership Forecast by Peak Hour/Peak Direction (2040) for MD 355 North Corridor

From	To	Build 1	Build 2	Build 2A
Snowden Farm Pkwy and Stringtown Rd	Snowden Farm Pkwy and Foreman Blvd	175	175	Not Tested
Snowden Farm Pkwy and Foreman Blvd	Midcounty Hwy and Ridge Rd	500	475	
Midcounty Hwy and Ridge Rd	MD 355 and Shakespeare Blvd	675	650	
MD 355 and Shakespeare Blvd	MD 355 and MD 118	1,325	1,250	625
MD 355 and MD 118	MD 355 and Middlebrook Rd	1,500	1,375	675

MD 355 and Middlebrook Rd	MD 355 and Professional Dr	1,825	1,700	875
MD 355 and Professional Dr	MD 355 and MD 124	2,000	1,875	925
MD 355 and MD 124	MD 355 and Odendhal Ave	2,075	1,925	1,000
MD 355 and Odendhal Ave	MD 355 and Brookes Ave	2,275	2,125	1,075
MD 355 and Brookes Ave	MD 355 and Education Blvd	2,125	1,975	1,200
MD 355 and Education Blvd	MD 355 and Shady Grove Rd	2,500	2,325	1,500
MD 355 and Shady Grove Rd	MD 355 and King Farm Blvd	2,450	2,275	1,450
MD 355 and King Farm Blvd	MD 355 and Gude Dr	2,275	2,100	1,200
MD 355 and Gude Dr	MD 355 and Mannakee St	2,250	2,075	1,175
MD 355 and Mannakee St	Rockville Metro Station (west entrance)	2,325	2,150	1,250
Average Daily Ridership (entire corridor)		**34,100**	**32,475**	**21,550**

Red = two-way median busway Blue = curb lane

The *Countywide Transit Corridors Functional Master Plan* recommends including this corridor as a mixed traffic transitway north of Shakespeare Boulevard, where forecast ridership is not strong but where additional service to Clarksburg is desired. South of Shakespeare Boulevard, the Plan recommends a two-way median busway because of the high ridership potential and recommends lane repurposing in the following segments:

- Game Preserve Road to the Corridor Cities Transitway—lane repurposing is recommended because BRT is anticipated to provide greater person-throughput
- 1,000 feet south of Indianola Road to 270 feet north of North Campus Drive—lane repurposing is recommended because traffic congestion will still be within an acceptable range
- just south of O'Neill Drive to 1,250 feet south of Shady Grove Road—lane repurposing is recommended because BRT is anticipated to provide greater person-throughput.

Table C-12 Corridor Recommendations for MD 355 North

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
MD355	Redgrave Pl	Little Seneca Creek	2	120	4	Mixed Traffic	120	4	0	0	N
MD355	Little Seneca Creek	Shakespeare Blvd	4	250	6		250	6	0	0	N
Seneca Meadows Parkway	Corridor Cities Transitway	Observation Dr	4	130	4	Two-Lane Median	130	4 + 2 bus	0	+2 bus	N
Shakespeare Boulevard	Observation Dr	MD 355	4	100	4		123	4 + 2 bus	0	+2 bus	N
MD 355	Shakespeare Blvd	Game Preserve Rd	6	250	6		250	4 + 2 bus	0	+2 bus	Y
MD 355	Game Preserve Rd	just south of O'Neil Dr	6	Gaithersburg		Two-Lane Median*			Gaithersburg		N

MD 355	Just south of O'Neil Dr	1250 ft south of Shady Grove Rd	6	150	6	Two-Lane Median	150	4 + 2 bus	0	- 2 general +2 bus	Y
MD 355	1250 ft south of Shady Grove Rd	Ridgemont Av	6	Rockville		Two-Lane Median*			Rockville		N
MD 355	Ridgemont Ave	Indianola Rd	6	120	6	Mixed Traffic	123	4+2 bus	+3	- 2 general +2 bus	Y
MD 355	Indianola Rd	1000 ft south of Indianola Rd	6	Rockville		Two-Lane Median*			Rockville		N
MD 355	1000 ft south of Indianola Rd	270 ft north of N. Campus Dr	6	150	6	Two-Lane Median	150	4 + 2 bus	0	- 2 general +2 bus	Y
MD 355	270 ft north of N. Campus Dr	Church St	6	Rockville		Two-Lane Median*			Rockville		N

* 2040 forecast ridership for the segments of MD355 within the Cities of Rockville and Gaithersburg warrants a two-lane median busway, however this Functional Plan cannot make changes or require dedication within those jurisdictions. The recommendation for a median busway can only become effective upon master plan changes made by those jurisdictions that would include recommendations on the right-of-way and the number of travel lanes.

Corridor 4: MD 355 South

The MD 355 South corridor has the highest daily ridership forecast for any corridor evaluated in this Plan. For the Build 1 scenario it was evaluated as two-lane median busway, and resulted in a corridor-wide daily ridership of 49,000 riders, with ridership above 1,500 pphpd throughout, and over 2,000 pphpd between the Rockville and Medical Center Metrorail stations. Ridership drops slightly in the Build 2 scenario, which evaluated the corridor south of Cedar Lane as curb lanes to reflect right-of-way impacts.

For the Build 2A scenario, the portion of the corridor south of the Grosvenor Metrorail station was evaluated as curb lanes. Overall, the corridor's ridership forecast was only slightly impacted, perhaps because some of riders switched to the MD 355 South corridor when the Old Georgetown Road South corridor was removed in the Build 2A scenario. This remains the highest performing corridor.

Table C-13 Link Ridership Forecast by Peak Hour/Peak Direction (2040) for MD 355 South Corridor

From	To	Build 1	Build 2	Build 2A
Rockville Metro Station (west entrance)	MD 355 and Edmonston Dr	1,975	1,800	1,425
MD 355 and Edmonston Dr	MD 355 and Halpine Rd	2,100	1,825	1,450
MD 355 and Halpine Rd	MD 355 and Hubbard Dr	2,375	2,075	1,725
MD 355 and Hubbard Dr	White Flint Metro Station	2,200	1,925	1,550
White Flint Metro Station	MD 355 and Security Ln	2,275	2,100	2,225
MD 355 and Security Ln	Grosvenor Metro Station	2,050	1,875	2,100
Grosvenor Metro Station	MD 355 and Pooks Hill Rd	2,125	1,950	2,000
MD 355 and Pooks Hill Rd	MD 355 and Cedar Ln	2,075	1,925	1,975
MD 355 and Cedar Ln	Medical Center Metro Station	2,000	1,825	1,900
Medical Center Metro Station	MD 355 and Cordell Ave	1,875	1,750	1,775
MD 355 and Cordell Ave	Bethesda Metro Station	1,825	1,700	1,775
Bethesda Metro Station	Bradley Blvd and MD 355	1,675	1,400	1,125
Bradley Blvd and MD 355	Friendship Heights Metro	1,550	1,450	1,175
Average Daily Ridership (entire corridor)		**48,750**	**46,025**	**43,875**

Red = two-way median busway Blue = curb lane

Much of this corridor duplicates existing Metrorail service on the Red Line, but we believe that this corridor retains importance for several reasons.

- Impact on the Red Line: While the Red Line ridership drops by between 14,000 and 23,000 riders, this only represents between 25 percent and 32 percent of BRT ridership on the Georgia Avenue and MD 355 South corridors. The ridership on these corridors is overwhelmingly new transit patrons.
- Additional stations: There are potential stations areas in between Red Line stations, including White Flint Mall, Pooks Hill, Cedar Lane, Woodmont Triangle, and Bradley Boulevard.
- Connectivity: BRT to Bethesda provides a direct connection to the Purple Line, eliminating one transfer.

Table C-14 Red Line Ridership Reduction as Percent of MD 355 and Georgia Ave BRT Ridership

Corridor	Build 1	Build 2	Build 2A
MD 355 South	48,700	46,000	43,900
Georgia Avenue North/South	24,300	23,700	12,300
Red Line reduction	23,100	21,700	13,900
Red Line reduction as % of BRT	32%	31%	25%

Therefore, because of the high ridership potential for this corridor, the moderate impact on the Red Line, connectivity to the Purple Line, and the potential for new stations, the *Countywide Transit Corridors Functional Master Plan* includes the MD 355 South corridor, with the following treatment recommendation:

- Two-lane median busway from Church Street to Bradley Blvd to accommodate the large ridership forecasts.
  - The portion of the corridor between Church Street and just south of Hubbard Street is in the City of Rockville and will need to be included in Rockville's ongoing master plan update. We envision retaining a typical section consistent with the White Flint Sector Plan.
  - The portion of the corridor between just south of Hubbard Street and Bou Avenue will be the subject of the White Flint 2 Sector Plan and the two-way median busway should be incorporated into this functional plan through that sector plan. We envision retaining a typical section consistent with the White Flint Sector Plan.
  - From Bou Avenue to Hillery Way: Retain the White Flint Sector Plan typical section.
  - From Hillery Way to I-495: Implement a two-way median busway.
  - Two-lane median busway from I-495 to Bradley Boulevard This portion of the corridor has constrained right-of-way and the busway should be implemented by repurposing two existing traffic lanes to the busway. Lane repurposing is justified because the forecast transit volumes between the Bethesda and Grosvenor Metrorail stations exceeds the lane capacity.
- For the portion of the corridor south of Bradley Boulevard, implement curb bus lanes. This portion of the corridor had lower ridership than the rest, but if coordinated with District of Columbia traffic and bus operations, a two-way median busway could be feasible.

Replacement of the curb lanes south of Bradley Boulevard with a two-way median busway could be considered within the context of a future area master plan update.

Table C-15 Corridor Recommendations for MD 355 South

Road	To	From	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
MD 355	Church St	Halpine Rd	6	Rockville		Two-Lane Median*			Rockville		N
MD 355	Halpine Rd	250 ft south of Twinbrook Pkwy	6								
MD 355	250 ft south of Twinbrook Pkwy	200 ft south of Hoya St	6	134	6	Two-Lane Median	150 (162)**	6	+16 (28)	+2 bus	N
MD 355	200 ft south of Hoya St	Edson Ln	6	150 (162)**	6 + 2 bus		150 (162)**	6 + 2 bus	0	+2 bus	N
MD 355	Edson Ln	Hillery Wy	6	150 (162)**	6 + 2 bus		150 (162)**	6 + 2 bus	0	+2 bus	N
MD 355	Hillery Wy	Grosvenor Ln	6	150	6		150	6 + 2 bus	0	+2 bus	N
MD 355	Grosvenor Ln	I-495	6	200	6		200	6 + 2 bus	0	+2 bus	N
MD 355	I-495	Cedar Ln	6	120	6		120	4 + 2 bus	0	-2 general +2 bus	Y
MD 355	Cedar Ln	Woodmont Ave	6	120	6		123	4 + 2 bus	+3	-2 general +2 bus	Y
MD 355	Woodmont Ave	Chestnut St	6	120	6		120	4 + 2 bus	0	-2 general +2 bus	Y
MD 355	Chestnut St	Bradley Blvd	6	120	6		122	4 + 2 bus	+2	-2 general +2 bus	Y
MD 355	Bradley Blvd	Nottingham Dr	6	120	6	Curb Lanes	122	4 + 2 bus	+2	-2 general +2 bus	Y
MD 355	Nottingham Drive	Drummond Ave	6	120	6		120	4 + 2 bus	0	-2 general +2 bus	Y
MD 355	Drummond Avenue	Oliver St	6	120	6		120	4 + 2 bus	0	-2 general +2 bus	Y
MD 355	Oliver Street	Western Ave	6	120	6		122	4 + 2 bus	+2	-2 general +2 bus	Y

* 2040 forecast ridership for the segments of MD355 within the City of Rockville warrant a two-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The recommendation for a median busway can only become effective upon adoption of the current draft Rockville's Pike Plan or a subsequent City master plan update that would include recommendations on the right-of-way and the number of travel lanes.

** The Rockville Pike 150-foot right-of-way can be expanded to 162 feet (additional space to be obtained through reservation).

Corridor 5: New Hampshire Avenue

The Build 1 scenario evaluated a two-lane median busway on the entire alignment of New Hampshire Avenue. Its daily ridership is forecast to be about 22,000 passengers. Link ridership between the Fort Totten Metro station and the Takoma/Langley Transit Center exceeded 1,600 pphpd, from the transit center to Northampton Drive it exceeds the 1,000 pphpd threshold, and generally trails off below the pphpd threshold to the north.

Because the large forecast ridership south of the transit center exceeded the traffic lane capacity of the road (1,450 people), the Build 2 scenario evaluated converting two existing general purpose lanes to bus curb lanes. This resulted in ridership that was slightly less than the Build 1 scenario though still high enough to justify lane repurposing. Initial evaluations show that lane repurposing actually improves traffic along portions of this link, but that finding will need to be confirmed with more detailed analysis. The Build 2 scenario had a daily ridership of about 21,000 passengers, with the links to the south of Northampton Drive experiencing the highest link volumes.

Build 2A evaluated busway recommendations specifically based on the Build 2 ridership results. Links with ridership above 1,000 pphpd were tested as curb lanes, while links below 1,000 pphpd were tested in mixed traffic. The link to the north of US 29 was not retained due to its very low (below 300 pphpd) ridership. The resulting analysis however showed that these changes made what was previously a very good corridor south of US 29 into a marginal corridor. The final recommendations seek to retain the higher forecast ridership by increasing the speed along the corridor, via a higher level of treatment, and adding back the portion north of the White Oak Transit Center as a mixed traffic segment.

Table C-16 Link Ridership Forecast by Peak Hour/Peak Direction (2040) for New Hampshire Ave Corridor

From	To	Build 1	Build 2	Build 2A
Colesville Park and Ride Lot	MD 650 and Randolph Rd	75	50	Not Tested
MD 650 and Randolph Rd	MD 650 and Valleybrook Dr	275	300	
MD 650 and Valleybrook Dr	MD 650 and Jackson Rd	350	275	
MD 650 and Jackson Rd	White Oak Transit Center	375	300	
White Oak Transit Center	FDA White Oak Campus	650	550	50
FDA White Oak Campus	MD 650 and Powder Mill Rd	775	650	25
MD 650 and Powder Mill Rd	MD 650 and Oakview Dr	825	725	150
MD 650 and Oakview Dr	MD 650 and Northampton Dr	875	750	175
MD 650 and Northampton Dr	Takoma/Langley Park Transit Center	1,125	1,025	400
Takoma/Langley Park Transit Center	MD 650 and MD 410	1,600	1,475	700
MD 650 and MD 410	MD 650 and Eastern Ave	1,750	1,600	875
MD 650 and Eastern Ave	Ft. Totten Metro Station	1,625	1,475	875
Average Daily Ridership (entire corridor)		**21,975**	**20,825**	**9,925**

Red = two-way median busway Blue = curb lane Yellow = mixed traffic

Therefore, because this corridor has the potential to reach high ridership levels, especially between DC and Northampton Drive, and because the segment north of US 29 provides an important source of ridership for the corridor, the *Countywide Transit Corridors Functional Master Plan* makes recommendations for the New Hampshire Avenue corridor as follows:

- Provide a two-lane median busway from the DC line to the Takoma/Langley Transit Center at University Blvd with lane repurposing. Lane repurposing is justified because the recommended treatments are likely to lead to ridership levels that exceed the traffic lane capacity of 1,200 persons, and to match the four lane configuration on the DC side of New Hampshire Avenue.
- Provide a one-lane median reversible busway from Northampton Drive to the White Oak Transit Center at Lockwood Drive to reflect the highly directional travel patterns in the corridor.
- Retain the link from the Colesville park-and-ride to the White Oak Transit Center in the corridor as mixed traffic. While the ridership forecast on this link would not warrant BRT if it was a stand-alone corridor, it is important to retain because it will improve the corridor-wide ridership by as much as 300 pphpd, while resulting in only minimal changes to the right-of-way.

Additionally, the ongoing *White Oak Science Gateway Master Plan* is considering substantially more land use in the vicinity of the White Oak Shopping Center and the Burnt Mills Shopping Center/Labor College site. An evaluation of the potential land use changes show that it would have a positive, though moderate impact on the ridership on the New Hampshire Avenue corridor. Combined with the

extension of BRT to the Colesville park-and-ride, the resulting ridership is likely to be closer to the Build 2 scenario then the Build 2A scenario.

Table C-17 Corridor Recommendations for New Hampshire Avenue

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
New Hampshire Avenue	Colesville park-and-ride	Lockwood Dr	6	120	6	Mixed Traffic	120	6	0	0	N
New Hampshire Avenue	Lockwood Dr	Oaklawn Dr	6	120	6	Reversible One-Lane Median	130*	6 + 1 bus	10	+1 bus	N
New Hampshire Avenue	Oaklawn Dr	Powder Mill Rd	6	120	6		120-130*	6 + 1 bus	0-10	+1 bus	N
New Hampshire Avenue	Powder Mill Rd	I-495	6	120	6		130*	6 + 1 bus	10	+1 bus	N
New Hampshire Avenue	I-495	Northampton Dr	6	150	6-8		150	6 + 1 bus	0	+1 bus	N
New Hampshire Avenue	Northampton Dr	University Blvd	6	Prince George's County**		Reversible One-Lane Median**			Prince George's County**		N
New Hampshire Avenue	University Blvd	East West Hwy	6	150	6-8	Two-Lane Median***	150	4 + 2 bus	0	-2 general +2 bus	Y
New Hampshire Avenue	East West Highway	DC Line	6	150 in MC 100-120 in PGC	6-8 in MC 6 in PGC	Two-Lane Median****	150 in MC	4 + 2 bus	0	-2 general +2 bus	Y

* A bi-directional cycle track plus sidewalk should be considered on the east side in place of on-road bike lanes plus shared use path. In areas where severe right-of-way constraints exist however, consideration should be given to accommodating cyclists and pedestrians via a shared use path only.

**2040 forecast ridership for the segments of MD650 within Prince George's County warrant a one-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The recommendation for a median busway can only become effective upon adoption of a subsequent master plan update that would include recommendations on the right-of-way and the number of travel lanes.

*** The design of the typical section in this segment should be coordinated with the City of Takoma Park to ensure consistency with its New Hampshire Avenue Corridor Concept Plan to the extent possible.

**** The existing ROW for this segment is in Prince George's County, but the Takoma Park Master Plan 150' ROW extends into Montgomery County. The lesser Prince George's County ROW would need to be revised in their Master Plan to implement the ultimate typical section, which should be coordinated with the City of Takoma Park to ensure consistency with its New Hampshire Avenue Corridor Concept Plan to the extent possible.

Corridor 6: North Bethesda Transitway

The North Bethesda Transitway has been conceived of as a spur from the Metrorail Red Line to the Rock Spring area at least as far back as 1992, when it was recommended in the North Bethesda / Garrett Park Master Plan. A study in the 1990s recommended implementing the transitway as a monorail. Starting at Montgomery Mall, it would pass through the Rock Spring area via Westlake Terrace, Fernwood Road and Rock Spring Drive, then head north on Old Georgetown Road. It heads east via the I-270 right-of-way, and emerges onto Tuckerman Lane near the North Bethesda Trail (Bethesda Trolley Trail). With the exception of Old Georgetown Road, much of the right-of-way is currently available through easements and dedications. There is a capital project to construct a transit center at the terminus of the transitway in Montgomery Mall.

Initial ridership forecasts in the Build 1 and Build 2 scenarios found low ridership, even though the corridor was evaluated with the speeds of a two-way median transitway. The ridership potential of the corridor appeared to be negatively affected by the two Old Georgetown Road corridors, which overlap with portions of the North Bethesda Transitway. In Build 2A, staff therefore removed the two Old Georgetown Road corridors, which had marginal ridership potential, and which have challenges in regards to right-of-way. The result was a doubling of ridership on the North Bethesda Transitway.

Table C-18: Link Ridership Forecast by Peak Hour/Peak Direction (2040) for North Bethesda Transitway

From	To	Build 1	Build 2	Build 2A
Montgomery Mall Transit Center	Rockledge Dr and Rock Spring Dr	175	175	300
Rockledge Dr and Rock Spring Dr	Rock Spring Dr and MD 187	475	475	1,025
Rock Spring Dr and MD 187	MD 187 and Tuckerman Ln	475	475	1,050
MD 187 and Tuckerman Ln	Tuckerman Ln and Sugarbush Ln	450	450	1,075
Tuckerman Ln and Sugarbush Ln	Grosvenor Metro Station	550	525	1,150
Average Daily Ridership (entire corridor)		**3,850**	**3,825**	**10,150**

Red = two-way median busway Blue = curb lane

The North Bethesda Transitway creates a connection between the Metrorail Red Line and Rock Spring, and positions the transitway so that it could be expanded to Tysons Corner and the Silver Line via the I-270 spur and I-495. Since the alignment of the transitway was identified before White Flint was envisioned as a major mixed-use center, it is important to revisit the assumptions behind the transitway.

The transfer point to the Red Line at the Grosvenor Metrorail Station in many ways is similar to the Fort Totten Metrorail Station. It would be a major transfer station at a rail station with relatively little land use. After the results of the Build 2A scenario were received, staff considered the merits of shifting the transfer station to one of the two Red Line stations at the end of Old Georgetown Road: White Flint or Bethesda.

A connection to White Flint was preferred because:

- The distance between the Montgomery Mall Transit Center and the proposed White Flint Metro station is about 2.7 miles whereas the distance to the Bethesda Metro station is about 4.5 miles.
- When the two Old Georgetown Road corridors were evaluated in Scenario 2, the Old Georgetown North corridor had the highest consistent ridership along Old Georgetown Road. (The Old Georgetown South corridor did show good ridership between Bethesda and NIH/Suburban Hospital, but the travel demand to the Rock Spring area was about half that of the Old Georgetown North corridor).
- If ultimately implemented as a connection to Tysons Corner, there is greater ridership potential from areas north of Grosvenor than to the south.

Once White Flint was selected as a potential new terminus of the North Bethesda Transitway it was necessary to evaluate it against the existing alignment along Tuckerman Road to the Grosvenor station. While the distance between the two Metro stations and the Rock Spring area is the same (about 2.7 miles) there are other advantages and disadvantages of shifting the alignment to White Flint.

Alignment to Grosvenor Metrorail Station:

- Most of the right-of-way along Tuckerman Lane is currently set aside in a transitway easement.
- It is closer to Bethesda.
- Monorail may not be a viable technology, due to its high cost and the inefficiencies of a proprietary technology. If planned as a BRT route, travel along the I-270 corridor may no longer be feasible, and would likely need to be routed along a greater portion of Tuckerman Lane.

Alignment to White Flint Metrorail Station:

- While there is only limited potential for a station along Tuckerman Road, a station at the intersection of Old Georgetown Road and Executive Boulevard could support greater land use.
- Greater ridership potential to White Flint: when both the Old Georgetown North corridor and the original North Bethesda Transitway corridor were evaluated together, the Old Georgetown North corridor had ridership ranging from 800-900 passengers on each link in Scenario 2. When the Old Georgetown North corridor was removed in Scenario 2A, the North Bethesda Transitway corridor link ridership captured 600 additional riders, increasing to 1,000 to 1,200. If the Old Georgetown North corridor was evaluated with the North Bethesda Transitway, its ridership would need to increase by only 200 to 300 riders to match the ridership of the North Bethesda Transitway in Scenario 2A. This ridership would likely come from the North Bethesda Transitway and the Old Georgetown Road South corridor.
- If the corridor is ultimately implemented as a connection to Tysons Corner, there is greater ridership potential from areas north of Grosvenor than to the south.
- A reversible one-lane median transitway could be implemented in a 120-foot section, the amount of right-of-way currently master-planned for Old Georgetown Road.

Therefore, the *Countywide Transit Corridors Functional Plan* recommends realigning the existing North Bethesda Transitway to follow the alignment of the Old Georgetown North corridor.

- The segment along Old Georgetown Road between Rockville Pike and Executive Boulevard should be implemented as a mixed traffic transitway to preserve the vision in the *White Flint Sector Plan*.

- The segment along Old Georgetown Road between Executive Boulevard and Rock Spring Drive should be implemented as a one-lane reversible transitway to reflect the highly directional travel patterns in this corridor.
- The segment between Old Georgetown Road and the Montgomery Mall should be included as a two-way transitway because the right-of-way is largely available through easements.

Table C-19: Corridor Recommendations for North Bethesda Transitway

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan	
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes
Old Georgetown Road	Rockville Pike	Executive Blvd	6	120	4	Mixed Traffic	120	4	0	0
Old Georgetown Road	Executive Blvd	Nicholson Ln	6	150	6	Reversible One-Lane Median	150	6 + 1 bus	0	+1 bus
Old Georgetown Road	Nicholson Ln	Tuckerman Ln	6	120	6		126	6 + 1 bus	+6	+1 bus
Old Georgetown Road	Tuckerman Ln	I-270	6	120	6		130	6 + 1 bus	+10	+1 bus
Old Georgetown Road	I-270	Rock Spring Dr	6	120	6		126	6 + 1 bus	+6	+1 bus
Rock Spring Drive	Old Georgetown Rd	Fernwood Rd	4	80*	4 + 2 bus	Two-Lane Side Running	80*	4 + 2 bus	0	0
Fernwood Road	Rock Spring Dr	Rockledge Dr	4	80*	4 + 2 bus		80*	4 + 2 bus	0	0
Westlake Terrace	Rockledge Dr	I-270	4	80*	4 + 2 bus		80*	4 + 2 bus	0	0

* Plus additional 40-foot-wide easement for side-running transitway

Corridor 7: Randolph Road

The Randolph Road corridor was evaluated as a two-way median busway in the Build 1 and Build 2 scenarios. Ridership forecasts show a corridor with about 16,000 riders per day, but with link ridership that hovers around the 1,000 pphpd threshold. The links between Glenmont and New Hampshire Avenue had the highest ridership and the links between New Hampshire Avenue and US 29 having the lowest ridership.

A test was performed to evaluate the potential ridership impacts of the ongoing *White Oak Science Gateway Master Plan* and the *Glenmont Sector Plan* on this corridor. The result was a substantial increase in ridership between US 29 and Glenmont (about 500 riders per link) and a moderate increase in ridership between Glenmont and White Flint (about 250 riders per link). The daily ridership increased to about 22,000 riders.

Due to limited right-of-way on Randolph Road and the large impacts to residential property if additional bus lanes were included in the master plan, Build 2A evaluated most of the corridor with the speeds of curb lanes. Along the local roads at the ends of the corridor, mixed traffic speeds were used to reflect the likelihood that additional lanes for BRT would not be provided. The results show significantly diminished ridership potential.

Table C-20: Link Ridership Forecast by Peak Hour / Peak Direction (2040) for Randolph Road Corridor

From	To	Build 1	Build 2	Build 2A
White Flint Metro Station	Randolph Rd and Lauderdale Dr	925	900	550
Randolph Rd and Lauderdale Dr	MD 586 and Randolph Rd	925	925	550
MD 586 and Randolph Rd	MD 185 and Randolph Rd	725	725	375
MD 185 and Randolph Rd	Randolph Rd and Bluhill Rd	800	800	350
Randolph Rd and Bluhill Rd	MD 97 and Randolph Rd	750	750	300
MD 97 and Randolph Rd	Glenmont Metro Station	675	725	250
Glenmont Metro Station	Glenallan Ave and Randolph Rd	1,075	1,125	650
Glenallan Ave and Randolph Rd	MD 650 and Randolph Rd	1,025	1,075	625
MD 650 and Randolph Rd	MD 650 and Fairland Rd	675	700	550
MD 650 and Fairland Rd	US 29 and Tech Rd	575	600	400
US 29 and Tech Rd	Industrial Pkwy and Tech Rd	25	25	0
Industrial Pkwy and Tech Rd	Industrial Pkwy and Water Tower	0	0	0
Average Daily Ridership (entire corridor)		**15,750**	**15,975**	**11,025**

Red = two-way median busway Blue = curb lane Yellow = mixed traffic

The *Countywide Transit Corridors Functional Master Plan* recommends including the Randolph Road corridor in mixed traffic for the following reasons:

- There would be substantial impacts from providing dedicated transit lanes, but this corridor has marginal ridership without a median busway.
- Eliminating the corridor altogether will negatively impact other connecting corridors, such as Georgia Avenue South.

The westernmost corridor segment would serve the planned White Flint MARC commuter rail station in addition to the Metrorail station. During facility planning, an alternative alignment along Nebel Street rather than Parklawn Drive should be considered if the at-grade Randolph Road crossing of the CSX tracks is retained. Land use decisions made during the White Flint 2 Sector Plan may also affect the desirability of one alignment over the other.

Table C-21: Corridor Recommendations for Randolph Road

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan	
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes
Randolph Road	US 29	Fairland Rd	4 / 5	80	4-5	Mixed Traffic	80	4-5	0	0
Randolph Road	Fairland Rd	Glenallen Ave	6	120	6		120	6	0	0
Glenallen Avenue	Randolph Rd	Layhill Rd	2	80	2		80	2	0	0
Glenallen Avenue	Layhill Rd	Georgia Ave	4	90	2		90	2	0	0
Randolph Road	Georgia Ave	Judson Rd	6	140	6		140	6	0	0
Randolph Road	Judson Rd	Lindell St	6	120	6		120	6	0	0
Randolph Road	Lindell St	Veirs Mill Rd	6	120	6		120	6	0	0
Randolph Road	Veirs Mill Rd	Dewey Rd	5 / 6	120	6		120	6	0	0
Randolph Road	Dewey Rd	Parklawn Dr	4 / 5	100	4		100	4	0	0
Parklawn Drive	Randolph Rd	Nebel St	4 / 5	80	4		80	4	0	0
Nicholson Lane	Nebel St	MD 355	4	90	4		90	4	0	0

Corridor 8: University Boulevard

In the Build 1 and Build 2 scenarios, the University Boulevard corridor was evaluated as a two-lane median busway for its entire alignment. The link between Wheaton and US 29 resulted in ridership levels that exceed the 1,000 pphpd threshold. East of the US 29 corridor, the forecast ridership drops. In the Build 2A scenario, the segment east of Arcola Avenue was evaluated as a mixed traffic transitway and the portion to the west was evaluated as curb lanes. As a result, the ridership dropped by between 400 and 600 riders per link along the entire corridor.

Table C-22: Link Ridership Forecast by Peak Hour / Peak Direction (2040) for University Blvd Corridor

From	To	Build 1	Build 2	Build 2A
Takoma/Langley Park Transit Center	MD 193 and Gilbert St	575	550	125
MD 193 and Gilbert St	MD 193 and East Franklin Ave	850	850	150
MD 193 and E Franklin Ave	US 29 and MD 193	925	900	175
US 29 and MD 193	MD 193 and Dennis Ave	1,050	1,025	425
MD 193 and Dennis Ave	MD 193 and Arcola Ave	1,050	1,050	450
MD 193 and Arcola Ave	MD 193 and Inwood Ave	1,250	1,225	675
MD 193 and Inwood Ave	MD 193 and Amherst Ave	1,300	1,275	750
MD 193 and Amherst Ave	Wheaton Metro Station	1,225	1,200	850

Red = two-way median busway Blue = curb lane Yellow = mixed traffic

While University Boulevard is not a very strong corridor, it does provide important east-west connectivity that supports the ridership along several other corridors that converge in Wheaton. Removing this corridor would negatively impact the ridership of the Veirs Mill Road, Georgia Avenue North, and Georgia Avenue South corridors. Therefore, this corridor is recommended to be included in the Functional Plan with a one-lane median reversible transitway from Georgia Avenue to Lorain Avenue, and then in mixed traffic between Lorain Avenue and New Hampshire Avenue. Permitting buses to operate in the Purple Line corridor would improve BRT operations but likely have adverse operational impacts on the Purple Line that would not be justified by the relatively low ridership on this corridor.

Table C-23: Corridor Recommendations for University Blvd

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
University Boulevard	Georgia Ave	Amherst Ave	6	120	6	Reversible One-Lane Median	129	6 + 1 bus	+9	+1 bus	N
University Boulevard	Amherst Ave	Dayton St	6	150	6		150	6 + 1 bus	0	+1 bus	N
University Boulevard	Dayton St	Easecrest Dr	6	120	6		124	6 + 1 bus	+4	+1 bus	N
University Boulevard	Easecrest Dr	Lorain Ave	6	120	6		124	6 + 1 bus	+4	+1 bus	N
University Boulevard	Lorain Ave	Piney Branch Rd	6	120	6	Mixed Traffic*	120	6	0	0	N
University Boulevard	Piney Branch Rd	Gilbert St	6	130	6 + 2 LRT		163**	5 + 2 LRT	+33	0	N
University Boulevard	Gilbert St	Seek Ln	6	130	6 + 2 LRT		150**,***	4 + 2 LRT	+20	0	N
University Boulevard	Seek Ln	Bayfield St	6	130	6 + 2 LRT		141**,***	4 + 2 LRT	+11	0	N
University Boulevard	Bayfield St	Carroll Ave	6	130	6 + 2 LRT		142**	4 + 2 LRT	+12	0	N
University Boulevard	Carroll Ave	Prince George's County line (east of 14th Ave)	6	120 (150)	6 + 2 LRT		120 (150)** in Montgomery County	4 + 2 LRT	0	0	N

*The right-of-way of University Boulevard from approximately 100 east of Merrimac Drive to New Hampshire Avenue is divided between Montgomery and Prince George's Counties.
** Additional right-of-way requirements for the Purple Line will be determined either at the time of final design for the Purple Line or at the time of subdivision using latest project-level plans available for the Purple Line.
***Up to an additional 10 ft is needed to accommodate wider medians and/or turn lanes at the intersections of University Boulevard/Gilbert Street and University Boulevard/Seek Lane.
****Up to an additional 10 ft is needed for a median at the intersection of University Boulevard/Seek Ln.

Corridor 9: US 29

The Build 1 scenario was evaluated as a two-way median busway. Its daily ridership was forecast to be about 18,000 riders per day, with link volumes ranging between 1,100 and 1,500 riders per day. The Build 2 scenario evaluated the corridor with a two-way median busway north of the US 29/Lockwood Drive intersection. South of this intersection, it was evaluated with curb lane speeds and lane repurposing. This reduced daily ridership to about 16,500 riders per day, with link volumes between 900 and 1,300 pphpd. In Build 2A, Lockwood Drive was evaluated with mixed traffic, which further reduced ridership.

A test was performed to evaluate the potential ridership impacts of the ongoing *White Oak Science Gateway Master Plan* and the *Glenmont Sector Plan* on this corridor. The result was a moderate increase in ridership along the corridor (between 100 and 200 riders per link).

Table C-24: Link Ridership Forecast by Peak Hour/Peak Direction (2040) for US 29 Corridor

From	To	Build 1	Build 2	Build 2A
Burtonsville park-and-ride	Briggs Chaney park-and-ride	425	350	225
Briggs Chaney park-and-ride	US 29 and Fairland Rd	1,075	925	700
US 29 and Fairland Rd	US 29 and Tech Rd	1,125	975	750
US 29 and Tech Rd	White Oak Transit Center	1,175	1,025	875
White Oak Transit Center	Lockwood Dr and Oak Leaf Dr	1,200	1,075	1,125
Lockwood Dr and Oak Leaf Dr	US 29 and Hillwood Dr	1,375	1,250	1,250
US 29 and Hillwood Dr	US 29 and MD 193	1,375	1,250	1,400
US 29 and MD 193	US 29 and Franklin Ave	1,400	1,275	1,425
US 29 and Franklin Ave	US 29 and Fenton St	1,450	1,325	1,475
US 29 and Fenton St	Silver Spring Transit Center	1,225	1,125	1,225
Average Daily Ridership (entire corridor)		**17,725**	**16,475**	**15,825**

Red = two-way median busway Blue = curb lane Yellow = mixed traffic

The *Countywide Transit Corridors Functional Master Plan* recommends including this corridor as follows:

- A two-way median busway north of Stewart Lane where the right-of-way is currently available.*
- Mixed traffic on Stewart Lane and Lockwood Drive because the existing roadway has only two lanes, but this recommendation is not intended to inhibit the continuation of express bus service along US29 through the New Hampshire Avenue interchange.
- Curb lanes between Lockwood Drive and Southwood Drive with lane repurposing because forecast ridership exceeds lane capacity.
- Mixed traffic between Southwood Avenue and Sligo Creek Parkway. This area experiences high traffic volumes due to vehicles entering and exiting I-495. (A mixed traffic operation is

recommended in this segment because of potential operational problems with curb bus lanes in the vicinity of the I-495 interchange, however the extension of dedicated lanes through this segment should be considered during facility planning.)

- Managed lanes between Sligo Creek Parkway and Georgia Avenue with lane repurposing. The six-lane roadway has lane controls to change the configuration according to the time of day: four lanes southbound and two lanes northbound during morning peak hours, two lanes southbound and four lanes northbound during evening peak hours, and three lanes in each direction during off-peak hours. Managed lanes would change this operation to have one dedicated lane in the peak direction during peak hours. Lane repurposing is justified because forecast ridership exceeds lane capacity. In addition, there is a lane drop north of Sligo Creek Parkway during peak hours in the peak direction.
- Curb lanes between Georgia Avenue and 16th Street with lane repurposing. Lane repurposing is justified because in this locations because the ridership forecast on this segment exceeds the lane capacity.

*During facility planning, the desirability of a spur connection along Cherry Hill Road to serve the development recommended in the White Oak Science Gateway Master Plan should be considered.

Table C-25: Corridor Recommendations for US 29

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan		Repurposing Existing Lanes?
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes	Y/N
US 29	MD 198	Stewart Ln	6	100-200	6	Two-Lane Median	161-200	6 + 2 bus	+61 max.	+2 bus	N
Stewart Lane	US 29	Lockwood Dr	2	80	2	Mixed Traffic	80	2	0	+2 bus	N
Lockwood Drive	Stewart Lane	New Hampshire Ave	2	80	2		80	2	0	+2 bus	N
Lockwood Drive	New Hampshire Ave	US 29	2	80	2		80	2	0	+2 bus	N
US 29	Lockwood Dr	Southwood Ave	6	120	6	Curb Lanes	122	4 + 2 bus	+2	+2 bus	Y
US 29	Southwood Ave	Sligo Creek Pkwy	6	120	6	Mixed Traffic*	120	6	0	0*	N*
US 29	Sligo Creek Pkwy	Spring St	6	120	6	Managed Lanes **	120	2 offpeak + 3 peak + 1 bus	0	0	Y**
US 29	Spring St	Fenton St	6	120	6		120	2 offpeak + 3 peak + 1 bus	0	0	Y**
US 29	Fenton St	Georgia Ave	6	100	6		100	2 offpeak + 3 peak + 1 bus	0	0	Y**
Colesville Road	Georgia Ave	East West Hwy	6	124	6	Curb Lanes	125	4 + 2 bus	+1	-2 general +2 bus	Y
Colesville Road	East West Hwy	16th St	6	125	6		125	4 + 2 bus	0	-2 general +2 bus	Y

* Dedicated lanes are desirable in these segments and the potential for lane-repurposing to achieve curb lanes should be considered during facility planning.

**The six existing general purpose lanes in these segments currently operate during peak hours as four in the peak direction and two in the off-peak direction; in off-peak hours, they operate as three lanes in each direction. This Plan recommends that the operation in peak hours be changed to one dedicated bus lane in the peak direction, three general purpose lanes in the peak direction, and two general purpose lanes in the off-peak direction.

Corridor 10: Veirs Mill Road

The Veirs Mill Road corridor is one of the corridors with the highest existing ridership in Montgomery County and has long been considered for bus enhancements. It is currently undergoing an extensive multi-year alternatives analysis under a partnership between Montgomery County and the State of Maryland that will recommend a BRT treatment. But because development along the corridor is low and ridership is not expected to grow significantly, this corridor does not rank among the top corridors that were evaluated for the 2040 forecast year. In the Build 1 and Build 2 scenarios, the corridor was evaluated as a median busway and that treatment was largely retained in Build 2A, except in the vicinity of Rockville, because of Veirs Mill Road's importance as an east-west connector even though forecast ridership falls below what normally would warrant dedicated lanes.

Combined with University Boulevard corridor, the Veirs Mill Road corridor has an average ridership of 26,500 for Build 1 and Build 2, but this drops to about 18,000 for Build 2A. Even under the most ambitious scenario (Build 1 and Build 2) its 2040 link ridership forecasts were just below the 1,000 pphpd threshold considered necessary for inclusion in the Functional Plan. Under the Build 2A scenario, ridership dropped to less than half of the 1,000 pphpd threshold.

Table C-26: Link Ridership Forecast by Peak Hour/Peak Direction (2040) for Veirs Mill Road Corridor

From	To	Build 1	Build 2	Build 2A
Wheaton Metro Station	MD 586 and MD 193	925	925	600
MD 586 and MD 193	MD 586 and Newport Mill Rd	875	900	575
MD 586 and Newport Mill Rd	MD 586 and MD 185	775	775	400
MD 586 and MD 185	MD 586 and Randolph Rd	750	775	400
MD 586 and Randolph Rd	MD 586 and Parkland Dr	800	825	425
MD 586 and Parkland Dr	MD 586 and Aspen Hill Rd	800	850	425
MD 586 and Aspen Hill Rd	MD 586 and Twinbrook Pkwy	725	775	350
MD 586 and Twinbrook Pkwy	MD 586 and Broadwood Dr	775	825	375
MD 586 and Broadwood Dr	MD 586 and Norbeck Rd	825	875	400
MD 586 and Norbeck Rd	Rockville Metro Station (west entrance)	825	850	400

Red = two-way median Busway Blue = curb lane Yellow = mixed traffic

Interestingly, the large reduction in ridership between Build 1/Build 2 and Build 2A occurs even though the evaluated treatments did not change substantially. This indicates that the Veirs Mill Road corridor is highly susceptible to changes on other corridors in the proposed BRT network. If other connecting corridors can be enhanced beyond the treatments evaluated in the Build 2A scenario, then the Veirs Mill Road corridor ridership will benefit. But because Veirs Mill Road is one of the few east-west corridors evaluated in the network, its removal would have a negative effect on the other corridors.

Therefore, because this corridor is a link between many corridors, because it has strong existing ridership, and because some of the connecting corridors will be recommended for enhanced treatments that will place them somewhere between the Build 2 and Build 2A ridership levels, it is recommended that this corridor be retained even though it may not be warranted as a stand-alone corridor.

The *Countywide Transit Corridors Functional Master Plan* recommends a bi-directional one-lane median busway, perhaps following the EmX model in Eugene, Oregon model, which relies on a single-lane busway with dual lanes at stations to facilitate passing.

This recommendation is based on several considerations:

- Network integrity: Even with low ridership, this corridor remains important because it connects the east and west sides of the county.
- Minimizing impacts to traffic and private property: Minimizing impacts is an important consideration for all corridors, but especially Veirs Mill Road, given its relatively low forecast increase in ridership over existing conditions. Therefore, a single bus lane rather than two lanes is desirable.
- No peak direction: While most corridors with low-density land use display existing travel patterns that are peak in one direction, this corridor is largely balanced in the eastbound and westbound directions. Therefore, the single median lane needs to be able to accommodate two-way travel.

More than any other corridor in the recommended network, more detailed study is needed to confirm the final desired treatment for this corridor. In addition to the considerations above, this corridor is also complicated by the following factors.

- The typical section is highly variable both in the number of travel lanes and in the presence of service roads on one, both, or neither side of Veirs Mill Road. These service roads provide parking for single-family homes, some of which have poor alternatives for off-street parking.
- The differences in vertical profile between the mainline of Veirs Mill Road and the service roads pose challenges to creating a consistent typical section that accommodates a median busway that requires roadway widening.
- The opening of Montrose Parkway East, whose construction is funded in the CIP, will greatly increase traffic demands on the segment of Veirs Mill Road between Randolph Road and Parkland Drive.
- The planned interchange at Randolph Road, which is directly adjacent to a commercial center and is the location of a BRT transfer station.

The County/State study currently underway will provide more detailed ridership forecasts and will recommend more detailed treatments. The conclusion of that study may result in a treatment that is different from the recommendations in this Functional Plan.

Table C-27: Corridor Recommendations for Veirs Mill Road

Road	From	To	Existing # of Lanes	Existing Master Plan		Recommendation			Change from Existing Master Plan	
				r.o.w.	Lanes	Treatment	r.o.w.	Lanes	r.o.w.	Lanes
Veirs Mill Road	MD 355	Meadow Hall Drive		Rockville		Mixed Traffic*			Rockville	
Veirs Mill Road	Meadow Hall Dr	Twinbrook Pkwy	5	150	4-6	Bi-directional One-Lane Median	150	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Twinbrook Pkwy	Parkland Dr	4	150	4-6		150	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Parkland Dr	Turkey Branch	5	150	4-6		150	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Turkey Branch	Gridley Rd	5	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Gridley Rd	Randolph Rd	6	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Randolph Rd	Ferrara Ave	5	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Ferrara Ave	Connecticut Ave	6	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Connecticut Ave	Newport Mill Rd	5 + 1	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Newport Mill Rd	Galt Ave	4 + 1	120	4-6		120	4 to 6, + 1 bus	0	+1 bus
Veirs Mill Road	Galt Ave	Ennalls Ave	5 + 1	120	6		129	6 + 1 bus	+9	+1 bus
Veirs Mill Road	Ennalls Ave	Wheaton Metro Station	4	120	6		129	6 + 1 bus	+9	+1 bus

* 2040 forecast ridership for the segment of Veirs Mill Road within the City of Rockville warrants a one-lane median busway, however this Functional Plan cannot make changes or require dedication within that jurisdiction. The median busway would only become effective upon adoption of a subsequent City Master Plan update that would include recommendations on the right-of-way and the number of travel lanes.

Appendix D: Travel Time Comparison

A comparison of travel times on sample corridors via BRT, local bus, and auto

Increases in transit ridership that are anticipated with the introduction of a network of BRT corridors are largely attributable to providing a service that is more attractive to potential transit riders. The service is more attractive for a number of reasons—primarily that it is faster than local bus service and in some cases (depending upon the configuration of the BRT runningway) approaches auto travel time for trips over the same corridor segments.

The assumed BRT speeds for the various transit corridor treatments were the key inputs in the transportation model. While adjustments were made to ensure network integrity, the forecast ridership levels for the corridor segments in the model results were the major factor in determining the final recommended corridor treatments.

An illustration of how bus travel time can vary with different runningway treatments and how those times compare with existing local bus travel time and existing auto travel time is provided below in Tables D-1 and D-2. There are three important qualifications to keep in mind when reviewing the data in the table.

- The table includes a comparison of modeled (future or year 2040) estimated travel times for BRT and existing travel times for local bus and auto.

- The two selected corridors and the segments within those corridors generally represent the two extremes of potential BRT treatments. The MD 355 (Rockville Pike/Wisconsin Avenue) corridor is representative of a two lane median treatment; the Georgia Avenue (MD 97) corridor is representative of mixed traffic and curb lane operation over one of the most congested segments in the County (and State).

- It's important to recognize that this comparison is being made with data from different sources.
  - Estimates of future BRT speeds are per the set of model inputs for the average bus speed for the designated treatment.
  - Existing local bus speeds are per the current bus timetable for the applicable bus route.
  - Existing auto travel times are per the average weekday peak hour (peak direction) for October 2012 as reported by INRIX.

Table D-1: MD 355 (Rockville Pike /Wisconsin Avenue) Speed and Time Comparison

Segment	BRT Treatment (length)	Existing/*Future* Auto Travel Time (min.)	Existing Ride On Route 46/ *Future Estimated BRT* Travel Time (min.)	Future Estimated BRT Average Speed (mph)	Comment
Rockville Metro to Medical Center Metro	two-lane median (6.73 miles)	na/*na*	40/*24.5*	16.5	Future BRT travel time will be 39% less than existing bus travel time
Rockville Metro to Bethesda Metro	Two-lane median (7.84 miles)	26/*36*	NA/*30.4*	15.5	Future BRT travel time will be 16% less than future auto travel time

Note that the above corridor segments overlap due to differences in the availability of data. Note also that the BRT treatment travel time includes dwell time for the bus at the BRT stations.

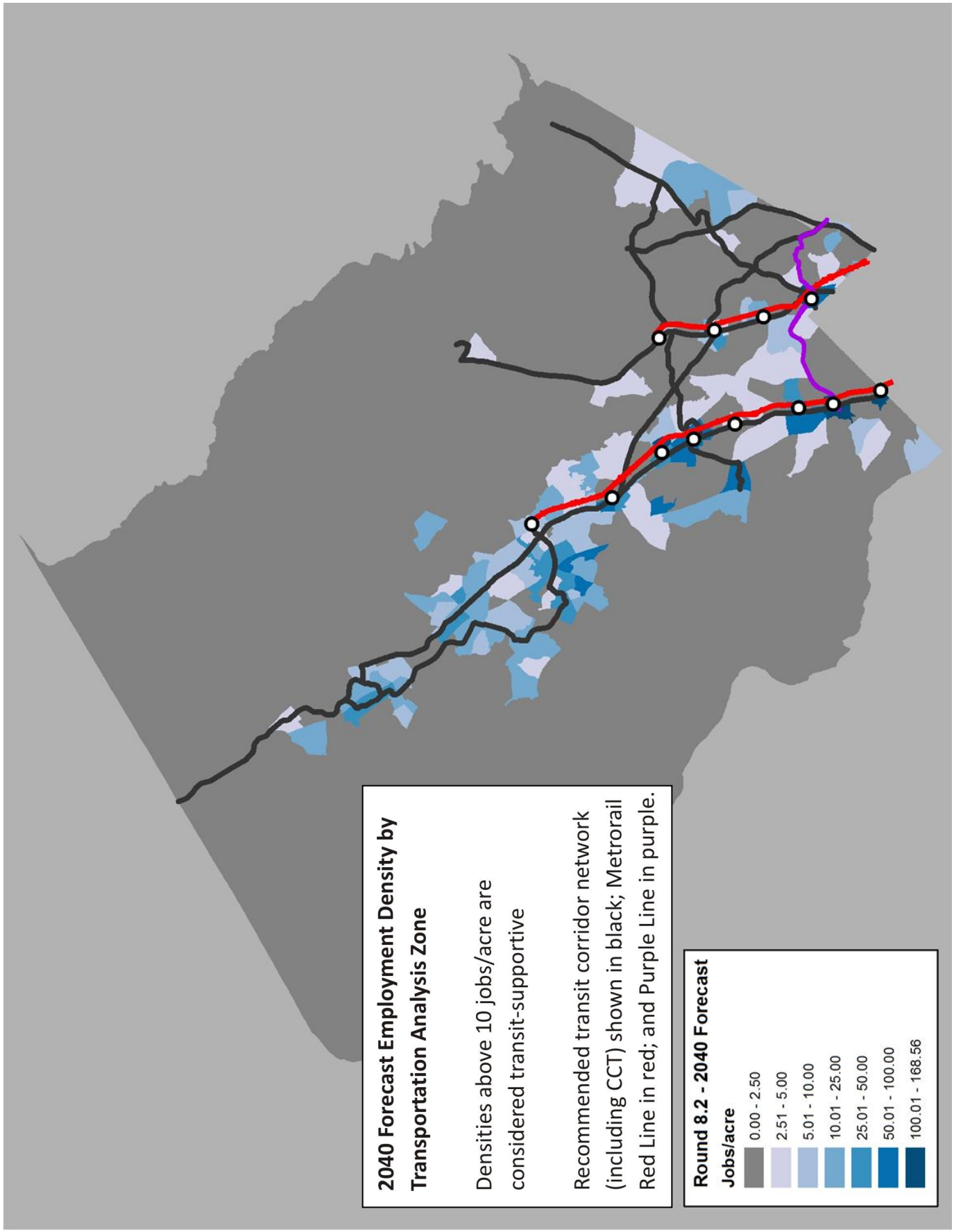
Table D-2: MD 97 (Georgia Avenue) Speed and Time Comparison

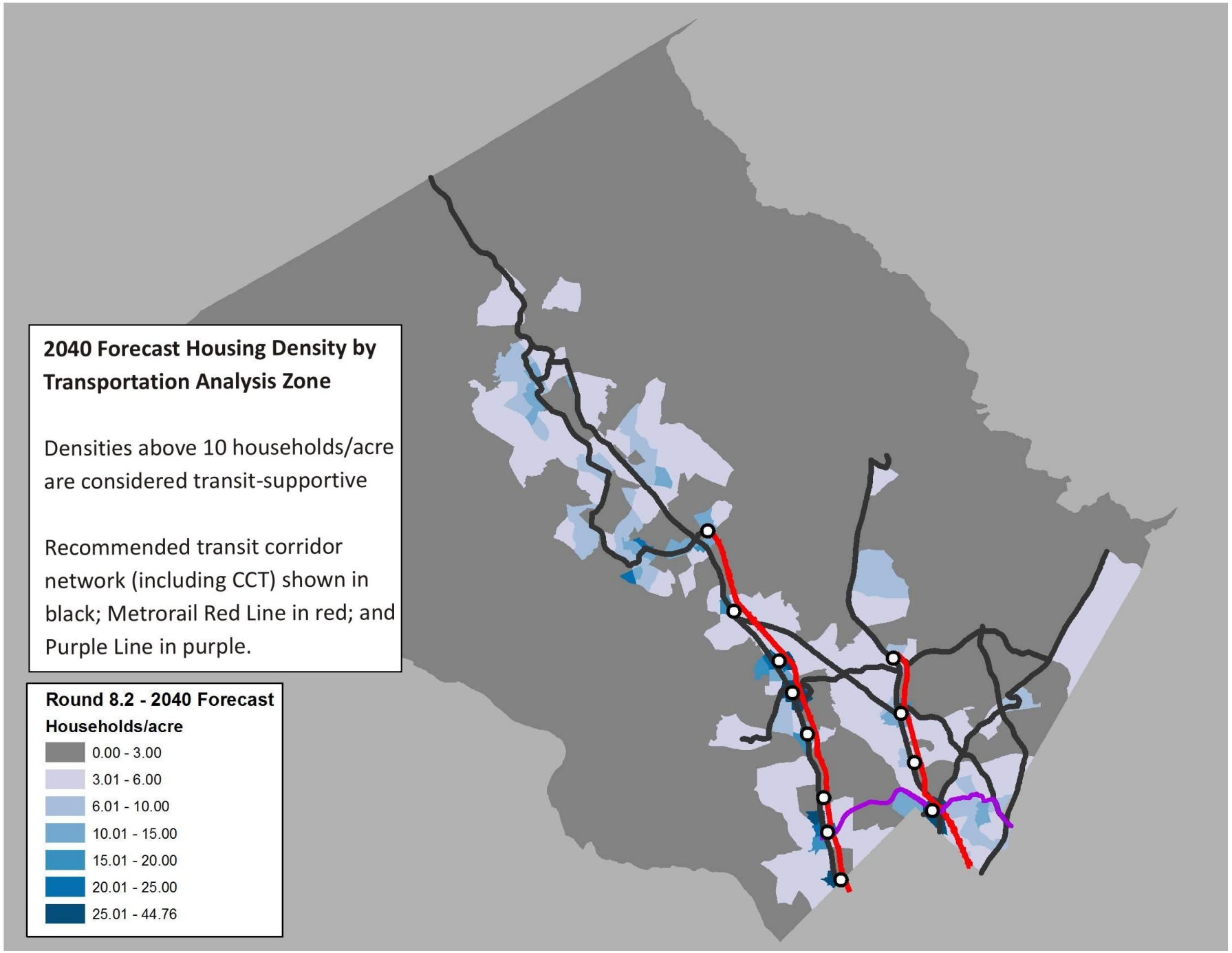
Segment	BRT Treatment	Segment Distance (mi.)	Existing/*Future* Auto Travel Time (min.)	Existing Ride On Route 46/ *Future Estimated BRT* Travel Time (min.)	Future Estimated BRT Segment Speed (mph)	Comment
Wheaton Metro to Seminary Road	Mixed Traffic	2.20	na/*na*	NA/***15.5***	8.5	
Seminary Road to Silver Spring Metro	Curb Lanes	1.34	na/*na*	NA/***7.2***	11.2	
Wheaton Metro to Silver Spring Metro	Mixed & Curb Lanes	3.54	9/***15***	18/***22.7***	9.4	Existing bus travel time is 100% greater than existing auto travel time; future BRT travel time will be 51% greater than future auto travel time

Again, it important to note that these estimates are, in some instances, comparing estimated speeds for a future BRT treatment against measured existing travel times and that the selected treatments represent opposite ends of potential treatments in terms of the level of service provided transit riders. The tables clearly identify the potential impacts different treatments have on speed and travel time, but due to the differences in data sources, the actual values cannot be confirmed.

Even though the estimated future BRT travel time for this segment of the Georgia Avenue corridor is greater than the estimated future auto travel time, ridership is forecast to increase. The forecast ridership increase may be more easily understood when considering the following.

- This corridor already has high levels of bus ridership, which will increase because of 2040 jobs and population increases.
- On corridors where WMATA has instituted MetroExtra service with shorter headways and longer stop spacing, ridership has increased by 25 to 30 percent.
- Wherever dedicated lanes can be provided, bus speed and reliability will improve and can be expected to increase ridership.
- Better buses, better stations, and faster boarding and alighting can also be expected to increase ridership.


2040 Forecast Employment Density by Transportation Analysis Zone
Densities above 10 jobs/acre are considered transit-supportive
Recommended transit corridor network (including CCT) shown in black; Metrorail Red Line in red; and Purple Line in purple.
Round 8.2 - 2040 Forecast
Jobs/acre
0.00 - 2.50
2.51 - 5.00
5.01 - 10.00
10.01 - 25.00
25.01 - 50.00
50.01 - 100.00
100.01 - 168.56


2040 Forecast Housing Density by Transportation Analysis Zone
Densities above 10 households/acre are considered transit-supportive
Recommended transit corridor network (including CCT) shown in black; Metrorail Red Line in red; and Purple Line in purple.
Round 8.2 - 2040 Forecast
Households/acre
0.00 - 3.00
3.01 - 6.00
6.01 - 10.00
10.01 - 15.00
15.01 - 20.00
20.01 - 25.00
25.01 - 44.76

Plan Appendix F Bikeway Accommodation

The staff draft of the *Countywide Transit Corridor Functional Master Plan* evaluated bikeway accommodations along all links recommended for a dedicated transitway (such as median lanes, curb lanes, or side-of-road lanes). Three policies were considered to determine whether the Functional Plan should recommend rights-of-way that would accommodate modifications or additions to planned bike facilities. Since right-of-way is constricted along most of the proposed BRT corridors, priority was given to these policies as follows.

The first priority was to include the **master planned bikeway recommendation**, whether this is a signed shared roadway, or a shared use path, bike lanes, or cycle tracks. This Functional Plan retains all master plan recommended bikeways.

The second priority was to include bike lanes based on the **Planning Board's bikeway policy**. This draft standard was recommended by the Planning Board on September 18, 2008 as part of the Context Sensitive Road Design Standards discussion. It states:

- Urban Major Highways, Arterials, and Minor Arterials
  - 5.5-foot wide bike lanes should be provided if specified in a Master Plan.
  - 14-foot wide curb lanes should be provided on all other major highways, arterials, and minor arterials.
- Suburban Major Highways, Arterials, and Minor Arterials
  - 5.5-foot wide bike lanes should be provided if specified in a Master Plan and should be provided on roads with average daily traffic (ADT) of 20,000 vehicles per day or posted speeds of 45 mph or greater.
  - 14-foot wide curb lanes should be provided on all other major highways, arterials, and minor arterials.
- Rural Major Highways, Arterials, and Minor Arterials
  - 5.5-foot wide bike lanes should be provided.

The third priority was given to accommodating the **State Highway Administration's Policy on Marked Bicycle Lanes (revised November 2011)**, which states on page 5 that "All projects that involve widening or new construction shall meet the preferred widths…for marking Bicycle Lanes." Bike lanes vary between 4 and 6 feet wide depending on the posted speed limit and the truck volumes. Most of the corridors in the recommended transit network are State highways.

The results show that 60 of the 81 miles of proposed transitways in the *Countywide Transit Corridor Functional Master Plan* would have some bikeway accommodation directly along the corridor, including 38 miles with a shared use path, nearly 22 miles with a signed shared roadway, over 18 miles with bike lanes, and one mile with cycle tracks. Bike lanes are included in nearly one-quarter of the transitway miles.

Table F-28: Bikeway Summary

Bikeway Type	Miles			% of BRT Network
	Master Plan	Planning Board	Total	
Shared Use Path	37.9	0.0	37.9	48%
Bike Lanes	8.7	9.7	18.4	23%
Cycle Tracks	0.9	0.0	0.9	1%
Signed Shared Roadway	21.5	0.0	21.5	27%
Any Bikeway	**54.5**	**9.7**	**58.9**	**74%**

And for nearly 77 of the 81 miles there are either bikeway accommodations directly along the corridor, or on parallel roads, as shown in the following corridor specific tables.

Table F-29: Bicycle Accommodation for Georgia Avenue North Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Georgia Avenue	Reedie Rd	400 ft north of Blueridge Ave	0.4			Amherst Ave/Grandview Ave
Georgia Avenue	400 ft north of Blueridge Ave	Mason St	0.8			Grandview Ave
Georgia Avenue	Mason St	500 ft south of Randolph Rd	0.1	Shared Use Path		Grandview Ave
Georgia Avenue	500 ft south of Randolph Rd	Randolph Rd	0.1	Shared Use Path	Yes	Grandview Ave
Georgia Avenue	Randolph Rd	Layhill Rd	0.2	Shared Use Path		
Georgia Avenue	Layhill Rd	Denley Rd	0.4	Shared Use Path		
Georgia Avenue	Denley Rd	Weller Rd	0.2	Shared Use Path		
Georgia Avenue	Weller Rd	Matthew Henson State Park	1.0	Shared Use Path	Yes	
Georgia Avenue	Matthew Henson State Park	MD 28	2.4	Shared Use Path		
Georgia Avenue	MD 28	Emory Ln	1.2	Shared Use Path		
Georgia Avenue	Emory Ln	Old Baltimore Rd	0.8	Shared Use Path		
Georgia Avenue	Old Baltimore Rd	200 ft south of Queen Mary Dr	0.8	Shared Use Path		
Georgia Avenue	200 ft south of Queen Mary Dr	Spartan Rd	0.2	Shared Use Path		
Georgia Avenue	Spartan Rd	MD 108	0.2	Shared Use Path		
Olney Sandy Spring Road	Georgia Ave	Spartan Rd	0.5	Shared Use Path		
Olney Sandy Spring Road	Spartan Rd	Prince Phillip Dr	0.5	Shared Use Path		
Prince Phillip Drive	MD 108	Brooke Farm Dr	0.4	Signed Shared Roadway		

Table F-30: Bicycle Accommodation for Georgia Avenue South Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Georgia Avenue	DC Line	Blair Mill Rd	0.3			Metropolitan Branch Trail / Silver Spring Green Trail
Georgia Avenue	Blair Mill Rd	Wayne Ave	0.4			Metropolitan Branch Trail / Silver Spring Green Trail
Georgia Avenue	Colesville Rd	Spring St	0.3			Metropolitan Branch Trail / Silver Spring Green Trail
Georgia Avenue	Spring St	16th St	0.7		Yes	Woodland Dr / 2nd Avenue
Georgia Avenue	16th St	Flora Ln	0.2	No bicycle accommodation		
Georgia Avenue	Flora Ln	I-495	0.2			Georgia Ave Pedestrian Bridge
Georgia Avenue	I-495	Forest Glen Rd	0.2	Shared Use Path		
Georgia Avenue	Forest Glen Rd	Dennis Ave	0.7	Shared Roadway		Woodland Dr
Georgia Avenue	Dennis Ave	Windham Ln	0.5	Shared Roadway		Amherst Ave
Georgia Avenue	Windham Ln	Veirs Mill Rd	0.3	Shared Roadway		Amherst Ave

Table F-31: Bicycle Accommodation for MD 355 North Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
MD 355	Church St	270 ft north of N. Campus Dr	1.4	Shared Use Path		
MD 355	270 ft north of N. Campus Dr	1000 ft south of Indianola Rd	0.6	Shared Use Path		
MD 355	1000 ft south of Indianola Rd	1250 ft south of Shady Grove Rd	1.1	Shared Use Path		
MD 355	1250 ft south of Shady Grove Rd	Just south of O'Neil Dr	0.4	Shared Use Path		
MD 355	Just south of O'Neil Dr	Game Preserve Rd	3.8	Shared Use Path		
MD 355	Game Preserve Rd	Redgrave Pl	3.5	Shared Use Path		

Table F-32: Bicycle Accommodation for MD 355 South Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
MD 355	Western Ave	Somerset Ter	0.3			Friendship Blvd / Belmont Ave
MD 355	Somerset Ter	Oliver St	0.1	Shared Use Path		
MD 355	Oliver St	Drummond Ave	0.2	Shared Use Path		
MD 355	Drummond Ave	Nottingham Dr	0.5	Shared Use Path		
MD 355	Nottingham Dr	Bradley Blvd	0.1	Shared Use Path		
MD 355	Bradley Blvd	Chestnut St	1.2			Woodmont Ave
MD 355	Chestnut St	Woodmont Ave	0.1		Yes	Woodmont Ave
MD 355	Woodmont Ave	Cedar Ln	0.8	Shared Use Path	Yes	North Bethesda Trail / Rock Creek Trail
MD 355	Cedar Ln	I-495	0.8		Yes	North Bethesda Trail / Rock Creek Trail
MD 355	I-495	Grosvenor Ln	0.4			North Bethesda Trail / Rock Creek Trail
MD 355	Grosvenor Ln	Tuckerman Ln (south)	0.1	Shared Use Path		North Bethesda Trail / Gosvenor Connector
MD 355	Tuckerman Ln (south)	600 ft north of Tuckerman Ln (n)	0.6		Yes	North Bethesda Trail / Gosvenor Connector
MD 355	600 ft north of Tuckerman Ln (n)	Hillery Way	0.5		Yes	North Bethesda Trail
MD 355	Hillery Way	Edson Ln	0.1			North Bethesda Trail
MD 355	Edson Ln	Just south of Hubbard Way	1.1	Shared Use Path		North Bethesda Trail / Nebel St
MD 355	Just south of Hubbard Way	Bou Ave	0.1	Shared Use Path		North Bethesda Trail / Nebel St
MD 355	Bou Ave	Twinbrook Pkwy	0.2			North Bethesda Trail
MD 355	Twinbrook Pkwy	Halpine Rd	0.3			Chapman Ave
MD 355	Halpine Rd	Church St	2.0	Shared Use Path		

Table F-33: Bicycle Accommodation for New Hampshire Avenue Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
New Hampshire Avenue	DC Line	University Blvd	1.8	Bike Lanes		
New Hampshire Avenue	University Blvd	Northampton Dr	0.0	Prince George's County		
New Hampshire Avenue	Northampton Dr	I-495	0.9	Shared Use Path / Shared Roadway	Yes	
New Hampshire Avenue	I-495	Lockwood Dr	1.7	Shared Use Path / Shared Roadway	Yes	
New Hampshire Avenue	Lockwood Dr	Randolph Rd	2.6	Shared Roadway		
New Hampshire Avenue	Randolph Rd	Colesville park-and-ride	0.1	Shared Use Path / Bike Lanes		

Table F-34: Bicycle Accommodation for North Bethesda Transitway

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Old Georgetown Road	Rockville Pike	Executive Blvd	0.3	Shared Use Path / Bike Lanes		
Old Georgetown Road	Executive Blvd	Nicholson Ln	0.2	Shared Use Path		
Old Georgetown Road	Nicholson Ln	Tuckerman Ln	0.7		Yes	
Old Georgetown Road	Tuckerman Ln	I-270	0.3	Shared Use Path	Yes	
Old Georgetown Road	I-270	Rock Spring Dr	0.3		Yes	
Rock Spring Drive	Old Georgetown Rd	Fernwood Rd	0.6	Shared Roadway		
Fernwood Road	Rock Spring Dr	Rockledge Dr	0.1	Bike Lanes		
Westlake Terrace	Rockledge Dr	I-270	0.1	Bike Lanes		

Table F-35: Bicycle Accommodation for Randolph Road Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Randolph Road	US 29	Paint Branch	0.8	Shared Use Path		
Randolph Road	Paint Branch	Fairland Rd	1.3	Shared Roadway		
Randolph Road	Fairland Rd	Glenallen Ave	3.1	Shared Use Path		
Glenallen Avenue	Randolph Rd	Layhill Rd	0.3	Shared Use Path		
Glenallen Avenue	Layhill Rd	Georgia Ave	0.3	Shared Use Path		
Randolph Road	Georgia Ave	Judson Rd	0.1	Shared Use Path		
Randolph Road	Judson Rd	Lindell St	0.6	Shared Use Path		
Randolph Road	Lindell St	Veirs Mill Rd	1.2	Shared Use Path		
Randolph Road	Veirs Mill Rd	Dewey Rd	0.4	Bike Lanes		
Randolph Road	Dewey Rd	Parklawn Dr	0.8	Bike Lanes		
Parklawn Drive	Randolph Rd	Nebel St	0.8	Bike Lanes		
Nicholson Lane	Nebel St	MD 355	0.4	Bike Lanes		

Table F-36: Bicycle Accommodation for University Boulevard Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
University Boulevard	Georgia Ave	Amherst Ave	0.2			Blueridge Ave / Reedie Dr
University Boulevard	Amherst Ave	Dayton St	0.4	Shared Use Path / Bike Lanes		
University Boulevard	Dayton St	Easecrest Dr	0.1	Shared Use Path / Bike Lanes		
University Boulevard	Easecrest Dr	US 29	2.1	Shared Use Path / Shared Roadway		
University Boulevard	US 29	Piney Branch Rd	1.8	Shared Use Path / Shared Roadway		
University Boulevard	Piney Branch Rd	New Hampshire Ave	0.9	Bike Lanes / Cycle Tracks		

Table F-37: Bicycle Accommodation for US 29 Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Colesville Road	16th St	East West Hwy	0.2	Shared Use Path / Shared Roadway		
Colesville Road	East West Hwy	Georgia Ave	0.3			Camerson St / Silver Spring Green Trail
US 29	Georgia Ave	Fenton St	0.1			Camerson St / Silver Spring Green Trail
US 29	Fenton St	Spring St	0.1			Camerson St / Silver Spring Green Trail
US 29	Spring St	Sligo Creek Pkwy	0.7			Ellsworth Dr
US 29	Sligo Creek Pkwy	I-495	0.6	Shared Roadway		
US 29	I-495	University Blvd (EB)	0.3	Shared Roadway		
US 29	University Blvd (EB)	University Blvd (WB)	0.0	Shared Roadway		
US 29	University Blvd	Southwood Ave	0.4	Shared Roadway		
US 29	Southwood Ave	Lockwood Dr	0.6	Shared Roadway	Yes	
Lockwood Drive	US 29	New Hampshire Ave	0.8	Shared Use Path / Shared Roadway		
Lockwood Drive	New Hampshire Ave	Stewart Ln	0.7	Bike Lanes		
Stewart Lane	Lockwood Dr	US 29	0.4	Shared Use Path / Shared Roadway		
US 29	Stewart Ln	MD 198	7.1	Shared Use Path / Shared Roadway		

Table F-38: Bicycle Accommodation for Veirs Mill Road Corridor

Road	From	To	Miles	Master Plan Recommendation	Additional Space Provided for Bike Lanes	Alternative Bike Routes
Veirs Mill Road	Wheaton Metro Station	Ennalls Ave	0.3	Shared Roadway		
Veirs Mill Road	Ennalls Ave	University Blvd	0.1	Shared Roadway		
Veirs Mill Road	University Blvd	Galt Ave	0.2	Shared Roadway		
Veirs Mill Road	Galt Ave	Sherrie Ln	0.1	Shared Roadway		
Veirs Mill Road	Sherrie Ln	Monterrey Dr	0.1	Bike Lanes		
Veirs Mill Road	Monterrey Dr	Newport Mill Rd	0.3			Monterry Dr / Broadview Rd / Wheaton - Claridge Local Park / Valleywood Dr
Veirs Mill Road	Newport Mill Rd	Gail St	0.4			Monterry Dr / Broadview Rd / Wheaton - Claridge Local Park / Valleywood Dr
Veirs Mill Road	Gail St	Connecticut Ave	0.3	Shared Roadway		
Veirs Mill Road	Connecticut Ave	Ferrara Ave	0.2	Shared Roadway		
Veirs Mill Road	Ferrara Ave	Sampson Rd	0.1	Shared Roadway		
Veirs Mill Road	Sampson Rd	Randolph Rd	0.3			Sampson Rd / Selfridge Rd
Veirs Mill Road	Randolph Rd	Gridley Rd	0.1			Sampson Rd / Selfridge Rd
Veirs Mill Road	Gridley Rd	Turkey Branch	0.3			Sampson Rd / Selfridge Rd
Veirs Mill Road	Turkey Branch	Parkland Dr	0.2	Bike Lanes		
Veirs Mill Road	Parkland Dr	Aspen Hill Rd	0.9	Bike Lanes		
Veirs Mill Road	Aspen Hill Rd	Twinbrook Pkwy	0.5	Bike Lanes		
Veirs Mill Road	Twinbrook Pkwy	Meadow Hall Dr	0.1	No Bicycle Accommodation		
Veirs Mill Road	Meadow Hall Dr	MD 355	1.8	City of Rockville		

Plan Appendix G Recommended Elements of a Plan of Improvements for Bicycle-Pedestrian Priority Areas

MCDOT is currently updating the State's Bicycle-Pedestrian Master Plan and is expected to include recommendations for plans of improvement for Bicycle-Pedestrian Priority Area (BPPAs). In the interim, listed below are a number of elements that we recommend be included in a plan of improvements for BPPAs, as designated in the *Countywide Transit Corridors Functional Master Plan.* These improvements should also be considered for any area where pedestrians and bicyclists are a significant proportion of the traveling public. These elements are structured into a baseline condition for all areas where pedestrians and bicyclists are permitted, for Business and Urban Districts as defined by the Maryland Vehicle Law, and for BPPAs.

Baseline Improvements for Bicyclists and Pedestrians

Accommodation during construction: Strict adherence to the Maryland *Manual on Uniform Traffic Control Devices*' (MD-MUTCD) recommendations for minimizing pedestrian and bicyclist inconvenience during construction should be made an explicit part of the plan. Sidewalks and bike facilities should be closed only as a last resort.

In addition to the normal maintenance-of-traffic issues, the construction sequencing of work should be addressed in the plan. For example, curb ramp relocations should only be done when the adjacent crosswalks can be striped in the new location within the next week.

Lane striping: Lane striping should reflect the guidance of the MD-MUTCD rather than repeating the existing lane striping pattern. Often the normal lane striping on State highways is extended through unsignalized intersections in Montgomery County, but this practice is not in conformance with MD-MUTCD Section 3B.08:

> "Where highway design or reduced visibility conditions make it desirable to provide control or to guide vehicles through an intersection or interchange, such as at offset, skewed, complex, or multilegged intersections, or where multiple turn lanes are used, dotted lane markings should be used to extend longitudinal line markings through an intersection or interchange area."

The extension of normal lane striping often occurs even on straight, flat roads that are not complex in any way that would warrant lane extensions per guidance in the MD-MUTCD. In locations where extensions are needed, the different pattern presented by dotted lane markings would more clearly alert drivers to the presence of an intersection.

Using normal lane striping for this purpose obscures the presence of intersections, making drivers entering the roadway from a side street an unexpected occurrence. Pedestrians crossing from these streets also may appear to the driver as a surprise, or even that they're not supposed to be crossing at that location even though pedestrians have the right-of-way at unsignalized intersections. A break in the normal striping pattern at intersections, as recommended by the MD-MUTCD, alerts drivers on the main road and improves safety. Transit patrons and other pedestrians in areas along State highways would benefit from closer adherence to MD-MUTCD guidance in this regard.

Bus stops: Bus stops within the project limits should be shown in the contract documents of every project. Safe ADA-accessible crossings should be provided to all bus stops and wherever possible, and median refuges should be provided at intersections and mid-block bus stop locations that are to be retained.

Sidewalks: Sidewalks should be constructed or reconstructed to standard where appropriate as part of all access permits.

Additional Improvements for Bicyclists and Pedestrians in Business and Urban Districts

SHA's Bicycle Pedestrian Design Guidelines: SHA should adopt its guidelines as SHA policy in areas where pedestrians and bicyclists are a significant proportion of the traveling public. These guidelines were created in 2006 as a very progressive document intended to promote bicycle and pedestrian access and safety. Because of their status as guidelines however, their use has been limited, missing the opportunity to create roadway designs that better accommodate pedestrians and bicyclists at little or no additional cost. This best practice document should become part of the engineer's standard toolbox, promoting the goal of safely and efficiently accommodating all users of the public right-of-way.

ADA accommodation: Crosswalks, marked or unmarked, exist at the intersection of all public streets per Maryland Vehicle Law. Therefore, all intersections, including unsignalized and T-intersections, and intersections on divided roadways where the median is not broken for vehicular movement, should be made ADA-accessible. Where an ADA-accessible crossing cannot be provided, the crossing should be posted to prohibit the crossing to everyone.

ADA best practices should be used to provide the best accommodation for all users, including the provision of dual directional curb ramps at corners and a straight, level sidewalk that is not interrupted by driveway slopes. Where this cannot be achieved, the reasons should be documented.

Accommodation during construction: Signs should be posted at worksites with contact information for the inspector who can then be quickly and easily notified of any problems. Special attention should be paid to winter closures where work may be left unfinished for perhaps months at a time. A month in advance of the normal winter closure period, a shutdown plan should be created for all work in progress and open worksites minimized.

Resurfacing projects: Resurfacing projects should include a safety evaluation of the locations of all curb ramps and crosswalks, which should be relocated and reconstructed as necessary to conform to SHA's Bicycle-Pedestrian Design Guidelines and ADA best practices.

Re-evaluation of speed limits: While Montgomery County continues to urbanize, the posted speeds of adjacent roadways are often not reassessed unless the roadway is being rebuilt. Posted speed limits in BPPAs and other Business and Urban Districts should be re-evaluated and waivers documented for limits in excess of the statutory speed limits. Design speeds for projects in these areas should not exceed the approved posted speed.

Pedestrian crossings of commercial driveways: A level sidewalk should be maintained across commercial driveways. Where this cannot be achieved and ramps must be provided, detectable warnings should be provided at the bottom of the ramps to alert blind pedestrians to potential vehicular conflicts. Detectable warnings should also be provided at all signalized commercial driveway crossings.

Further Improvements in Bicycle-Pedestrian Priority Areas

Minimizing disruption to pedestrian travel: SHA should ensure that construction affecting pedestrian and bike accessibility in BPPAs be expedited to the extent practicable. For example, utility work in BPPAs, such as pole relocations and valve adjustments, should be prioritized so that the utility companies know that these work items are more important than those outside BPPAs.

Access for during snow emergencies: A definite timeline should be set for curb ramps at intersections to be cleared of snow after a snowstorm. When roadways get plowed on intersecting streets, the area in front of the circular curb—where most curb ramps are—are often blocked with snow, reducing access for persons least likely to be able to climb over the resulting snow mounds.

An extra pass by a snowplow around the corner in priority areas would greatly improve pedestrian accessibility and winter safety, as well as providing basic accommodation for all users. While property owners in Montgomery County are required to clear the snow from sidewalks within 24 hours after a snow storm, there is no requirement for them to shovel snow in the street, particularly the large mounds of snow that end up in front of the circular curb. While this is a problem with both County and State roads, the majority of our transit routes are on State roads, increasing the need to correct this problem.

Signing and striping: Crosswalk striping in BPPAs should be inspected quarterly to ensure that they are in good condition. Where these crosswalks are impacted by utility work, they should be inspected upon completion of the work to ensure that they remain in good condition.

Intersections: Where an intersection in a BPPA meets any traffic signal warrant, a traffic signal should be provided to facilitate safe pedestrian and bicyclist movement. Signalized intersections should have marked crosswalks on each leg of the intersection, per SHA's Bicycle-Pedestrian Design Guidelines. Curb ramp designs in BPPAs should be coordinated with pedestrian access points to adjacent properties to facilitate travel to, through, and around the ramps.

All projects along State highways in BPPAs should be reviewed by SHA's Office of Environmental Design to address the higher level of urban design that is required in these areas. One example is a coordinated and consolidated design of traffic signal poles, signs, lights, and other equipment at intersections near curb ramps. These facilities should be combined where possible and use the fewest number of poles to minimize obstructions where the greatest number of pedestrians congregate. Also, the bases of the poles, including Audible Pedestrian Signal poles, should be countersunk where possible to minimize the footprint of these obstructions, thereby maximizing the pedestrian circulation area.

Lighting: Lighting in BPPAs should meet AASHTO standards; this is particularly true for intersections. Care should be taken to locate lighting fixtures at crosswalks so that the light source is between the vehicle and the pedestrian wherever possible, maximizing contrast. Increasing the contrast between pedestrians and the road ahead has been shown to provide a general benefit to drivers but most particularly to elderly drivers, an increasing percentage of the population. Requiring developers to bring adjacent intersections to current lighting standards should be a requirement of their access permit.

Optimize traffic signal timing for pedestrians: There are many places where pedestrians are unnecessarily prevented from crossing the roadway because the "DON'T WALK" light is on when it

doesn’t need to be. The traffic signal timing and phasing in BPPAs should be reviewed and revised as necessary to maximize pedestrian mobility.

Curb height: Curb height on State highways in BPPAs should be six inches rather than the SHA standard eight inches to reduce the required curb ramp length. In addition to making it easier for all users to navigate in more urban areas, a shorter ramp length ensures a greater level area behind the ramp so that pedestrians not crossing are not unnecessarily required to traverse the ramp and negotiate that grade.

Area-specific BPPA plans: BPPA plans should include all master or sector plan-recommended pedestrian and bike improvements within the BPPA.

The Plan Process

A plan provides comprehensive recommendations for the use of publicly and privately owned land. Each plan reflects a vision of the future that responds to the unique character of the local community within the context of a countywide perspective. Together with relevant policies, plans should be referred to by public officials and private individuals when making land use decisions.

The STAFF DRAFT PLAN is prepared by the Montgomery County Planning Department for presentation to the Montgomery County Planning Board. The Planning Board reviews the Staff Draft Plan, makes preliminary changes as appropriate, and approves the Plan for public hearing. After the Planning Board's changes are made, the document becomes the Public Hearing Draft Plan.

The PUBLIC HEARING DRAFT PLAN is the formal proposal to amend an adopted master plan or sector plan. Its recommendations are not necessarily those of the Planning Board; it is prepared for the purpose of receiving public testimony. The Planning Board holds a public hearing and receives testimony, after which it holds public worksessions to review the testimony and revise the Public Hearing Draft Plan as appropriate. When the Planning Board's changes are made, the document becomes the Planning Board Draft Plan.

The PLANNING BOARD DRAFT PLAN is the Planning Board's recommended Plan and reflects their revisions to the Public Hearing Draft Plan. The Regional District Act requires the Planning Board to transmit a master plan or sector plan to the County Council with copies to the County Executive who must, within sixty days, prepare and transmit a fiscal impact analysis of the Planning Board Draft Plan to the County Council. The County Executive may also forward to the County Council other comments and recommendations.

After receiving the Executive's fiscal impact analysis and comments, the County Council holds a public hearing to receive public testimony. After the hearing record is closed, the relevant Council committee holds public worksessions to review the testimony and makes recommendations to the County Council. The Council holds worksessions, then adopts a resolution approving the Planning Board Draft, as revised.

After Council approval, the plan is forwarded to The Maryland-National Capital Park and Planning Commission for adoption. Once adopted by the Commission, the plan officially amends the master plans, functional plans, and sector plans cited in the Commission's adoption resolution.

ACKNOWLEDGMENTS

Gwen Wright, Director

Project Team
Functional Planning and Policy Division
Mary Dolan, Chief
David Anspacher
Tom Autrey
Larry Cole (lead planner)
Eric Graye
Jeremy Strauss (intern)
Scott Whipple

Research and Technology Division
Steve Hurst

Park Planning, Department of Parks
Charles Kines

Management Services
Valerie Berton
Sam Dixon
Brian Kent
Kevin Leonard

Planning Board Draft

Countywide Transit Corridors Functional Master Plan

July 2013

Montgomery County Planning Department
M-NCPPC
MontgomeryPlanning.org