

T&E COMMITTEE #1
November 5, 2013

MEMORANDUM

November 4, 2013

TO: Transportation, Infrastructure, Energy and Environment Committee
FROM: Glenn Orlin, Deputy Council Administrator^{Go}
SUBJECT: Countywide Transit Corridors Functional Master Plan: wrap-up worksession

Councilmembers: Please bring your copies of the Draft Master Plan and the November 1 packet to this worksession.

1. Follow-up on North Bethesda Transitway. On November 1 the Committee agreed on recommendations regarding the portion of this corridor west of the Old Georgetown Road/Rock Spring Drive intersection. What remains for the Committee to decide are:

- What route should the corridor take between this intersection and the Red Line?
- Where should the stations be?

2. Markup of the plan. During the prior six worksessions the Committee has made recommendations regarding each of the ten bus rapid transit (BRT) corridors in the Planning Board's Final Draft, and on the proposed expansion of Bicycle-Pedestrian Priority Areas (BPPAs) and accommodating a potential third track from MARC north of Metropolitan Grove. The Committee has not yet come to closure on the level of detail that should be included in the Plan regarding BRT corridors. On one hand, the Plan should be specific enough to provide a picture to the community as to what is generally intended in each corridor and to provide meaningful guidance to the agencies that will be implementing BRT: the Maryland and Montgomery County Departments of Transportation. On the other hand, the Plan should not be so specific as to preclude alternatives being developed during project planning that would best achieve the mission of providing significant improvement in transit service while minimizing negative impacts.

The Committee Chair, after consulting with Council staff and others, is recommending a detailed markup of the Plan. Text deleted from the Draft Plan is shown in [brackets] and added text is shown as underlined. The main features of this markup are:

- An Executive Summary is included, outlining the primary purposes and scope of the Plan.
- For each corridor, the recommendations are for the route, the station locations, and, for each segment, the minimum right-of-way, whether there would be dedicated lanes or not, and whether there would be up to 0, 1, or 2 lanes added in the road's cross-section dedicated to BRT.
- No specific treatments are recommended.
- The Draft Plan's recommendations about implementation priorities are deleted. Project prioritization should not be memorialized in a master plan with a 20+-year life, but should be revisited regularly in order to respond to changing circumstances. This winter's update of the Council/Executive State transportation priorities letter will be an opportunity to set priorities. Another will be the Executive's forthcoming supplemental appropriation and CIP amendment request regarding the use of the \$10 million of State aid for BRT studies.
- The text in Appendices F (Bikeway Accommodation) and G (Recommended Elements of a Plan of improvements for BPPAs) are moved into the Plan. Appendices A-E and the tables in Appendix F are not included.

The final version of the mark-up, in addition to any changes the Committee may make at this worksession, would include:

- The Committee's final recommendation on the North Bethesda Transitway corridor.
- The Committee's final recommendation on the Bethesda-to-Friendship Heights segment of the MD 355 South corridor, should it find a compromise that would allow it to have a Committee recommendation.
- The number of miles of BRT in dedicated lanes and mixed traffic, once the above decisions have been made. (They appear as **XXs** in the markup.)
- The corridor maps would be revised so only to distinguish between dedicated lanes and mixed traffic. They would not show treatments.

3. US 29 through Four Corners. As noted on page 27 of the Chairman's mark-up, the recommendations in each corridor "represent the maximum footprint in each corridor segment, without predetermining the treatment to be employed." The one exception in the Draft Plan is the segment of the US 29 BRT (Corridor 9) between Southwood Avenue and Sligo Creek Parkway. In that segment the Draft Plan—and the Chairman's mark-up (see page 58)—recommends that the BRT run in mixed traffic in this segment, but it has a footnote that states: "Dedicated lanes are desirable in these segments and the potential for lane-repurposing to achieve dedicated lanes should be considered during facility planning."

To be consistent with how other corridors are treated—and other segments within the US 29 corridor itself—the Plan should have this segment identified as having dedicated lanes, and the footnote should be deleted. What this would mean is that if dedicated lanes were found to be infeasible as a result of the facility planning study, then having the BRT run in mixed traffic would be the fallback option.

Council staff recommendation: On page 58 change the entry in the "Dedicated Lanes?" column for the Southwood-to-Sligo Creek link from "No" to "Yes," and delete the footnote.

Executive Summary

The Washington, D.C. region is consistently rated among the most congested in the nation, with average commuting times exceeding 35 minutes. Additionally, travel forecasts show that roadway congestion in the County is predicted to increase by 70% by 2040. While population and employment opportunities are forecasted to grow significantly over time, options for building new roads or expanding existing ones are limited given their impact on existing neighborhoods and businesses.

Expanding transit infrastructure through more efficient use of public rights-of-way is essential if current and future congestion is to be mitigated. In addition to reducing countywide travel time for drivers, an expanded transit network is necessary to support the County's land use, environmental, and economic development goals and make transit a reliable alternative to driving in the County's developed core.

This plan recommends implementing an XX-mile bus rapid transit network comprising 10 corridors and the Corridor Cities Transitway, and expanding right-of-way for the CSX Metropolitan Branch to allow for enhanced MARC commuter rail service. It also designates 24 additional Bicycle–Pedestrian Priority Areas.

Public rights-of-way are a critically important and scarce resource. Like any scarce resource, they need to be used in the most efficient manner possible. Therefore, an important goal of this plan is to increase *person-throughput*, the number of people that can be accommodated within these rights-of-way, as well as increasing the modes of transportation that can be accommodated safely.

This principle was used in determining rights-of way while making every effort to limit impacts to existing communities. For the most part, the property required to accommodate this plan fits within previously approved master-planned rights-of-way. In the few instances where the plan recommends reserving more right-of-way than is currently master-planned, it is largely to accommodate future enhancements or new construction of master-planned bikeways and sidewalks. An overriding County objective is to provide enhanced mobility for all users of the transportation system.

Transit maximizes *person-throughput*. For transit to truly succeed, and to achieve the desired ridership, it must have (1) an extensive network and (2) dedicated lanes. The bottom line must be that the system will produce a significant improvement in travel time for many that already use transit and that it will attract new riders that would otherwise drive. Indeed, over half of the projected riders of this bus rapid transit network are anticipated to be new transit users. However, it is not only transit riders who will benefit from this plan. Drivers should experience better conditions than they will otherwise face with a well-functioning, high-performing transit network.

At the heart of this plan is the recommendation to create dedicated lanes for bus transit. Only a system that is primarily characterized by dedicated lanes can deliver on the promise of “rapid” in bus rapid transit. Of the approximately XX corridor miles recommended in this plan, XX% of this network is comprised of dedicated lanes. In most instances, where the plan calls for dedicated lanes, it is the result of adding transit lanes within previously approved master-planned right-of-way. In some instances, dedicated lanes may be created from existing or planned general purpose lanes. Where “repurposing” has been preliminarily identified as the best option, it is on the basis of analysis that shows that the number of forecasted transit riders exceeds the capacity of a general purpose lane. There are only XX

miles in this network that anticipate buses running in mixed traffic. It is understood that where a route is dominated by mixed traffic, it will not be rapid. However, it will have enhanced station facilities and service, and it will be part of a larger network that is rapid.

This plan does not endorse specific “treatments” since considerably more study will be conducted by the State Highway Administration and/or the County’s Department of Transportation to determine whether, for example: a dedicated lane should be in the median or on the curb; whether where the right-of-way could accommodate bi-directional bus rapid transit, or if a single reversible lane could achieve the same objective; or whether dedicated lanes achieved by repurposing are warranted and achievable given further detailed traffic analysis and ridership forecasts.

These studies will be done using the State or County’s standard facility planning process, which includes significant community outreach, opportunities for public input including but not limited to public hearings, and will ultimately come back before the County Council for review. In this respect, this plan is not different from other road projects recommended in master plans for which alternatives are reviewed and subject to considerable community feedback. While this plan recommends a robust transit network to maximize the potential of transit to serve a more significant part of the County’s future transportation needs, it will be achieved in a way that responds to the needs of the communities it passes through, and addresses traffic impacts.

Insofar as the goal of this transit network is to increase the efficiency of predominately State roads, the County expects the State will be a full partner in this enterprise. Moreover, this plan anticipates additional cooperation and collaboration with our regional partners – the residents of Howard, Prince George’s and Fairfax Counties, and the District of Columbia all have a stake in an interconnected, efficient transit system. Finally, it is understood that this XX-mile network will be constructed in stages over a number of years based on available resources, priorities, and need.

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; and
- the recent introduction of traffic-signal priority on portions of MD 355 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); and
- 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] a different set of stations [be added during] as a result of 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 and minimizes negative impacts 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 each corridor's treatment;
- 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; and
- 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

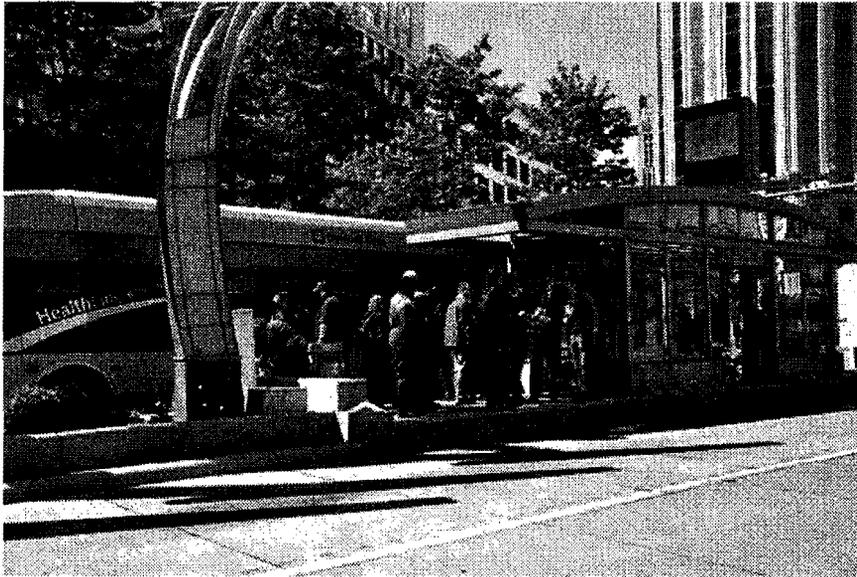


Photo credit: www.flickrriver.com

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:

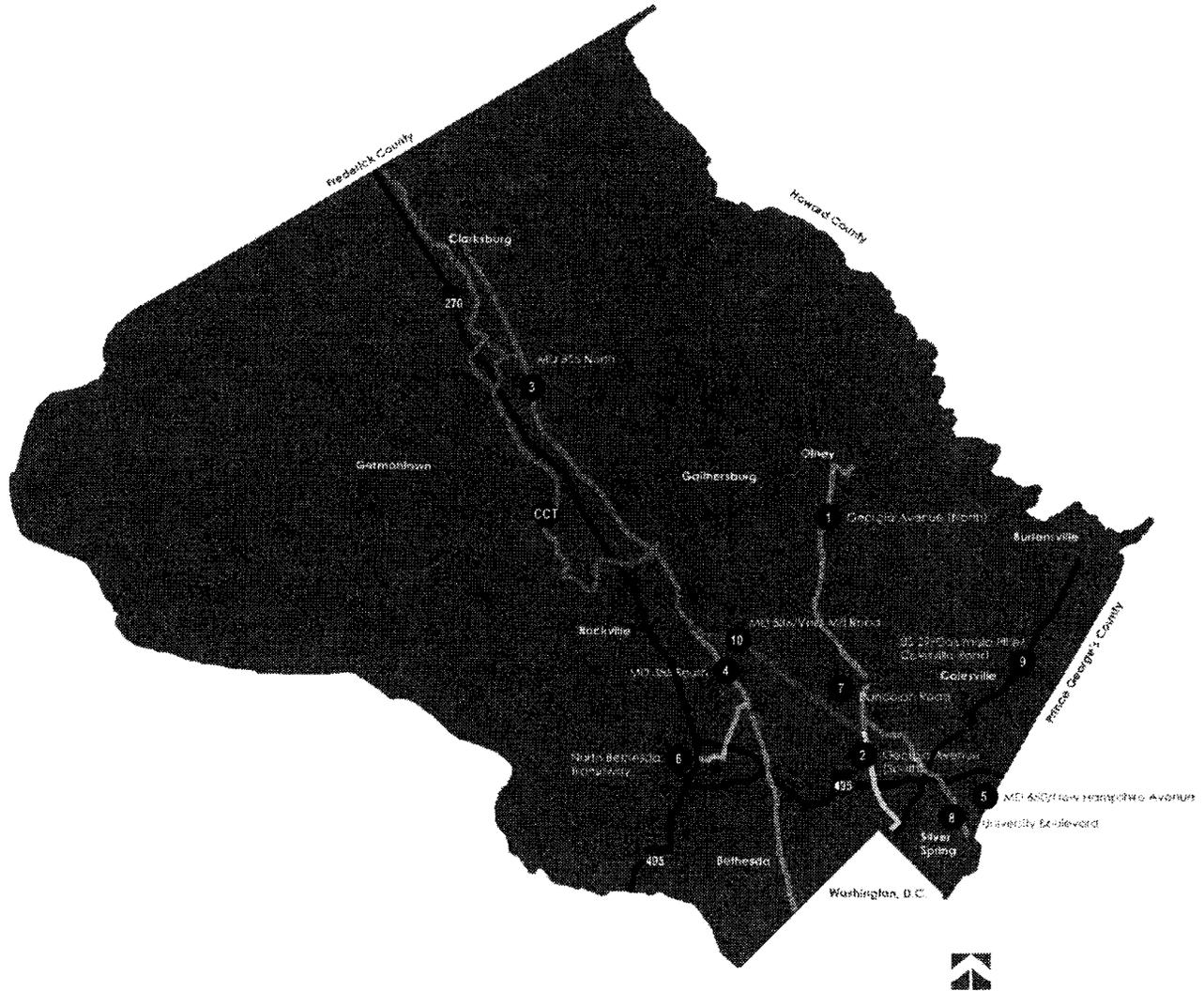
- identify the corridors needed to accommodate the desired BRT network, facilitating superior transit service along many of the County's major roadways;
- identify the corridor segments where lanes would be designated for BRT, but without designating the specific treatment;

- recommend a minimum public right-of-way for each affected roadway and any changes to the planned number of travel lanes; and
- 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].

(REVISE MAP TO REFLECT COMMITTEE RECOMMENDATIONS)

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; and
- adding a third track on a portion of the MARC Brunswick Line to promote regional transit service improvements.

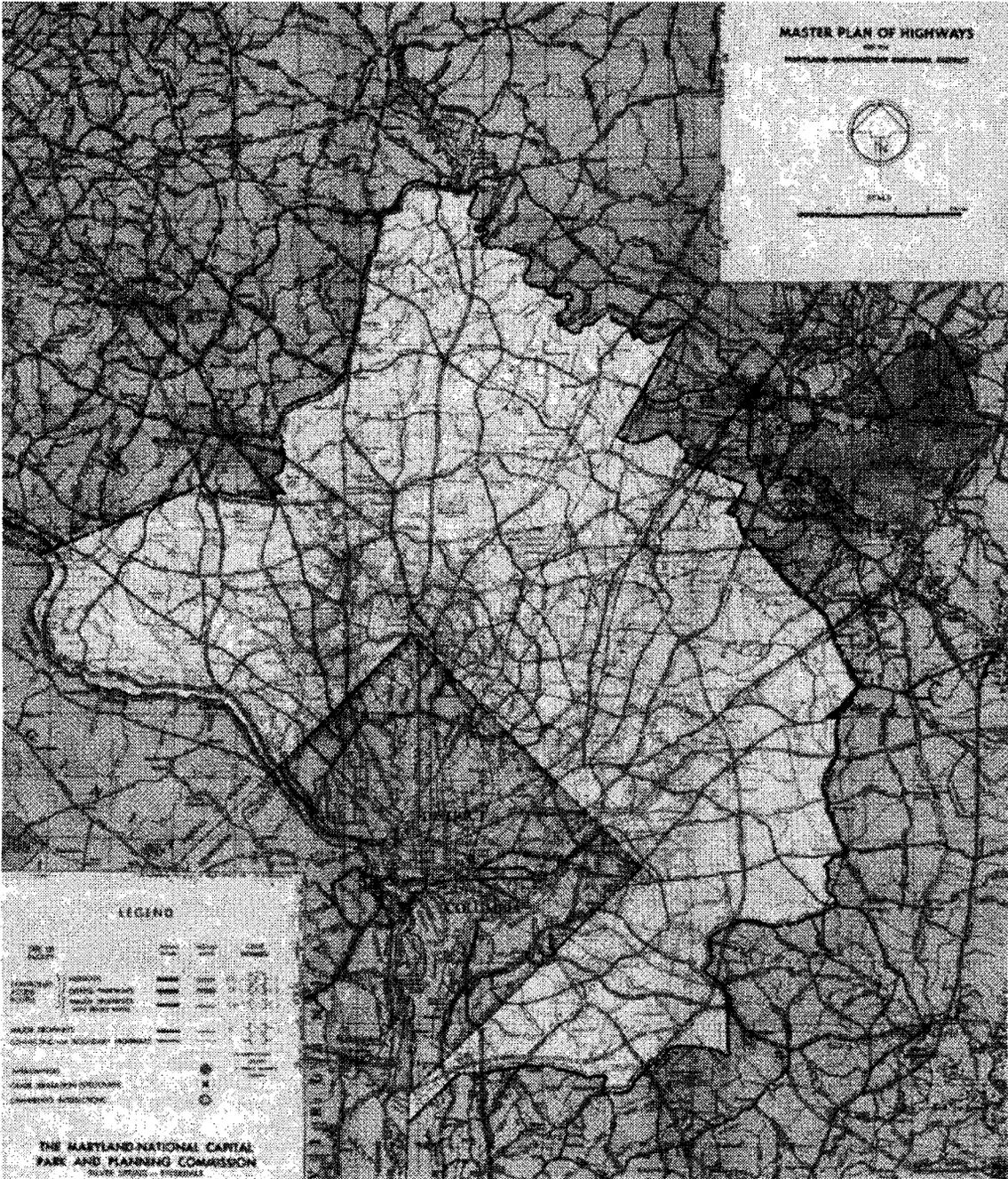
This Plan's recommended transit corridor network is intended to serve current and planned land use in adopted master and sector plans. No changes to land use or zoning are recommended in this Functional Plan.

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] Light Rail;
- Corridor Cities Transitway;
- North Bethesda Transitway; and
- 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 Ccounty 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; and
- potentially 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] boundary. 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. The Corridor Cities Transitway, a busway, will connect to up-County activity centers in the portions of Gaithersburg and Germantown west of I-270, and to Clarksburg. The 10 additional BRT corridors in this plan [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 MD 355 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 should 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 and where subsequent analysis shows acceptable impacts on traffic, 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[.] ; and
- 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] Potential 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] Future facility planning studies will develop detailed ridership projections and traffic forecasts, will evaluate the specific conditions for each corridor segment and the system as a whole, and will include the following [decisions] considerations:[.]

- 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 generally 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; and
- 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

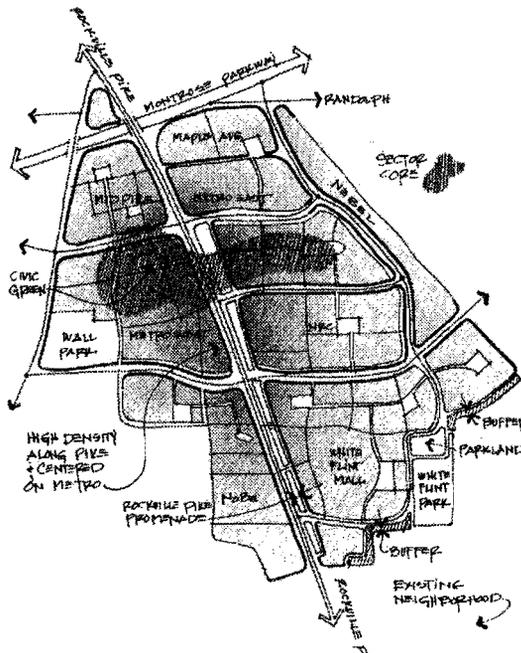
integrity considerations, some lower-ridership segments were retained, most often as mixed traffic operations.

[Median vs. Curb Lanes]

Median busways have [exclusive] dedicated rights-of-way and provide the highest level of BRT accommodation. They are generally 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 may make[s] 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] This Plan identifies the rights-of-way necessary to facilitate the development of a network of dedicated transit lanes. [This Plan] it 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; and
- 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] may be warranted 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] considered, 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 [A] amendment to this Plan or to the appropriate [A] 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] Illustrative Treatments

This Plan makes recommendations for a network of [81] ~~XX~~ miles of BRT [transit corridors] in addition to the Corridor Cities Transitway [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]. There are several potential treatments in each corridor; these will be determined during the facility planning stage of project development. The cross-sections on the following pages illustrate these treatments generically.

[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.]

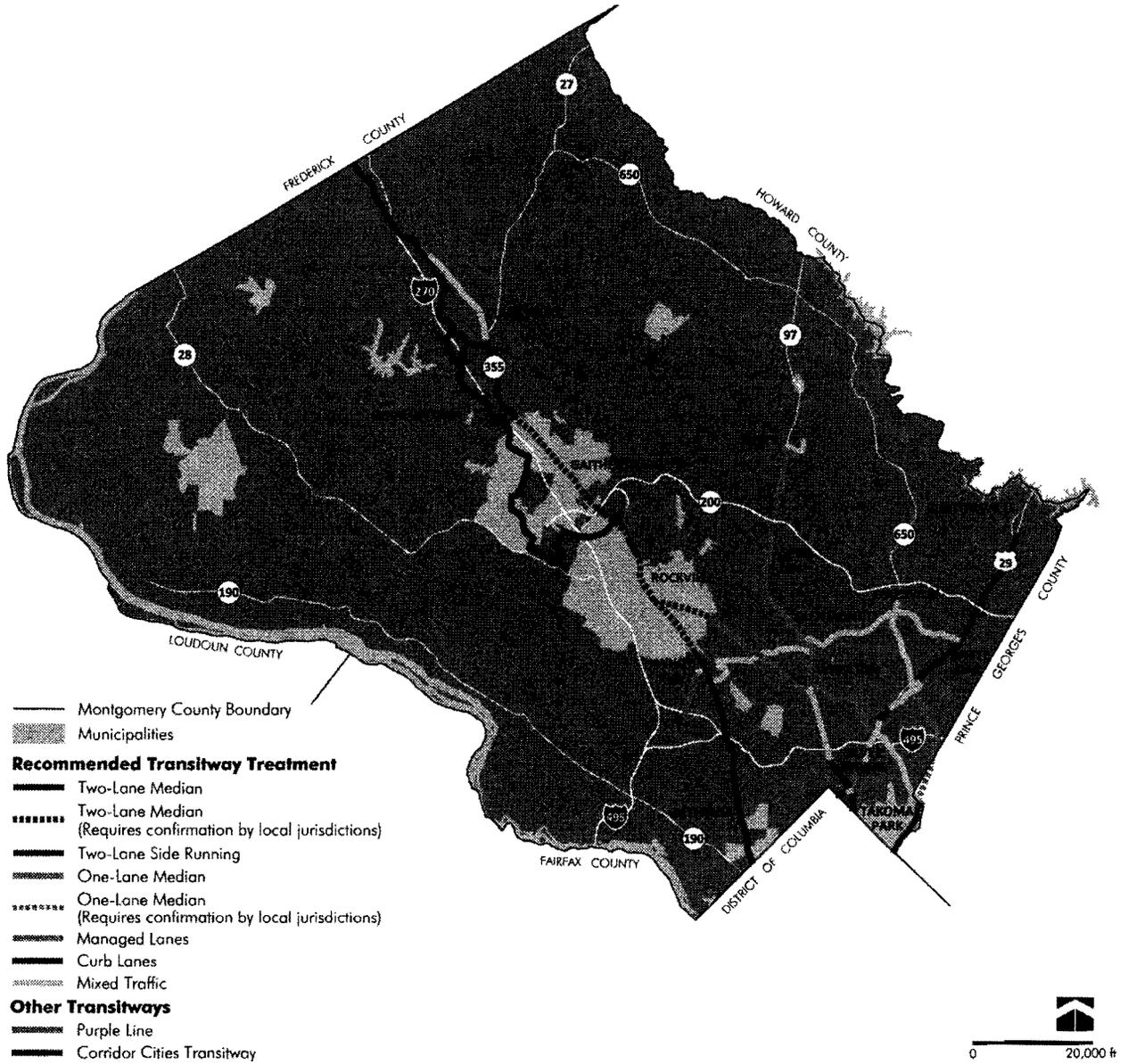
(NOTE: The next two paragraphs are moved to the "Recommended Corridors" section.)

[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.]

(DELETE MAP 2)

[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] Illustrative 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

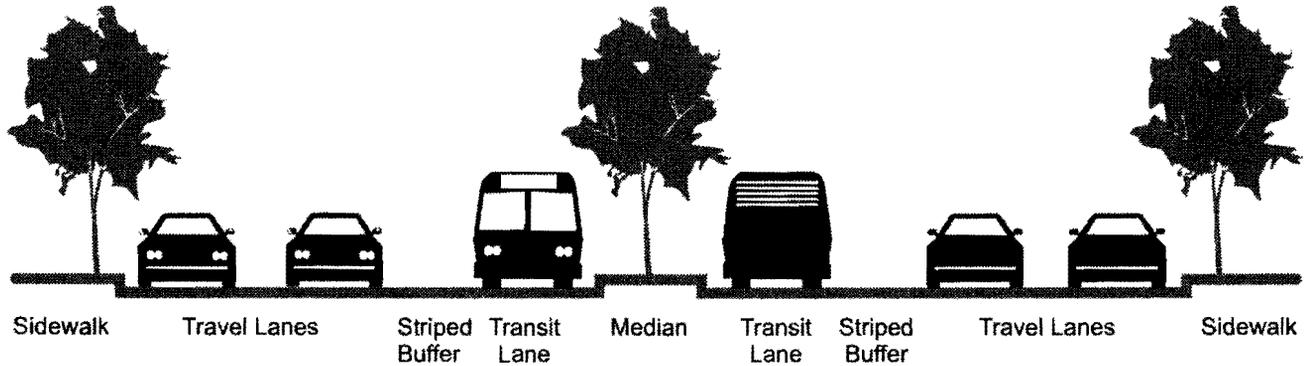


Illustration 6 [Recommended] Illustrative Corridor Segment Treatment: Two-Lane Side Busway

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

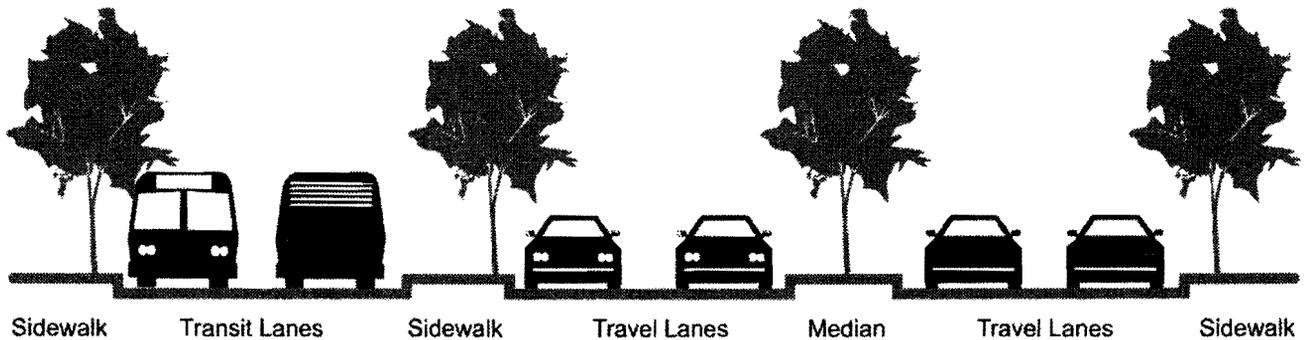


Illustration 7 [Recommended] Illustrative Corridor Segment Treatment: One-Lane Median Busway

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

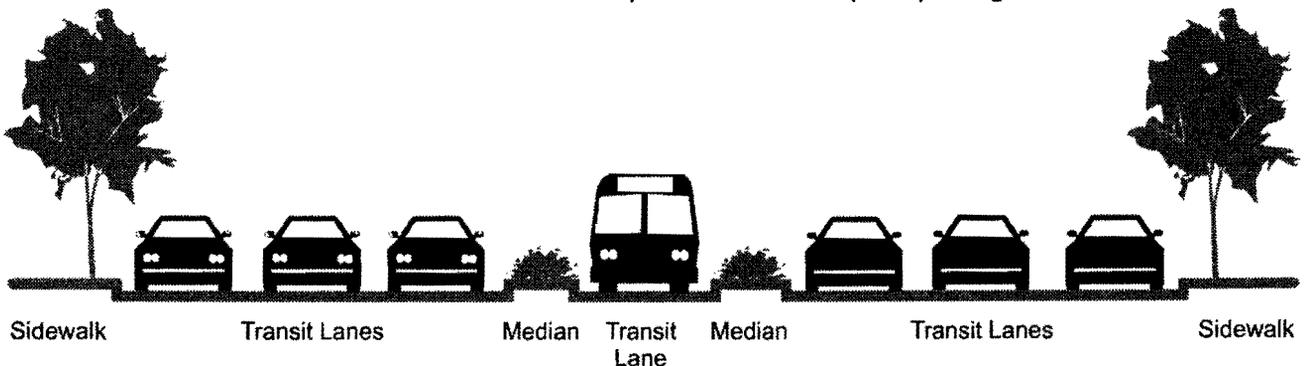


Illustration 8 [Recommended] Illustrative Corridor Segment Treatment: Managed Lanes

One lane dedicated to BRT service during peak hours in the peak direction of travel only on roads that have a reversible-lane operation

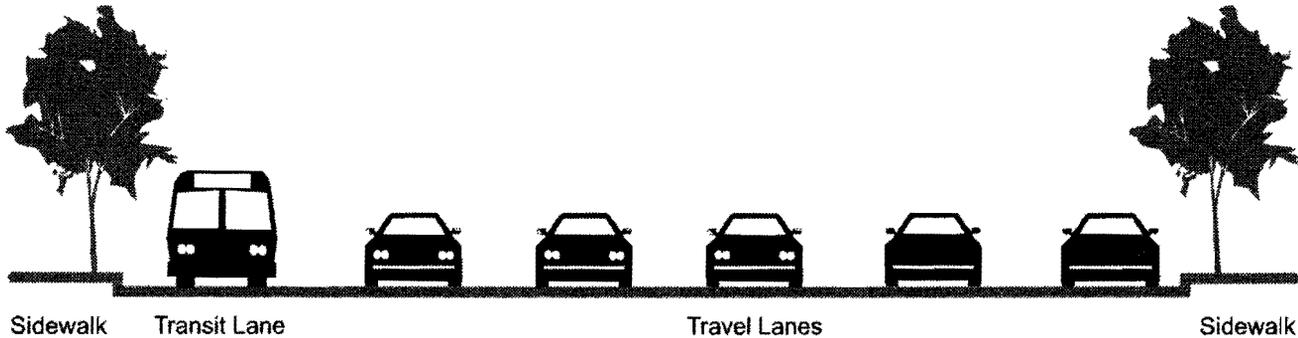


Illustration 9 [Recommended] Illustrative Corridor Segment Treatment: Curb Lanes

Outside lanes adjacent to the curb (nearest the sidewalk) dedicated to BRT service, either during peak hours or all day

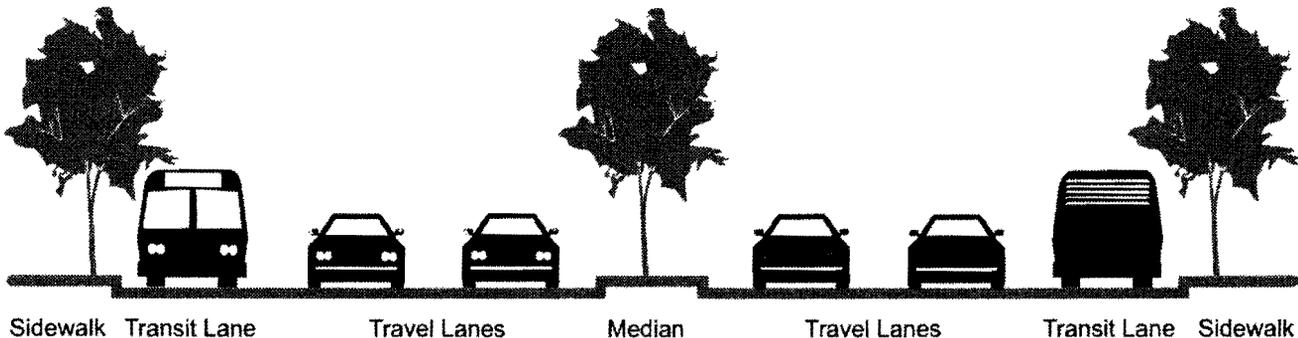
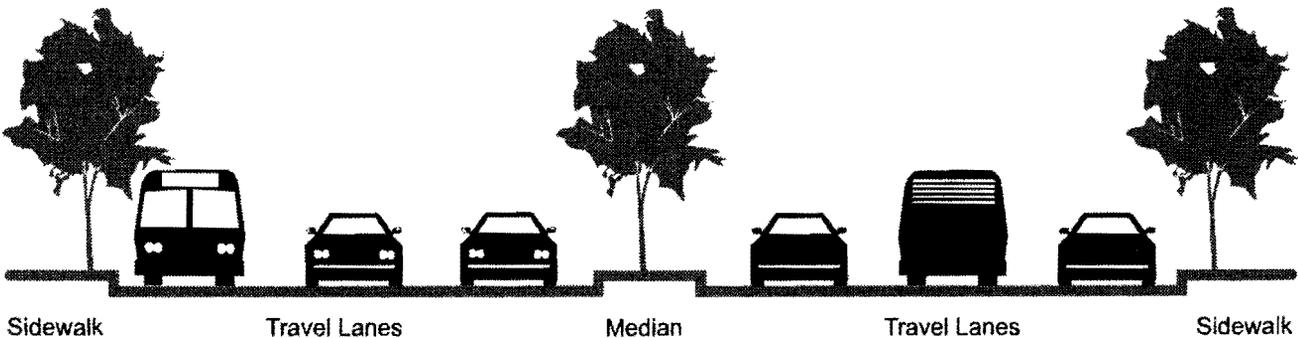


Illustration 10 [Recommended] Illustrative Corridor Segment Treatment: Mixed Traffic

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 and segment 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
- whether or not there would be one or more lanes dedicated for BRT use
- intersections [at] near which transit stations should be located.

These recommendations represent the maximum footprint in each corridor segment, without predetermining the treatment to be employed. For example, where the Plan recommends adding one dedicated lane to the cross-section, this would leave open the option of not adding a lane but simply repurposing existing lanes, or, if even repurposing is not feasible, merely having the BRT service run in mixed traffic.

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] may also be required for stations and 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.]

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, station locations, 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.

[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 Reddie Road in Wheaton, [a reversible one-lane median transitway] a dedicated lane.
- Along Reddie 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



Recommended BRT Treatment

-  County Line
-  One-Lane Median
-  Mixed Traffic
-  Other BRT Corridors
-  BRT Station
-  Metro Station
-  Park-and-Ride Station



Table 3 Corridor Recommendations, Georgia Avenue North

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
Prince Phillip Dr	Brooke Farm Dr	MD 108	[Mixed Traffic]	80	[4] 0
Olney Sandy Spring Rd	Prince Phillip Dr	Georgia Ave	<u>No</u>	150	[4] 0
Georgia Avenue	MD 108	Spartan Rd	[Reversible One-Lane Median] <u>Yes</u>	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	[4 +] 1 [bus]
Georgia Avenue	MD 28	Matthew Henson State Park		150	[4 +] 1 [bus]
Georgia Avenue	Matthew Henson State Park	Weller Rd		130	[4 +] 1 [bus]
Georgia Avenue	Weller Rd	Denley Rd		135	[4 +] 1 [bus]
Georgia Avenue	Denley Rd	Layhill Rd		145	[4 +] 1 [bus]
Georgia Avenue	Layhill Rd	500 ft south of Randolph Rd		170	[4 +] 1 [bus]
Georgia Avenue	500 ft south of Randolph Rd	Mason St		124	[4 +] 1 [bus]
Georgia Avenue	Mason St	400 ft north of Blueridge Ave		120	[4 +] 1 [bus]
Georgia Avenue	400 ft north of Blueridge Ave	Reedie [Rd] Drive		129	[4 +] 1 [bus]
Reedie [Road] Drive	Georgia Ave	Veirs Mill Rd		[Mixed Traffic] <u>No</u>	70

* Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

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] dedicated lanes. This transitway could accommodate BRT and/or [an] a potential 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

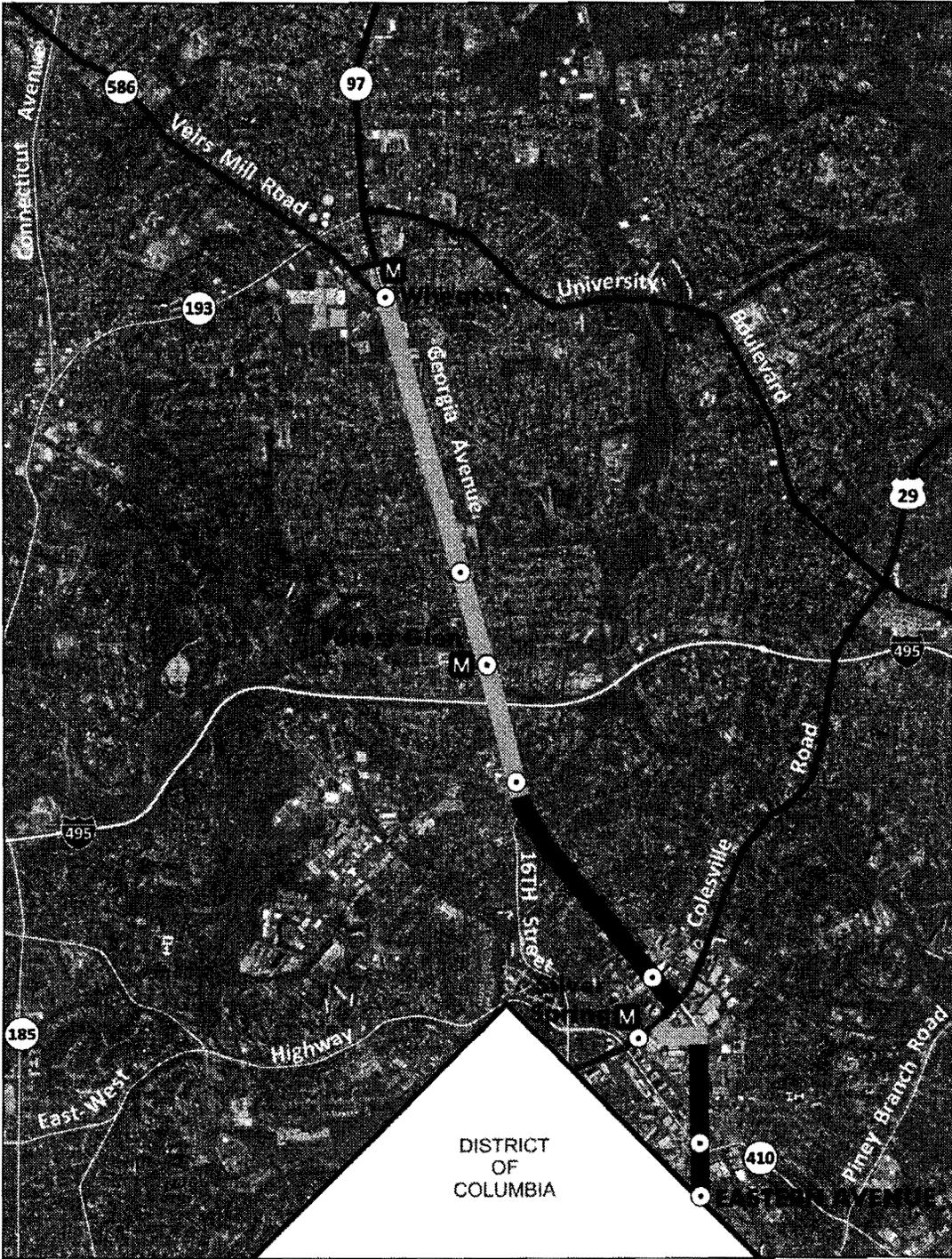
MD 97 and Cameron Street

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



Recommended BRT Treatment

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



Table 5 Corridor Recommendations, Georgia Avenue South

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
Georgia Avenue	Veirs Mill Rd	Dennis Ave	[Mixed Traffic] <u>No</u>	120	[6] <u>0</u>
Georgia Avenue	Dennis Ave	I-495		110	[6] <u>0</u>
Georgia Avenue	I-495	Flora Ln		120	[6] <u>0</u>
Georgia Avenue	Flora Ln	16th St		120	[7] <u>0</u>
Georgia Avenue	16th St	Spring St	[Curb Lanes] <u>Yes</u>	122	[4 + 2 bus] <u>0</u>
Georgia Avenue	Spring St	Colesville Rd		126	[4 + 2 bus] <u>0</u>
Wayne Avenue	Colesville Rd	Georgia Ave	[Mixed Traffic] <u>No</u>	120	[4] <u>0</u>
Georgia Avenue	Wayne Ave	Blair Mill Rd	[Curb Lanes] <u>Yes</u>	125-140	[4 + 2 bus] <u>0</u>
Georgia Avenue	Blair Mill Rd	DC Line	<u>Yes</u>	125	[4 + 2 bus] <u>0</u>

* Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

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] Dedicated lanes are 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.
- Along Seneca Meadows Parkway from the Corridor Cities Transitway to MD 118.
- Along Goldenrod Lane from MD 118 to Observation Drive.
- Along Observation Drive from Goldenrod Lane to Middlebrook Road.
- Along Middlebrook Road from Observation Drive to MD 355.

Delete the master-planned link of the Corridor Cities Transitway's East Branch between Century Boulevard and Seneca Meadows Parkway.

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

The Shops at Seneca Meadows

Seneca Meadows Corporate Park

Montgomery College -- Germantown Campus

Holy Cross Hospital/Pinkney Life Science Park

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



Table 6 Corridor Recommendations, MD 355 North

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
MD355	Redgrave Place	Little Seneca Creek	[Mixed Traffic] No	4	[120] 0
MD355	Little Seneca Creek	Shakespeare Blvd		6	[250] 0
Seneca Meadows Pkwy	Corridor Cities Transitway	Observation Dr	[Two-Lane Median] Yes	130	[4 +] 2 [bus]
Shakespeare Blvd	Observation Dr	MD 355		123	[4 +] 2 [bus]
MD 355	Shakespeare Blvd	[Game Preserve Rd] MD 118		250	[4 + 2 bus] 0
<u>MD 355</u>	<u>MD 118</u>	<u>Game Preserve Rd</u>	Yes	<u>250</u>	<u>1</u>
MD 355	Game Preserve Rd	Just south of O'Neil Dr	[Two-Lane Median *] Yes		
MD 355	just south of O'Neil Dr	1,250 ft south of Shady Grove Rd	[Two-Lane Median] Yes	150	[4 + 2 bus] 1
MD 355	1,250 ft south of Shady Grove Rd	Ridgemont Ave	[Two-Lane Median *] Yes		
MD 355	Ridgemont Ave	Indianola Rd	[Two-Lane Median] Yes	123	[4 + 2 bus] 1
MD 355	Indianola Rd	1,000 ft south of Indianola Rd	[Two-Lane Median *] Yes		
MD 355	1,000 ft south of Indianola Rd	270 ft north of N. Campus Dr	[Two-Lane Median] Yes	150	[4 + 2 bus] 1
MD 355	270 ft north of N. Campus Dr	Church St	[Two-Lane Median *] Yes		

And:

<u>Seneca Meadows Parkway</u>	<u>East Branch of Corridor Cities Transitway</u>	<u>MD 118</u>	Yes	<u>100</u>	<u>0</u>
<u>Goldenrod Lane</u>	<u>MD 118</u>	<u>Observation Drive</u>	Yes	<u>80</u>	<u>0</u>
<u>Observation Drive</u>	<u>Goldenrod Lane</u>	<u>Middlebrook Road</u>	Yes	<u>80</u>	<u>0</u>
<u>Middlebrook Road</u>	<u>Observation Drive</u>	<u>MD 355</u>	Yes	<u>150</u>	<u>0</u>

[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.] Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

- 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] – **TO BE DETERMINED**). 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] Bethesda Metro station, dedicated lanes.
- From [Bradley Boulevard] Bethesda Metro station to Western Avenue, [a curb lane transitway] (**TO BE DETERMINED**).

Station Locations

Rockville Metro Station
MD 355 and Edmonston Drive
MD 355 and Templeton Place
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 (**TO BE DETERMINED**)
Friendship Heights Metro (**TO BE DETERMINED**)

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



Table 7 Corridor Recommendations, MD 355 South

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
MD 355	Church Street	Halpine Rd	[Two-Lane Median *] Yes		
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] Yes	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] 1
MD 355	Cedar Ln	Woodmont Ave		123	[4 + 2 bus] 1
MD 355	Woodmont Avenue	Chestnut St		120	[4 + 2 bus] 1
<u>MD 355</u>	<u>Chestnut Street</u>	<u>Bethesda Metro</u>		<u>122</u>	<u>1</u>
THE DECISION RE THE REST OF THIS ROUTE IS TO BE DETERMINED					
MD 355	[Chestnut Street] <u>Bethesda Metro</u>	Bradley Blvd	Curb Lanes	122	4 + 2 bus
MD 355	Bradley Blvd	Nottingham Dr		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.] Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

** 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:

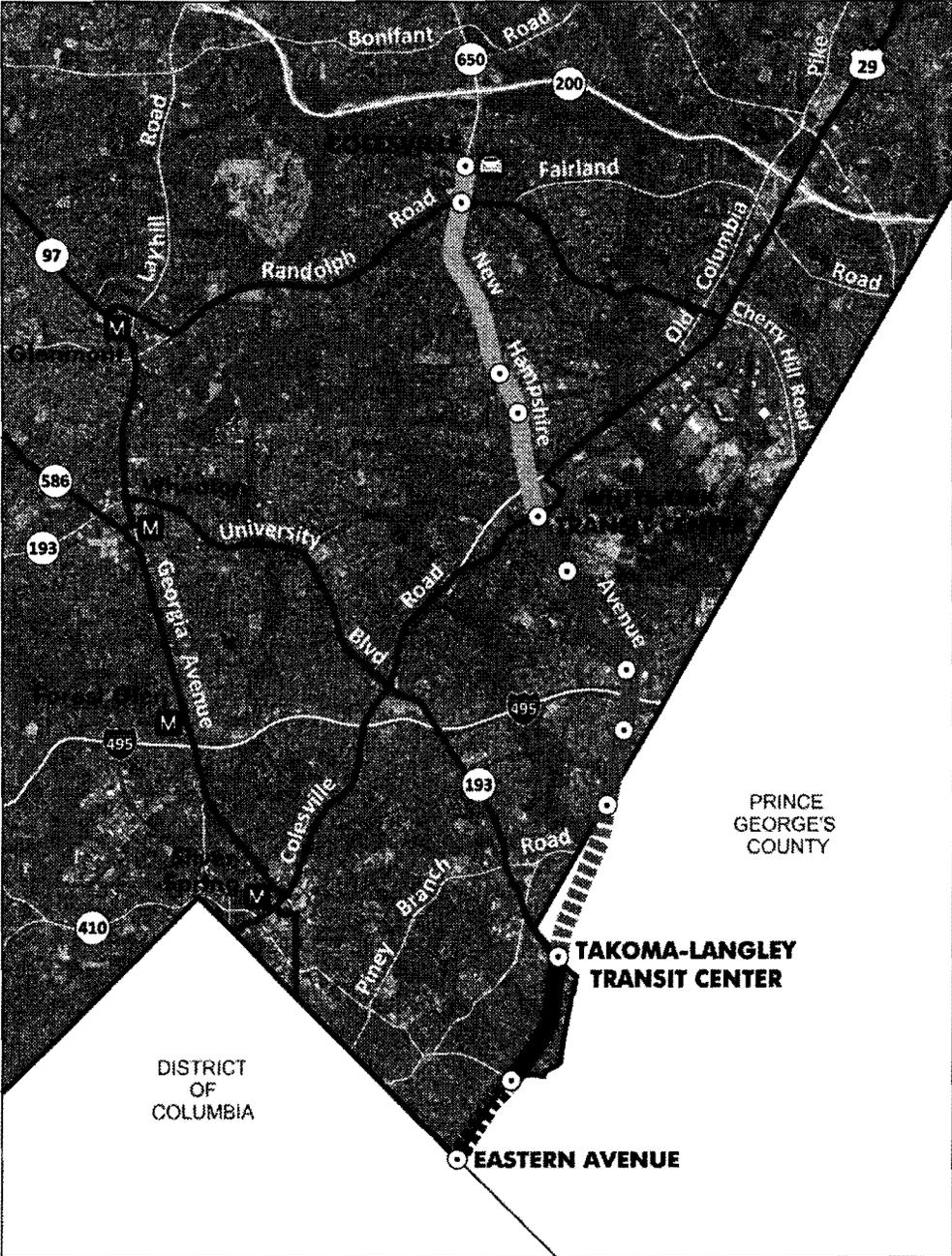
- From Colesville park-and-ride to Lockwood Drive, a mixed traffic transitway.
- From Lockwood Drive to [University Boulevard, a reversible one-lane median transitway.
- From University Boulevard to] the District line, [a two-lane median transitway] dedicated lane(s). During facility planning, however, 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 Traffic
- ▬ Other BRT Corridors
- BRT Station
- M Metro Station
- 🚗 Park-and-Ride Station



Table 8 Corridor Recommendations, New Hampshire Avenue

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.*****	Maximum Additional Transit Lanes
New Hampshire Ave	Colesville park-and-ride	Lockwood Dr	[Mixed Traffic] <u>No</u>	120	[6] <u>0</u>
New Hampshire Ave	Lockwood Dr	Oaklawn Drive	[Reversible One-Lane Median] <u>Yes</u>	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] <u>Yes</u> **		
New Hampshire Ave	University Blvd	East West Highway	[Two-Lane Median] <u>Yes</u> ***	150	[4 + 2 bus] <u>0</u>
New Hampshire Ave	East West Highway	D.C. Line	[Two-Lane Median] <u>Yes</u> ****	150 in MC	[4 + 2 bus] <u>0</u>

* 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.

***** Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

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



Recommended BRT Treatment

-  Two-Lane Side Running
-  One-Lane Median
-  Mixed Traffic
-  Other BRT Corridors
-  BRT Station
-  Metro Station



Table 9 Corridor Recommendations, North Bethesda Transitway

Road	from	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit 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*
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.

There are two alternative routes in the [The] westernmost portion of the corridor [segment would serve the planning White Flint MARC commuter rail station in addition to the Metrorail station]. One alternative is in dedicated right-of-way following the Veirs Mill Road BRT line (Corridor 10) from Randolph Road to its station at Parkland Drive, then proceeding west along Montrose Parkway over Rock Creek, Parklawn Drive (where there would be a station), and the CSX Metropolitan Branch, joining the MD 355 South BRT line (Corridor 4) to the White Flint Metro Station. The other alternative would proceed in mixed traffic west on Randolph Road (and a station at Lauderdale Drive), south on Parklawn Drive, and west on Nicholson Lane to the White Flint Metro Station. [During project planning, and alternative alignment along] A sub-option of this second alternative would use 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

Montrose Parkway and Parklawn Drive or 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

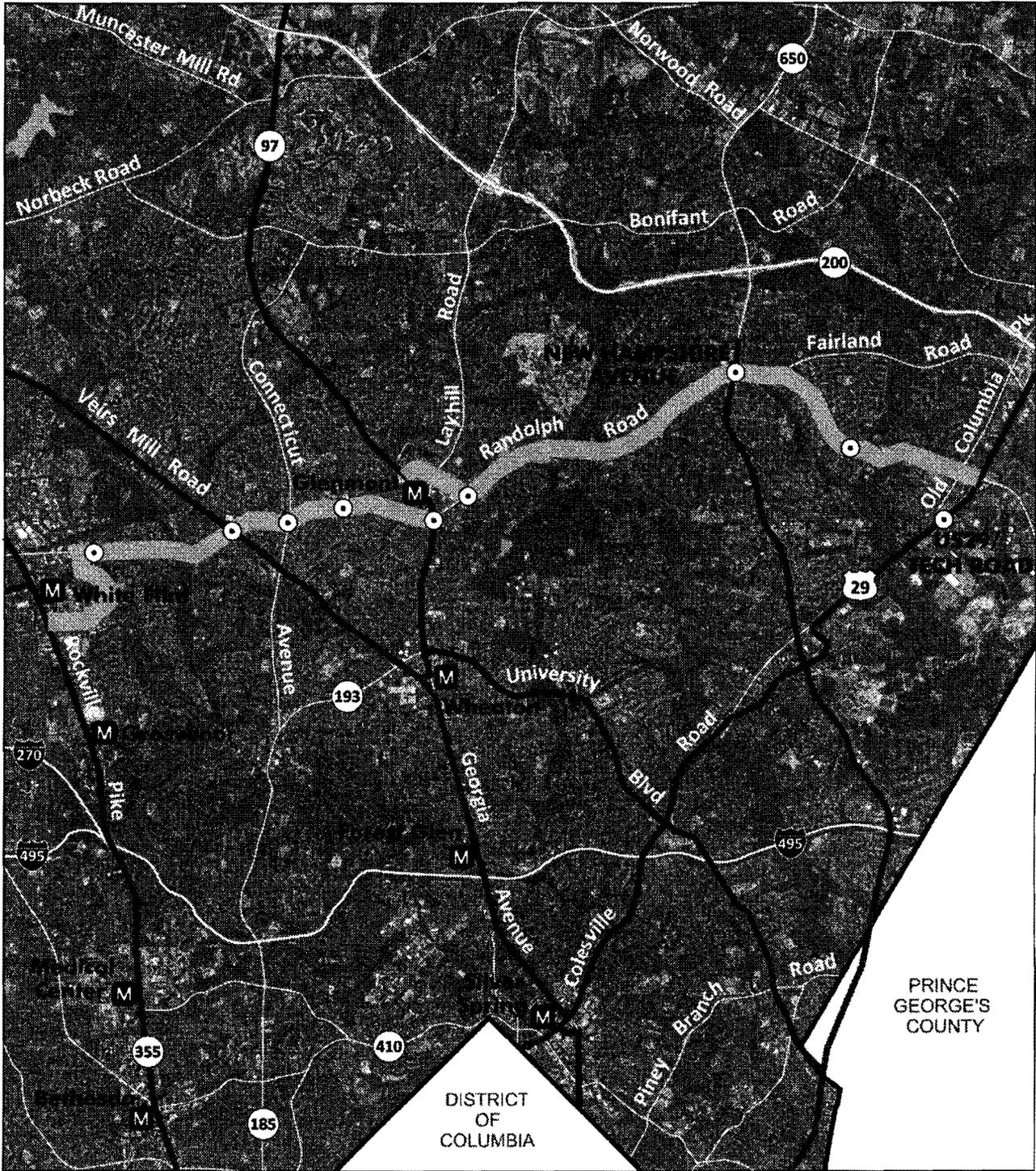
Randolph Road Glenallan Avenue

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



Table 10 Corridor Recommendations, Randolph Road

Road	from	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
Randolph Road	US 29	Fairland Rd	[Mixed Traffic] <u>No</u>	80	[4-5] <u>0</u>
Randolph Road	Fairland Rd	Glenallen Ave		120	[6] <u>0</u>
Glenallen Avenue	Randolph Rd	Layhill Rd		80	[2] <u>0</u>
Glenallen Avenue	Layhill Rd	Georgia Ave		90	[2] <u>0</u>
Randolph Road	Georgia Ave	Judson Rd		140	[6] <u>0</u>
Randolph Road	Judson Rd	Veirs Mill Rd		120	[6] <u>0</u>
Randolph Road	Veirs Mill Rd	Dewey Rd		120	[6] <u>0</u>
Randolph Road	Dewey Rd	Parklawn Dr		100	[4] <u>0</u>
Parklawn Drive	Randolph Rd	Nebel St		80	[4] <u>0</u>
Nicholson Lane	Nebel St	MD 355		90	[4] <u>0</u>

Or, west of Veirs Mill:

<u>Veirs Mill Road</u>	<u>Randolph Rd</u>	<u>Parkland Dr</u>	<u>Yes</u>	<u>120</u>	<u>1</u>
<u>Montrose Parkway</u>	<u>Dewey Rd</u>	<u>Parklawn Dr</u>	<u>Yes</u>	<u>300</u>	<u>1</u>
<u>MD 355</u>	<u>Montrose Pkwy</u>	<u>White Flint Metro</u>	<u>Yes</u>	<u>162</u>	<u>2</u>

* Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

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] dedicated right-of-way.
- Along University Boulevard from Lorain Avenue to [New Hampshire Avenue] Williamsburg Drive, a mixed traffic transitway.
- Along University Boulevard from Williamsburg Drive to New Hampshire Avenue, a dedicated right-of-way.

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 | | BRT Station |
| | One-Lane Median | | Metro Station |
| | Mixed Traffic | | |
| | Other BRT Corridors | | |



Table 11 Corridor Recommendations, University Boulevard

Road	from	To	[Treatment] Dedicated Lane(s)?	R.O.W.*	Maximum Additional Transit Lanes
University Boulevard	Georgia Ave	Amherst Ave	[Reversible One-Lane Median] <u>Yes</u>	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]
<u>University Boulevard</u>	<u>Lorain Ave</u>	<u>Williamsburg Dr</u>	<u>No</u>	<u>120</u>	<u>0</u>
University Boulevard	[Lorain Avenue] <u>Williamsburg Dr</u>	Piney Branch Rd	[Mixed Traffic] <u>Yes*</u>	[120] <u>124</u>	[6] <u>1</u>
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 14 th 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.

*****Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

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.

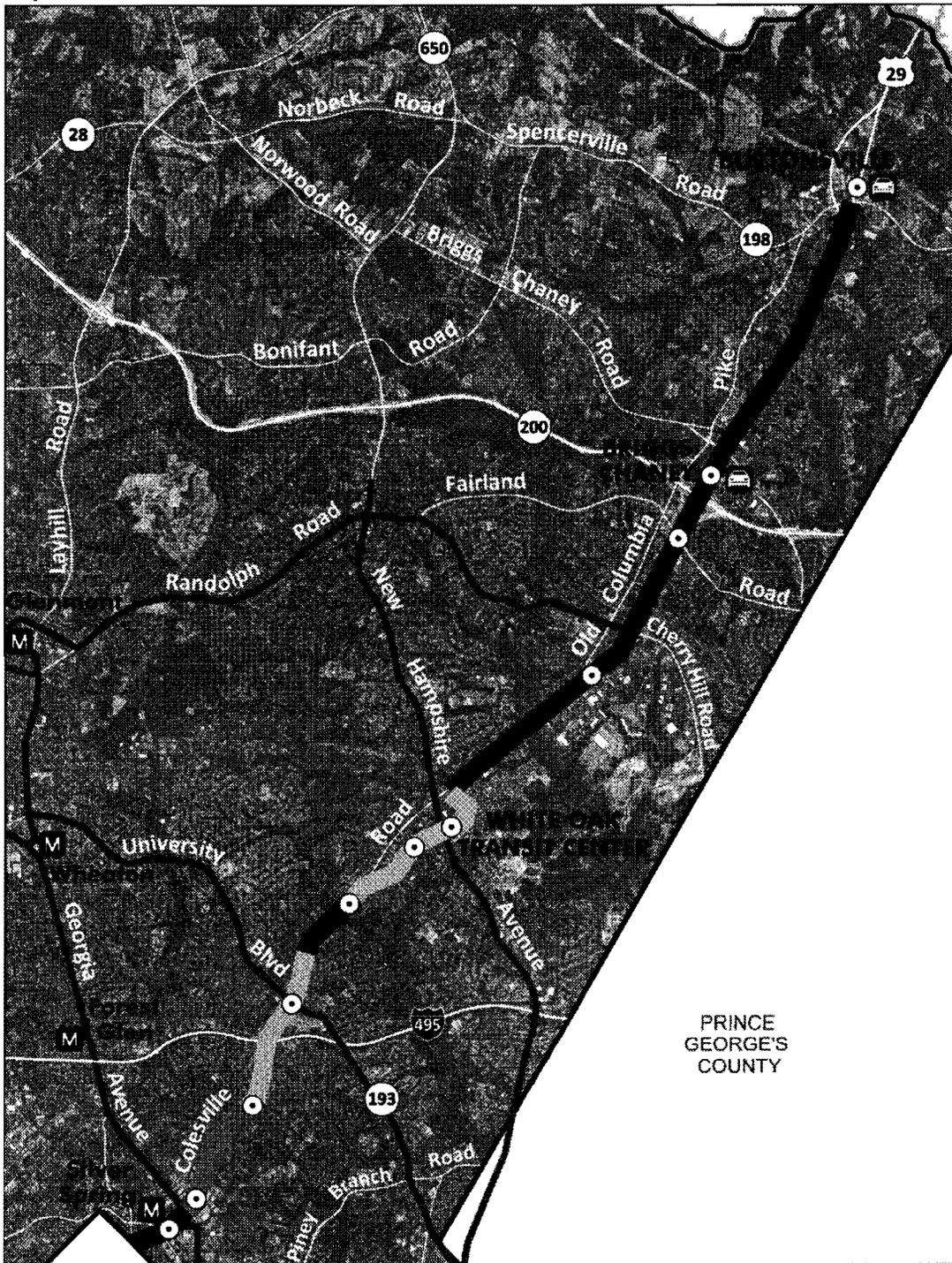
Corridor [treatment] recommendations, from north to south:

- Along US 29 from MD198 to [Stewart Lane] Southwood Avenue, [a two-lane median busway] dedicated lanes.
- 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] a dedicated lane in the peak-hour peak-direction.
- Along US 29 from Georgia Avenue to Sixteenth Street, [curb lanes via lane-repurposing] dedicated lanes.

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 |  Mixed Traffic |  Park-and Ride Station |
|  Two-Lane Median |  Other BRT Corridors | |
|  Managed Lanes |  BRT Station | |
|  Curb Lanes |  Metro Station |  |
- 0 5000 ft

Table 12 Corridor Recommendations, US 29

Road	From	To	[Treatment] Dedicated Lane(s)?	R.O.W.***	Maximum Additional Transit Lanes
US 29	MD 198	Stewart Ln	[Two-Lane Median] <u>Yes</u>	[161-]200	[6 + 2 [bus] 0
Stewart Lane	US 29	Lockwood Drive	[Mixed Traffic] <u>No</u>	80	[2] 0
Lockwood Drive	Stewart Ln	New Hampshire Ave		80	[2] 0
Lockwood Drive	New Hampshire Ave	US 29		80	[2] 0
US 29	Stewart Lane	Lockwood Drive	[Curb Lanes] <u>Yes</u>	122	[4 + 2 bus] 0
US 29	Lockwood Dr	Southwood Ave	[Curb Lanes] <u>Yes</u>	122	[4 + 2 bus] 0
US 29	Southwood Ave	Sligo Creek Pkwy	[Mixed Traffic] <u>No*</u>	120	[6] 0
US 29	Sligo Creek Pkwy	Fenton St	[Managed Lanes] <u>Yes**</u>	120	[2 off-peak + 3 peak + 1 bus] 0
US 29	Fenton St	Georgia Ave		100	[2 off-peak + 3 peak + 1 bus] 0
Colesville Road	Georgia Ave	East West Hwy	[Curb Lanes] <u>Yes</u>	125	[4 + 2 bus] 0
Colesville Road	East West Hwy	16th St		125	[4 + 2 bus] 0

* 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 there be [changed to one dedicated bus] a dedicated lane in the peak direction[, three general purpose lanes in the peak direction, and two general purpose lanes in the off-peak direction].

***Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations

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.]

The corridor recommendation is for one or more dedicated lanes between the Rockville and Wheaton Metro Stations, where feasible.

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



Table 13 Corridor Recommendations, Veirs Mill Road

Road	from	To	[Treatment] Dedicated Lane(s)?	R.O.W.**	Maximum Additional Transit Lanes
Veirs Mill Road	MD 355	Meadow Hall Dr	[Bi-directional One-Lane Median] <u>Yes</u> *		
Veirs Mill Road	Meadow Hall Drive	Twinbrook Pkwy	[Bi-directional One-Lane Median] <u>Yes</u>	150	[4 to 6, +] 1 [bus]
Veirs Mill Road	Twinbrook Pkwy	Parkland Dr		150	[4 to 6, + 1 bus] 2
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.
 ** Reflects the minimum right-of-way, and may not include land needed for spot improvements such as turn lanes and stations.

[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 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.]

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 right-of-way designations for transit corridors in this amendment to the Master Plan of Highways represent what is needed to ensure network integrity and achieve the County's vision, which is to make transit a viable and reliable alternative to driving in the County's developed core. These right-of-way designations are intended to support the development of a BRT network that improves the performance of the overall transit network as measured by the traffic tests contained in the Subdivision Staging Policy.

More detailed facility planning may result in modifications to the recommended treatments in specific corridors or segments, but a guiding standard is needed to ensure that the treatments ultimately implemented for individual corridors as well as the overall network are consistent with the minimum level of service anticipated by this amendment. While adequate right-of-way designations are essential to accommodate the infrastructure needed to support a level of speed and reliability that will make BRT

an attractive travel option, operational decisions such as the use of signal prioritization, off-board fare collection, and similar questions must also take performance quality standards into account.

Therefore, the Council directs the Planning Board, with assistance from the Department of Transportation, to develop -- and recommend for the Council's consideration for adoption as an amendment to the Subdivision Staging Policy -- minimum performance standards to guide the implementation of the BRT network to ensure that it will be an attractive alternative to driving. The Planning Board's recommendations should be designed to achieve a level of service for transit that is consistent with the minimum quality of service anticipated by the right-of-way designatons and related statements of policy in this amendment to the Master Plan of Highways.

The transit network that is achieved by the sum of the final treatments on individual corridor segments should produce a significant improvement in travel time by transit when compared to the no-build scenario, resulting in a net increase in transit riders and a net decrease in vehicle-miles of travel across the county.

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 where feasible 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.

The work leading to 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 most of the BRT lines in the *Countywide Transit Corridor Functional Master Plan* would have some bikeway accommodation directly along the corridor, including XX miles with a shared use path, nearly XX miles with a signed shared roadway, over XX miles with bike lanes, and **one mile** with cycle tracks. Bike lanes are included in nearly **one-quarter** of the transitway miles.

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.

The Maryland Department of Transportation 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 should be included in a plan of improvements for BPPAs. 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

Prohibiting right-turn on red. Within BPPAs, right-turn on red signal phases should be prohibited, unless for safety reasons this is not feasible.

Pedestrian signal phases. Within BPPAs, all traffic signals should be timed so that there is adequate time for slower-moving pedestrians to cross a street during a single phase. The assumption should be that pedestrians will walk at a pace no faster than 3.5 feet per second.

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.

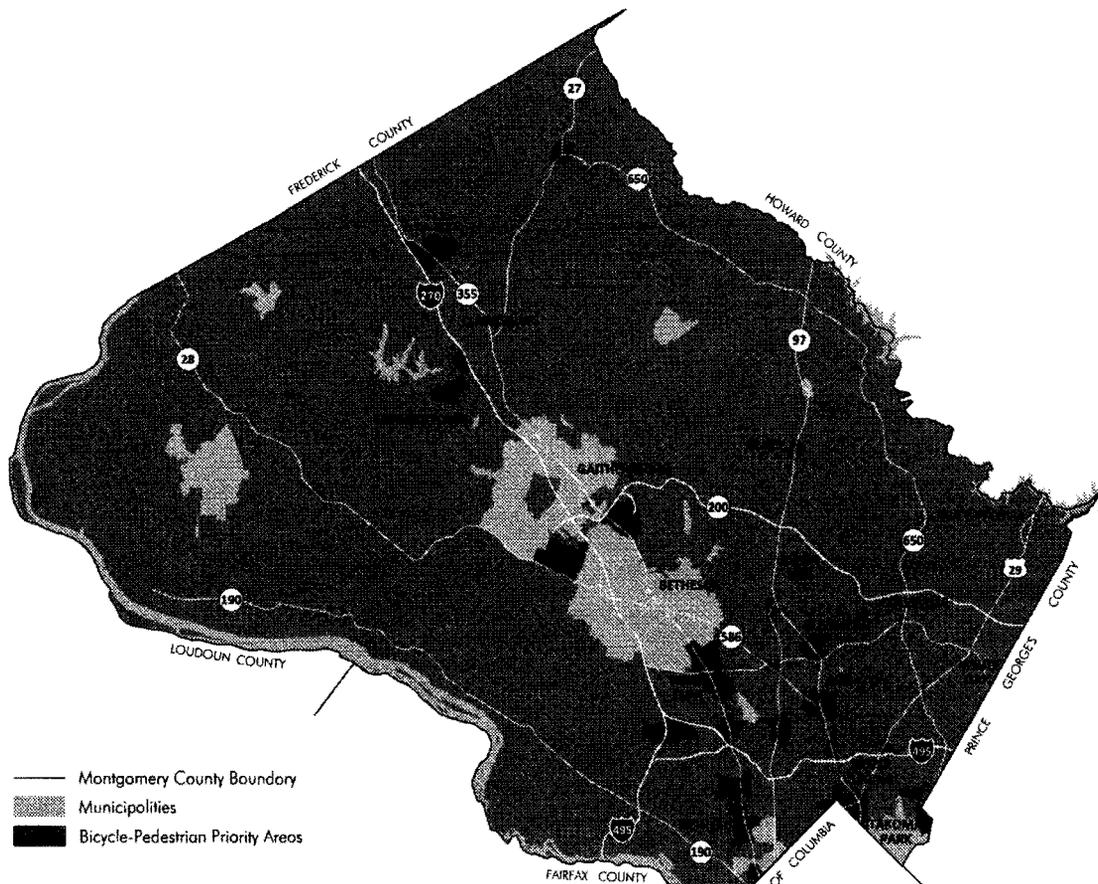
Lighting: Lighting in BPPAs should meet AASHTO standards; this is particularly true for intersections. Care should be taken to locate lighting fixtures at crosswalks so that the light source is between the vehicle and the pedestrian wherever possible, maximizing contrast. Increasing the contrast between 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.

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.

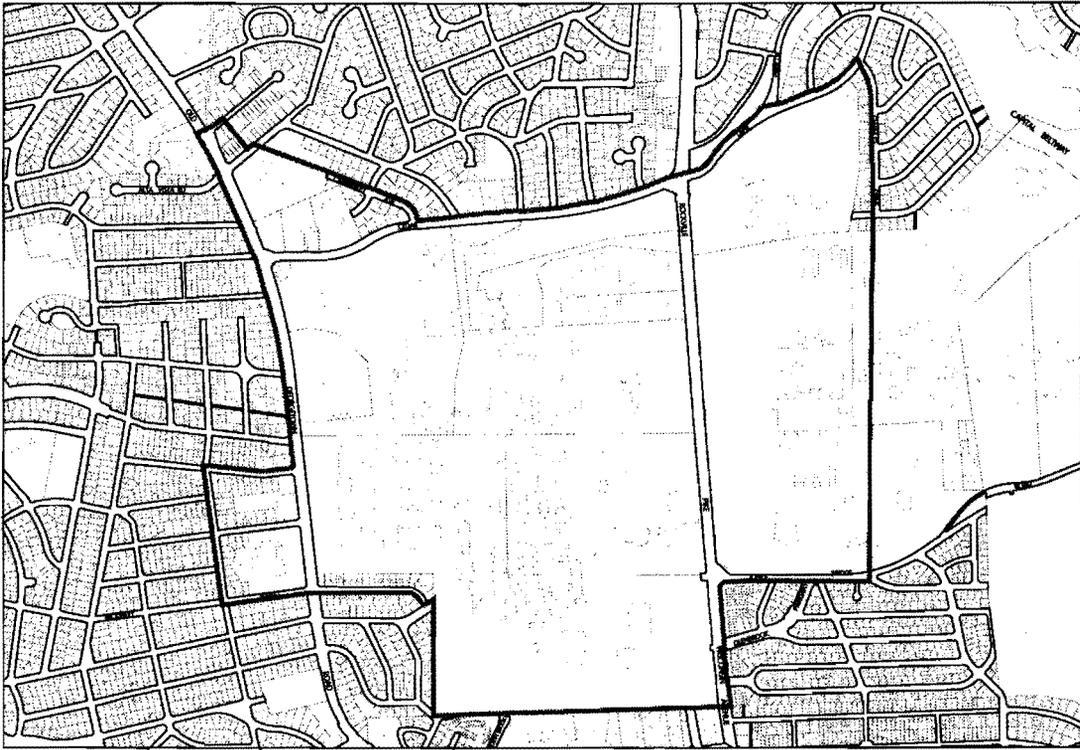
Map 14 Montgomery Mall/Rock Spring BPPA



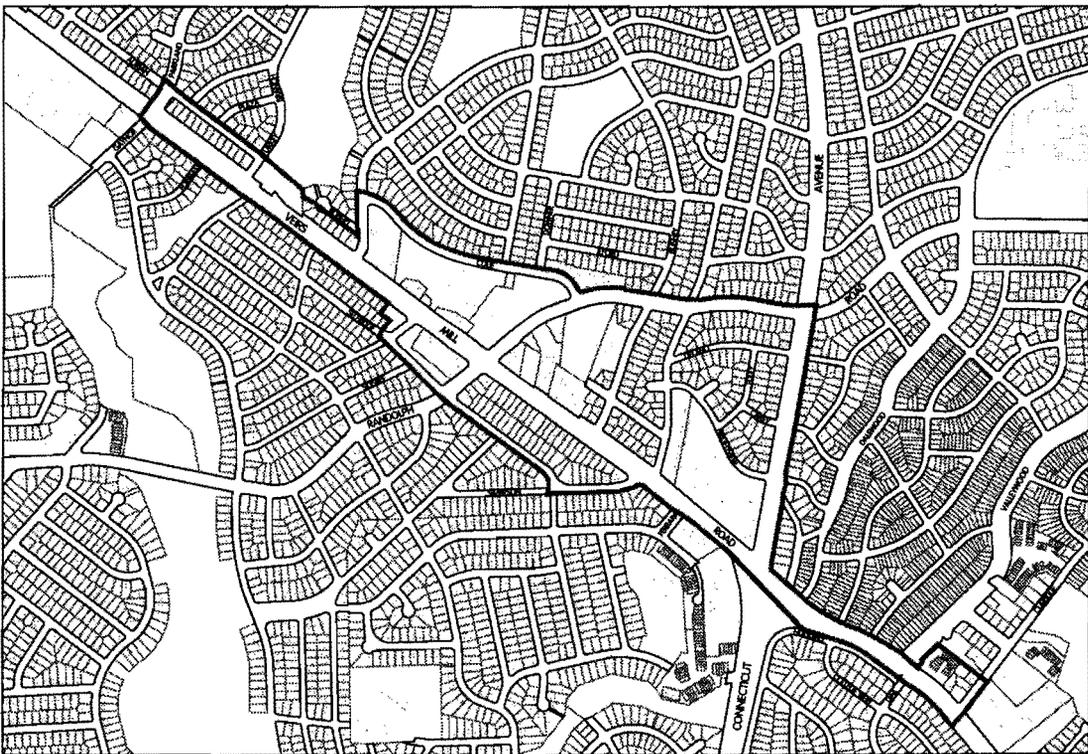
Map 15 Piney Branch/University Boulevard Purple Line Station Area BPPA



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



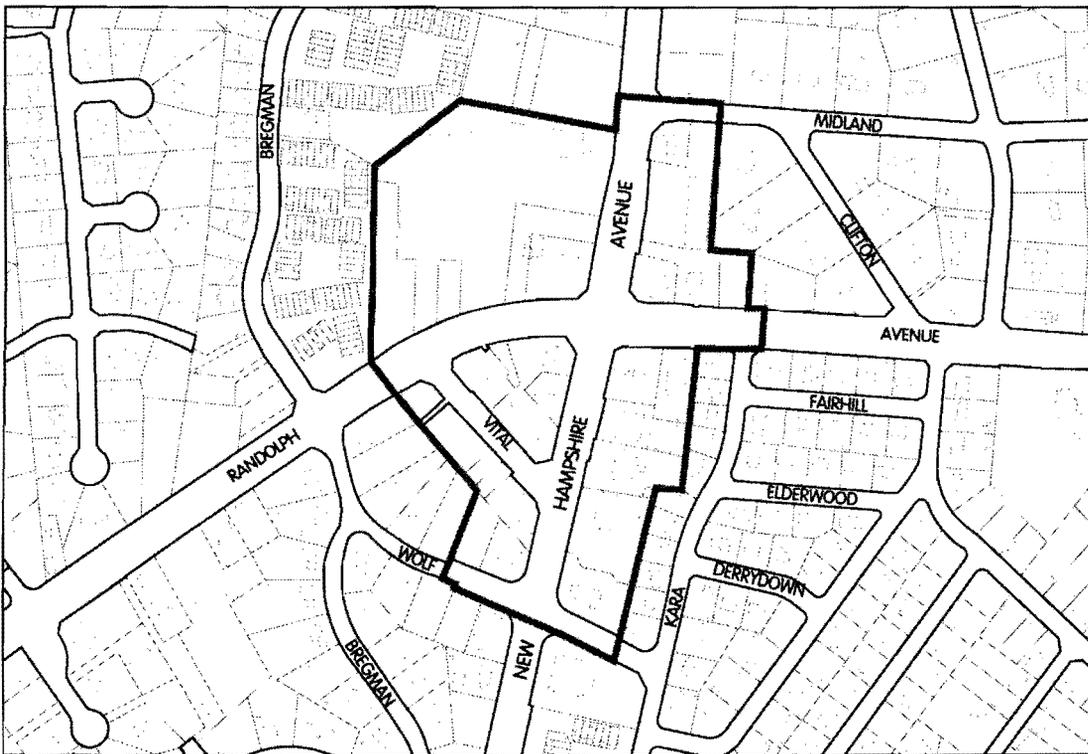
Map 17 Veirs Mill Road/Randolph Road BPPA



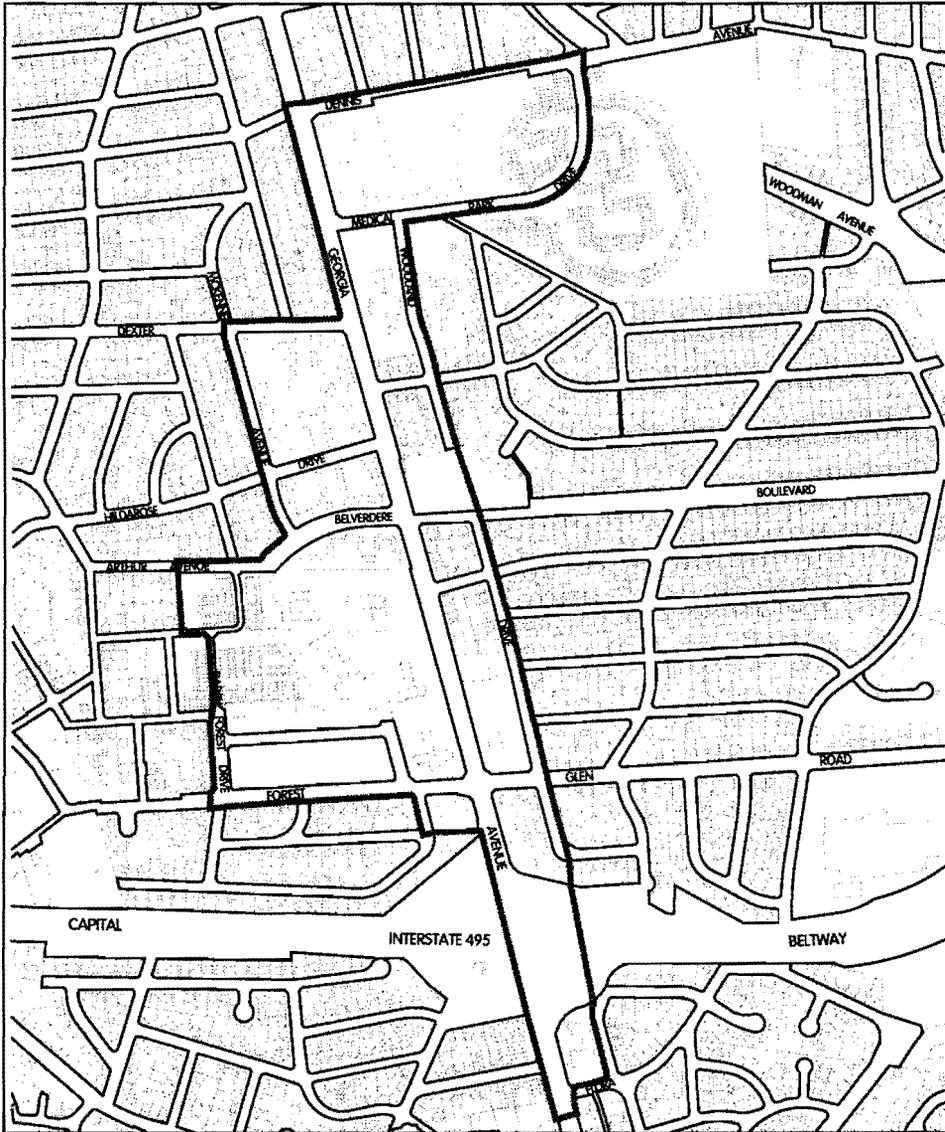
Map 18 Aspen Hill BPPA



Map 19 Colesville BPPA



Map 20 Forest Glen Metro Station Area BPPA



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.

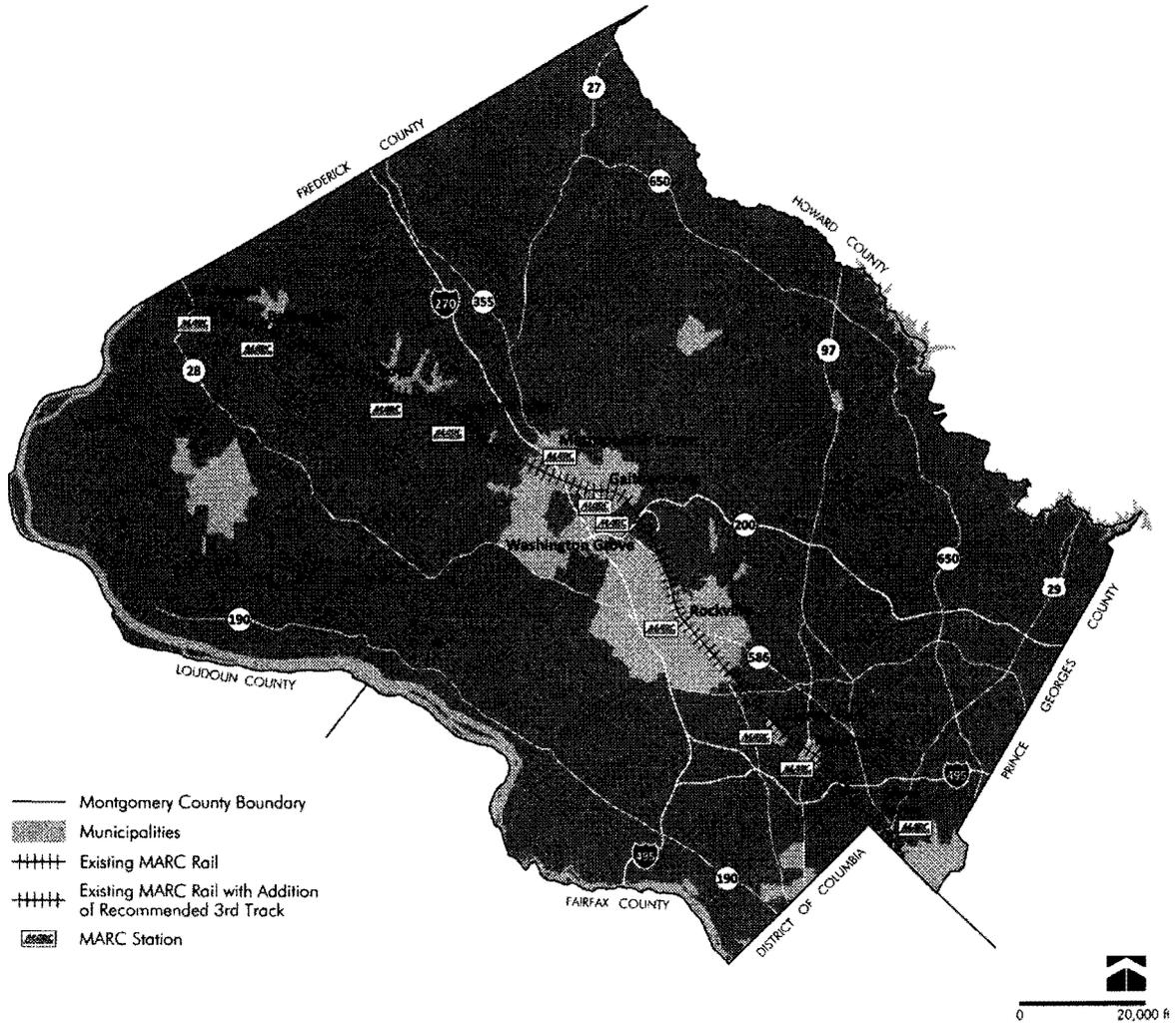
This Plan recommends that a third track be constructed on the Brunswick Line between the Frederick County line and the Metropolitan Grove station to reduce conflicts with freight service and enabling the expansion of MARC service. This additional capacity would accommodate a tripling of ridership and 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.] To accommodate a third track, this Plan recommends that the master-planned right-of-way be widened by 25' in this segment.

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
CO ₂ e reduction (lbs/yr)	82,627,960	98,317,893	61,011,667
CO ₂ e 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 Plan² 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).