

Transit Service Coordination Report

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ACRONYMS

Acronym	Definition
BRT	Bus Rapid Transit
CCT	Corridor Cities Transitway
ETL	Express Toll Lane
FTA	Federal Transit Administration
FHWA	Federal Highway Administration
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
ITB	Inside the Beltway
MARC	Maryland Area Regional Commuter
MCDOT	Montgomery County Department of Transportation
MDOT MTA	Maryland Department of Transportation Maryland Transit Administration
MDOT SHA	Maryland Department of Transportation State Highway Administration
MDTA	Maryland Transportation Authority
Metrobus	WMATA Metrobus Service
Metrorail	WMATA Metrorail Service
MPO	Metropolitan Planning Organization
MWCOG	Metropolitan Washington Council of Governments
NCR	National Capital Region
NVTC	Northern Virginia Transportation Commission
OTB	Outside the Beltway
P3	Public-Private Partnership
Purple Line	Purple Line Light Rail

Ride On	Montgomery County Bus Service
SOV	Single Occupancy Vehicle
The Bus	Prince George's County Bus Service
TIGER	Federal Transportation Infrastructure Generating Economic Recovery
TNC	Transportation Network Companies
TOD	Transit Oriented Development
TPB	NCR Transportation Planning Board
TTF	Transportation Trust Fund
VMT	Vehicle Miles Traveled
WMATA	Washington Metropolitan Area Transit Authority
WSTC	Washington Suburban Transit Commission

SECTION 1: EXECUTIVE SUMMARY

Multiple studies over the last decade have shown that the National Capital Region (NCR) is one of the most congested in the nation, and Marylanders face the second highest commuting times in the country. Today, on average, travelers experience seven hours of congestion daily on I-270. The duration is even worse on I-495 with travelers experiencing ten hours of congestion daily. With the projected population growth in the NCR, Marylanders will continue to see those numbers increase. Multiple studies show that a comprehensive transportation network, including improvements to I-495 and I-270 coupled with investment in transit is necessary to address congestion and not only move people, but goods and services throughout the NCR.

The NCR's long-range transportation plan, known as Visualize 2045, was completed and approved in October 2018 by the NCR Transportation Planning Board (TPB), the federally designated metropolitan planning organization for the region on which sits representatives from Maryland, Virginia, and the District of Columbia. Visualize 2045 defines the initiatives to which TPB has committed and championed for years to address the ever-increasing congestion on our region's roadways and provide enough transit capacity to serve additional anticipated passengers. These initiatives include bringing jobs and housing closer together, expanding bus rapid transit, moving more people on Metrorail, increasing telecommuting, improving walking and bike access to transit, completing the National Capital Trail, and expanding the express highway network with managed lanes and new opportunities for transit. Visualize 2045 notes that all these initiatives would be needed to significantly improve the region's transportation system performance compared to current plans and programs.

While the Maryland Department of Transportation (MDOT) supports all the initiatives outlined in Visualize 2045, the I-495 and I-270 Public-Private Partnership (P3) Program is looking to advance managed lanes and provide new opportunities for transit in the I-495 and I-270 corridors.

Managed lanes are typically a "freeway-within-a-freeway" where a set of lanes is separated from the general-purpose lanes. Using the managed lanes for transit gives travelers more choices and offers greater transportation benefits. Acting as a new "fixed guideway" the managed lanes enable more efficient transit operations through faster and more reliable operating speeds and offer the opportunity to create a suburban transit network that is a time competitive alternative to driving.

This Transit Service Coordination Report is the result of coordination between MDOT and local governments, transit providers and state agencies through the Managed Lanes Transit Work Group. This report is intended to inform the development of the I-495 & I-270 P3 Program¹ and assist affected counties and transit providers in prioritizing capital and operating investments.

The State of Maryland and its transit partners have developed one of the largest and most successful multi-modal transit networks in the United States. Through the MDOT Maryland Transit Administration (MTA), Washington Metropolitan Transit Authority (WMATA) and local transit partnerships, Maryland provides a combination of rail and bus services supporting robust mobility across the state and especially in the I-495 and I-270 corridors. The State's transit investments include the ongoing construction of the MDOT MTA Purple Line in Montgomery and Prince George's counties, support for WMATA's new Metrorail Silver Line

¹ The I-495 & I-270 Managed Lanes Study (MLS) being done in compliance with the National Environmental Policy Act (NEPA) is still ongoing at the time of publication of this report. The improvements noted in this report are recommendations and would need to be done in coordination with transit providers. Therefore, the MLS currently does not assume any improvements recommended as part of this report.

from Largo to Dulles Airport and far reaching commuter rail and commuter bus services across the Metropolitan Washington region.

This Transit Service Coordination Report presents information about regional population and employment, potential transit markets and the current transit services operating in the I-495 and I-270 corridors. Key observations and findings include:

- The Region is forecasted to grow in population and jobs by 2045.
 - Overall, the NCR alone is forecast to add 1.3 million² more residents with the most rapid growth occurring in the central core of Washington DC and Arlington, VA and the outer suburban jurisdictions.
 - The counties directly served by the P3 Program including Montgomery, Prince George's and Frederick will add more than 235,000 people (15%).
 - Neighboring suburban Maryland counties such as Anne Arundel, Howard, Charles, St. Mary's and Calvert will add 228,000 residents (18%).
 - The NCR alone will add 1.0 million³ jobs with Washington DC and Arlington, VA adding 262,000 jobs (25%).
 - The counties directly served by the P3 Program including Montgomery, Prince George's and Frederick counties are expected to add 224,000 jobs (22%).
 - Maryland's suburban employment centers including Rockville, Bethesda, Silver Spring, College Park, New Carrollton and Largo are predicted to add 78,000 jobs (20%) and present opportunities for new and expanded transit services as a result of the P3 Program.
- Commuting between Maryland and Virginia across the American Legion Bridge is an underserved transit market with 19,000 daily commuters traveling from Fairfax County to Montgomery County and 22,000 daily commuters traveling from Montgomery County to Fairfax County.
- Suburban population growth along with job growth in the central core of Washington DC will present the opportunity for continued expansion in commuter bus services which will have faster travel speeds by utilizing the managed lanes.
- Conceptual locations have been developed for managed lanes access on I-270 south of I-370 and on I-495. These access ramps allow for improved access to and from existing and planned transit centers and transit-oriented development.
- There are robust transit services in the I-495 and I-270 corridors with new services in planning and under construction.

Transit Enhancements

- The proposed managed lanes offer an opportunity to implement a transit network where regional trips could be accomplished with a single transfer. The location and configuration of managed lanes access points, especially along I-270 north of I-370 will be critical to an effective network.
- The suburban counties including Frederick, Charles, Anne Arundel and Howard identified the need for all-day bus services connecting to the Metrorail system.

² Source – National Capital Region Transportation Planning Board, Visualize 2045, A Long-Range Transportation Plan for NCR, Page 6, Forecast Growth

³ Source – National Capital Region Transportation Planning Board, Visualize 2045, A Long-Range Transportation Plan for NCR, Page 6, Forecast Growth

- With the proposed managed lanes, a “virtual” Purple Line Bus Rapid transit (BRT) service between New Carrollton, Largo, Branch Avenue, National Harbor and Alexandria, VA, operating as high-frequency bus service would be possible. This could build transit ridership and improve access to activity centers.
- The proposed addition of managed lanes between Tyson’s Corner, Virginia and Montgomery County enables time competitive transit across the American Legion Bridge. An interstate partnership with Virginia could lead to new bus services connecting Montgomery and Fairfax counties.
- Eleven transit routes using the managed lanes were evaluated using the MWCOG 2045 Regional Travel Forecast Model⁴. Over 10,000 new weekday transit trips are estimated to use these services.
- New transit centers and additional park and ride spaces will be needed to support the new transit services. These facilities should be designed in coordination with the managed lanes access ramps.

This report should be used to inform affected counties and transit providers about the significant transit opportunities offered by managed lanes and initiate discussions about ways to incorporate regional transit services into the P3 Program. The alternatives are broad, and in many cases a significant investment would be needed to implement the options. Further discussion will be required to establish priorities and determine appropriate long-term funding strategies.

⁴ COG/TPB Travel Demand Forecasting Model, Version 2.3.75

SECTION 2: INTRODUCTION

Based on annual delay and congestion cost per auto commuter data⁵, the NCR is the most congested in the nation. And, the cost of congestion will only continue to grow as the population in the NCR region alone is expected to increase by 1.3 million people⁶ by 2045. Today, Maryland has the second highest commuting time in the Nation. In fact, on average the I-495 and I-270 corridors are congested between seven and ten hours per day.

As part of Maryland's I-495 & I-270 P3 Program, an environmental study, known as the I-495 & I-270 Managed Lanes Study is underway concurrently with the solicitation of the first phase of the P3 Program. MDOT began the environmental study in 2018 to develop a travel demand management solution(s) that addresses congestion, improves trip reliability and enhances existing and planned multi-modal mobility and connectivity and to assess potential environmental and community benefits and impacts associated with the no-build and build alternatives.

A P3 is a method for delivering public infrastructure assets, such as highway improvements, through an agreement between the State and a private entity. The private entity undertakes the designing, building, financing, operation, and maintenance of the transportation facility. This partnership allows the State to make the improvements more quickly and allows the private sector to bring innovation to the design, construction, operation and maintenance in the most cost-effective manner.

This Transit Service Coordination Report has been developed as part of the P3 Program. It was done in collaboration with local jurisdictions both directly and indirectly affected by the P3 Program. The intent of this report is to inform the planning process for transit services and related infrastructure needs such as transit access and park and ride facilities. It illustrates where there may be feasible opportunities for transit services and carpooling to realize the benefits of the managed lanes along the I-495 and I-270 corridors.

While managed lanes provide a new option for motorists, they also represent new opportunities for transit. To analyze these new options and opportunities, commuting patterns and projected population changes were examined and underserved markets were identified. A thorough review of potential access points and transit station locations was performed. Service concepts were vetted, and park and ride facilities were examined.

This report provides local jurisdictions and the State with strategies to maximize the benefits of reliability and speed at which transit services can utilize the managed lanes. It provides a basis for the evaluation of future capital and operating needs in the service area. It provides interested parties with information about the existing and potentially feasible transit options in the region.

2.1 Objective

Managed lanes with direct access generally benefit transit through improved operational speeds and improved reliability. In addition, the use of managed lanes to serve transit gives travelers more choices and offers greater transportation benefit. Managed lanes with a multimodal use can carry many more people than congested general-purpose travel lanes, or standalone transit options.

⁵ Maryland Department of Transportation Customer Service Annual Report 2018

⁶ Visualize 2045, A Long-Range Transportation Plan For The National Capital Region, October 2018

The key objectives of this work include:

- Analyzing existing and potential transit markets
- Identifying short-term transit service modifications to maximize the benefit
- Identifying where long-term transit service options may be feasible
- Identifying key managed lane access points beneficial to transit
- Analyzing existing and potential carpool and vanpool markets and strategies
- Documenting Maryland's investment in transit throughout the service corridor

2.2 Collaboration

In the P3 Program area there are numerous agencies directly involved in transit solutions, including the MDOT MTA, WMATA, and Frederick, Montgomery and Prince George's counties. In addition, Anne Arundel, Charles, and Howard counties are benefitted by the P3 Program as well. Although, I-495 and I-270 do not operate through these jurisdictions, many commuters travel either to or from these counties using arteries that feed into I-495 or I-270. Therefore, as our work began on Transit Service Coordination efforts, an all-inclusive approach was taken to gather input from local stakeholders who were both directly and indirectly affected by the P3 Program.

Beginning in May 2019, the Managed Lanes Transit Work Group was formed. The group included transit and planning representatives from Montgomery, Prince George's, Frederick, Howard, Anne Arundel and Charles counties, as well as MDOT MTA commuter bus and Maryland Area Rail Commuter (MARC) and WMATA, MDOT The Secretary's Office of Planning and Capital Programming, MDOT State Highway Administration (SHA), Federal Highway Administration (FHWA), Federal Transit Administration (FTA) and Metropolitan Washington Council of Governments (MWCOC). The representatives gave input on existing services and identified where there may be feasible opportunities for transit to use the managed lanes. The group undertook the following activities:

- Transit Market Analysis
- A transit review of the managed lane access points
- Coordination with the Washington Area Bus Transformation Project
- Casual Carpooling Market Analysis
- Park and Ride facilities evaluation and improvement planning

2.3 Existing and Planned Transit Services

In the P3 Program area, traditional bus service, rail service and casual carpooling exist today. Tables 1 and 2 show existing bus and rail services in the I-495 and I-270 corridors. Montgomery and Prince George's counties are served by WMATA's Metrobus and Metrorail systems. Frederick, Montgomery, and Prince George's counties' services operate locally in neighborhoods and act as a collector and distributor type of service, serving medical, employment, education, shopping centers and more. The MDOT MTA operates the MARC commuter rail and commuter bus services. As this planning work was conducted, the Transit Work Group members provided details about planned services in their respective jurisdictions. Consideration was also given to existing planning efforts that have been undertaken as well as any new services under development. This included:

- New Services Under Construction
 - The Purple Line
 - The Silver Spring Transit Center

- The Bethesda South Station Entrance
- The US29 Flash BRT

- Planning Studies
 - Montgomery County's Bus Rapid Transit (BRT) Program Development
 - The Veirs Mill Flash BRT (planning)
 - The MD355 Flash BRT (design and implementation strategy)
 - WMATA's Bus Transformation Project
 - Move Anne Arundel Transportation Master Plan (underway)
 - Howard County's Washington Region Transit Priority for 2020

Table 1: Existing Bus Transit in I-495 and I-270 Corridor

Route	Name	Provider	Route Type	Distance on Corridor	Daily Ridership
201	Gaithersburg Park and Ride - BWI Airport	MDOT MTA	Commuter Bus	5 miles	362
203	Columbia - Bethesda	MDOT MTA	Commuter Bus	Uses ICC	186
204	Frederick - College Park Metrorail Station	MDOT MTA	Commuter Bus	26 miles	273
335	Clarksville - Washington DC	MDOT MTA	Commuter Bus	4 miles	317
345	Ellicott City - Washington DC	MDOT MTA	Commuter Bus	4 miles	324
505	Hagerstown - Shady Grove Metrorail Station	MDOT MTA	Commuter Bus	29 miles	326
515	Frederick - Shady Grove Metrorail Station	MDOT MTA	Commuter Bus	26 miles	680
70	Milestone Park and Ride - Bethesda	Ride On	Express	15 miles	680
73	Shady Grove Metrorail Station - Cabin Branch	Ride On	Express	6 miles	134
79	Shady Grove Metrorail Station - Clarksburg	Ride On	Express	4 miles	329
100	Germantown - Shady Grove Metrorail Station	Ride On	Express	5 miles	1,957
87	Laurel Park - New Carrollton Metrorail Station	WMATA	Local	5 miles	586

Table 2: Corridor Rail Stations

Station	Rail Line	Daily Boardings	Distance to I-495 / I-270 Corridor
Germantown	MARC	800	1 mile
Shady Grove Metrorail Station	Red	11,139	2 miles
Rockville Metrorail Station	Red	3,756	1.7 miles
Rockville	MARC	312	1.7 miles
Twinbrook Metrorail Station	Red	3,807	2 miles
White Flint Metrorail Station	Red	3,506	2 miles
Grosvenor Metrorail Station	Red	4,995	1.5 miles
Medical Center Metrorail Station	Red	5,181	1 mile
Bethesda Metrorail Station	Red	8,999	2 miles
Forest Glen Metrorail Station	Red	2945	¼ mile
Silver Spring Metrorail Station	Red	11,682	2 miles
Silver Spring	MARC	654	2 miles
Greenbelt Metrorail Station	Green	5,350	¼ mile
New Carrollton Metrorail Station	Orange	6,584	½ mile
New Carrollton	MARC	261	½ mile
Largo Metrorail Station	Blue	4,181	½ mile
Morgan Boulevard Metrorail Station	Blue	1,826	1 mile
Branch Avenue Metrorail Station	Green	5,263	1 mile
Sources: WMATA Data Portal; MDOT MTA Ridership Reports			

2.4 Benefits for Existing Service

Existing service includes 12 bus routes along the I-495 and I-270 P3 Program corridors which use between four and 29 miles of the highway and have ridership of over 6,000 passenger trips per day. Transit services adjacent to the corridor include 15 rail stations between one-quarter mile and two miles from the corridor. These stations provide for more than 81,000 boardings per day and are an integral part of the overall transit network. With the implementation of managed lanes, these present-day transit customers have the potential to benefit from the project with access, dependability, and a travel-time advantage.

The P3 Program offers both short-term and long-term benefits to transit by:

- Enabling more efficient transit operations through a more reliable and faster system
- Providing for existing services to use the managed lanes
- Acting as new transit “fixed guideway”
- Facilitating the opportunity for new market trials
- Offering the ability to more effectively provide transit services to underserved suburban to suburban markets
- Enhancing opportunities for partnership with Virginia to offer interstate services
- Facilitating the use of technology and innovation in transit and tolling

2.5 Modification of Existing Service

Existing transit service may need to be modified to accommodate the changes that will result from the P3 Program. While transit service is compatible with the managed lane highways, transit providers may need to review their operating plans to consider the affects the managed lanes will have on their service.

The P3 Program provides a unique opportunity for transit providers in the region to evaluate their current operating plans and make alterations to routes to realize the transit benefits the managed lanes offer. While they are very conducive to longer express bus routes that collect people at transit centers or park and ride lots, they also facilitate the ability to more effectively provide transit service between suburban markets.

Due to the congestion and poor travel time reliability on I-495 and I-270 that exists today, a limited number of transit services currently operate on these highways. But as the managed lanes are introduced, modifications should be considered to routes that operate on the parallel arterial roads. Consideration should be given to utilizing the managed lanes to optimize the speed and reliability of the trips as appropriate. Additionally, service providers should examine their service coverage and route structure and make modifications to existing services that ensures optimal routing and minimizes duplication of services.

Every five years, each of the local transit providers updates their Transportation Development Plan. These plans detail current transit services, changes in the demand for transit, and offer short to mid-term transit modifications to address the changing operational environment. Additionally, each jurisdiction undertakes other short and long-range transit planning efforts. The concepts in this report should be used as a foundation for that work to ensure that where practical the highway network is used to facilitate efficient and effective transit.

2.6 Transit Markets and Service Opportunities

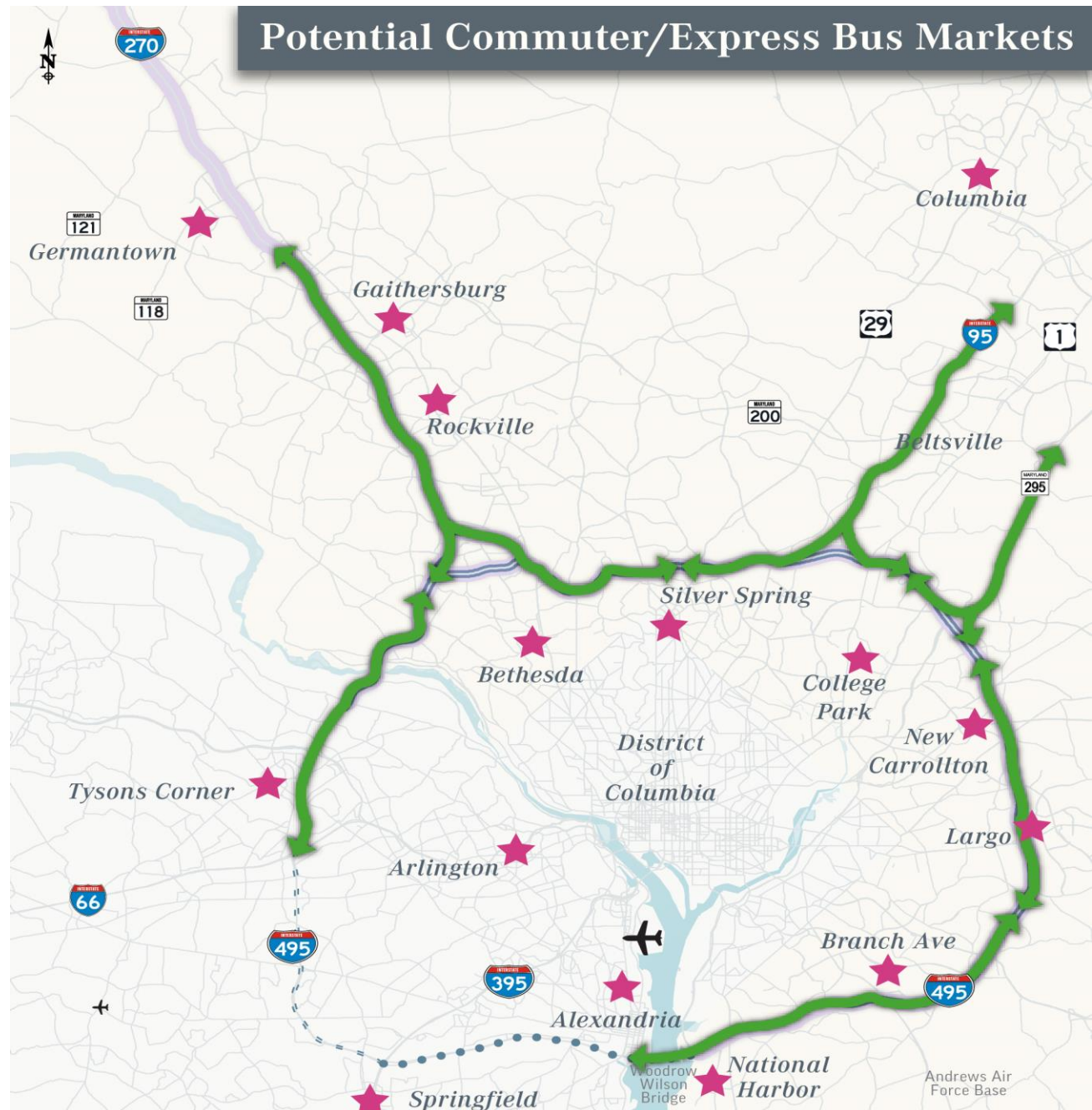
The Transit Work Group conducted a comprehensive review of the I-270 corridor from Frederick to I-495 and the I-495 corridor from Bethesda to Largo to identify potential transit markets and new service opportunities. Careful consideration was given to the types of trips, population growth, travel patterns, and the location of suburban work centers.

Trips are generally categorized as three types; short distance (less than 5 miles); medium distance (5 - 20 miles); and long distance (21 - 60 miles). Certainly, the longer you travel along the managed lanes, the greater the time savings realized. Therefore, the benefit to commuter buses is not surprising since longer bus routes without intermediate stops benefit the most from the faster speeds and reliability. But the medium distance trips that are taken from suburb to suburb will greatly benefit as well. Those trips are thought to be between

10 and 20 miles long. Based on the commuting trends to suburban job center locations, getting into the managed lanes will significantly improve the speed at which suburban markets can be served.

The analysis shows that these two types of transit services represent the greatest opportunities for successful use of the managed lanes. It should be noted, however, that the suburb to suburb types of services are historically a challenging transit model in Maryland. They don't fall within the WMATA model of local bus service, nor the MDOT MTA's commuter bus model. And, local jurisdictions don't generally cross jurisdictional boundaries. Figure 1 illustrates potential commuter and express bus markets.

Figure 1: Potential Commuter/Express Bus Markets



SECTION 3: MARYLAND TRANSIT PROGRAMS AND FUNDING

In Maryland, transit is provided by a myriad of operators. Each of the 23 counties, as well as the Town of Ocean City, Baltimore City, and Annapolis operate their own local transit systems. In addition, the MDOT MTA and WMATA operate rail and bus services. Funding comes from several different sources including federal and state subsidies and local funds.

3.1 Transit Programs in the Study Area

The area within the P3 Program is served by five transit operators. The services include local routes provided by Frederick, Montgomery and Prince George's counties, regional bus and rail service provided by WMATA, and commuter bus and commuter rail services offered by the MDOT MTA.

3.1.1 Frederick County

Frederick County TransIT provides public transit, paratransit and commuter services throughout Frederick County, serving medical, employment, education, shopping centers and more. They operate 10 Connector Routes in the City of Frederick and the urbanized areas of Frederick County. Commuter Shuttles and two Meet-the-MARC shuttles operate each weekday.

3.1.2 Montgomery County

Fixed-route bus service is provided by the Montgomery County Ride On system throughout the County. Ride On operates primarily in neighborhoods and provides a collector and distributor service to the major transfer points and transit centers in the County. Ride On supplements and coordinates the County's mass transit services with WMATA Metrobus and Metrorail service. The Ride On transit system operates and manages 78 routes.

3.1.3 Prince George's County

Prince George's County is served by WMATA Metrorail and Metrobus and ridership is among the highest in the region. In addition, Prince George's County operates TheBus' 26 local routes, Call-A-Bus and Call-A-Cab programs. They also work with local municipalities to assist them in providing a Call-A-Bus Program within their respective jurisdictions. These locally operated services are designed as a feeder system into the regional routes and provide transit options to the public and special communities such as seniors and people with disabilities.

3.1.4 Washington Metropolitan Area Transit Authority

WMATA operates the third largest rail system and the seventh largest bus network in the United States. WMATA was created in 1967 by an interstate compact in which Maryland, Virginia, and Washington DC participate. In accordance with Section 10-205 of the Transportation Article of the Annotated Code of Maryland, Maryland's share of WMATA's operating and capital expenses are paid as a grant from MDOT to the Washington Suburban Transit Commission (WSTC) through the Transportation Trust Fund (TTF). Services include a Metrorail network of six lines, 91 stations, and 117 miles of track; a Metrobus system covering over 11,000 stops across 1,500 square miles in Maryland, Virginia, and Washington DC; and the Metro Access paratransit system.

3.1.5 MDOT MTA

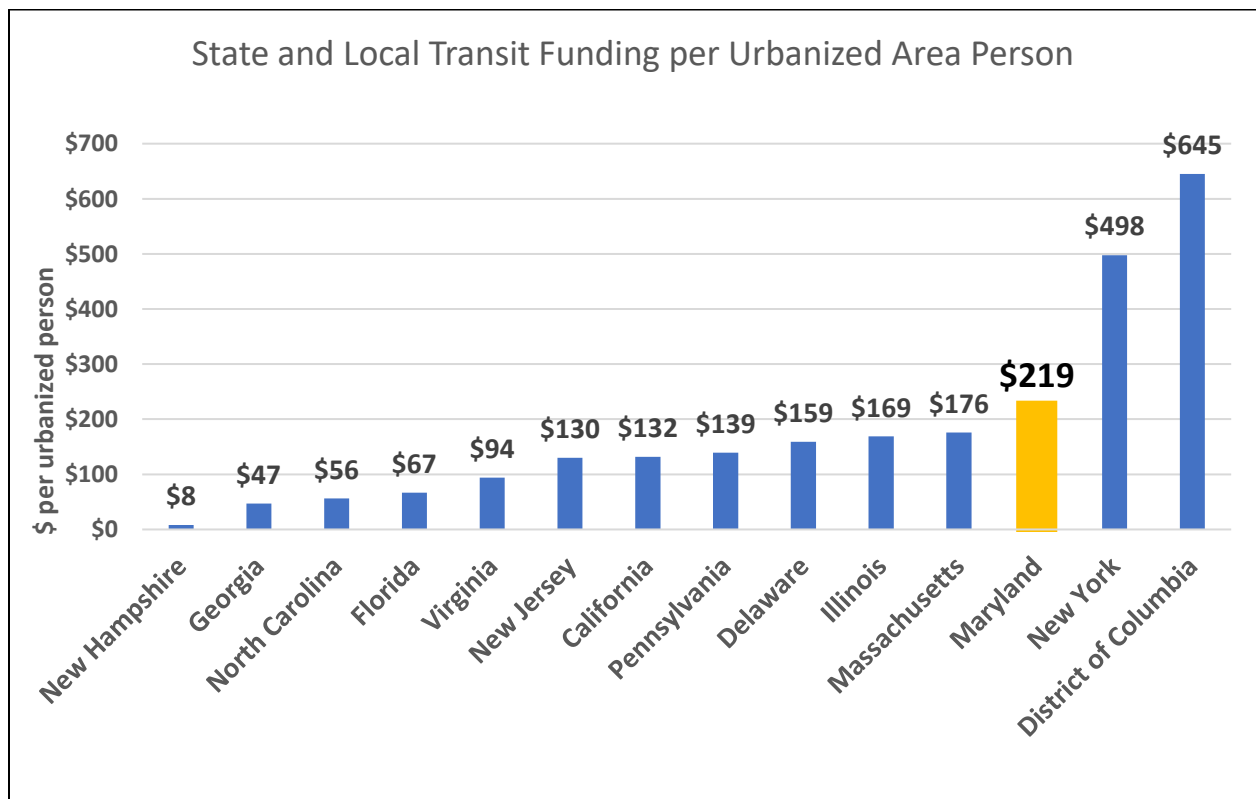
The MDOT MTA operates one of the largest multi-modal transit systems in the United States including local buses, commuter buses, Light Rail, Metro Subway, MARC train service, and a comprehensive paratransit system (Mobility). The MDOT MTA also manages the Taxi Access system and directs funding and statewide assistance to locally operated transit systems in each of Maryland's 23 counties, Annapolis, Baltimore City and Ocean City.

Specifically, within the P3 Program area, the MDOT MTA operates six commuter bus routes and MARC commuter rail service on the Brunswick Line. The MDOT MTA is also working in partnership with Montgomery and Prince George's counties to construct the new Purple Line.

3.2 Funding

The cost of offering a comprehensive transit network is high. But research shows that Maryland is committed to supporting mass transit programs. In FY17, Maryland spent \$219 per urbanized person on transit, surpassing 48 other states (see Figure 2).

Figure 2: State and Local Transit Funding Comparison - FY 2017



Source: FY2017 National Transit Database and 2010 US Census

To make this kind of a commitment to transit, there has historically been a collaborative funding approach to ensure that services are provided in the most effective way to meet the needs of the citizens. Funding for transit in the region and throughout Maryland comes from several different sources including local general funds, transit taxes, and state and federal grant subsidies. State subsidies are provided through the TTF.

3.2.1 State and Federal Subsidies

MDOT makes a strong budgetary commitment to support transit services throughout Maryland. The MDOT MTA's portion and Maryland's contribution to WMATA for the services they provide in Maryland make up almost 48% of the MDOT six-year combined capital and operating program (See Table 3).

Table 3: MDOT 2020 to 2025 Combined Capital and Operating Program

MDOT Transportation Program (\$ Millions)	Capital	Operating	Combined
Secretary's Office	\$146.5	\$663.2	\$809.7
Motor Vehicle Administration	\$147.0	\$1,333.0	\$1,480.0
Maryland Aviation Administration	\$1,034.0	\$1,371.6	\$2,405.6
Maryland Port Administration	\$1,159.8	\$328.1	\$1,487.9
Maryland Transit Administration	\$3,007.0	\$6,313.9	\$9,320.9
Washington Metropolitan Area Transit Authority	\$2,705.3	\$2,750.2	\$5,455.5
State Highway Administration	\$8,126.0	\$1,979.2	\$10,105.2
Total	\$16,325.7	\$14,739.2	\$31,064.9
Source: A-17 Department of Transportation Operating and Capital Program Summary Note: Funds are from the TTF and Maryland Transportation Authority (MDTA) is not included.			

As one of the transportation business units of MDOT, the MDOT MTA is the designated recipient of Federal Transit Administration (FTA) funds. The MDOT MTA provides grants to the local transit systems in all Maryland counties, including those in the counties affected by the P3 Program. These grants are supported through funding received from the FTA and revenues from the TTF. Additionally, as described previously MDOT provides an annual grant to support Maryland's share of WMATA for services they provide in Montgomery and Prince George's counties. This contribution makes up over 17% of MDOT's six-year combined capital and operating program.

3.2.2 Local General Funding and Special Transit Taxes

In addition to the state and federal subsidies, each of the counties supports transit with budget allocations from their general funds. Montgomery and Prince George's counties also utilize the WSTC as a means of collecting tax revenues for mass transit operations.

The WSTC was created in 1965 to ensure a regional approach to transportation. It consists of seven members appointed to three-year terms. Two each are appointed by the county executives for Montgomery and Prince George's counties; with the Senate advice and consent, the Governor appoints a member from each of the jurisdictions; and the MDOT Secretary of Transportation or designee serves in an ex-officio capacity.

The WSTC appoints the two voting and two alternates to the WMATA Board for the State of Maryland. The Maryland WMATA Board voting and alternate members must be members of the WSTC. Traditionally, Maryland's two voting members to the WMATA Board are selected from the Governor's appointees to the WSTC and the alternate members are split between one member each from Montgomery and Prince George's counties. In addition to its role in selecting the Maryland members of the WMATA Board, the WSTC is charged with paying the local share of WMATA funding for Montgomery and Prince George's counties. This is done through annual appropriations made by the Maryland General Assembly from the Maryland TTF to the WSTC, in the form of MDOT grants, who pays it to WMATA. Grants by MDOT are subject to appropriation and budgetary provisions of the Transportation Articles Code of Maryland to support WMATA. Notwithstanding any other provision of law, the grants may be derived from any State-enacted transportation fees or taxes, or federal transportation grants available to Maryland to fund transit capital equipment replacement and are contingent upon the receipt of a request by the Washington Suburban Transit District to MDOT, based on an annual capital improvements program adopted by WMATA.

Each of the two counties and Maryland have established codes and ordinances detailing the authority and funding for the Washington Suburban Transit Commission/District. The WSTC is charged to administer the Washington Suburban Transit District. The District has the authority to plan, develop, and oversee (on a bi-county basis) a transportation system that includes mass transit facilities and services for Montgomery and Prince George's counties. The commission coordinates mass transit programs with the two counties, WMATA, and MDOT.

Within the counties, the WSTC acts as a financial conduit for funding mass transit projects as detailed in each of their respective charters. In part, funding for the transportation services and administrative costs is provided through taxes levied against all the assessable property within the Washington Suburban Transit District by Montgomery and Prince George's counties. Based on available information, the current WSTC rate is \$.0672 per \$100 of assessable property for Montgomery County. In Prince George's County the rate is \$.026 per \$100 of assessed real property and \$.065 per \$100 of assessed value for personal property.

Although the current WSTC construct includes only Montgomery and Prince George's counties, the county codes allow for the geographical area of the Washington Suburban Transit District to be altered to include additional counties, or part thereof, as may be agreed upon by the WSTC and the governing body of the county desiring to be included according to the defined process.

SECTION 4: TRANSIT MARKET ANALYSIS

This section presents an analysis of the market (or demand) for regional transit services in the vicinity of the I-495 & I-270 P3 Program. This includes an inventory of the relevant existing transit services in the area, analysis of travel patterns and population and employment trends, review of existing transit use in the corridors, and an identification of underserved transit markets.

4.1 Existing Transit Service

In the area surrounding the P3 Program corridor, there is a strong transit network of services provided by Frederick, Montgomery, and Prince George's counties, WMATA, and the MDOT MTA. The network is made up of WMATA's Metrorail and Metrobus, MARC commuter rail, local bus routes and commuter bus services. The following inventory of existing transit services focusses on those services using or connecting to the I-495 and I-270 corridors. These are primarily commuter bus routes and heavy rail services provided by MARC and WMATA Metrorail. Twelve express routes as shown in Table 1 operate along portions of the P3 Program corridors. The existing express services will be enhanced by the managed lanes through better access, reliability and speed while customer and bus access to the commuter rail and Metrorail stations will be improved through faster trip times and direct access in some cases.

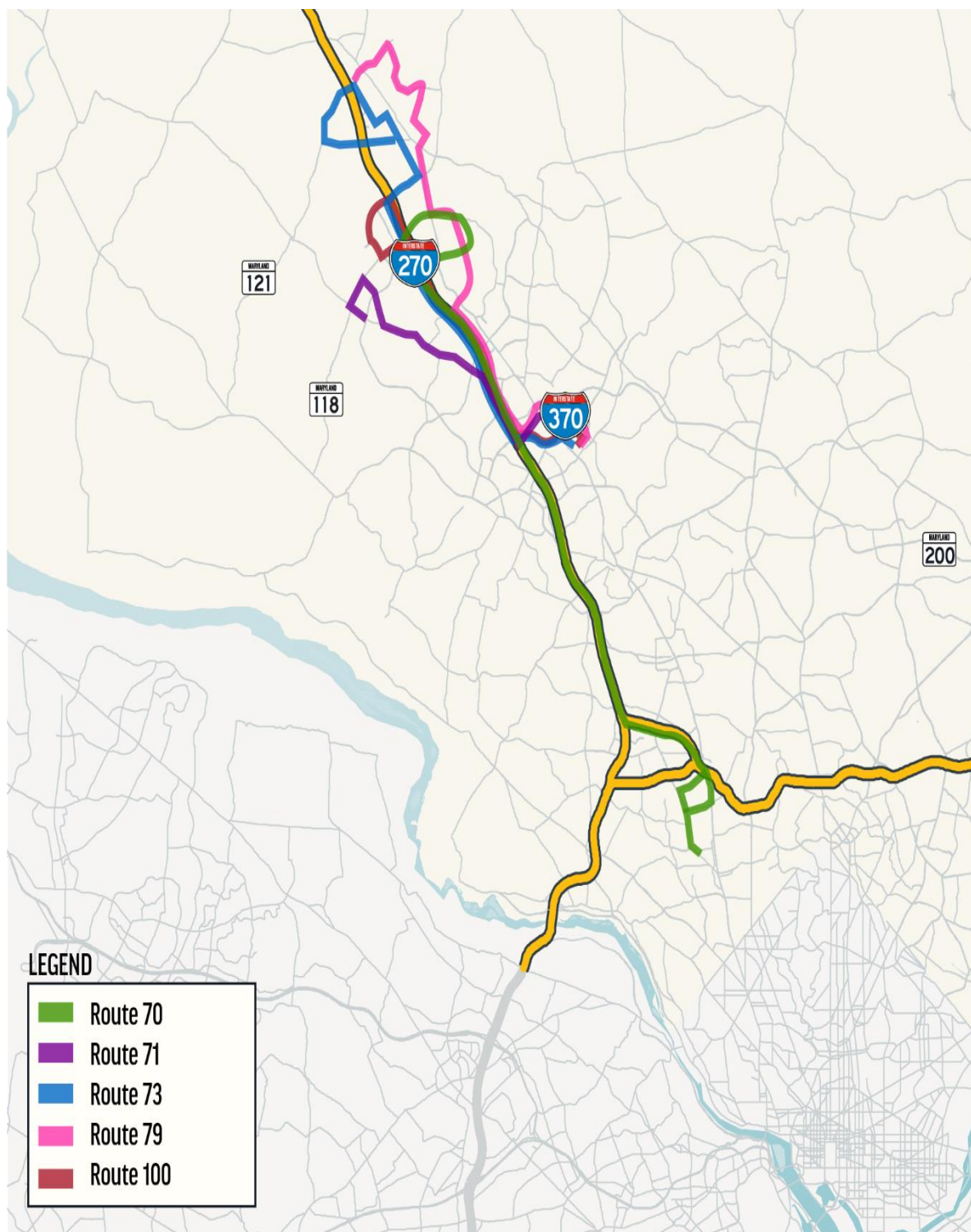
4.1.1 I-270 Existing Transit Services

The I-270 Corridor includes bus services provided by MDOT MTA commuter bus and Montgomery County Ride On. The MARC Commuter Rail Brunswick Line runs parallel to I-270, and WMATA Metrorail runs parallel to I-270 south of Shady Grove (See Table 4 and Figure 5). Commuter bus and Metrobus routes connect to WMATA Metrorail stations in Montgomery and Prince George's counties, while Commuter Rail connects directly to downtown Washington DC. There are also many local transit routes near the corridor which are not inventoried here as they provide for shorter, local trips.

Table 4: I-270 Corridor Existing Transit Services

Route	Name	Distance on I-270	Daily Ridership
MDOT MTA Commuter Bus			
201	Gaithersburg - BWI	Uses ICC	362
204	Frederick - College Park via I-270, MD 200	26	273
505	Hagerstown - Shady Grove/Rock Spring	29	326
515	Frederick - Shady Grove/Rock Spring	26	680
MARC Commuter Rail			
Brunswick Line	Martinsburg, WV, Frederick, Germantown, Washington DC	parallel	7,822
Montgomery County Ride On			
70	Milestone Park and Ride - Bethesda	15	680
71	Kingsview Park and Ride - Shady Grove	1.5	383
73	Cabin Branch - Shady Grove	6	134
79	Clarksburg - Shady Grove	4	329
100	Germantown - Shady Grove	5	1,957
WMATA Metrorail			
Red	Shady Grove to Bethesda (6 stations)		64,768

Figure 4: Existing Ride On Transit Services



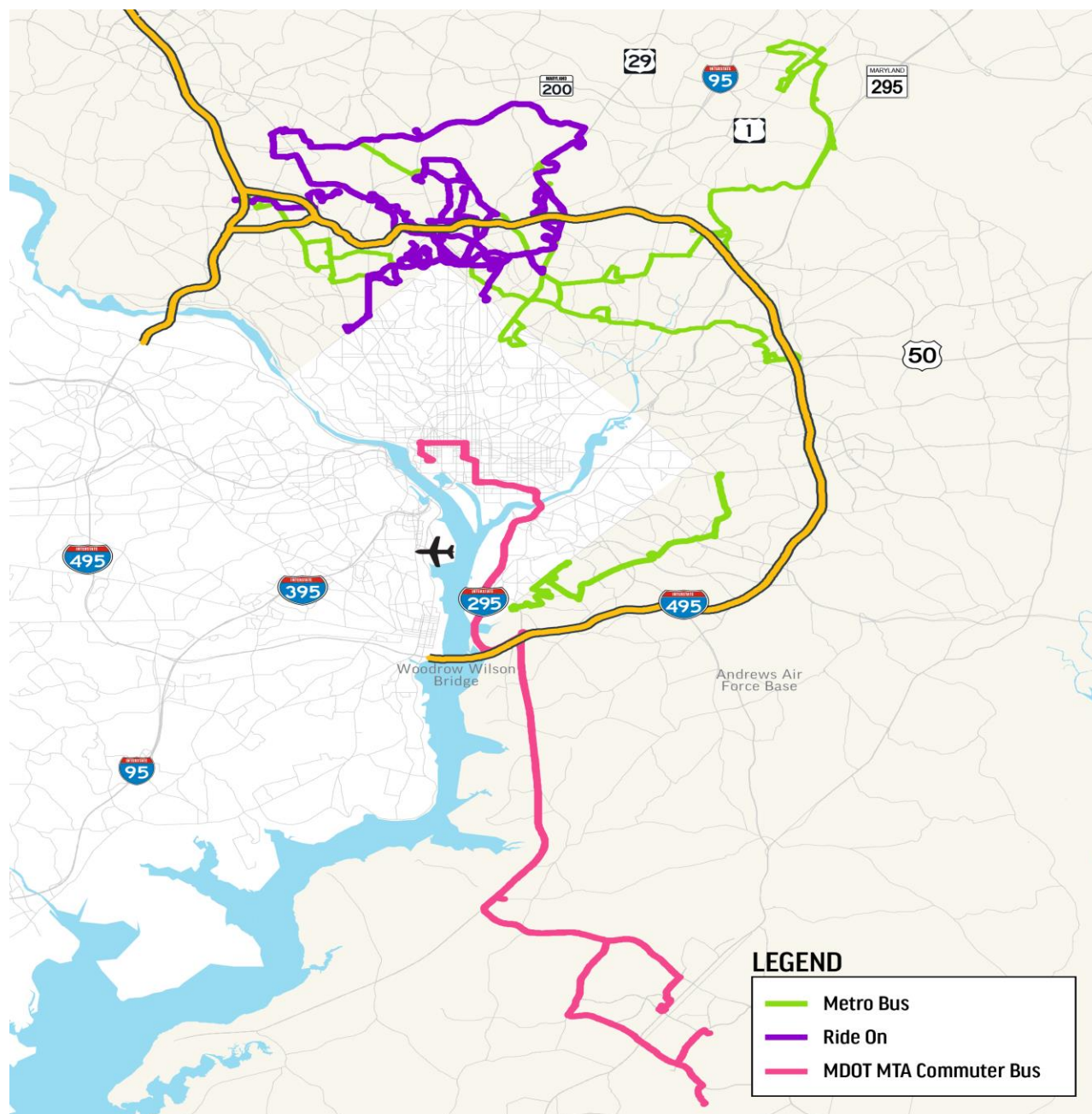
4.1.2 I-495 Existing Transit Services

There are currently few transit routes using I-495. This is understandable as recurring congestion on I-495 makes service difficult to operate and unappealing to the transit rider. Commuter bus routes 335 and 345 use the corridor for approximately 4 miles and Metrobus route 87 uses the corridor for approximately 5 miles. There are, however, many crossing express routes and certain local routes which serve key destinations generally along the I-495 corridor that are an important consideration when analyzing potential new services as discussed later in this report. These are listed below in Table 5 and illustrated in Figure 5.

Table 5: I-495 Corridor Existing Transit Services

Route	Name	Distance on I-495	Daily Ridership
MDOT MTA Commuter Bus			
203	Columbia - Bethesda	Uses ICC	186
204	Frederick - College Park	Uses ICC	273
335	Clarksville - Washington DC	4	317
345	Ellicott City - Washington DC	4	324
WMATA Metrobus			
87	Laurel Express Line (to Greenbelt and New Carrollton)	5	586
C 2,4	Twinbrook to Greenbelt	n/a	9,615
K 6,9	New Hampshire Ave - White Oak to Fort Totten	n/a	7,201
F 4	New Carrollton - Silver Spring	n/a	5,979
J 1,2,3	Bethesda - Silver Spring	n/a	5,277
P 12	Eastover - Addison Road	n/a	5,245
NH 2	National Harbor - Alexandria	4	741
Montgomery County Ride On			
1,11	Friendship Heights - Silver Spring	n/a	2,322
15	Langley Park - Silver Spring	n/a	3,052
20	Hillandale - Silver Spring	n/a	2,827

Figure 5: I-495 Corridor Existing Transit Services



4.1.3 Connecting Express Transit Services

Managed lanes on I-495 will provide opportunities for efficient express bus transit services connecting key destinations and Metrorail stations along the corridor such as connections from New Carrollton to Largo, Branch Avenue, National Harbor, and Alexandria, VA. Some existing express transit routes may benefit from these opportunities as shown in Tables 6, 7 and 8 with potential changes and improvements discussed later in this report. Inventories of relevant services include select services coming from Anne Arundel, Charles and Howard counties.

Table 6: Anne Arundel County Existing Select Transit Services

Route	Name	Distance on I-495	Daily Ridership
MDOT MTA Commuter Bus			
220	Annapolis - Washington DC	n/a	538
230	Severna Park - Annapolis - Washington DC	n/a	523
250	Kent Island - Davidsonville - Washington DC	n/a	281
260	Severna Park - Davidsonville - Washington DC	n/a	269

Table 7: Charles County Existing Select Transit Services

Route	Name	Distance on I-495	Daily Ridership
MDOT MTA Commuter Bus			
610	Waldorf - Washington DC	n/a	759
620	Waldorf - Washington DC	n/a	811
630	La Plata - Waldorf - Washington DC	n/a	385
640	Waldorf - Washington DC	n/a	512
650	La Plata - Waldorf - Washington DC	n/a	734
705	Charlotte Hall - Waldorf - Washington DC	n/a	881
715	Charlotte Hall - Waldorf - Washington DC	n/a	623
725	California - Charlotte Hall - Washington DC	n/a	255
735	Charlotte Hall - Waldorf - Washington DC	n/a	427

Table 8: Howard County Existing Select Transit Services

Route	Name	Distance on I-270	Daily Ridership
MDOT MTA Commuter Bus			
203	Columbia - Bethesda	3.5	154
305	Columbia - Silver Spring - Washington DC	n/a	563
315	Columbia - Silver Spring - Washington DC	n/a	430
325	Columbia - Silver Spring - Washington DC	n/a	235
335	Clarksville - Washington DC	4	317
345	Ellicott City - Washington DC	4	324

4.2 Planned Transit Services

Transit investments have been a key ingredient in the Region's success, and local and state governments continue to plan and implement new transit services. Select projects under development or in the long-range transportation plan which impact the P3 Program include the MDOT MTA Purple Line, WMATA Silver Line, MARC Brunswick Line capacity improvements, Montgomery County Flash BRT, Corridor Cities Transitway and Tysons Corner to Bethesda Metrobus service.

4.2.1 MDOT MTA Purple Line

The Purple Line is a 16-mile light rail line that will extend from Bethesda in Montgomery County to New Carrollton in Prince George's County. It will have 21 stations and a hiker/biker trail along the Georgetown Branch between Bethesda and Silver Spring. The Purple Line will connect the Metrorail Red, Green and Orange lines at Bethesda, Silver Spring, College Park and New Carrollton. It will also connect to MARC and Amtrak and to local bus service. It is currently under construction by MDOT MTA through a P3. The Purple Line will provide reliable and rapid east-west travel and is anticipated to serve approximately 50,000 passenger trips per day by 2040. (Sources: MDOT MTA's purplelinemd.com; and Purple Line FEIS Chapter 3)

Figure 6: Purple Line

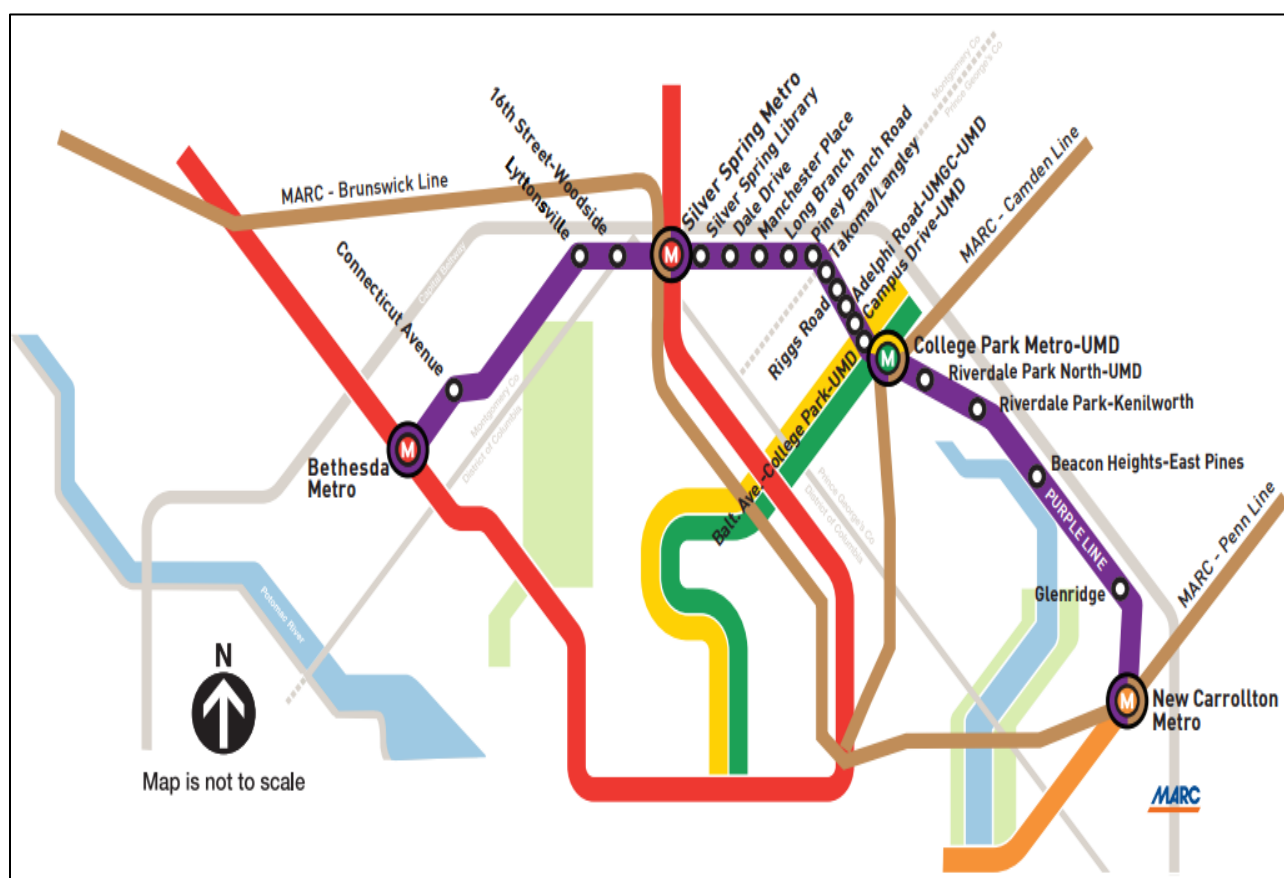


Image Source: MDOT MTA

4.2.2 WMATA Silver Line

The WMATA Silver Line project (also called The Dulles Metrorail Project) is a 23-mile extension of Metrorail from Falls Church (where it branches off the Orange Line) to Washington Dulles International Airport. Phase 1 opened in 2014 to Wiehle-Reston East and Phase 2 is currently under construction and anticipated to open in 2020. Phase 1 included 11.7 miles and five stations, while Phase 2 will include 11.4 miles and six stations. The complete Silver Line service will share five stations with the Orange Line alone, 13 stations with both the Orange Line and Blue Line, and five stations with the Blue Line through the eastern terminus at Largo, MD. It is anticipated that the project will serve over 90,000 total corridor trips per day and attract approximately 48,000 new transit trips to the regional transit system by 2025. The Silver Line, when complete, will increase the frequency of Metrorail trains serving Largo and add Metrorail capacity between Prince George's County and Washington DC. (Sources: dullesmetro.com; Dulles Corridor Rapid Transit Project FEIS, Chapter 6).

Figure 7: Dulles Corridor Metrorail Project

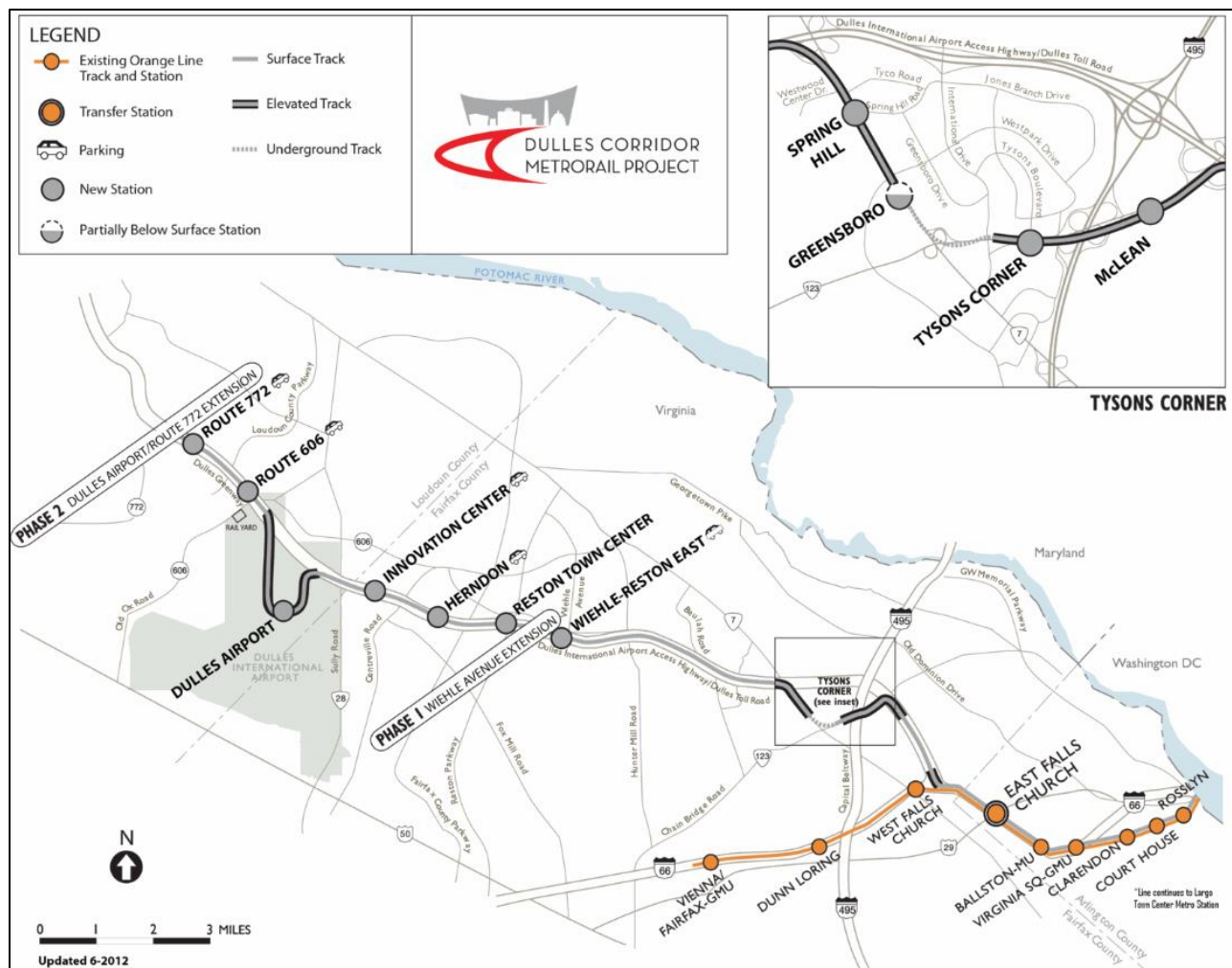


Image Source: dullesmetro.com

4.2.3 MARC Brunswick Line Capacity Improvements

The MARC Brunswick Line is a commuter rail corridor from Martinsburg, WVA and Brunswick, MD to Washington DC, including a branch to Frederick, MD. This MARC line parallels the I-270 corridor from Frederick to Washington DC and the Metrorail Red Line from Shady Grove to Union Station. It adds significant passenger capacity in the corridor. The MARC service operates weekday, peak hour with single-seat service from Frederick to downtown Washington DC.

The Brunswick Line carries approximately 8,000 passenger trips per day, with the busiest stations at Union Station, Germantown, Brunswick, Silver Spring, Rockville and Gaithersburg. MDOT MTA's MARC Cornerstone Plan describes the challenges and opportunities for MARC Brunswick Line capacity improvements. The service is currently experiencing capacity limitations in terms of the number of thru tracks, size of platforms, station infrastructure, and number of railcars. The service operates on freight tracks owned by CSX. CSX will not allow additional commuter rail service without adding a third main line. The Cornerstone Plan identifies \$1.3 billion in capital investments necessary for increased service on the Brunswick Line. (Source: MDOT MTA MARC Cornerstone Plan)

Figure 8: MARC Commuter Rail Service



Image Source: MDOT MTA MARC Cornerstone Plan

4.2.4 Montgomery County BRT Corridors

The Countywide Transit Corridors Functional Master Plan (2013) recommends a 102-mile BRT network on 10 corridors to improve mobility and accessibility throughout the County. Montgomery County Department of Transportation (MCDOT) is currently working to plan and implement three BRT projects within the area affected by the P3 Program:

US 29 BRT - MCDOT is designing and constructing a 14-mile BRT line along US 29 from Burtonsville to Silver Spring. It will be the first BRT line to open in the State of Maryland, with service expected to begin during 2020. BRT service will use the existing bus-on-shoulder lanes on US 29 in the northern section of the corridor. It will operate in mixed traffic in the southern section of US 29 and along Lockwood Drive, Stewart Lane, Briggs Chaney Road, and Castle Boulevard. The service will feature off-board fare collection, level boarding, new BRT vehicles, new stations, transit signal priority and station access improvements. The project is funded in part by a Federal Transportation Infrastructure Generating Economic Recovery (TIGER) grant.

MD 355 BRT – MCDOT is leading an alternatives analysis to determine the best way to implement BRT on MD 355 from Clarksburg to Bethesda. The study corridor is approximately 22 miles in length and would serve many activity centers including Clarksburg, Metropolitan Grove, Gaithersburg, Shady Grove/King Farm, Montgomery College, Rockville, Twinbrook, White Flint, Grosvenor, Medical Center, and Bethesda. The County is evaluating alternatives for the project's phased implementation.

MD 586 BRT – The proposed MD 586/Veirs Mill Road BRT line would extend approximately 6.7 miles from the Rockville Metrorail Station to the Wheaton Metrorail Station, with a 1.5-mile extension from the Rockville Metrorail Station to Montgomery College. The MDOT SHA and MDOT MTA, in cooperation with MCDOT, completed an evaluation of alternatives for BRT on MD 586 in 2017. The recommended alternative will be moved forward for design and implementation once funding becomes available.

4.2.5 Corridor Cities Transitway

The Corridor Cities Transitway (CCT) is a proposed 15-mile BRT project which would run from the Shady Grove Metrorail Station to the former COMSAT site near Clarksburg. The project was envisioned to be implemented in two phases. Phase I would operate along a nine-mile corridor from the Shady Grove Metrorail Station to the Metropolitan Grove MARC Station, and Phase II would be a six-mile extension from Metropolitan Grove to the former COMSAT site near Clarksburg. The MDOT MTA has completed 30% design of the project. Funding for design and construction of the project has not been identified; therefore, the NEPA decision document has not been prepared.

4.2.6 Tysons Corner to Bethesda Metrobus Service

Two future WMATA bus routes are planned between Montgomery County and Tysons Corner, VA which will likely use and benefit from the managed lanes. These bus routes are included in Visualize 2045.

4.3 Regional Population and Employment Projections

To understand the need for transit service changes, population and employment have been analyzed using the MWCOG Regional Travel Model 2045 and US Census geographical layers. Generally, the highest percentage of population growth is in the central core including Washington DC and Arlington, VA with high population growth in the more distant suburban communities.

4.3.1 Regional Population

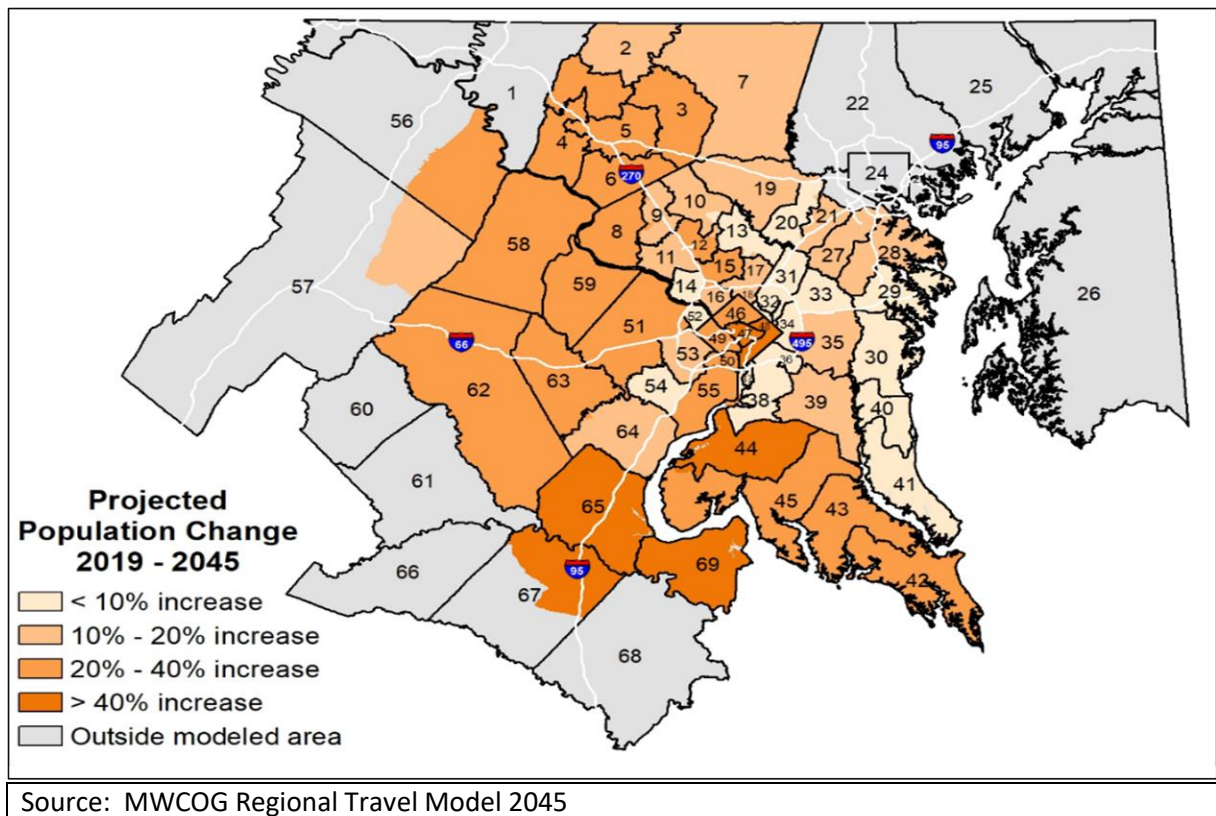
Visualize 2045 forecasts that the NCR alone will add 1.3 million more residents by 2045.⁷ Overall, based on the demographic inputs to the MWCOG Travel Model 2045 used for this work, growth in the entire TPB Model area is expected to exceed more than 1.7 million people with the most rapid growth occurring in the central core of Washington DC and Arlington, VA and surrounding outer suburban jurisdictions. (Table 9 and Figure 9). Although the beltway jurisdictions of Montgomery, Prince George's and Fairfax counties and the City of Alexandria, VA are forecast to have a slower growth rate, they still add nearly 600,000 people.

Table 9: MWCOG Regional Metropolitan Washington Population Forecasts by Area

Area	2019	2045	Difference	Percent Change
Washington DC and Arlington VA	952,865	1,288,380	335,515	35.2%
Montgomery and Prince George's counties, Fairfax, and Alexandria VA	3,314,652	3,897,265	582,613	17.6%
Outer Suburban Jurisdictions	3,140,729	3,937,985	797,256	25.4%
TPB Model Area Total	7,408,246	9,123,630	1,715,384	23.2%
Source: MWCOG Regional Travel Model 2045; <i>Visualize 2045 Air Quality Conformity Analysis</i> . Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018.				

⁷<https://www.mwcog.org/documents/2018/10/17/visualize-2045-air-quality-conformity-analysis/> *Visualize 2045 Air Quality Conformity Analysis*. Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018, page 9.

Figure 9: Projected Population Change



Population change was also evaluated for select Maryland counties as shown in Table 10. Montgomery County is forecast to add the most residents while Charles, St. Mary's and Frederick counties have the highest growth rates.

Table 10: MWCOG Regional Population Change from 2019 to 2045 for Select Maryland Counties

Area	2019	2045	Difference	Percent Change
Montgomery	1,044,630	1,223,345	178,715	17.1%
Prince George's	919,398	995,874	76,476	8.3%
Anne Arundel	575,933	638,133	62,200	10.8%
Howard	331,870	373,639	41,769	12.6%
Frederick	263,527	344,138	80,611	30.6%
Charles	163,787	236,479	72,692	44.4%
St. Mary's	118,558	162,899	44,341	37.4%
Calvert	93,812	100,850	7,038	7.5%

Source: MWCOG Regional Travel Model 2045 and Visualize 2045 Air Quality Conformity Analysis. Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018.

4.3.2 Regional Employment

Employment patterns are also forecast to change over the period 2019 to 2045. Visualize 2045 forecasts that the NCR alone will add approximately 1.0 million more jobs by 2045 in the TPB Planning Area.⁸ Overall, based on the demographic inputs to the MWCOG Travel Model 2045 used for this work, as shown in Table 11 and Figure 10, the entire TPB Model Area will add 1.2 million jobs with the outer suburban jurisdictions having the largest growth and highest percentage growth. The central core of Washington DC and beltway counties will also attract substantial employment. The addition of over 950,000 jobs in beltway counties and outer jurisdictions indicates the need for transit solutions in addition to the existing radial commuter routes serving the central core.

Table 11: MWCOG Regional Metropolitan Washington Employment Forecasts by Area

Area	2019	2045	Difference	Percent Change
Washington DC and Arlington VA	1,052,122	1,314,454	262,332	24.9%
Montgomery and Prince George's counties, Fairfax, and Alexandria VA	1,723,937	2,167,885	443,948	25.8%
Outer Suburban Jurisdictions	1,459,162	1,971,664	512,502	35.1%
TPB Model Area Total	4,235,221	5,454,003	1,218,782	28.8%
Source: MWCOG Regional Travel Model 2045 and <i>Visualize 2045 Air Quality Conformity Analysis</i> . Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018.				

The change in employment from 2019 to 2045 is shown for select Maryland counties in Table 12. Montgomery County is forecast to have the largest employment change although some of the suburban counties have higher employment growth rates.

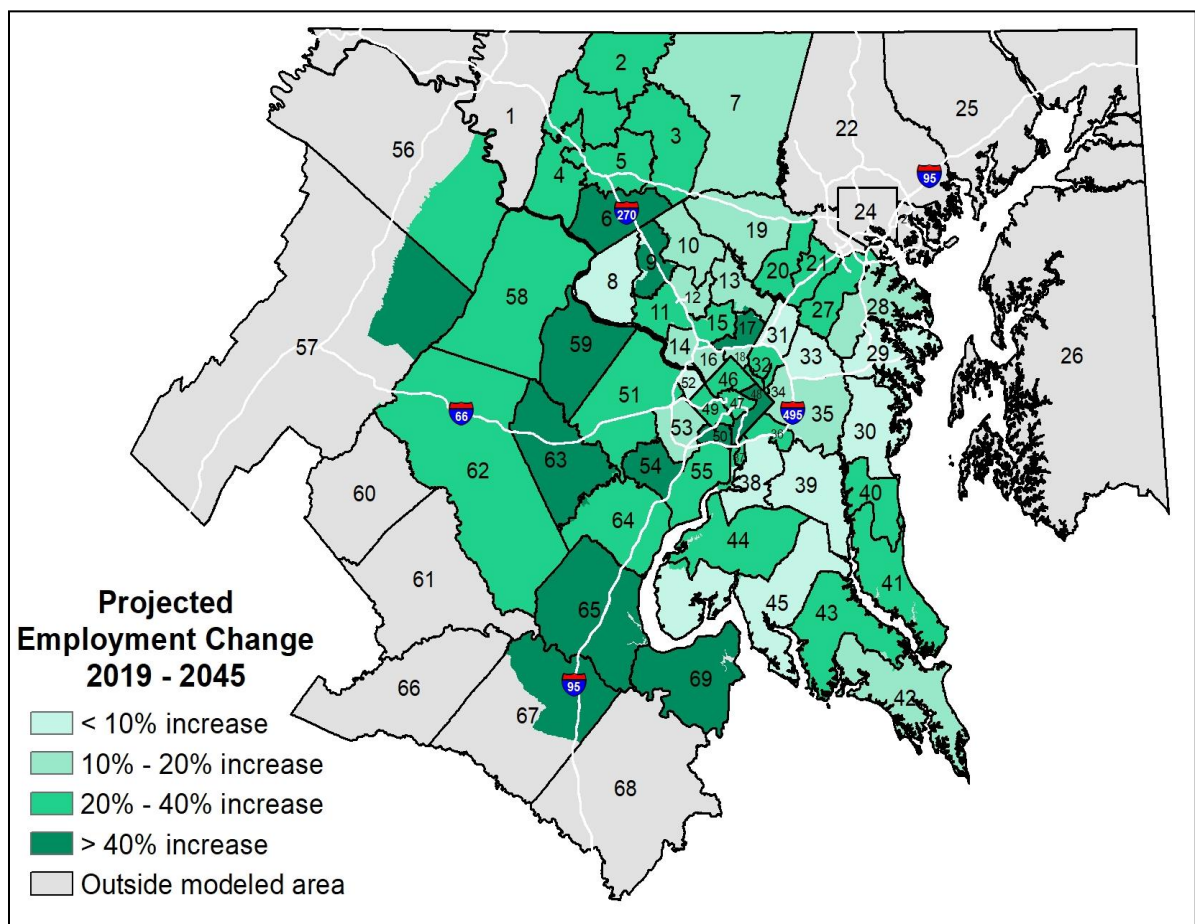
⁸ <https://www.mwcog.org/documents/2018/10/17/visualize-2045-air-quality-conformity-analysis/> *Visualize 2045 Air Quality Conformity Analysis*. Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018, page 8.

Table 12: MWCOG Regional Employment from 2019 to 2045 for Select Maryland Counties

County	2019	2045	Difference	Percent Change
Montgomery	538,814	678,753	139,939	26.0%
Prince George's	346,951	402,145	55,194	15.9%
Anne Arundel	336,309	407,101	70,792	21.0%
Howard	183,379	236,651	53,272	29.1%
Frederick	116,205	145,526	29,321	25.2%
Charles	46,912	61,505	14,593	31.1%
St. Mary's	65,351	79,435	14,084	21.6%
Calvert	36,236	44,300	8,064	22.3%

Source: MWCOG Regional Travel Model 2045 and Visualize 2045 Air Quality Conformity Analysis. Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018.

Figure 10: Projected Employment Change



Source: MWCOG Regional Travel Model 2045

The comparison between commuters leaving a jurisdiction and commuting into a jurisdiction is shown in Table 13. Washington DC has the greatest number and percentage of in-commuting jobs although the beltway counties attract hundreds of thousands of in-commuting workers.

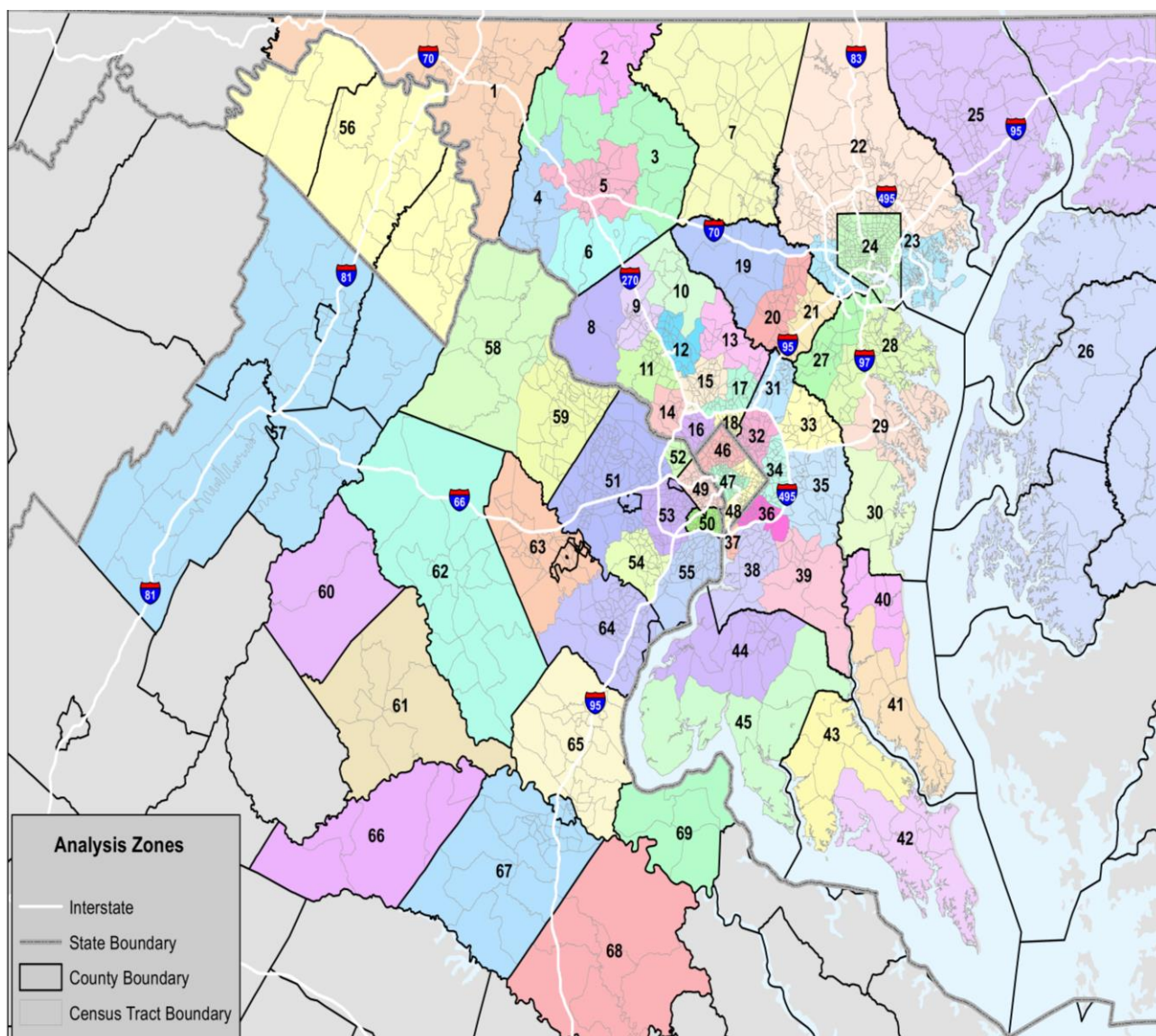
Table 13: MWCOG Regional Travel Model Jurisdiction Commuting Patterns

Jurisdiction	Commuters	% Commuting Out	Jobs	% Commuting In
Washington DC	292,166	32%	651,724	69%
Montgomery	466,077	49%	462,633	49%
Prince George's	411,126	71%	294,693	60%
Frederick	115,957	58%	88,074	45%
Charles	67,996	75%	36,001	53%
Howard	146,909	69%	166,112	73%
Anne Arundel	250,986	57%	239,028	54%
Fairfax	512,237	48%	582,274	54%
Arlington	112,412	79%	138,589	83%
Alexandria City	71,185	82%	84,467	85%
Loudoun	177,415	67%	139,258	58%
Source: Based on post-processing using the MWCOG Regional Travel Model 2045 output				

4.4 Transit Market

The primary indicator of the market (demand) for commuter transit service is the pattern and density of home-to-work trips. A significant pattern of trips from home-to-work concentrations is a good indicator of potential transit demand. US Census Longitudinal Employer-Household Dynamics (LEHD) data and census boundaries were used to evaluate commuting between 69 analysis zones as shown in Figure 11.

Figure 11: Commuting Analysis Zones



In the P3 Program study area, the key suburban job destination along the Program corridor are illustrated in Figure 12 and Table 14. These represent the largest suburban Maryland employment destinations outside of downtown Washington DC. Data from the MWCOC Regional Travel Model 2045 shows that these six job centers contain over 390,000 jobs and are expected to add nearly 78,000 jobs between 2019 and 2045.

Each suburban job center's commuting patterns is analyzed in the following sections using LEHD data. Note that the LEHD data is different than the regional model data generally having fewer jobs because self-employed individuals are not included in the LEHD data.

Figure 12: Suburban Job Centers I-495 and I-270

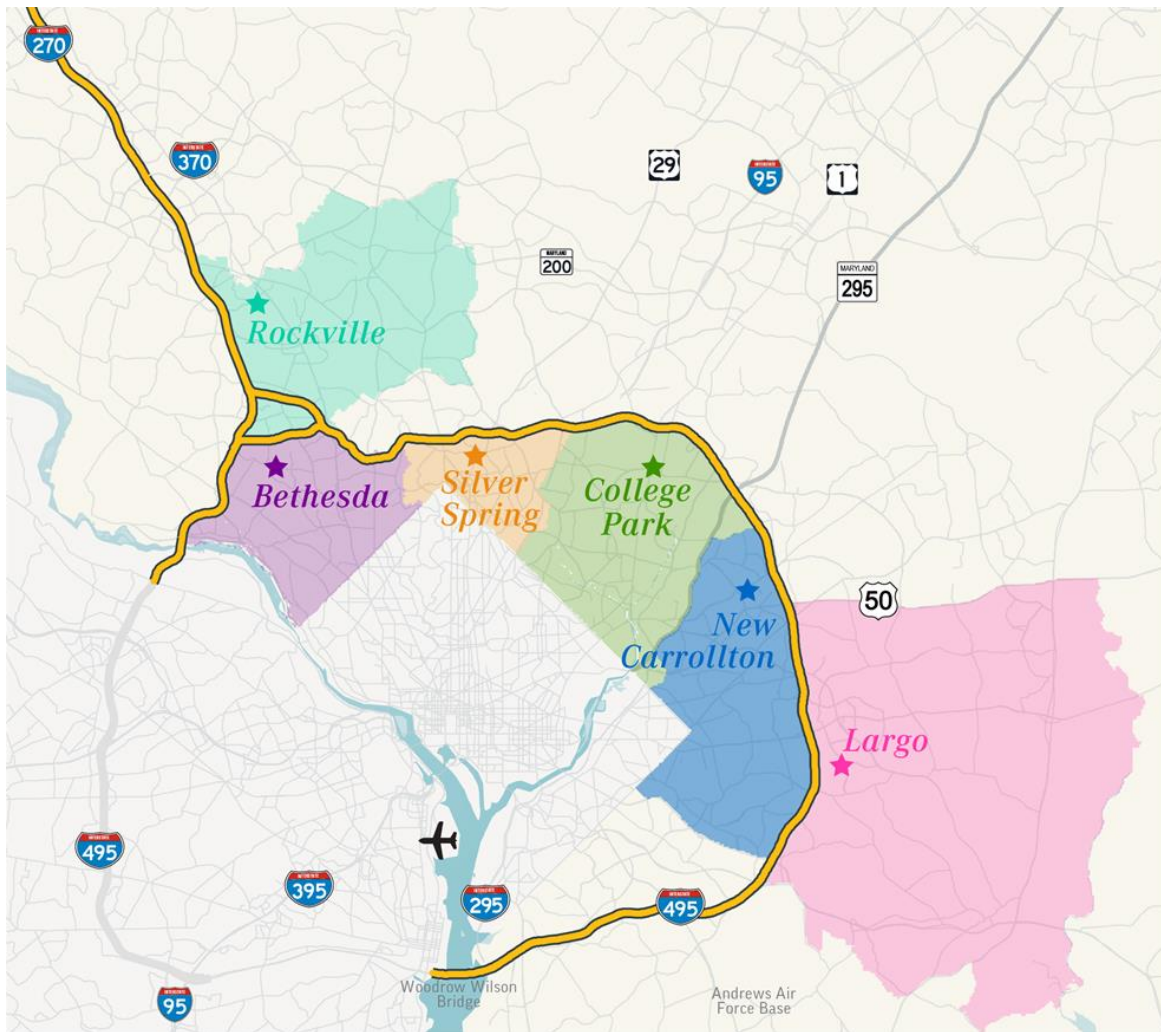


Table 14: Managed Lanes Corridor Suburban Employment Centers 2019 and 2045

Area	2019	2045	Difference	Percent Change
Rockville	104,454	134,458	30,004	28.7%
Bethesda	90,862	105,290	14,428	15.9%
Silver Spring	41,665	48,631	6,966	16.7%
College Park	71,562	88,717	17,155	24.0%
New Carrollton	37,102	38,539	1,437	3.9%
Largo	45,187	53,113	7,926	17.5%

Source: MWCOG Regional Travel Model 2045 and Visualize 2045 Air Quality Conformity Analysis. Metropolitan Washington Council of Governments. National Capital Region Transportation Planning Board, October 17, 2018.

4.4.1 Rockville Commuting

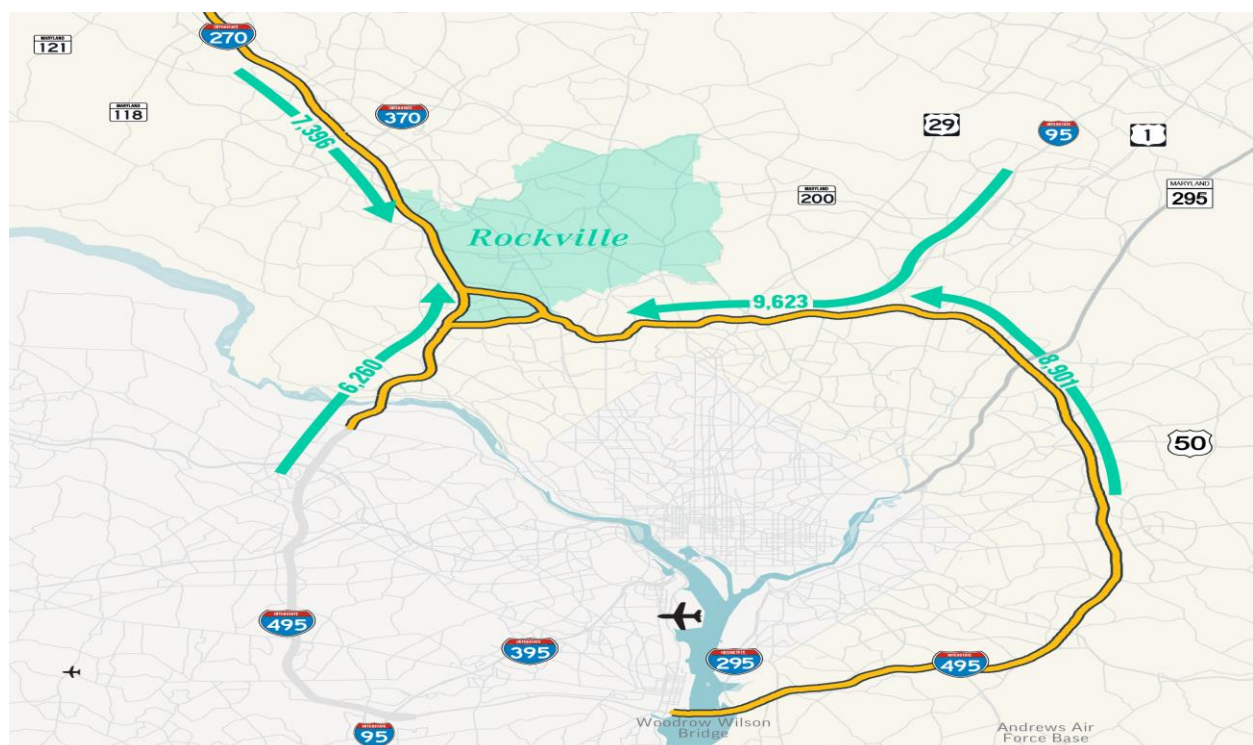
Rockville area commuting is illustrated in Table 15 and Figure 13 which show generalized commuting estimates along the key interstate corridors. More than 7,000 workers commute to Rockville from Frederick, surrounding counties and West Virginia. Over 6,000 workers use I-495 and the American Legion Bridge to reach Rockville jobs.

Table 15: Rockville Commuting

To Rockville		Workers	Major Transit Services
From	Rockville	11,984	
	Bethesda, Washington DC, Arlington, Alexandria	4,679	Metrorail Red Line
	Other Montgomery County	28,390	
	Frederick, Washington Co, West Virginia	7,396	MARC Commuter Rail
	Prince George's	8,901	
	Anne Arundel, Howard	5,675	
	Baltimore	3,948	
	Other Virginia	6,260	
	Other Maryland	3,079	
Total		80,312	

Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015

Figure 13: Rockville Commuting



4.4.2 Bethesda Commuting

Bethesda commuting patterns are shown in Table 16 and Figure 14. More than 30,000 workers commute to Bethesda from Montgomery County and I-270 north, and more than 17,000 commuters come from I-95 and I-495 east. Nearly 7,500 commuters also use I-495 and the American Legion Bridge to reach Bethesda jobs.

Table 16: Bethesda Commuting

To Bethesda		Workers	Major Transit Services
From	Bethesda	6,809	
	Other Montgomery County	30,431	Metrorail Red Line
	Frederick, Washington Co, West Virginia	3,120	2 Commuter Bus lines
	Silver Spring, New Carrollton, College Park	7,211	MDOT MTA Purple Line
	Other Prince George's, Charles	9,400	
	Washington DC, Arlington, Alexandria	11,030	Metrorail Red Line
	Other Virginia	7,458	
	Baltimore Area	3,721	
	Other Maryland	4,040	
Total		83,220	

Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015

Figure 14: Bethesda Commuting



4.4.3 Silver Spring Commuting

Silver Spring commuting patterns are shown in Table 17 and Figure 15. More than 7,000 workers commute to Silver Spring from Montgomery County and I-270 north, and more than 9,000 commuters come from I-95 and I-495 east. Nearly 2,500 commuters also use I-495 and the American Legion Bridge to reach Silver Spring jobs.

Table 17: Silver Spring Commuting

To Silver Spring		Workers	Major Transit Services
From	Silver Spring	3,584	
	Other Montgomery County	11,359	Metrorail Red and MDOT MTA Purple lines
	Frederick, Washington Co, West Virginia	1,143	MARC Commuter Rail
	New Carrollton, College Park	3,115	MDOT MTA Purple Line
	Other Prince George's, Charles	4,551	
	Washington DC, Arlington, Alexandria	4,081	Metrorail Red Line
	Other Virginia	2,485	
	Howard County and Baltimore Area	3,263	MARC Commuter Rail 3 Commuter Bus Lines
	Other Maryland	2,243	
Total		35,824	
Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015			

Figure 15: Silver Spring Commuting



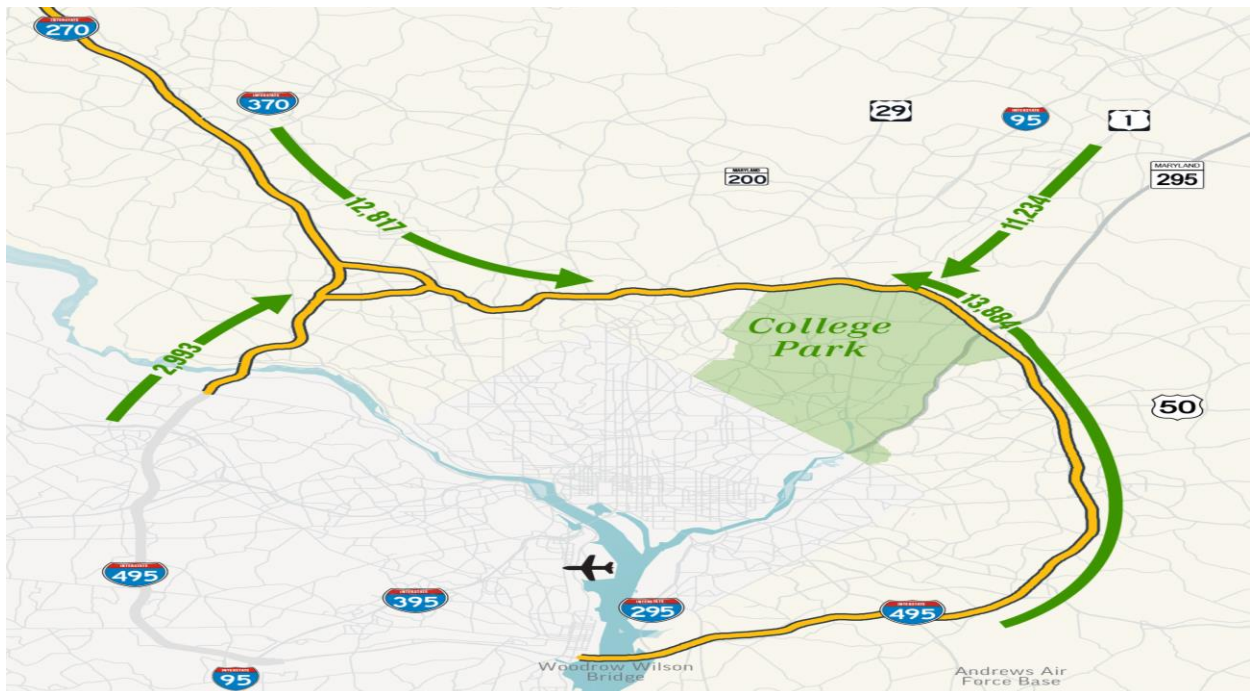
4.4.4 College Park Commuting

College Park commuting patterns are shown in Table 18 and Figure 16. More than 7,000 workers commute to College Park from Montgomery County and I-270 north, and more than 11,000 commuters come from I-95 north. Nearly 14,000 commuters also use I-495 from Prince George's and Charles counties.

Table 18: College Park Commuting

To College Park		Workers	Transit
From	College Park	8,232	
	Other Montgomery County	8,657	
	Frederick, Washington Co, West Virginia	1,160	MDOT MTA 204 Commuter Bus Line
	Bethesda, Silver Spring, New Carrollton	6,044	MDOT MTA Purple Line
	Other Prince George's, Charles	13,884	
	Washington DC, Arlington, Alexandria	5,746	Metrorail Green Line
	Other Virginia	2,993	
	Baltimore, Anne Arundel, Howard	11,234	MARC Commuter Rail
	Other Maryland	2,612	
Total		60,562	
Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015			

Figure 16: College Park Commuting



4.4.5 New Carrollton Commuting

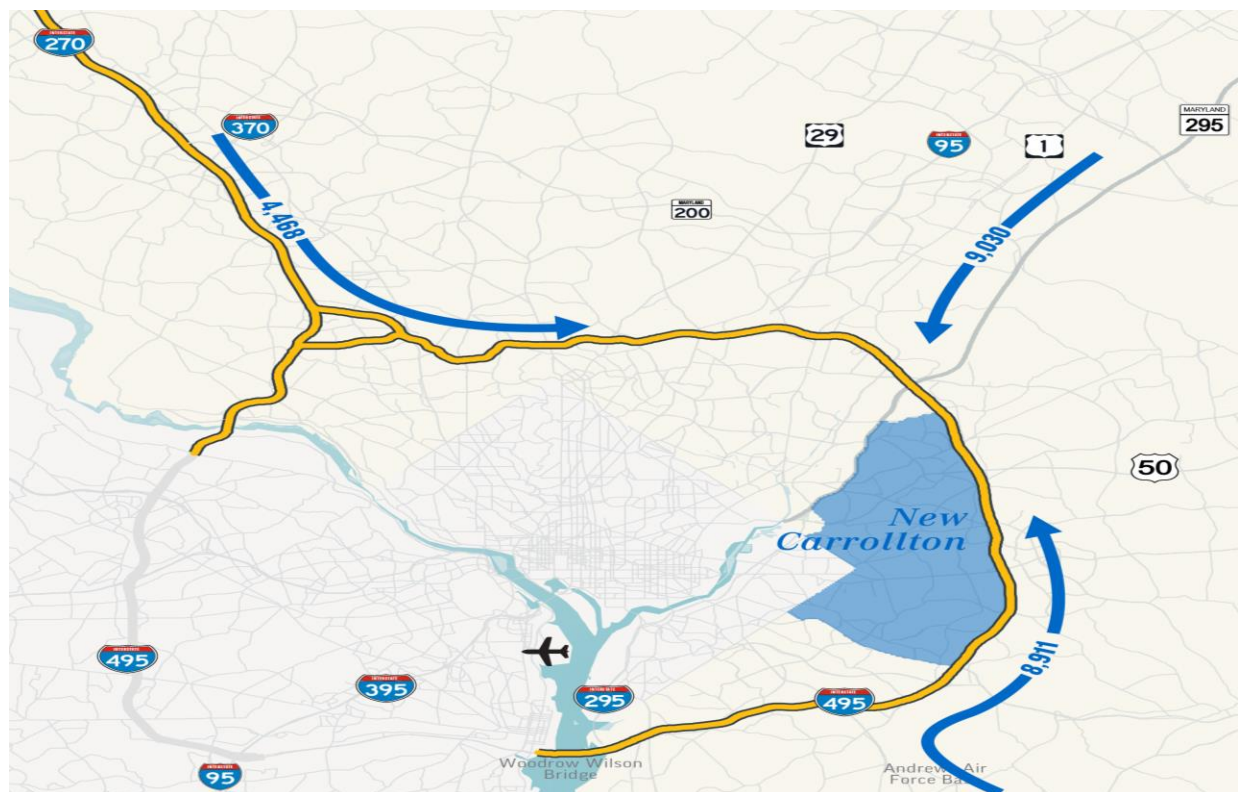
New Carrollton commuting patterns are shown in Table 19 and Figure 17. More than 4,000 workers commute to New Carrollton from Montgomery County and I-270 north, and more than 9,000 commuters come from I-95 north. Nearly 9,000 commuters also use I-495 from Prince George's and Charles counties.

Table 19: New Carrollton Commuting Patterns

To New Carrollton		Workers	Transit
From	New Carrollton	3,545	
	Montgomery County	3,813	
	Frederick, Washington Co, West Virginia	655	
	College Park	1,742	MDOT MTA Purple Line
	Other Prince George's, Charles	8,911	
	Washington DC, Arlington, Alexandria	2,078	Metrorail Orange Line
	Other Virginia	1,320	
	Baltimore, Anne Arundel, Howard	9,030	MARC Commuter Rail
	Other Maryland	2,223	
Total		33,317	

Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015

Figure 17: New Carrollton Commuting



4.4.6 Largo Commuting

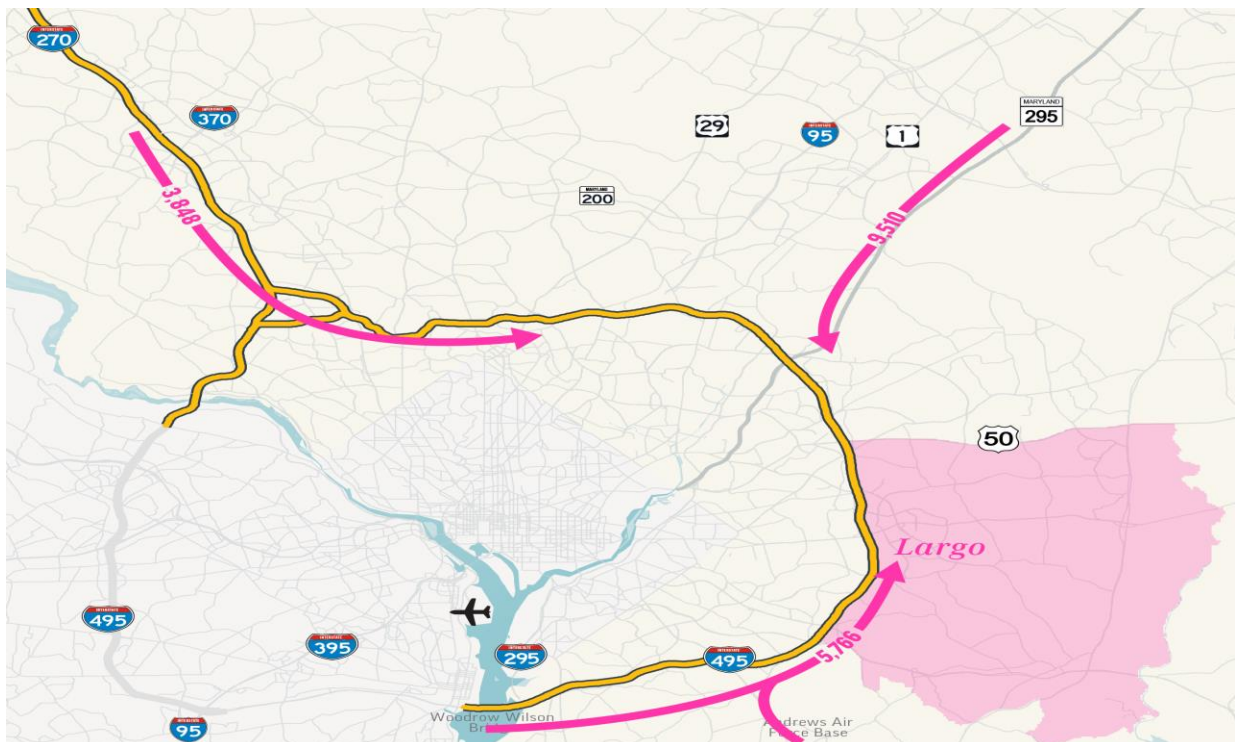
Largo commuting patterns are shown in Table 20 and Figure 18. More than 3,000 workers commute to Largo from Montgomery County and I-270 north, and more than 9,000 commuters come from I-95 north. Over 5,000 commuters also use I-495 from Prince George's and Charles counties.

Table 20: Largo Commuting

To Largo		Workers	Transit
From	Largo	5,528	
	Montgomery County	3,030	
	Frederick, Washington Co, West Virginia	818	
	College Park and New Carrollton	4,837	
	Other Prince George's	11,279	
	Washington DC, Arlington, Alexandria	2,831	Metrorail Orange and Silver lines
	Other Virginia	1,701	
	Baltimore, Anne Arundel, Howard	9,510	
	Charles, St. Mary's, Calvert	5,766	
	Other Maryland	1,612	
	Total	46,912	

Source: US Census Longitudinal Employer-Household Dynamics (LEHD) 2015

Figure 18: Largo Commuting



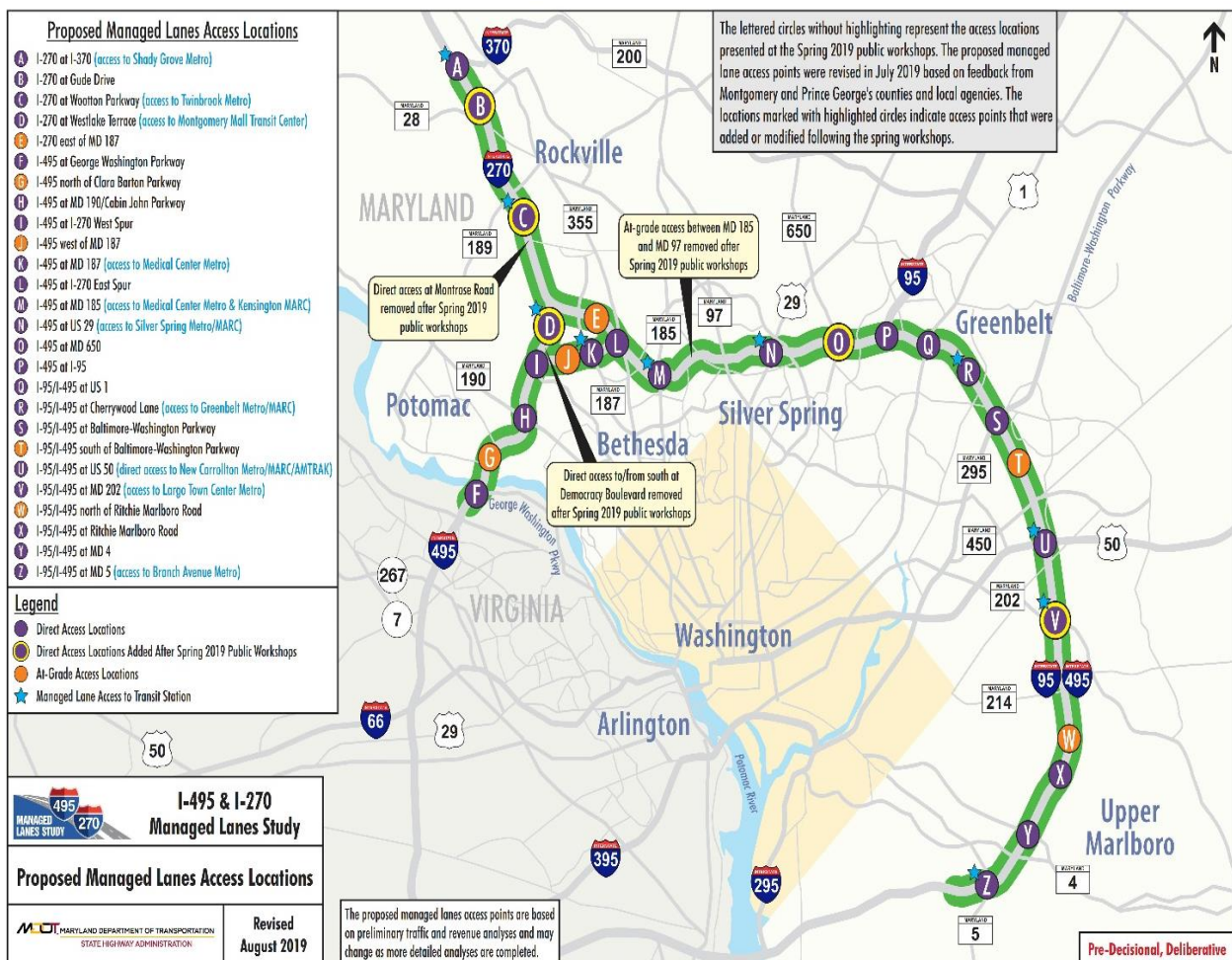
SECTION 5: TRANSIT ACCESS POINTS

The design and location of the managed lanes access ramps will directly affect transit ridership. Careful design of access to and from connecting roads, highways and transit facilities must be considered as part of the overall program development. The planning of transit routes using the managed lanes must also consider the location and design of access points. This section identifies the preliminary concept locations for access points within the I-495 & I-270 Managed Lanes Study limits and looks more specifically at those access points most advantageous to transit routing. Since the Managed Lanes Study is still in a preliminary stage of development, it is anticipated that some of the access locations may be altered during final design.

5.1 Overall Managed Lanes Concept

The preliminary managed lanes access plan is illustrated in Figure 19 below for I-495 and I-270 south of I-370. The concept locations of access points along I-270 north of I-370 are currently under development. As noted, these locations and design concepts are preliminary and subject to change. As shown, there are 26 access points, including access to surface streets, limited access highways and certain transit facilities. There are 21 Direct Access Locations and five At-Grade Access Locations, which are explained and illustrated in Section 5.2.

Figure 19: Proposed Managed Lanes Access Locations



5.2 Types of Managed Lanes Access

The managed lanes access locations include direct access locations, at-grade access locations and special managed lanes access to transit stations. Direct access provides vehicular access directly to or from another street or highway. There are many potential designs, but the key feature is access directly to the managed lanes from a connecting street or highway. Figure 20 illustrates one example concept, where ramps connect from the managed lanes directly to a crossing roadway. Figure 21 shows an existing example at I-270/Westlake Terrace in Montgomery County.

Figure 20: Direct Access Illustration



Figure 21: Example of Direct Access - Existing HOV Access at I-270/Westlake Terrace



IMAGE SOURCE: GOOGLE

Another type of managed lanes access is the at-grade access design (Figure 22) which allows vehicles traveling in the corridor to merge between the general-purpose travel lanes and the managed lanes (and vice versa). This design is used carefully so as not to facilitate excessive lane changing by locating an at-grade access close to an adjacent general-purpose interchange.

Figure 22: At-Grade Access Illustration



5.3 Transit Station Access from Managed Lanes

Figure 19 identifies nine access points specially located to provide access to nearby transit stations. In addition, this analysis identified three other access points which may be used to facilitate convenient access for express bus/BRT routing. For the segment of I-270 north of I-370 (where the access locations have not yet been evaluated) this analysis identifies places where they would be well located to facilitate bus ingress and egress to park and ride locations. Note that any managed lanes access point might be used for transit; but the locations listed in Table 21 are those that this analysis deems most beneficial to effective transit routing. Each of these access concepts is presented and discussed in Appendix A.

Table 21: Managed Lanes Access Locations Examined in this Analysis

Potential Access Locations on I-270 north of I-370	Preliminary Concept Access Locations Examined
I-270 at Spectrum Drive	A: I-270 at I-370
I-270 at MD 80	B: I-270 at Gude Drive
I-270 at MD 109	C: I-270 at Wooton Parkway
I-270 at MD 121	D: I-270 at Westlake Terrace
I-270 at Dorsey Mill Road	K: I-495 at MD 187
I-270 at MD 118	M: I-495 at MD 185
I-270 at Watkins Mill Road	N: I-495 at US 29
I-270 at MD 117	R: I-495 at Cherrywood Lane
	U: I-495 at US 50
	V: I-495 at MD 202
	X: I-495 at Ritchie Marlboro Road
	Z: I-495 at MD 5

5.4 Managed Lanes Access Observations

As illustrated in the prior sections, there are key locations where buses using the managed lanes could connect to collection and distribution points and could operate point-to-point service between transit facilities or link service along the route. While it is recognized that managed lane access is for both auto and transit users, this analysis looks specifically at transit access. Table 22 summarizes to what degree each planned access point facilitates transit access, including both existing transit routes as well as potential routes which are described in detail in Section 6.

It should be noted that it is important to pay attention to the actual design of the access point itself to allow for the safe operation of bus service. This includes bus turning radii since different bus types have different requirements and horizontal separation that could adversely affect site distance especially around curves.

Table 22: Managed Lanes Access Locations

Managed Lanes Access Location	Provides Access To		Existing Buses Per Hour	Future Buses per Hour		
	Transit Station or Park and Ride	Distance (miles)		Existing Routes	Potential Routes	Total
I-270 North						
I-270 at Spectrum Drive	Frederick MARC Monocacy	1.0	4	10	4	14
I-270 at MD 80	Urbana Park and Ride	0.2	6	15	4	19
I-270 at MD 109	Potential Park and Ride	0.3	-	-	4	4
I-270 at MD 121	Premium Outlets	0.4	-	-	8	8
I-270 at Dorsey Mill Road	Planned Ride On Transit Center	0.4	-	-	16	16
I-270 at MD 118	Milestone Park and Ride	1.6	6	5	16	21
I-270 at Watkins Mill Road	MARC Metropolitan Grove, Quince Orchard and Montgomery Co park and rides	1.4	-	-	6	6
I-270 at MD 117	Diamond Avenue, Quince Orchard and, Montgomery Co park and rides	0.2	4	5	-	5
I-270 South & I-495						
A: I-270 at I-370	Shady Grove	2.1	43	54	8	62
B: I-270 at Gude Drive	Rockville	3.0	-	-	-	-
C: I-270 at Wooten Parkway	Rockville Twinbrook	2.2 2.7	-	-	-	-
D: I-270 at Westlake Terrace	Montgomery Mall	0.2	7	17	8	25
I-495						
K: I-495 at MD 187	Medical Center	3.0	-	-	24	24
M: I-495 at MD 185	Medical Center	1.7	2	3	8	11
N: I-495 at US 29	Silver Spring	17	-	-	16	16
R: I-495 at Cherrywood Lane	Greenbelt	0.6	-	-	3	3
U: I-495 at US 50	New Carrollton	1.2	6	7	8	15
V: I-495 at MD 202	Largo	2.2	-	-	8	8
X: I-495 at Ritchie Marlboro Road	Largo	3.7	-	-	8	8
Z: I-495 at MD 5	Branch Avenue	0.8	-	-	12	12

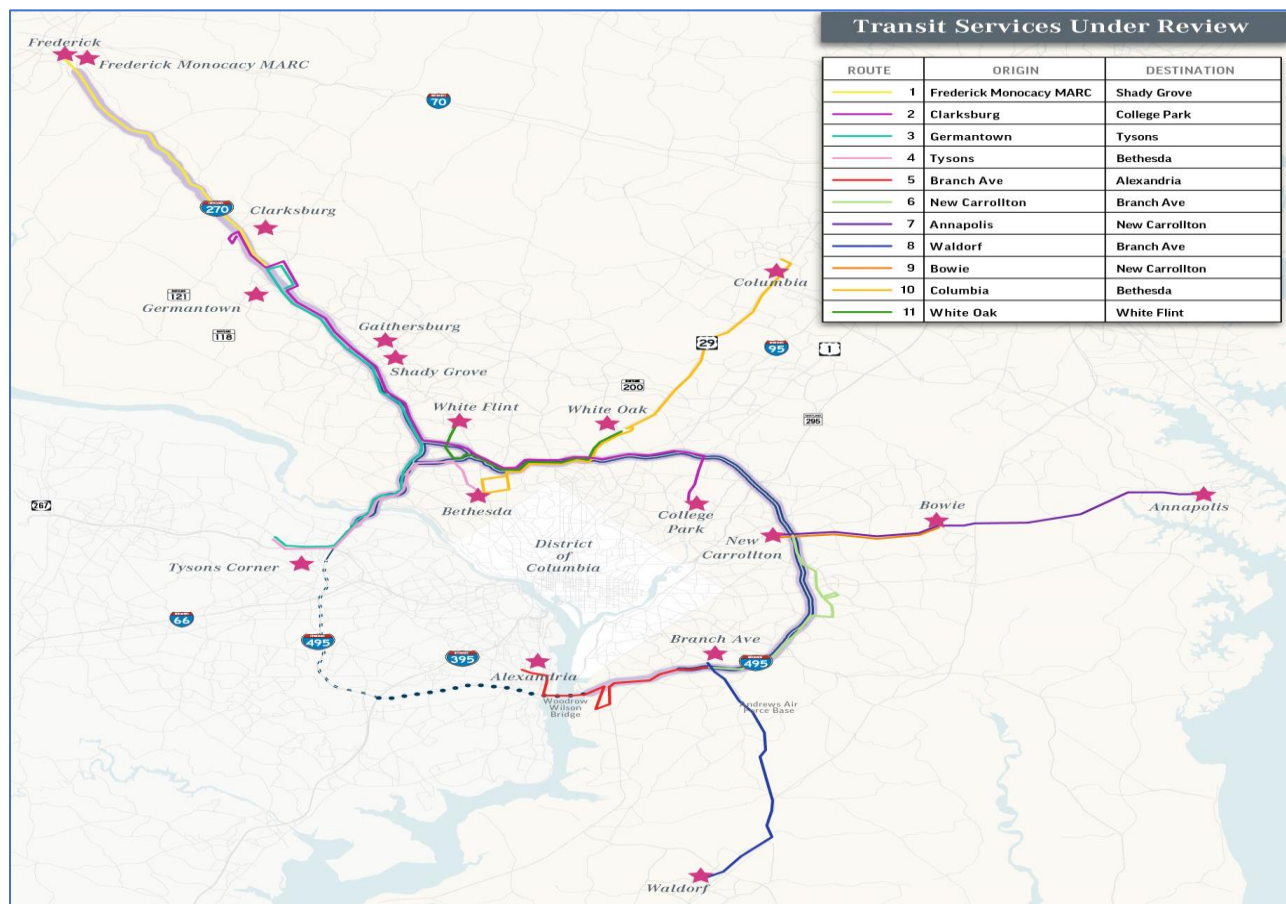
SECTION 6: POTENTIAL NEW OR MODIFIED TRANSIT SERVICE CONCEPTS

Throughout the immediate area surrounding the I-495 & I-270 P3 Program, there are several transit providers, including Frederick, Montgomery, and Prince George's counties as well as MDOT MTA and WMATA. Additionally, there are other local jurisdictions who indirectly benefit from the P3 Program including Anne Arundel, Charles and Howard counties.

Today, for the most part, transit serves discreet markets with travel times dependent on highly congested roadways. New managed lanes will provide the opportunity to enhance the existing transit network through reliable and time competitive services to many more suburban markets. They will form a regional backbone for flexible, dependable and time competitive transit services that will evolve as the NCR grows and changes.

In developing the foundation from which to build concepts for transit enhancements, meetings were held individually with the directly and indirectly affected jurisdictions and with the entire Transit Work Group to gather feedback, seek recommendations, and validate the work performed. The intent was to ensure that the transit concepts developed through this initiative are truly representative of the goals and objectives of the transit providers. So, extensive work was done to gather their input on how the P3 Program could benefit their transit operations today and in the future. As a result, a series of transit service concepts shown in Figure 23 were developed that include modifications to existing services as well as potential new services.

Figure 23: Potential Transit Services Under Review



While collectively, all the services together form the optimal transit network for achieving the benefits of the managed lanes, each can stand on its own merits. The services have been designed in such a way that they can be implemented individually based on future priorities or funding availability.

It should be noted that these service designs are based on the preliminary concepts being considered for the P3 Program. They may need to be refined as the P3 Program continues to develop.

Section 6.1 below summarizes the early input received from transit operators and local governments. Section 6.2 describes the resulting potential new transit services, including the route design, operating assumptions, and demand estimates.

6.1 Early Input

At the onset of work on this study, input was sought from each of the stakeholder groups. They were asked to provide their observations about ways in which their existing services may benefit from the P3 Program. Discussion included new transit service concepts, potential access points, constraints, and any general thoughts or comments about the relationship between the P3 Program and transit. Below is a summary by stakeholder group:

6.1.1 Montgomery County

6.1.1.1 Observations

- Traffic from Frederick continues to increase and adds to the congestion on I-270. However, parking capacity is somewhat limited in Frederick. Additional parking for commuter bus and MARC train service could be added.
- Access to the Metropolitan Grove Station will improve with the new Watkins Mill interchange. Consider providing direct access from the managed lanes to the Metropolitan Grove Station with additional parking.
- Additional transit parking is needed at Germantown and Clarksburg.
- Shady Grove Metrorail Station bus bay area is near capacity during peak hours. Additional service would require expanded capacity for buses.

6.1.1.2 Service Concepts

- MARC Brunswick Line
 - Add bi-directional AM and PM service
 - Add more trips to schedule
 - Add mid-day trips between Germantown and Union Station, CSX negotiations involved
- Bethesda/White Flint/Twinbrook to Tysons Corner
 - Lack of parking capacity in Virginia has been an issue in the past
 - With Silver Line service into Loudoun County, a Tyson's area Metrorail Station could provide a terminus for future bus service
- Greenbelt Metrorail Station to FDA (White Oak)
 - Frequent customer request

- Recent development in the White Oak area has fostered interest in establishing a new transit center in the area
- White Oak to White Flint
 - Due to development trends in both White Oak and White Flint, an east-west cross county connection has been discussed
 - Unknown if this potential service could utilize managed lanes
- Montgomery Mall Transit Center
 - Currently has northbound access to I-270 High Occupancy Vehicle (HOV) lanes
 - With southbound access, the transit center could become a transfer point for service to Tysons Corner within the managed lanes
 - Plans are to build a parking garage on the lot next to the Montgomery Mall Transit Center
 - Following the demolition of the Sears Department Store, re-development is slated for the area around the transit center – parking deck and retail
- US 29 Corridor to Bethesda
 - Current plans for the Flash BRT service will connect the US 29 corridor to Silver Spring and allow for a transfer to the Purple Line (or existing bus service) to reach Bethesda
 - Express bus service from the US 29 corridor to major employment centers in Bethesda (NIH, Walter Reed, etc.) could utilize managed lanes on I-495 and provide a faster, one-seat trip

6.1.1.2 Potential Managed Lanes Access Points

- Three new projects along I-270 could be good candidates for managed lanes access points:
 - New I-270 interchange south of Clarksburg Road (Exit 18) – critical: parking is at capacity
 - Dorsey Mill Bridge over I-270 north of Father Hurley Boulevard/Ridge Road (Exit 16)
 - Watkins Mill Interchange north of Montgomery Village Avenue/Quince Orchard Road (Exit 11). Could provide easy access to the Metropolitan Grove MARC Station
- Montgomery Mall Transit Center currently has direct access to I-270 northbound HOV lanes; southbound access would make this location an ideal candidate for transit service in the managed lanes
- A full managed lanes interchange at I-370 with north facing ramps would be ideal for access to/from the Shady Grove Metrorail Station
- A managed lanes access point at I-495 and Georgia Avenue could necessitate a review of bus access into the Forest Glen Metrorail Station
 - Northbound left turns from Georgia Avenue onto Forest Glen Road are restricted during peak-periods
 - Bus service to the Forest Glen Metrorail Station is currently under-utilized

6.1.2 Prince George's County

6.1.2.1 Observations

- Prince George's County has a keen interest in an extension of the Purple Line
 - Could initially operate as bus service, but light rail expansion is the ultimate goal
 - It should operate to Largo, New Carrollton, National Harbor, and continue to Alexandria, VA

6.1.2.1 Service Concepts

- Branch Avenue to New Carrollton – limited stop (virtual BRT) service
- Largo/New Carrollton to Branch Avenue - limited stop (virtual BRT) service
- Greenbelt to New Carrollton/Largo – express bus service
- Largo/New Carrollton to Montgomery County
 - Long-term feeding into Rockville
- National Harbor/Branch Avenue
 - Connections with Metrorail, National Harbor and Alexandria, VA
- The P3 Program should allow paratransit services such as Metro Access and Call-A-Bus to use the managed lanes free of charge

6.1.2.2 Potential Managed Lanes Access Points

- Prince George's County staff had separate discussions with P3 Program staff. The proposed access locations would work well with the limited stop bus service between New Carrollton/Largo and Branch Avenue

6.1.3 Frederick County

6.1.3.1 Observations

- Prior I-270 multi-modal study evaluated options should be reviewed
- Additional commuter bus service along I-270 may be needed to relieve congestion and improve speeds. Demand for the commuter bus service is likely to increase with faster speeds in the managed lanes. Additional commuter bus service may need to be added to meet the demand.
- Monocacy MARC Station could be a potential Transit Oriented Development (TOD) location

6.1.3.2 Service Concepts

- Expanded park and ride and commuter bus service
- Regular service connecting the Monocacy MARC Station to the Shady Grove Metrorail Station
- Expanded transit service between Monocacy/Urbana/Clarksburg Outlets/Germantown/Shady Grove with 15-minute peak and 30-minute mid-day service
- Local Connection with Montgomery County Ride On

6.1.3.3 Potential Managed Lanes Access Points

- Monocacy
- Urbana
- Hyattstown

6.1.4 Charles County

6.1.4.1 Observations

- The County appreciates the high quality MDOT MTA commuter bus services
 - The buses and park and ride facilities are full
 - The County welcomes new services to additional suburban destinations
- 75% of the County's workers leave the County, including 32% that commute to jobs inside the beltway
- Bus connections to adjoining counties have been recently added
- Land use plans and development initiatives are in place to focus growth around transit nodes
- The County wants to incrementally develop high capacity transit – express bus/BRT/LRT
- The County staff is willing to seek County support for expanded commuter services

6.1.4.2 Service Concepts

- The County's Brandywine Connector could be extended to the Branch Avenue Metrorail Station for all-day service between Waldorf and the Metrorail system
- Additional commuter bus service will be needed

6.1.5 Anne Arundel County

6.1.5.1 Observations

- The County's Move Anne Arundel Transportation Master Plan is in progress
- Anne Arundel County and the City of Annapolis have long envisioned a transit center in the Greater Annapolis area to serve Annapolis Transit, MDOT MTA local and commuter buses

6.1.5.2 Service Concepts

- The County is interested in all day bus service from the Greater Annapolis area to Washington DC

6.1.6 Howard County

6.1.6.1 Observations

- Three BRT corridors have been evaluated in prior studies
 - US 29 Corridor from Mount Hebron to the Silver Spring Transit Center
 - US 1 Corridor – BWI and Arundel Mills to the College Park Transit Center
 - Broken Land Parkway – Columbia Town Center to the Savage MARC Station

- The County is interested in transit connections to the US 29 Flash BRT at Briggs Chaney Park and Ride or White Oak/FDA
- The County would like to undertake planning for improved transit connections from Columbia to I-495/Silver Spring/DC/VA

6.1.6.2 Service Concepts

- Potential services could be an extension of Montgomery County transit service or MDOT MTA commuter bus.
- Service to Bethesda using the managed lanes may be desirable

6.1.7 MDOT MTA MARC and Commuter Bus

6.1.7.1 Observations

- The Brunswick MARC Line peak trips are largely at capacity, with some room on the fringe trips. Bi-level cars could be added for limited additional capacity
- CSX will not permit any additional weekday trips without major infrastructure investments to increase rail capacity
- There may be opportunities for TOD at Monocacy and Germantown
- For new commuter bus services, funding must be available and procurement changes would be necessary before implementing new services
- Factors such as level of service, economic conditions, the cost of alternative transportation modes, fuel cost, accessibility, and land use patterns are among the factors that impact ridership
- The MDOT MTA capital and operating budgets are constrained

6.1.7.1 Service Concepts

- MARC systemwide locomotive and railcar replacement, overhaul and rehabilitation
- Purchasing additional bi-level cars would increase peak service capacity
- Brunswick Line infrastructure investment needed to increase rail capacity – over \$1 billion
- Brunswick Line Station rehabilitation - \$22 million
- Frederick Branch (MDOT MTA owned) grade crossing improvements and rail tie replacement -\$10 million
- Brunswick Yard Maintenance Facility improvements - \$40 million
- Short-term (through 2025) commuter bus improvements
 - Provide additional service from Frederick to Shady Grove
 - Implement new service from Frederick/Mounty Airy to Columbia
 - Additional service between Shady Grove and Frederick
 - Implement service between Indian Head/Accokeek and Washington DC
 - Implement service between Waldorf and the Branch Avenue Metrorail Station
- Medium-term commuter bus improvements (2026-2035)
 - Implement service between Frederick/Mounty Airy and Metropolitan Grove
- Long-term commuter bus improvements (2036-2045)

- Implement service between downtown Hagerstown and the Shady Grove Metrorail Station

6.1.8 MDOT State Highway Administration

The MDOT SHA Regional and Intermodal Planning Division was consulted in developing these observations regarding park and ride facilities.

6.1.8.1 Observations

- Historically, MDOT SHA builds park and ride facilities where they have surplus land in conjunction with larger highway and interchange projects
- As cost savings measures, MDOT SHA doesn't always pave the complete parcel. Grading and infrastructure are completed, but some of the parcel is reserved for future expansion
- MDOT SHA seeks opportunities to develop park and ride lots where they will be served by transit
- Expansion is planned for two park and ride lots in Frederick County – Mount Zion Park and Ride and Emmitsburg Park and Ride
- MDOT SHA is trying to identify appropriate parking for trucks in Frederick
- The Park and Ride at I-270 and MD 117 is not heavily used due to access issues
- Conversely, the lot at I-270 and MD 124 is heavily used because of the ease of access
- MDOT SHA is looking at improvements along the MD210 corridor. It will transition into more of a freeway pattern
- A Park and Ride Utilization Report should be completed in early 2020

6.2 Potential Transit Services

From the results of the market analysis, input from transit operators and local governments, and completed analysis, eleven new bus services are offered for consideration. These potential services build upon the current transit services, compliment planned transit services (such as the Purple Line and planned BRT corridors) and make good use of the managed lanes system. The following sections identify those services, including detailed operating assumptions and present preliminary ridership forecasts for the new services.

6.2.1 Service Plan

The eleven potential new services are listed in Table 23 and illustrated on area maps in Figures 24, 25 and 26. Figures 27-30 present schematics of the destinations served by these as well as select existing transit services in order to help better understand how these services are intended to compliment and not duplicate existing services.

Table 23 summarizes the operating assumptions for the potential services, including days per week, operating hours and frequency of service. While routes 1 and 3-11 would be entirely new services, route 2 is a modified version of MDOT MTA's current commuter bus route 204.

Table 23: Potential New Express Transit Services

Route	Days	Weekday Hours	Weekday Frequency (peak/off peak)
1 – Frederick Monocacy MARC to Shady Grove	7	5 am - 12 midnight	30/60
2 – Clarksburg to College Park	5	Peak periods only	30
3 – Germantown to Tysons	5	Peak periods only	15
4 – Bethesda to Tysons	7	6 am - 12 midnight	15/30
5 – Branch Avenue to Alexandria	7	6 am - 12 midnight	15/30
6 – New Carrollton to Branch Avenue	7	6 am - 12 midnight	15/30
7 – Annapolis to New Carrollton	7	6 am - 12 midnight	30/60
8 – Waldorf to Branch Avenue	5	6 am - 10 pm	30/60
9 – Bowie to New Carrollton	5	6 am - 10 pm	15/30
10 – Columbia to Bethesda	5	6 am - 10 pm	15/30
11 – White Oak to White Flint	5	6 am - 10 pm	15/30

Figure 24: Potential Express Routes, I-270 Corridor

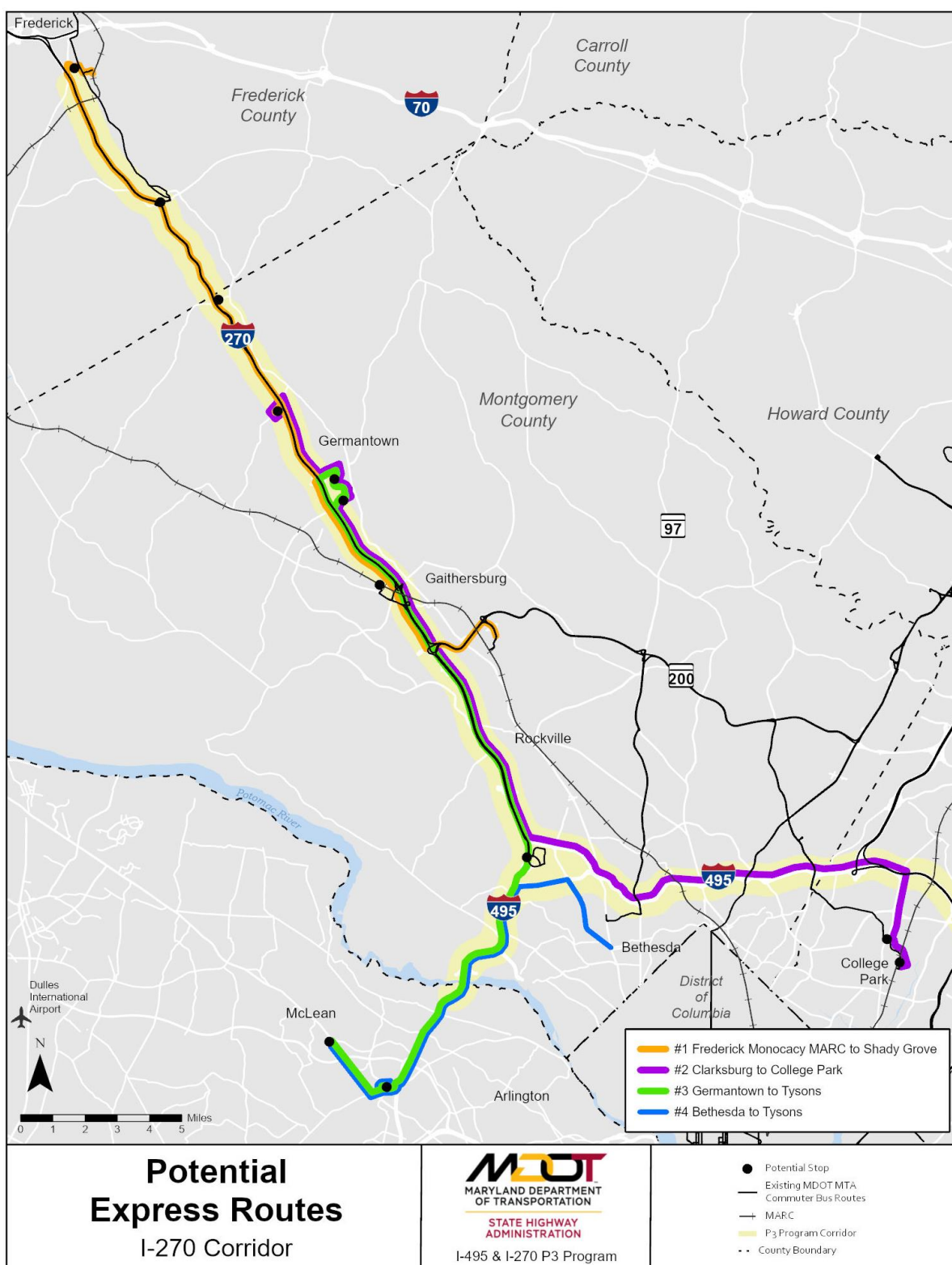


Figure 25: Potential Express Routes, US 29 Corridor

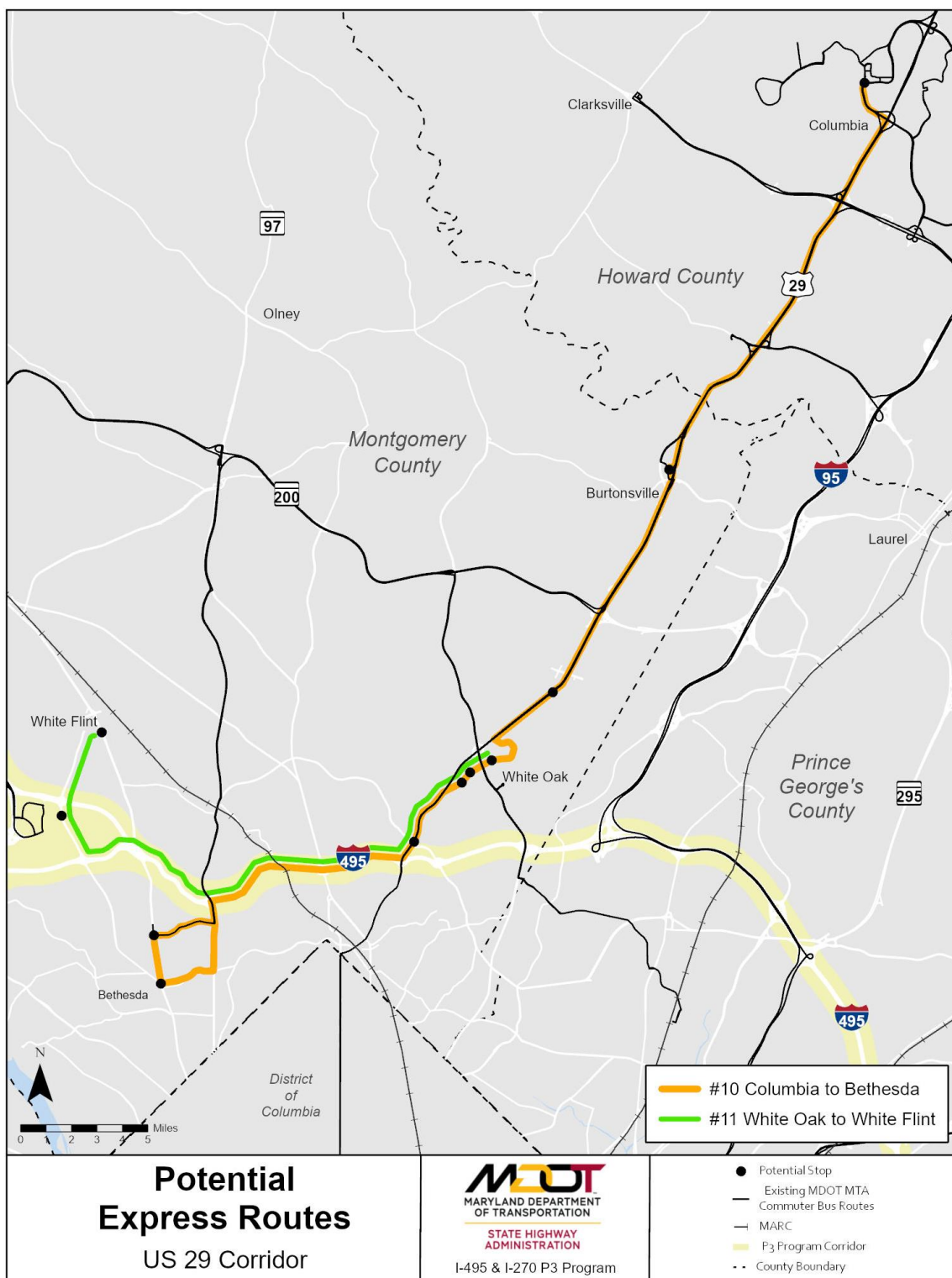


Figure 26: Potential Express Routes, I-495 Corridor

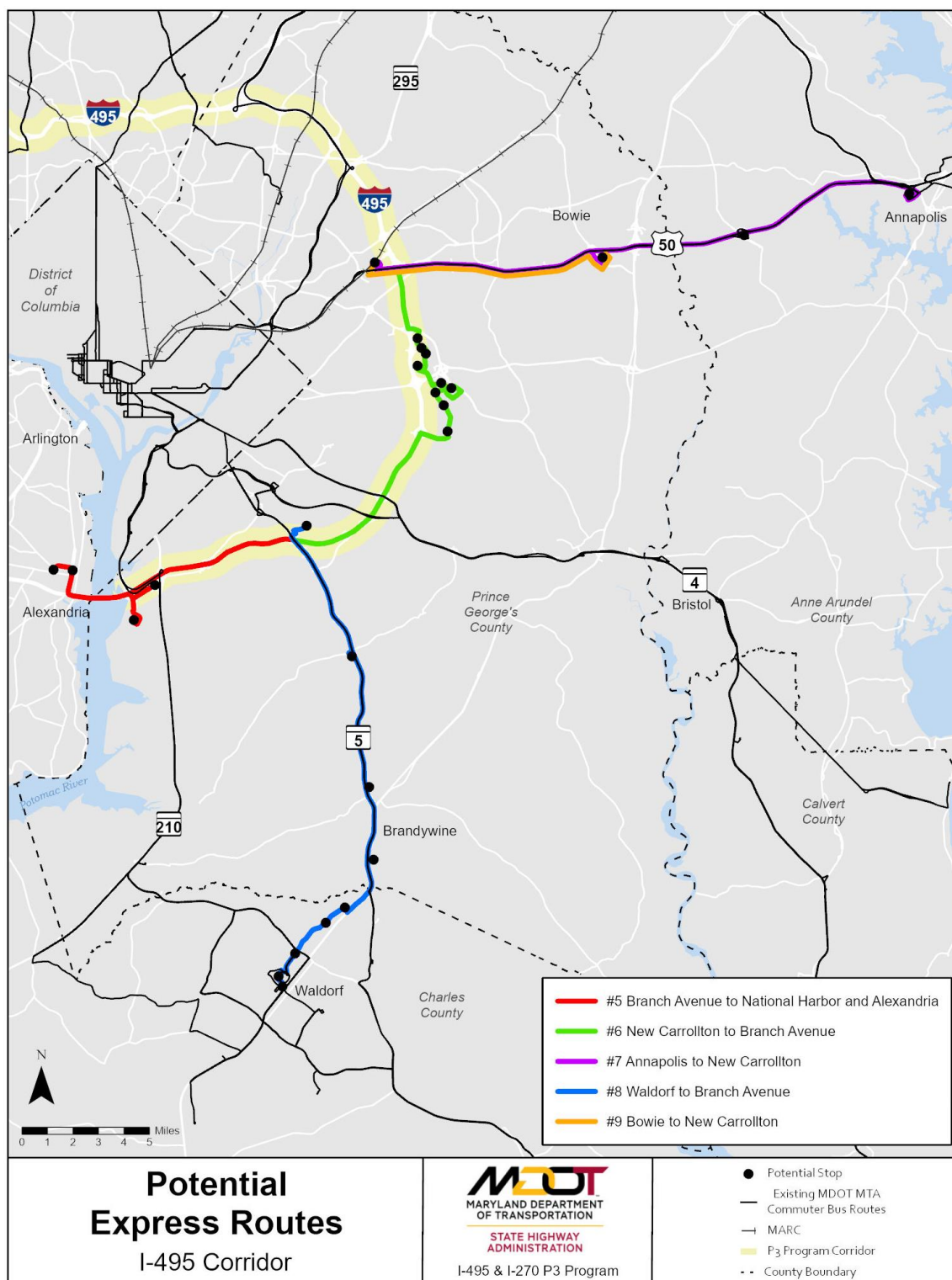


Figure 27: Transit Service Concept – I-270 Corridor



Figure 28: Transit Service Concept – I-495 Corridor

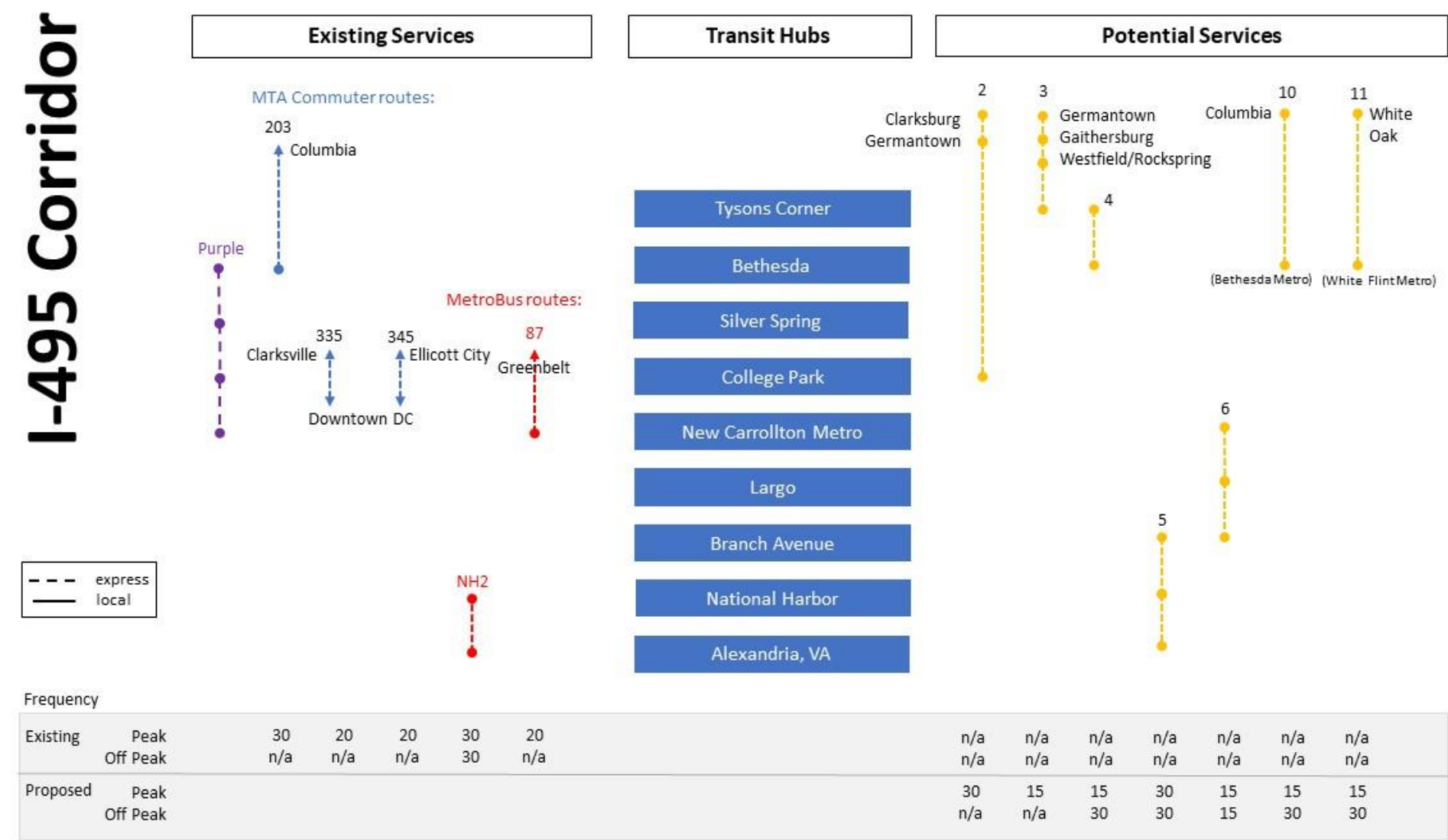


Figure 29: Transit Service Concept – US 50 Corridor



Figure 30: Transit Service Concept – MD 5 Corridor



6.3 Ridership

In order to determine ridership projections for the transit services under analysis, a combination of travel demand modeling and post-model adjustment was used based on the nature of the service. The transit concepts were modelled using the MWCOG Regional Travel Model 2045, using the most current concepts for the I-495 & I-270 P3 Program. The MWCOG model contains many factors that influence travel demand such as population growth forecasts and planned transportation improvements like the FLASH BRT and the Purple Line. For existing transit services, the model output was carefully compared to route-specific and corridor-level model output so that post-model adjustments could be made to new transit routes. The results, summarized below in Table 24, suggest strong demand for these potential services.

The 11 potential services are forecast to generate over 10,000 new trips per day. It should be noted that passenger trips on these express-type transit services are typically much longer than on local transit or Metrorail and, therefore, have a significant impact in reducing total vehicle miles traveled. These potential routes vary in length from 8.5 miles to 29 miles (one way). If we assume that the average passenger trip is just the median distance (17.8 miles), then these eleven routes will carry approximately 180,000 passenger miles per day. If those riders were previously driving alone, that's a reduction of 180,000 vehicle miles traveled (VMT) per day.

Table 24: Daily Ridership Forecasts, Year 2045, Potential New Services

Route	2045 New Daily Riders
1 – Frederick Monocacy MARC to Shady Grove	300
2 (204) – Frederick to College Park (a modified version of current commuter bus route #204)	200
3 – Germantown to Tysons (includes planned route 14C)	1,500
4 – Bethesda to Tysons (includes planned route 14A)	1,000
5 – Branch Ave to Alexandria, VA	1,000
6 – New Carrollton to Branch Avenue	2,000
7 – Annapolis to New Carrollton	350
8 – Waldorf to Branch Avenue	300
9 – Bowie to New Carrollton	700
10 – Columbia to Bethesda	1,800
11 – White Oak to White Flint	1,000
Total	10,150

Table 25 lists the ridership forecasts for select existing routes. The projections took into consideration the potential new routes shown in Table 24 and the other new transit services included in the long-range plan such as the MD355 Flash BRT, Corridor Cities Transitway and the Brunswick Commuter Rail Capacity improvements. If any of these new services were not constructed, forecast ridership would be different.

Table 25: Daily Ridership Forecasts, Year 2045, Select Existing Services

Route	Name	Provider	Existing (2019) Daily Ridership	2045 Daily Riders
201	Gaithersburg Park and Ride - BWI Airport	MDOT MTA	362	460
204	Frederick - College Park Metrorail Station	MDOT MTA	273	540
335	Clarksville - Washington DC	MDOT MTA	317	560
345	Ellicott City - Washington DC	MDOT MTA	324	450
505	Hagerstown - Shady Grove Metrorail Station	MDOT MTA	326	730
515	Frederick - Shady Grove Metrorail Station	MDOT MTA	680	1,740
70	Milestone Park and Ride - Bethesda	Ride On	680	530
73	Shady Grove Metrorail Station - Cabin Branch	Ride On	134	100
79	Shady Grove Metrorail Station - Clarksburg	Ride On	329	360
100	Germantown - Shady Grove Metrorail Station	Ride On	1,957	2,180
87	Laurel Park - New Carrollton Metrorail Station	WMATA	586	680
Total			5,968	8,330

SECTION 7: CASUAL CARPOOL AND VANPOOL

Ridesharing has developed as a way in which commuters can reduce their commuting costs and for passengers to avoid driving. In this region ridesharing has developed under formal programs that assist in forming pre-arranged on-going carpools and vanpools, and informally as a means for drivers and riders to make use of lanes designated for HOV by spontaneously forming carpools on an ad hoc basis at park and ride lots. Carpools and vanpools of either type complement managed lanes by:

- Increasing corridor person throughput, helping to maintain travel speeds in the lanes (particularly at peak travel times),
- Complementing existing bus transit services using the lanes, and
- Providing cost effective alternatives to separate transit solutions.

Figure 31: Carpool Photo



Photo from Towson.edu

Other types of ridesharing include airport shuttles, taxi services, and now dynamic ridesharing provided through Transportation Network Companies (TNCs).

7.1 Carpool/Vanpool/Dynamic Rideshare Existing Programs

7.1.1 Commuter Choice Maryland

Maryland Commuter Choice, a statewide program sponsored by MDOT, incentivizes ridesharing by providing employers monthly tax credits. Employees who carpool or vanpool qualify for the tax benefits provided by this program. These state-income tax benefits include:

- Employer-provided transit benefit:
 - Employer may take up to \$100 Maryland income tax credit per employee each month
 - Tax credit is based on 50% of qualified monthly commuting costs (vanpool or transit)
- Employee pre-tax benefit:
 - Employer allows employee to set aside income (pre-tax) for transit costs – 7.65% savings on payroll taxes

- Employees also save money on income and payroll taxes
- Combination employer-paid and employee pre-tax benefit:
 - Employer contributes a portion of transit costs and the employee pays remainder with pre-tax income

7.1.2 Commuter Connections

MWCOG coordinates the Commuter Connections program in the Washington region. Commuter Connections collaborates with local governments in Maryland and Northern Virginia to better provide employers and employees with resources to help commuters choose which mode(s) of travel work best for them. These programs include information about telework, a list of local vanpool services, and links to local rideshare programs. Commuter Connections together with the Maryland Transportation Institute at the University of Maryland has developed a mobile app called Incentrip that allows commuters throughout the Washington DC region to do real-time multi-modal trip planning. Commuters who use the app during rush hours receive rewards points that can be redeemed for cash from Commuter Connections. The app includes information on the best travel mode, departure time, and suggested routes based on predicted traffic patterns and user preferences. It also includes alternatives to Single Occupancy Vehicle (SOV) use including carpooling, walking, cycling, and transit.

7.1.3 Casual Carpooling

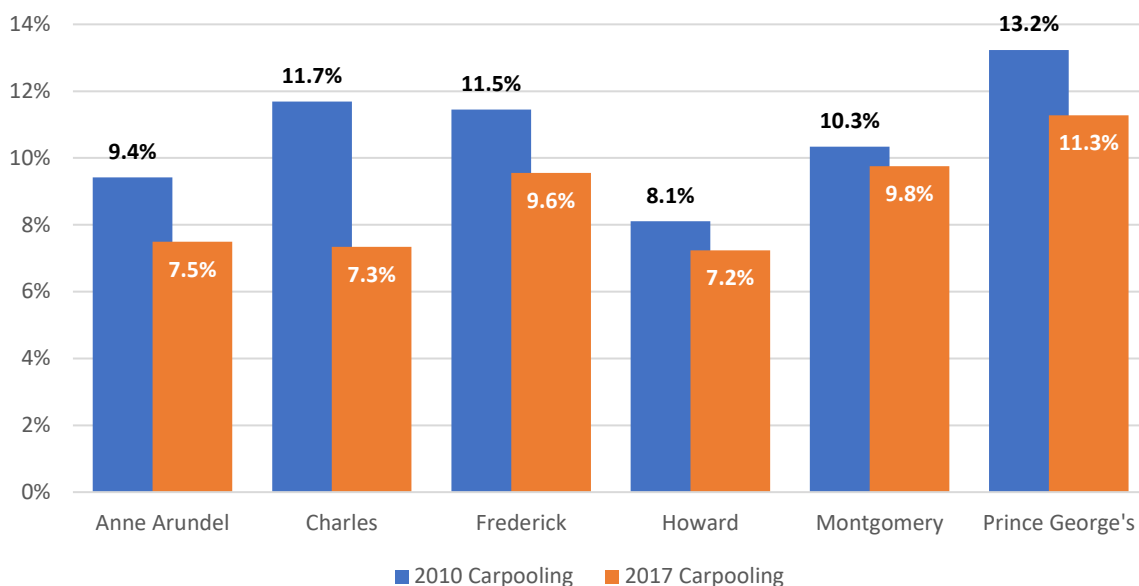
Casual carpooling, or “slugging,” got its start in Northern Virginia during the 1970’s. As the presence of HOV lanes and other incentives increased, similar activities emerged elsewhere, particularly in the Bay Area and Houston. One of the most well-known “slugging” systems began along HOV lanes in Northern Virginia, connecting thousands of commuters to employment centers in Arlington (primarily the Pentagon) and downtown Washington DC. HOV lanes accessible only to carpools with three or more occupants, combined with concentrated employment destinations in the same corridor (the Pentagon and downtown Washington DC.) created a situation in which drivers seeking the travel time advantage of the lanes would pick up riders at park and ride lots without any pre-arrangement or ongoing relationship. A well-defined, but unofficial, system of social customs developed around the pickup process, and it became (and remains) a major feature of the commuting pattern in the I-95/I-395 corridor in Northern Virginia, even as the lanes have changed from HOV to High Occupancy Toll (HOT) lanes that permit vehicles with three or more occupants (HOT 3+) to use the lanes without paying the toll. Casual carpooling may also further develop in the future as a result of the proliferation of smartphones, which could use websites and mobile apps to facilitate the networking needed to set up a casual carpool by matching drivers and passengers on a trip-by-trip basis. TNC’s are already offering services of this type.

7.2 Carpool/Vanpool/Dynamic Rideshare Trends

7.2.1 Maryland Carpooling Trends

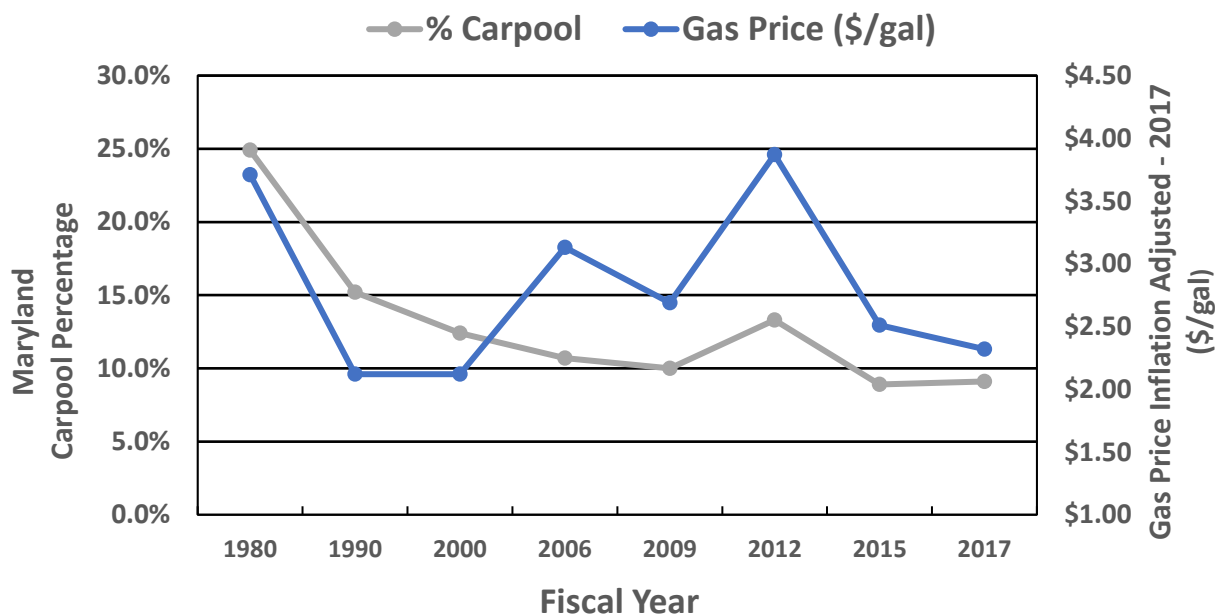
From 2010 to 2017, the percentage of people commuting by carpool has decreased in all Maryland counties within Metropolitan Washington. Currently, the largest percentages of carpoolers are found in Prince George’s (11.3%), Montgomery (9.8%), and Frederick (9.6%) counties. The largest decrease in carpooling was found in Charles County, where the percentage of commuters who carpooled dropped by 4.3%. Figure 32 shows the change over time for the percentage of people carpooling in the Maryland counties that are part of Metropolitan Washington.

Figure 32: 2010 to 2017 Carpooling Trends in Maryland



This decrease is likely due to the long term drop in the real price of gasoline since 1980. From 1980 to 2017, the per gallon price of gasoline, adjusted for inflation, has dropped from \$3.71 to \$2.28. Between 2009 and 2012, gas prices increased, leading to a sharp increase in carpooling. This may account for the elevated levels of carpooling in 2010. As gas prices came back down, carpooling decreased in lockstep. Figure 33 graphically displays this trend.

Figure 33: Correlation between gas prices and carpooling in Maryland, 1980-2017



Source: US Census, American Community Survey and US Energy Information Agency

7.2.2 Commuter Connections 2019 State of the Commute Survey

MWCOG's triennial State of the Commute Survey⁹ was most recently undertaken in 2019 to assess commuting trends in the NCR. The report addresses the relative prevalence of carpooling and vanpooling in the region. Some takeaways from the State of the Commute survey include:

- Carpool/vanpool mode share was 4.6% regionally, declining from its peak mode share of 7.1% in 2007
 - 3.4% formal carpool
 - 1.0% slug lines
 - 0.2% vanpool
- Driving alone continued to decline; from 66.9% in 2007 to 58.3% in 2019
- Transit accounted for the largest increase in mode share since 2007; from 17.7% to 24.1%
- Average commute distance was about the same in 2019 (17.1 miles), but the average commute time in 2019 (43 minutes) was longer than the average commute time in 2016 (39 minutes) and in 2013 (36 minutes).
- Drive-alone rates varied by distance from core, "Middle Ring" commuters (from Fairfax, VA, and Montgomery and Prince George's counties) were less likely to drive alone than "Outer Ring" commuters
- Carpools and vanpools had the highest mode share in the region's outer suburbs
- 8% of regional commuters were offered a carpool subsidy
 - Of those with the option, 25% of employees used their carpool subsidy
- Since 2016, carpool and vanpool commuters' satisfaction has dropped from 66% satisfied to 48% satisfied.

When considering a commuter's access to HOV or Express lanes, the survey found that:

- 9% of commuters with access to HOV only use carpool/vanpool
- 11% of commuters with access to both HOV and Express lanes use carpool/vanpool
- 3% of commuters with access to Express lanes only use carpool/vanpool
- 3% of commuters with access to neither HOV or Express lanes use carpool/vanpool

7.2.3 Casual Carpooling – Comparing Northern Virginia to Maryland

Northern Virginia is a stronghold of the type of casual carpooling known as "slugging." Virginia originally instituted HOV-4 lanes on I-95 and I-395. In 1989, they were changed to HOV-3. Slugging lines developed informally in an effort to take advantage of HOV lanes by creating an ad-hoc carpooling network that uses park-&-ride lots to organize informal rides. "Slugging" has had success in Northern Virginia due to the following factors:

- Presence of HOV lanes, making carpooling benefit both drivers and passengers
- Convenience of park-&-ride lots served to major interstates
- Availability of commuter bus service to and from the lots providing an alternative in case riders are unable to connect with a driver (particularly for the outbound trip)
- Highly concentrated employment centers in Arlington, VA and Washington DC

⁹ Metropolitan Washington Council of Governments, National Capital Region, Transportation Planning Board Commuter Connections Program, *2019 State of the Commute Survey- Technical Survey Report*, September 2019.

Just across the Potomac in Maryland, casual carpooling has not become as popular of a commuting mode due to several factors, including:

- The presence of multiple large employment centers some distance from the Beltway (Bethesda, Hyattsville, College Park, Silver Spring, etc.)
- No direct highway connection to downtown Washington DC
- Limited HOV lanes (only on I-270 and US 50)
- Many major park and rides are located at Metrorail stations rather than at the interstates

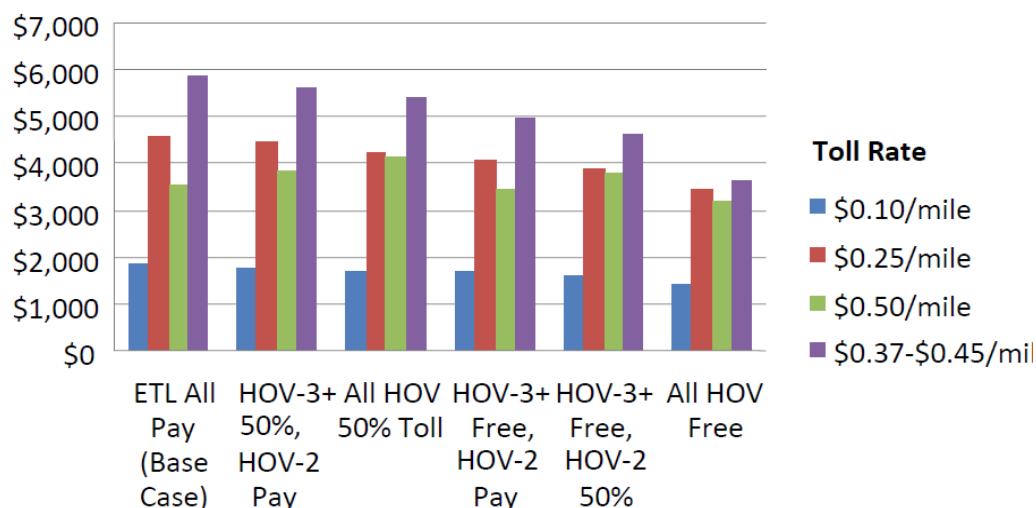
With the lack of concentrated major employment centers, and without the incentive of the HOV lanes and the backup provided to commuters by the available commuter bus service, casual carpooling has not developed in Maryland. A question is whether the implementation of managed lanes on I-495 and I-270 could incentivize the practice of casual carpooling and vanpooling in Maryland, particularly if complemented by commuter bus services utilizing the managed lanes and associated park and ride lots.

7.2.4 Carpooling Case Studies

Studies about the effect of HOV conversion, or changing HOV lanes into HOT lanes, on carpooling have been undertaken in several metropolitan areas, producing varied outcomes. These studies found that the impacts of converting HOV to HOT lanes were not uniform.

In 2009, the Texas A&M Transportation Institute published a report¹⁰ that modeled the impact of different managed lane pricing structures on revenue generation and person throughput. Pricing structures were created by combining two variables, the per mile toll rate and price discounts for carpooling. The modeling done by Texas A&M found that increasing person throughput by providing HOV discounts came at the expense of higher revenue generation. Inversely, policies that generated more revenue had less person throughput. This study showed the varied impact managed lane toll policies can have on carpooling (Figures 34 and 35), which helps to explain the variance in the case studies referenced above.

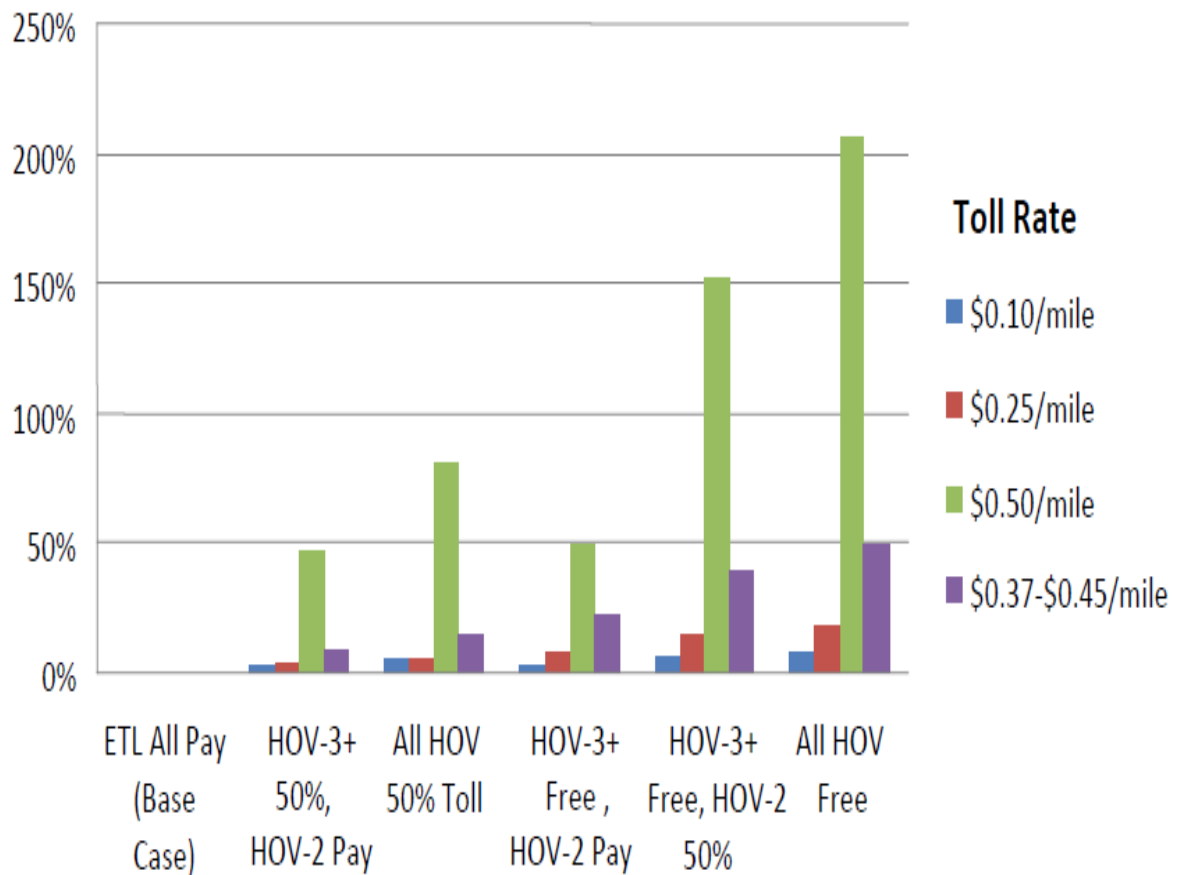
Figure 34: Impacts of Managed Lanes Toll Policies on Revenue Generation



Source: Texas Transportation Institute 2009

¹⁰Texas Transportation Institute, Texas A & M University, for the Texas Department of Transportation, *The Role of Preferential Treatment for Carpools in Managed Lanes*, College Station, Texas, June 2009.

Figure 35: Impacts of Managed Lanes Toll Policies on Person Throughput

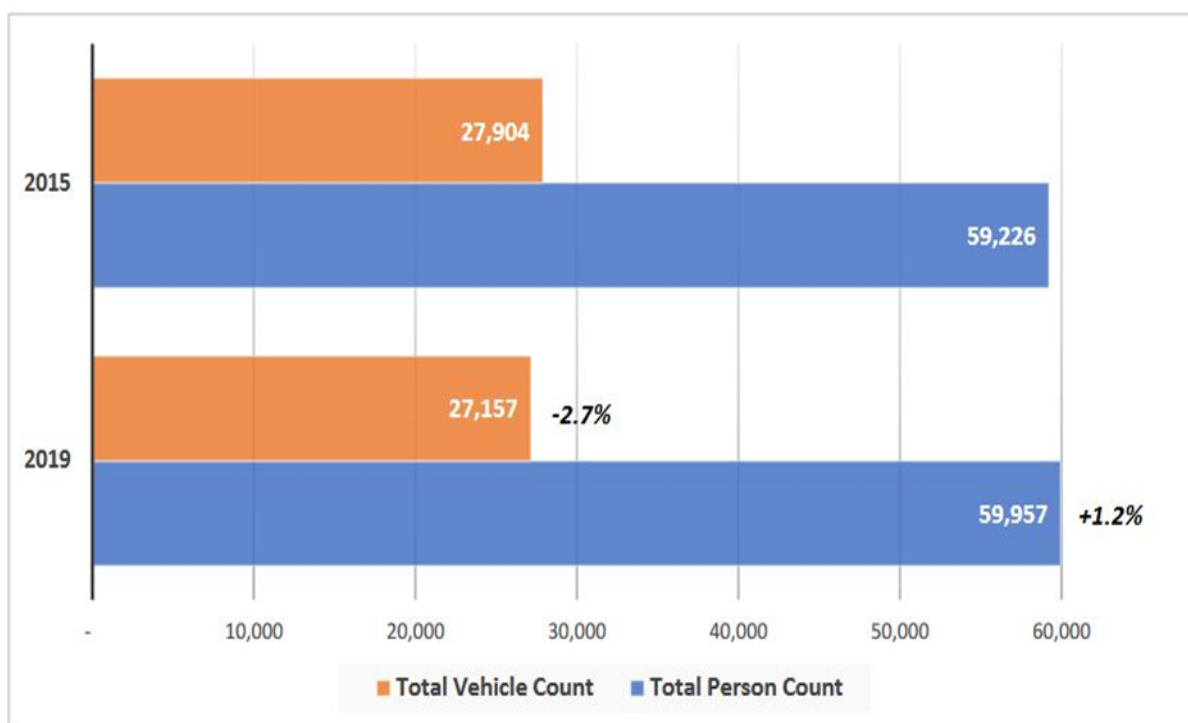


Source: Texas Transportation Institute 2009

Recent reports on the implementation of HOT options in existing HOV corridors in Virginia demonstrate that HOV usage can be maintained or grown, person throughput can be increased, and vehicle volume reduced.¹¹ The analysis of first-year data from the I-66 Inside the Beltway (ITB) Commuter Choice Program showed that the corridor was more efficient in 2019 than in 2015. In 2015 these lanes were completely transit and HOV-2. In late 2017, Commuter Choice changes allowing SOV usage with tolls, combined with a free ride for HOV-2 were instituted. Counts taken by MWCOC comparing April 2015 to April 2019 show that inbound (peak-direction) peak hour person throughput increased by 1.2%, while highway traffic volume decreased by 2.7%. Highway person throughput increased 0.6%, while transit person throughput in the corridor increased by 2.2%. The Commuter Choice Program utilized funding to support new and enhanced commuter bus service in the corridor, adding to the increase in person throughput when combined with a slight increase in rail transit ridership, offsetting reduced local bus ridership in the corridor.

¹¹ Northern Virginia Transportation Commission (NVTC), 2019 Corridor Performance Report for the I-66 Inside the Beltway and I-395 Corridors, presented to the Commission on May 5, 2020.

Figure 36: Impact of Managed Lanes on Person Throughput and Vehicle Count



Source: Metropolitan Washington Council of Governments Transportation Policy Board, April 2015 and April 2019 traffic counts

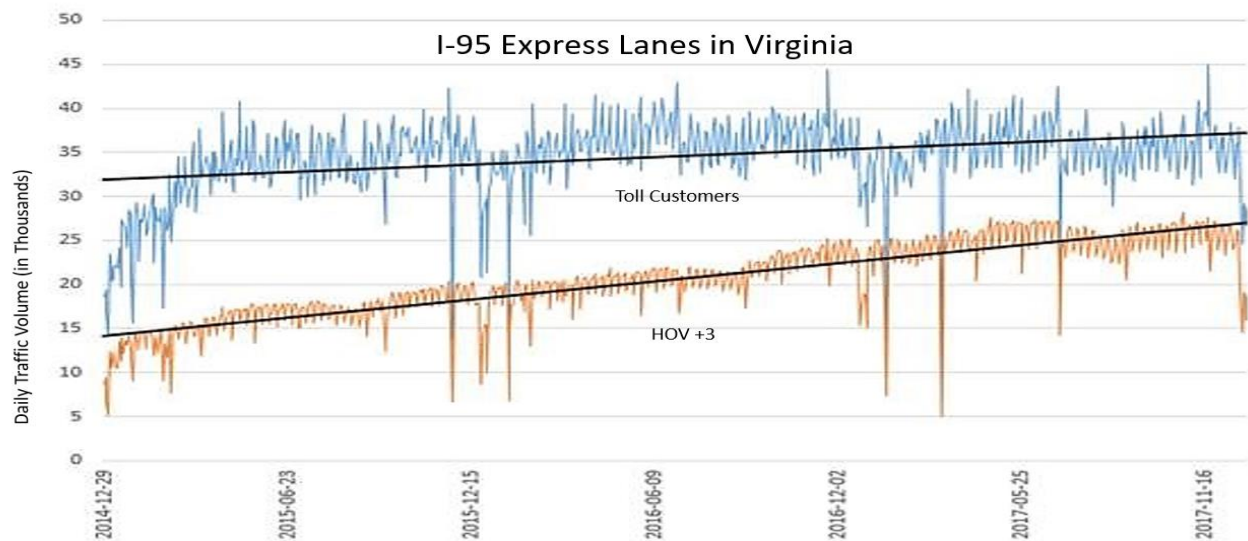
In addition, average vehicle occupancy increased from 1.25 to 1.29 persons per vehicle in the corridor, and from 1.52 to 1.54 persons per vehicle on I-66 itself even though only HOV-2 and transit were permitted in 2015, and now SOV with dynamic tolling is permitted.

Additional evidence that the tolls for SOV do not have a major impact on HOV usage can be seen in the data for I-395 from the same NVTC 2019 Corridor Performance Report. As noted above, the I-395/I-95 corridor has long had HOV lane restrictions, and there is a significant ridesharing culture in the corridor. At the beginning of 2015, Express Lane tolling was introduced for the I-95 HOV lanes outside the Beltway (OTB), yet traffic counts on I-395 ITB in April 2019 showed that 28.2% of the inbound peak hour trips are made by HOV (defined as HOV 3+), with the average automobile occupancy of 1.85 persons per vehicle on I-395 itself. The ITB reversible peak-direction median lanes became express lanes (with toll for SOV) in late 2019, and future studies will need to evaluate the impact of this extension of the I-95 Express Lanes on HOV and transit usage. In addition, the impact of enhanced bus service made possible by Commuter Choice Program funding will need to be considered as this has provided for implementation of more frequent local and commuter bus services in the corridor.

Additional traffic count data from Northern Virginia is presented in Figures 37 and 38, further demonstrating that the implementation of tolled express lanes combined with un-tolled HOV 3+ has resulted in increased HOV traffic volume. The two cases are somewhat different, in that I-95 Express Lanes were implemented in a corridor with a high level of pre-existing HOV usage, as noted above.

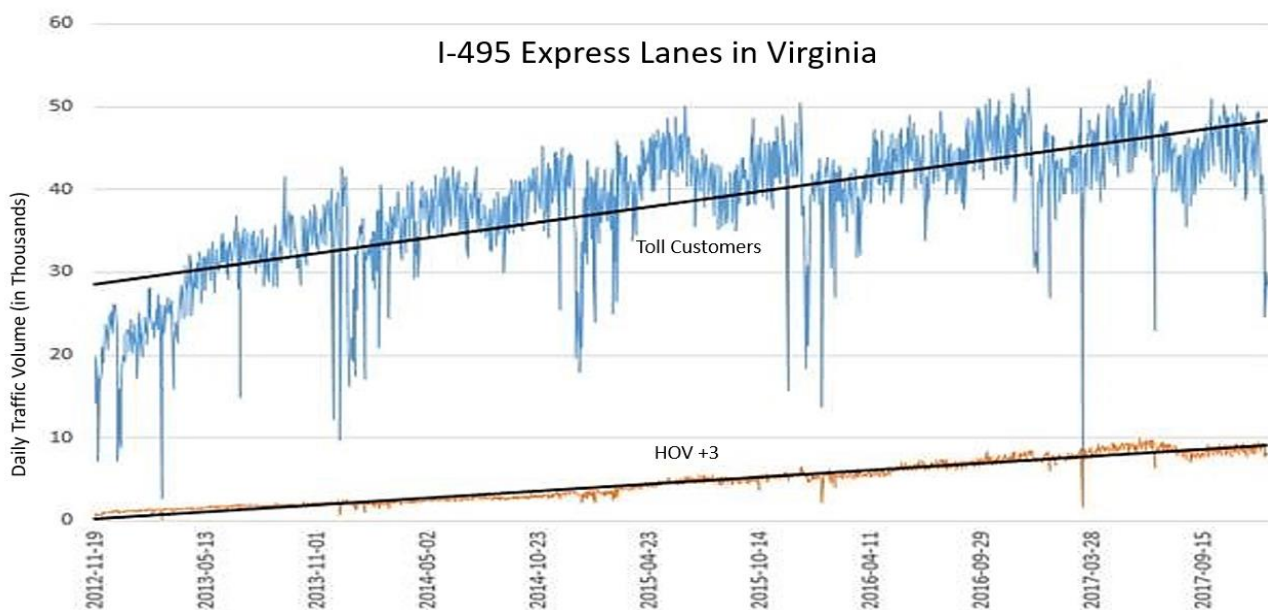
Nevertheless, HOV 3+ traffic volumes have increased at a greater rate than toll volumes. Figure 38 presents traffic volume data for the I-495 Express Lanes. This is more comparable to I-495 in Maryland as there were no pre-existing HOV lanes on I-495 in Virginia, and the new lanes added capacity while providing an incentive for ridesharing by allowing HOV 3+ with no toll. For that reason, the HOV 3+ daily traffic volume is starting from a very low level but is continually increasing over the time period depicted in the graph, from no HOV traffic to nearly 10,000 vehicles per day.

Figure 37: I-95 Virginia Express Lane Daily Traffic Volume for Toll and HOV 3+ Use



Source: Virginia Department of Transportation

Figure 38: I-495 Virginia Express Lane Daily Traffic Volume for Toll and HOV 3+ Use



Source: Virginia Department of Transportation

7.3 Estimated Participation

At this stage of the managed lanes development process, it is difficult to accurately assess how much of an impact they will have on carpooling. Based on Maryland's recent overall decline in the use of carpool and vanpool modes and the correlation between gas prices and carpooling, it is not expected that the presence of managed lanes will increase ridesharing, whether formal or casual without incentives to form carpools such as reduced tolls or free usage of the managed lanes by multi-occupant vehicles. There are several methods to institute these fare policies, but it should be noted that free or reduced HOV fares will likely lead to lower revenue generation for the lanes and lower revenue to support regional transit service improvements.

SECTION 8: PARK AND RIDE

The purpose of park and ride lots is to encourage transit ridership as well as vanpooling and carpooling. Express and commuter bus service operating along the managed lanes is supported by the park and ride lots. Since the managed lanes are likely to have limited entry points, the physical connection between the lanes and the park and ride lot takes on added importance.

Park and ride lots are placed strategically as collection points with consideration given to demand and type of use. They are typically located on the suburban or urban fringe. They are placed at the origin of commuter bus routes as seen in Frederick, Montgomery, Howard, Prince George's, Anne Arundel and Charles counties, or as a place for intermediate stops for commuter services. Park and ride lots can also support perpendicular transit lines that complement the transit network.

Park and ride facilities can be more elaborate, acting as a transit hub where transit routes intersect, in conjunction with a rail facility, or more simplistic as a stand-alone facility with parking and a bus stop. The amenities provided at park and ride lots range from bus shelters, benches, lighting, trash receptacles, charging stations for electric vehicles, next vehicle arrival information, and enclosed waiting areas to no amenities. The lots vary in size and ownership.

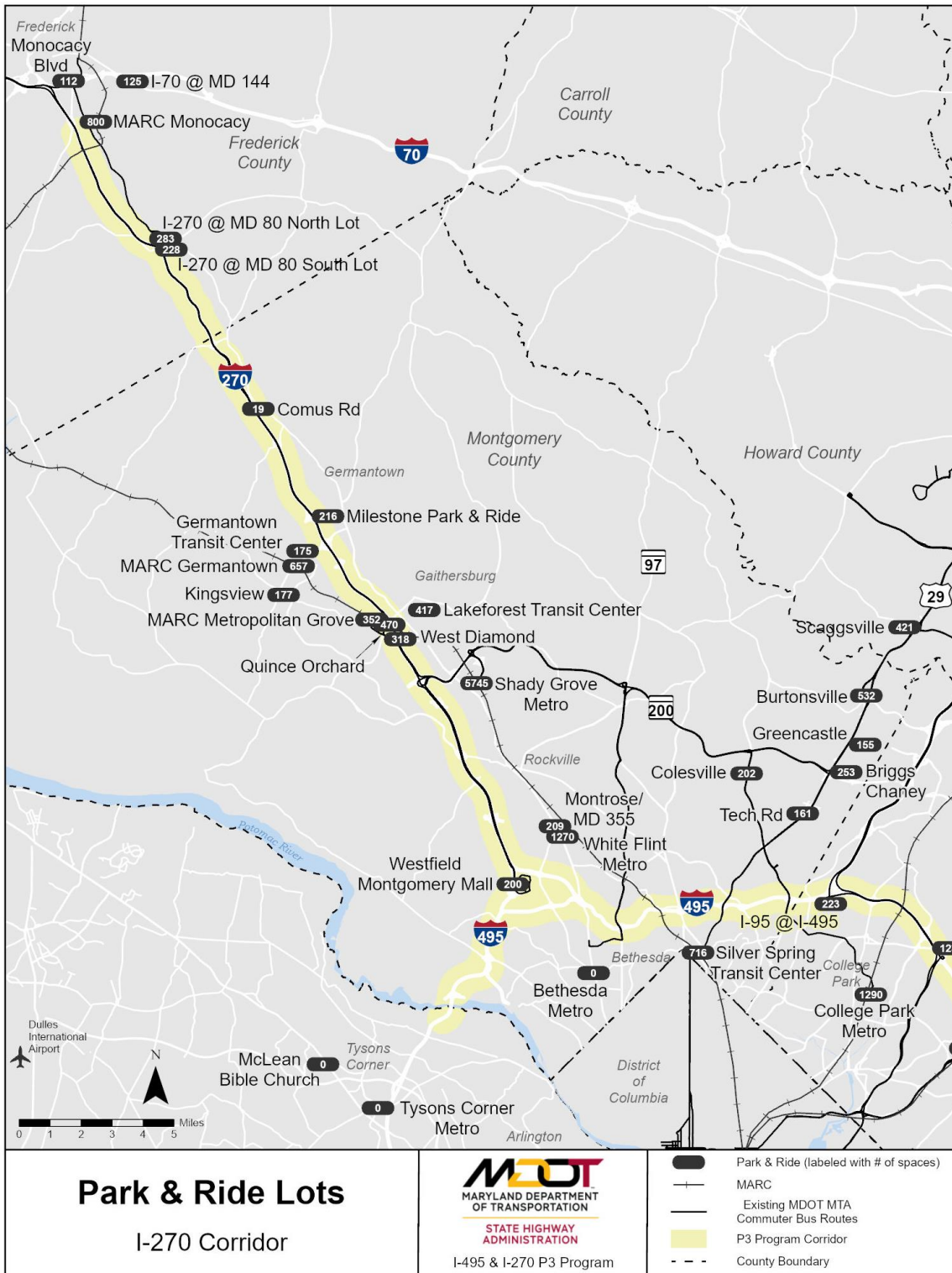
In Maryland's current construct, the majority of park and ride lots in the managed lanes corridor are free of charge and accommodate local and commuter bus service, carpool and vanpool commuters. At all WMATA Metrorail station park and ride lots, there is a fee charged to park except on the weekends and federal holidays. WMATA Metrorail stations are within or just outside I-495 where land value is high and parking demand is even greater. This is evident by the lack of parking availability at WMATA Metrorail stations during the work week. Parking at MARC train stations is free except at stations with both Amtrak and MARC services.

8.1 Park and Ride Lot Locations

Park and ride lots in the six-county area outside Washington DC are seen in Figures 39, 40, and 41. They are located near major corridors where local and commuter bus service operates with efficient access for both passenger and transit vehicles. The lots are clustered in densely populated areas as seen in Germantown, Bethesda and Waldorf, and spaced further apart at the urban fringe. Park and ride lots at MARC train and WMATA Metrorail stations have a greater number of parking spaces as rail has greater ridership capacity. Existing park and ride lots served by local and commuter bus service in some cases may be limited in size due to land constraints.

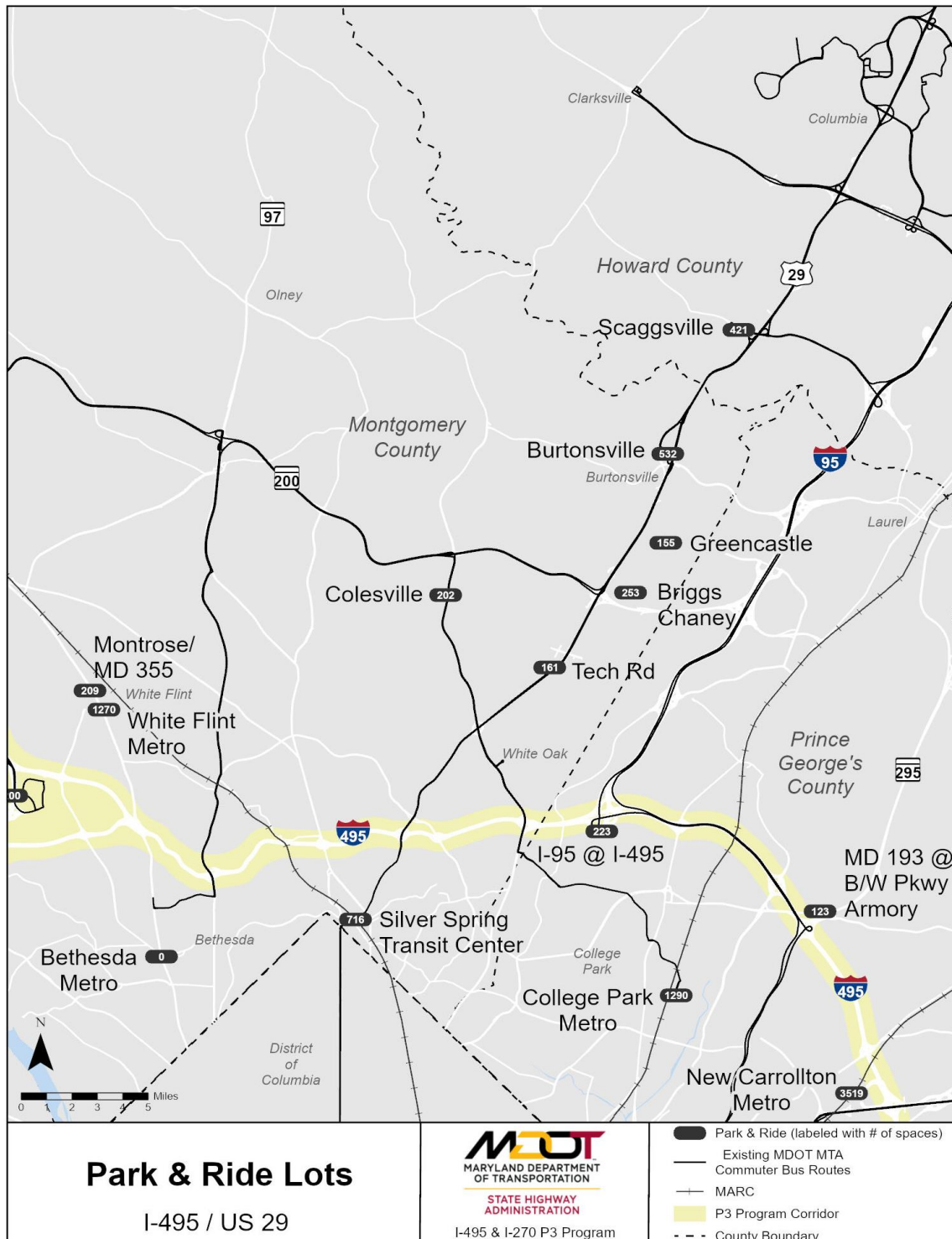
As shown in Figure 39, park and ride lots are clustered in Frederick off I-70 and I-270. In upper Montgomery County the lots adjacent to I-270 between Frederick and I-370 are spaced further apart allowing commuter and local bus service to travel a greater distance between each stop.

Figure 39: Existing Park and Ride Lots I-270 Corridor



Park and ride lots along US 29 are evenly spaced, not clustered closely together. Commuter and local bus service in the US 29 corridor access transit stops at these locations as illustrated in Figure 40. Although US 29 is perpendicular to the managed lanes corridor, transit operating on US 29 will benefit from the managed lanes network.

Figure 40: Existing Park and Ride Lots I-495 and US 29 Corridor



The commuter bus service currently operating out of Anne Arundel and Charles counties accesses park and ride lots along US 50 and MD 5. The park and ride lots shown in Figure 41 are spread out with transit service traveling longer distances between transit stops for improved running time.

Figure 41: Existing Park and Ride Lots I-495

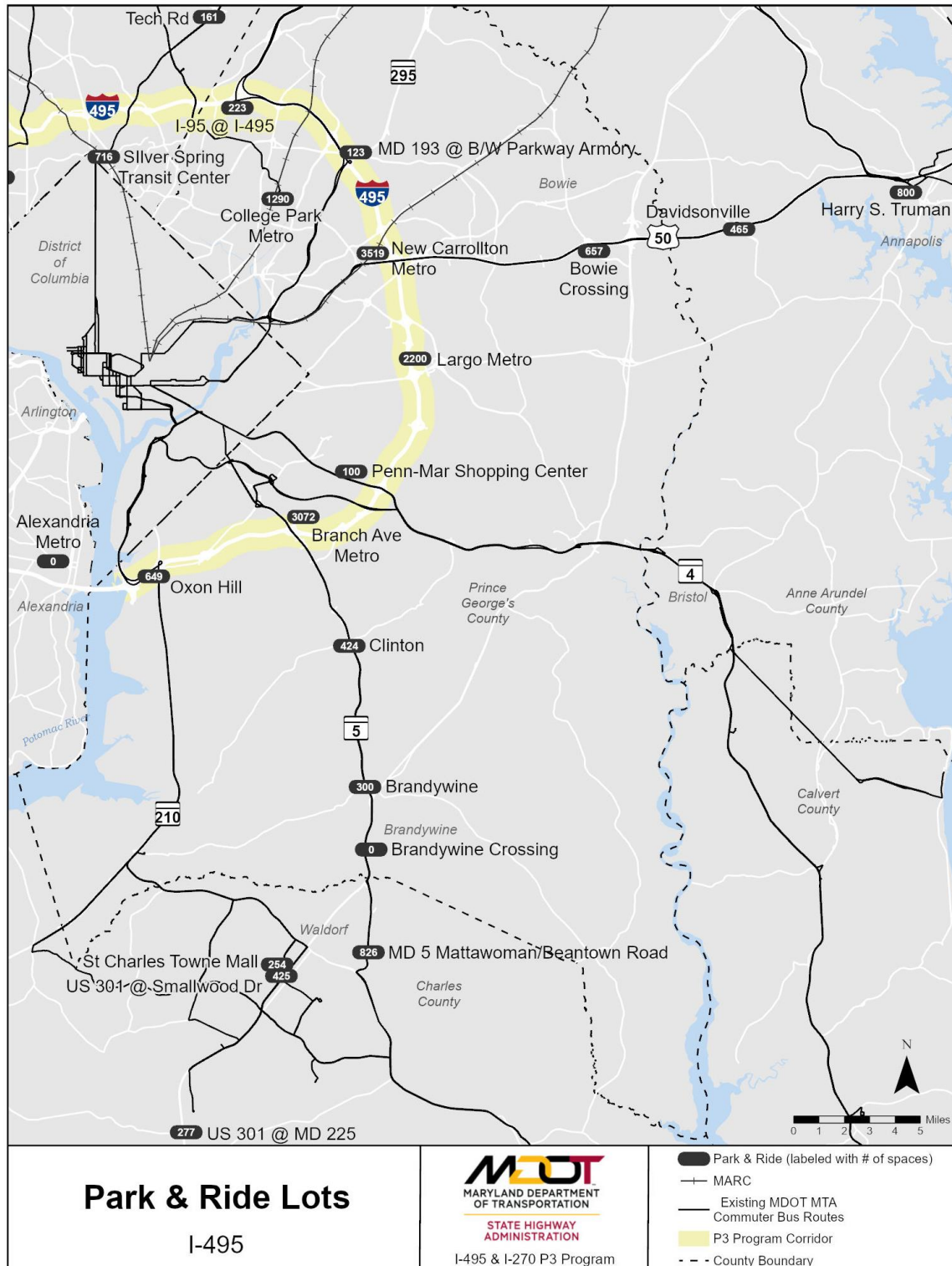


Table 26 is a master list of park and ride lots in the region, listed alphabetically by county, location, number of parking spaces, percent utilization and ownership. There are presently over 28,000 parking spaces at park and rides in the region.

The existing park and ride facilities throughout the corridor are already very popular. The number of available parking spaces in the region on an average weekday is approximately 1,000 spaces. Taking into consideration that only the park and ride lots located near major corridors and the managed lanes will be served by express bus service, those lots where express bus service is not planned to make stops, should not be included in the pool of available parking for commuters.

Table 26: Park and Ride Lots in Region

Park and Ride	Location	Highway Access	Spaces	% Utilization	Owner
Anne Arundel County					
Davidsonville	Davidsonville Road/MD 424	US 50	465	70%	MDOT SHA
Harry S Truman	Riva Road	MD 665	800	70%	MDOT SHA
Charles County					
Mattawoman Beantown	Mattawoman Beantown Road and Welsh Lane	MD 5	826	70%	MDOT SHA
St. Charles Towne Center	Smallwood Drive at JC Penny	US 301	254	60%	Developer
US 301 Waldorf	US 301 and Smallwood Drive	US 301	425	100%	Charles County
Frederick County					
MARC Monocacy	MD 355 and Genstar Drive	I-270	800	85%	MDOT MTA
Urbana North	MD 80 North Lot	I-270	283	35%	MDOT SHA
Urbana South	MD 80 South Lot	I-270	228	95%	MDOT SHA
Howard County					
Scaggsville	US 29 and MD 216	US 29	421	45%	MDOT SHA
Montgomery County					
Briggs Chaney	Briggs Chaney Road and Gateshead Manor Way	US 29	253	60%	Montgomery County
Burtonsville	US 29 and Old Columbia Pike	US 29	532	50%	Montgomery County
Colesville	New Hampshire Avenue and Randolph Road	MD 200	202	35%	MDOT SHA
Germantown Transit Center	Germantown Road and Aircraft Drive	I-270	175	100%	Montgomery County
Greencastle	Greencastle Road and Turbridge Drive	US 29	155	25%	Montgomery County
Kingsview	Clopper Road and Kingsview Village Avenue	I-270	177	10%	Montgomery County
Lakeforest Transit Center	Lost Knife Road and Odendhal Avenue	I-270	417	25%	Developer
MARC Germantown	Germantown Road and Bowman Mill Drive	I-270	657	100%	Montgomery County
MARC Metropolitan Grove	Clopper Road and Metropolitan Grove Road	I-270	352	70%	Montgomery County
Milestone	Shakespeare Boulevard and MD 355	I-270	216	90%	Developer
Montrose/MD 355	Montrose Road and MD 355	MD 355	209	40%	MDOT SHA
Quince Orchard	MD 124 Montgomery Village Avenue	I-270	470	65%	MDOT SHA

Park and Ride	Location	Highway Access	Spaces	% Utilization	Owner
Shady Grove Metrorail Station	MD 355 and Redland Road	I-370	5,745	100%	WMATA
Tech Road	US 29 and Tech Road	US 29	161	10%	Montgomery County
West Diamond	MD 117 and I-270	I-270	318	60%	MDOT SHA
Westfield Montgomery Mall	Westlake Terrace	I-270	200	50%	Developer
White Flint Metrorail Station	MD 355 and Marinelli Road	MD 355	1,270	100%	WMATA
Prince Georges County					
Armory	Greenbelt Road and MD 295	MD 295	123	1%	MDOT SHA
Bowie Crossing	MD 197 and Northview Drive	US 50	657	30%	Prince George's County
Branch Avenue Metrorail Station	MD 5 and I-495	I-495	3,072	100%	WMATA
Brandywine	Branch Avenue and Spine Road	MD 5	300	New	MDOT SHA
Clinton	Branch Avenue and Woodyard Road	MD 5	424	50%	Prince George's County
College Park Metrorail Station	Campus Drive and River Road	Campus Drive	1,290	90%	WMATA
I-495 and I-95	I-495 and I-95 Interchange	I-95	223	100%	MDOT SHA
Largo Town Center Metrorail Station	Lottsford Road	I-495	2,200	100%	WMATA
New Carrollton Metrorail Station	US 50 and Corporate Drive	I-495	3,519	100%	WMATA
Oxen Hill	National Harbor Oxen Hill Road	I-495	649	40%	Prince George's County
Total			28,468		

8.2 Park and Ride Lot Estimated Demand

Since there is a direct correlation between transit ridership and the need for park and ride capacity, the 2045 projected ridership was used as a tool to estimate the demand for park and ride facilities in the P3 Program corridor. This analysis illustrates where parking deficiencies may occur and where there are opportunities to plan for additional park and ride lots. However, there are many factors that affect the demand for transit and the associated parking such as tolls, fuel prices, parking supply, federal transit subsidy, road construction projects, and changes in land use.

In determining the level of parking needed to support transit, carpooling and vanpooling in the managed lanes corridors, the following factors were taken into consideration:

- Current weekday utilization of park and ride lots,
- The 2045 estimated new daily ridership using the MWCOC Travel Model
- The ratio of riders to vehicle using an industry standard of 1.13 passengers per vehicle work trip
- A comparison of existing utilization and future demand

It should be noted that due to land use adjacent to most park and ride lots and their location off major roads, the current percentage of pedestrian and bicyclist mode of access to park and ride lots is relatively small. Therefore, pedestrian and bicyclist trips were not considered as a separate mode in the 2045 parking estimate.

Using the considerations identified above, an analysis was done for the managed lanes corridors and estimated parking needs at the corridor level have been determined. This analysis should be used for planning purposes for expanded, relocated or new park and ride lot locations.

8.3 Park and Ride Lots Adjacent to Managed Lanes

To maximize the efficiency of transit, potential express bus routes have been planned to travel in the managed lanes. It is desirable to plan express bus stops adjacent to the P3 Program corridor to reduce the overall travel time. While it is difficult to predict the travel choices of commuters, some corridors will have greater numbers of commuters and a corresponding higher demand for parking. Accommodating bus service, carpools and vanpools, parking will need to be planned for in greater numbers in specific corridors. Three separate corridors; I-270; I-495 and US 29; and US 50, MD 5 and I-495 and the associated parking demand are represented below. These anticipated parking needs are high-level corridor needs. Further analysis may be warranted at individual locations as the P3 Program continues to develop.

8.3.1 I-270 Corridor Parking Needs

Based on the projected 2045 transit ridership, it is expected that there will be a parking deficiency within the I-270 corridor. This takes into consideration the current available park and ride capacity, and newly planned potential express bus services. An estimated additional 2,750 spaces are anticipated to be needed in the I-270 corridor in areas around the locations described in Table 27.

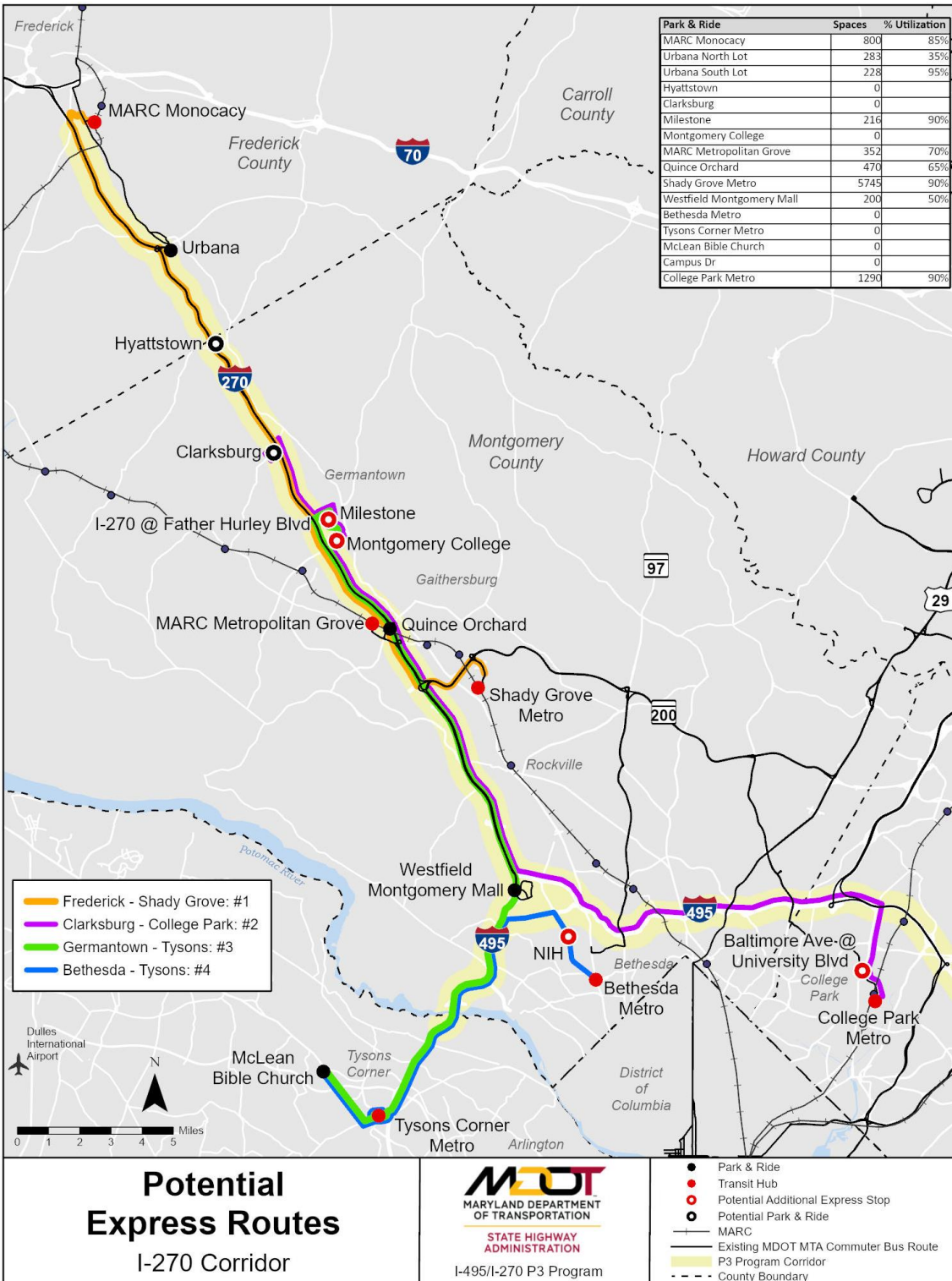
Table 27: I-270 Corridor 2045 Parking Estimate

Potential Park and Ride Areas	Number of Additional Parking Spaces Needed
Monocacy	500
Urbana	500
Hyattstown	250
Clarksburg	400
Germantown	500
Metropolitan Grove	300
Westfield/Rock Springs	300
Total	2750

Some points to consider in locating park and rides in this corridor:

- Potential express bus service route #1 from Frederick to the Shady Grove Metrorail Station is planned to stop at Hyattstown. The potential stop is to accommodate commuters traveling from New Market south on MD 75 to I-270
- A park and ride in the Clarksburg area would service two commuter routes – route #1 Frederick to Shady Grove and route #2 Clarksburg to College Park, allowing buses to travel in the managed lanes and exit to serve the Clarksburg area
- Commuter bus services, Clarksburg to College Park route #2, and Bethesda to Tysons route #4, would benefit traveling longer distances in the managed lanes between stops
- Route #4 Bethesda to Tysons commuter bus service does not require parking as trips are presumed to be transfers to bus or rail at these transit hub locations
- Germantown park and ride lots are currently at capacity, and three new routes are conceptualized to serve Germantown (routes #1, #2 and #3)
- Planned transit hubs are located at major rail and bus stations; MARC Monocacy, MARC Metropolitan Grove, Shady Grove Metrorail, College Park Metrorail, Bethesda Metrorail and Tysons Corner Metrorail, allowing passengers transfer options to rail or local bus services

Figure 42: Potential Express Route Service Stops I-270 Corridor



8.3.2 I-495 and US 29 Corridor Parking Needs

Based on the projected 2045 transit ridership, it is expected that there will be a parking deficiency within the I-495. This takes into consideration the current available park and ride capacity, and newly planned potential express bus services. At this time, however, it is not known how current parking along US 29 will be impacted with newly configured US 29 FLASH stations. Therefore, an estimated 800 spaces are anticipated to be needed in areas near the locations shown in Table 28.

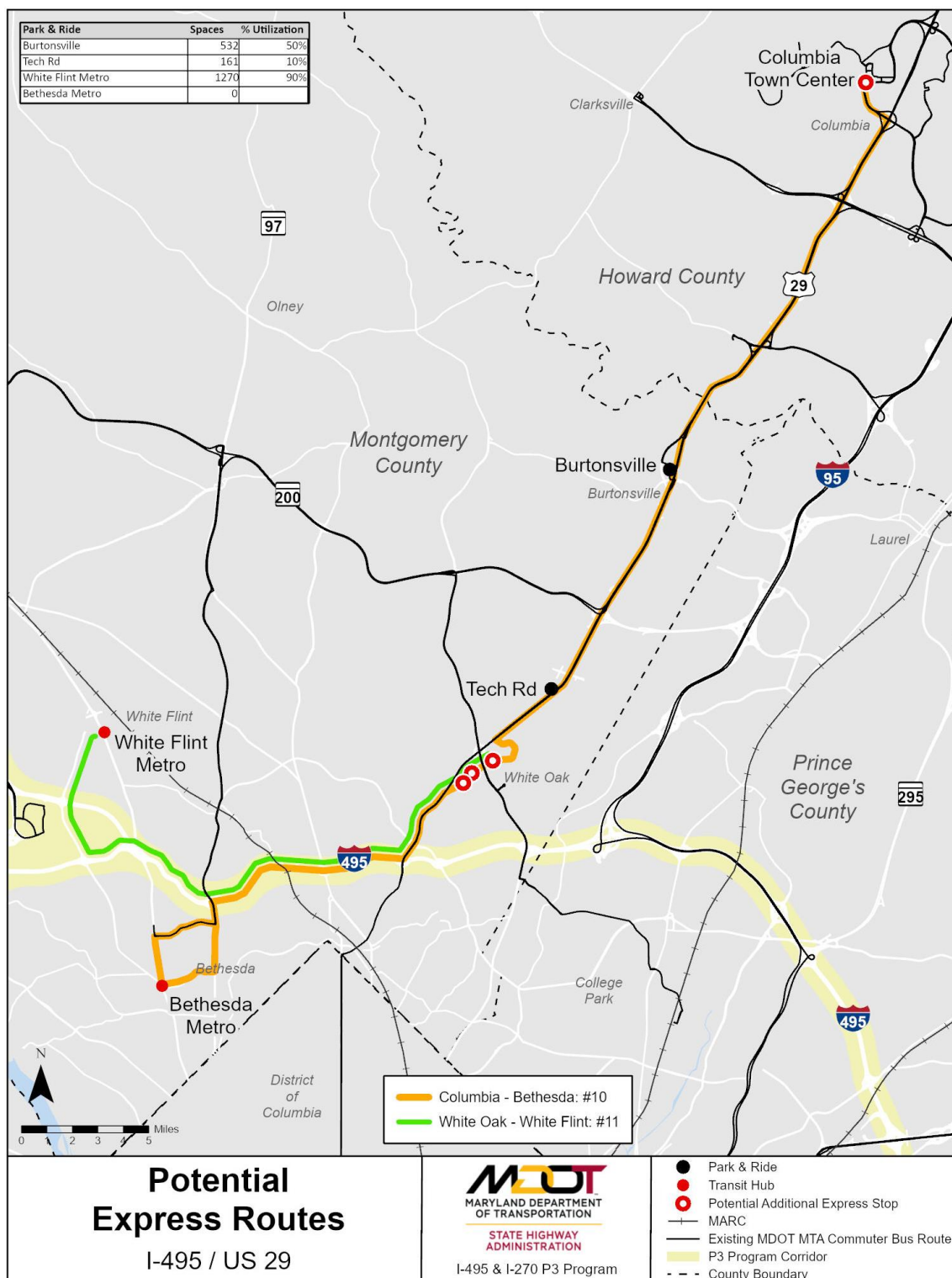
Table 28: I-495 and US 29 Corridor 2045 Parking Estimate

Potential Park and Ride Areas	Number of Additional Parking Spaces Needed
Columbia/Burtonsville/Tech Road	800
White Oak/White Flint	0
Total	800

Some points to consider in locating park and rides in this corridor:

- The express bus routes #10 and #11 are conceptualized to operate on US 29 and in the I-495 managed lanes
- Route #10 Columbia to Bethesda express bus service would travel on US 29 with limited stops until White Oak, then travel in the managed lanes until reaching the transit hub at the Bethesda Metrorail Station with the option to transfer to the Purple Line
- Opportunities may exist along the US 29 corridor to expand or introduce new park and ride lots, with the US 29 FLASH operating between Burtonsville and the Silver Spring Transit Center
- Route #11 White Oak to White Flint is conceptualized to travel on US 29 and enter the managed lanes on I-495, traveling to the White Flint
- The White Oak to White Flint route assumes passengers will be transferring from rail or bus and alighting the express bus service. Therefore, additional parking is not anticipated to be needed in the White Oak to White Flint corridor.

Figure 43: Potential Express Route Service Stops I-495 and US 29



8.3.3 I-495, US 50 and MD 5 Corridor Available Parking

The US 50, I-495 and MD 5 corridors were evaluated for park and ride capacity based on the transit services conceptualized in this study. Tables 29, 30, and 31 display potential parking needs.

There are no demonstrated additional park and ride needs in the I-495 corridor. However, in the US 50 corridor between Annapolis and New Carrollton an estimated 300 spaces are needed; and another 300 spaces are estimated to be needed between Waldorf and Branch Avenue in the MD 5 corridor based on the 2045 parking demand forecast.

Table 29: I-495 Corridor 2045 Parking Estimate

Potential Park and Ride Areas	Number of Additional Parking Spaces Needed
Branch Avenue/New Carrollton, Alexandria	0

Table 30: US50 Corridor 2045 Parking Estimate

Potential Park and Ride Areas	Number of Additional Parking Spaces Needed
Annapolis	200
Bowie	100
	300

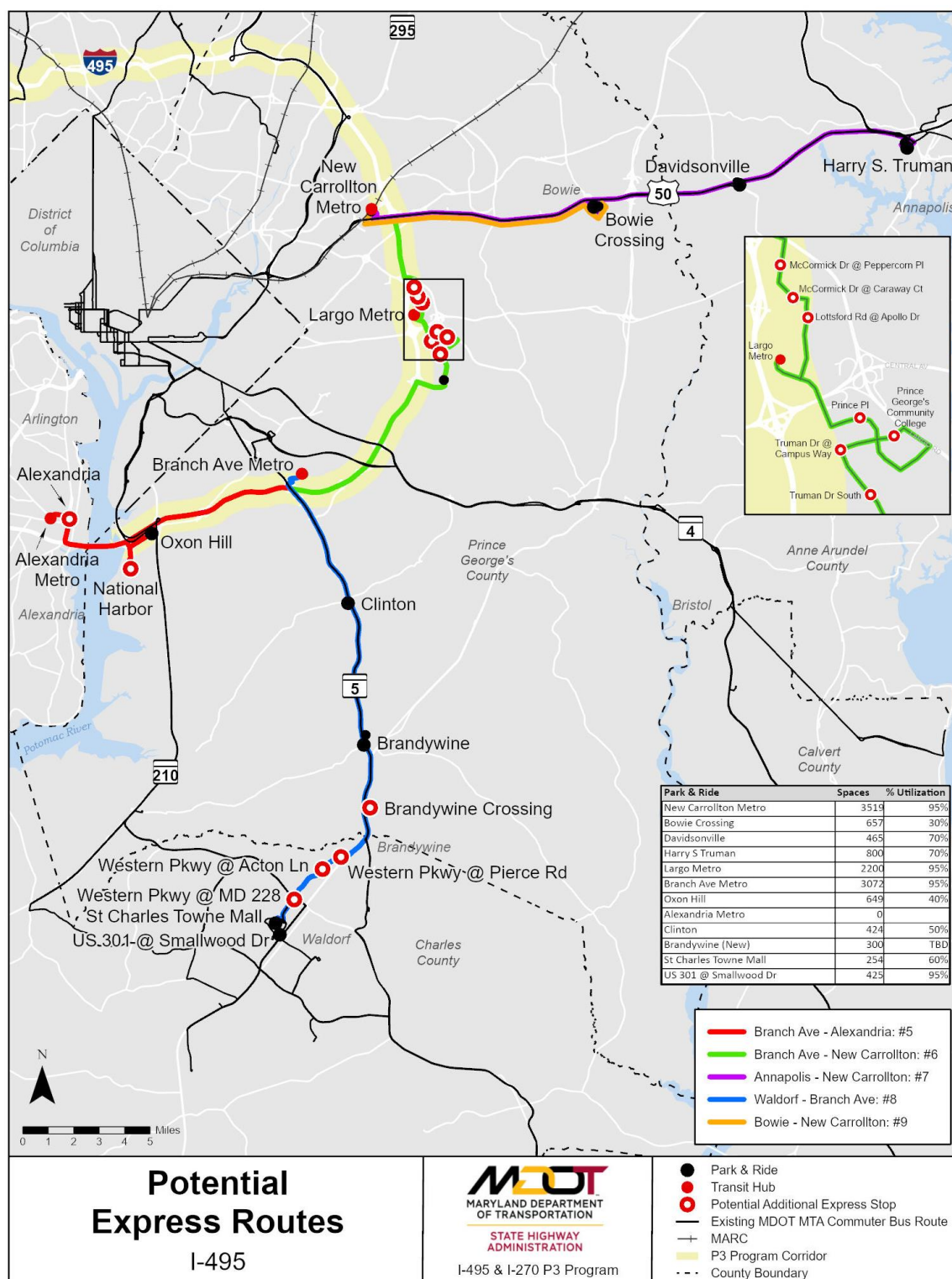
Table 31: MD5 Corridor 2045 Parking Estimate

Potential Park and Ride Areas	Number of Additional Parking Spaces Needed
Waldorf	300

Some points to consider in locating park and rides in this corridor:

- Branch Avenue to Alexandria, route #5, and Branch Avenue to New Carrollton, route #6, do not require additional parking since they originate or end at a Metrorail station. In addition, the New Carrollton Metrorail Station is a transfer location to the Purple Line as seen in Figure 42.
- Express bus service along the US 50 corridor from Annapolis, route #7, and Bowie, route #9, to the New Carrollton Metrorail Station are estimated to need additional parking within the US 50 corridor. Trips originating in Annapolis and Bowie operate perpendicular to I-495, crossing the managed lanes prior to entering the New Carrollton Metrorail Station.
- The Waldorf to Branch Avenue, route #8, may have added parking capacity opportunities in the Waldorf area. Trips originating in Waldorf will demand additional park and ride capacity. In Brandywine at MD 5, Branch Avenue and Spine Road, a new interchange and park and ride lot is under construction. The park and ride lot has expansion potential.

Figure 44: Potential Express Route Service Stops I-495



8.4 Park and Ride Lot Considerations

In Maryland, park and ride facilities are owned by a number of different stakeholders – local governments, MDOT, and others yet are leased from private property owners. Some have been built as part of a larger highway project, others as part of larger transit projects, and others to support a growing demand for commuter bus services.

The P3 Program provides the opportunity for Maryland to take a holistic approach to the development of park and rides along the corridor and establish standards. The facilities need to be planned as an integral part of the managed lanes system. Special consideration will need to be given to the exact location as well as the physical design to ensure that they meet the operational needs of the transit network. Safe, accessible, inviting and well-defined pedestrian and bicycle access to park and ride lots should be considered to encourage walk up and bicycle access to express bus service.

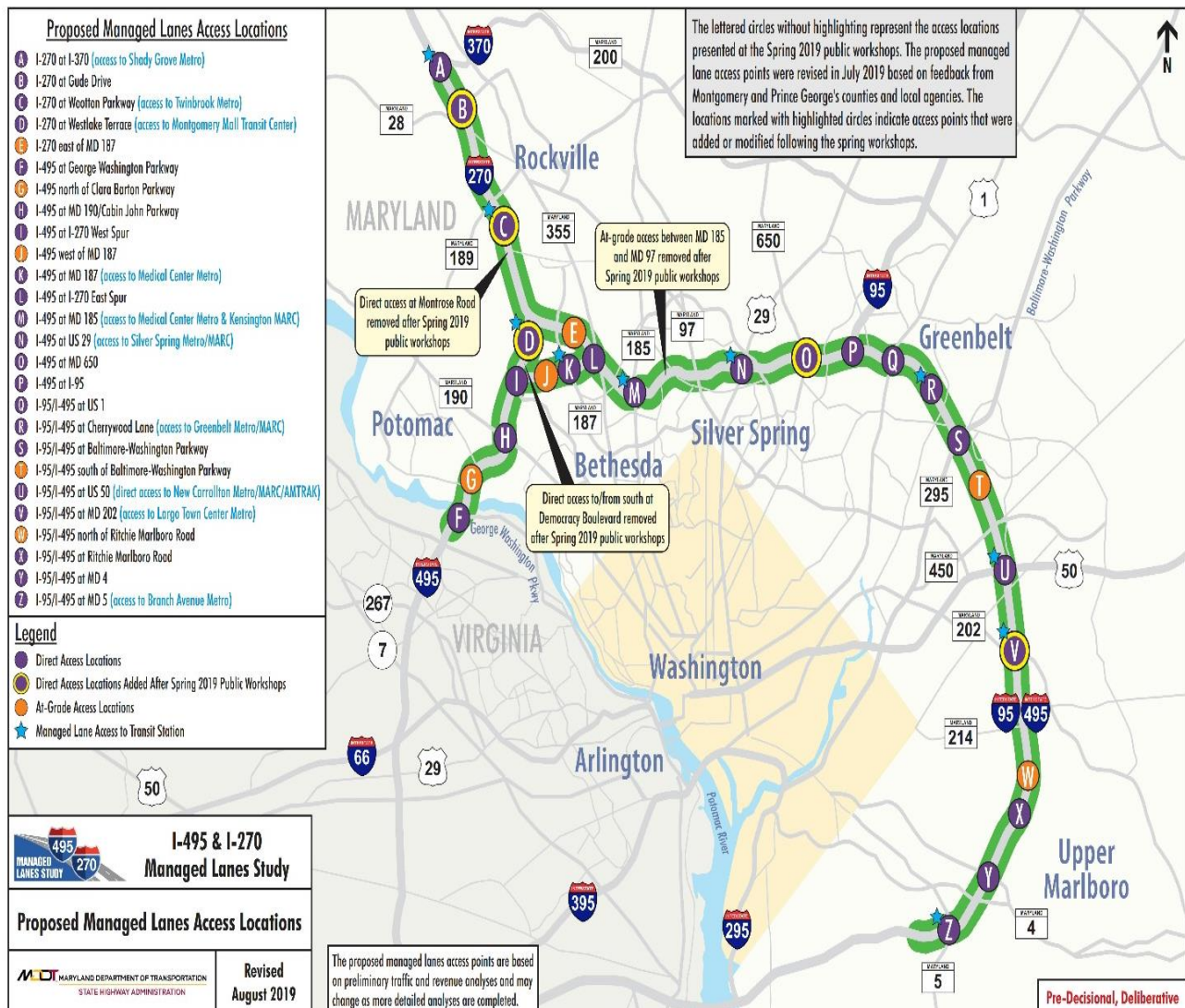
As the P3 Program progresses, the specific parking requirements will need to undergo further evaluation and consideration with the goal of developing facilities that ultimately provide the necessary infrastructure to support transit, carpooling and vanpooling that reduces congestion and enables the highway to operate more effectively.

SECTION 9: APPENDIX

Preliminary Managed Lane Access Concepts

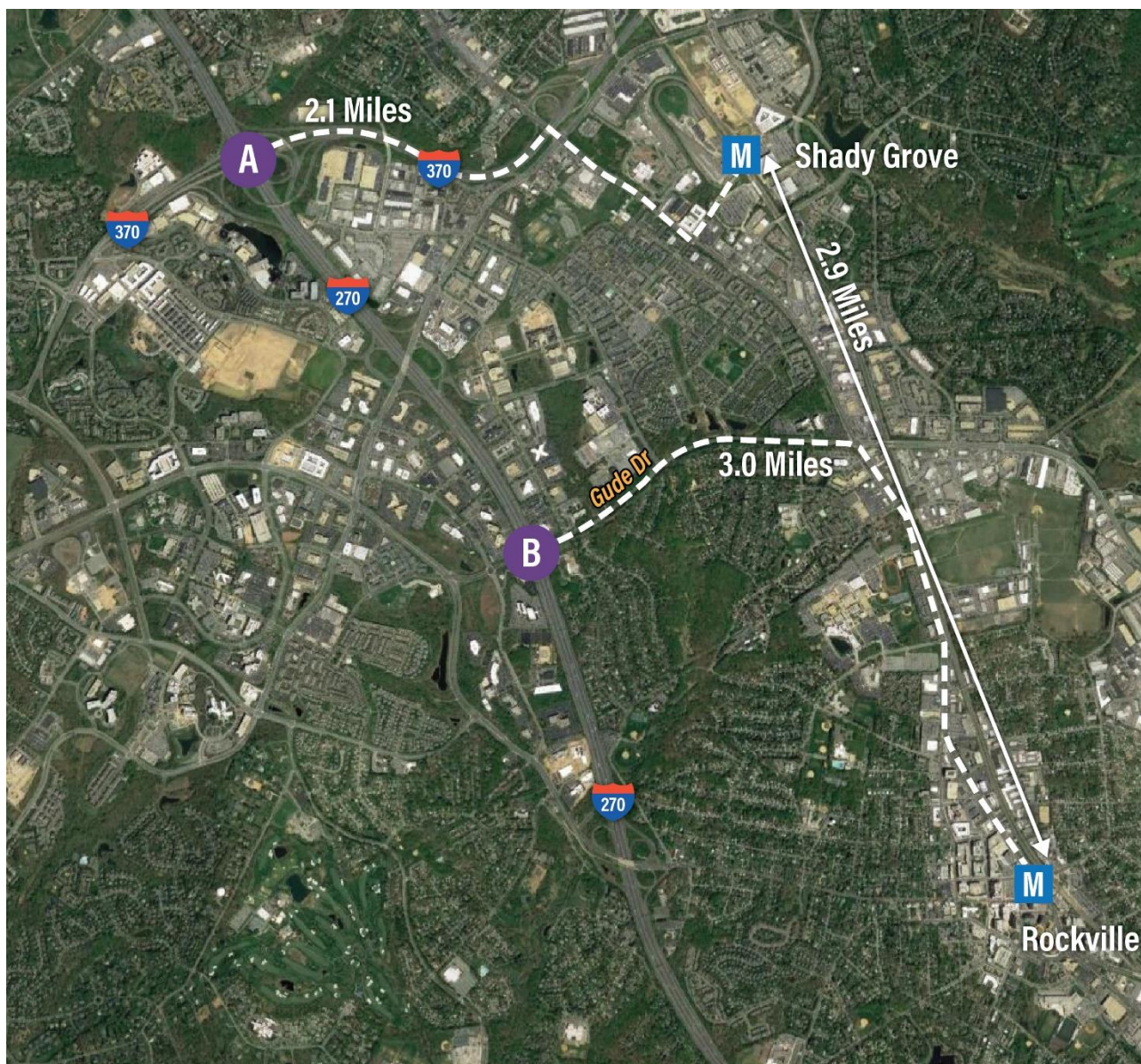
This Appendix documents the preliminary managed lane access concepts assumed for this transit analysis. These access locations and layouts are subject to change as the P3 Program develops. The location map below shows all the currently proposed access points within the limits of the I-495 & I-270 Managed Lanes Study. The exhibits which follow are also labeled according to these locations A through Z for ease of reference. The following exhibits illustrate those access points assumed to be useful for transit access to the managed lanes and are not provided for all access points. For each access point, the exhibits which follow show the nearby highway network context, identify nearby transit stations and illustrate the preliminary concept configuration.

Proposed Managed Lane Access Locations



Location A: I-270 at I-370

Vicinity Map

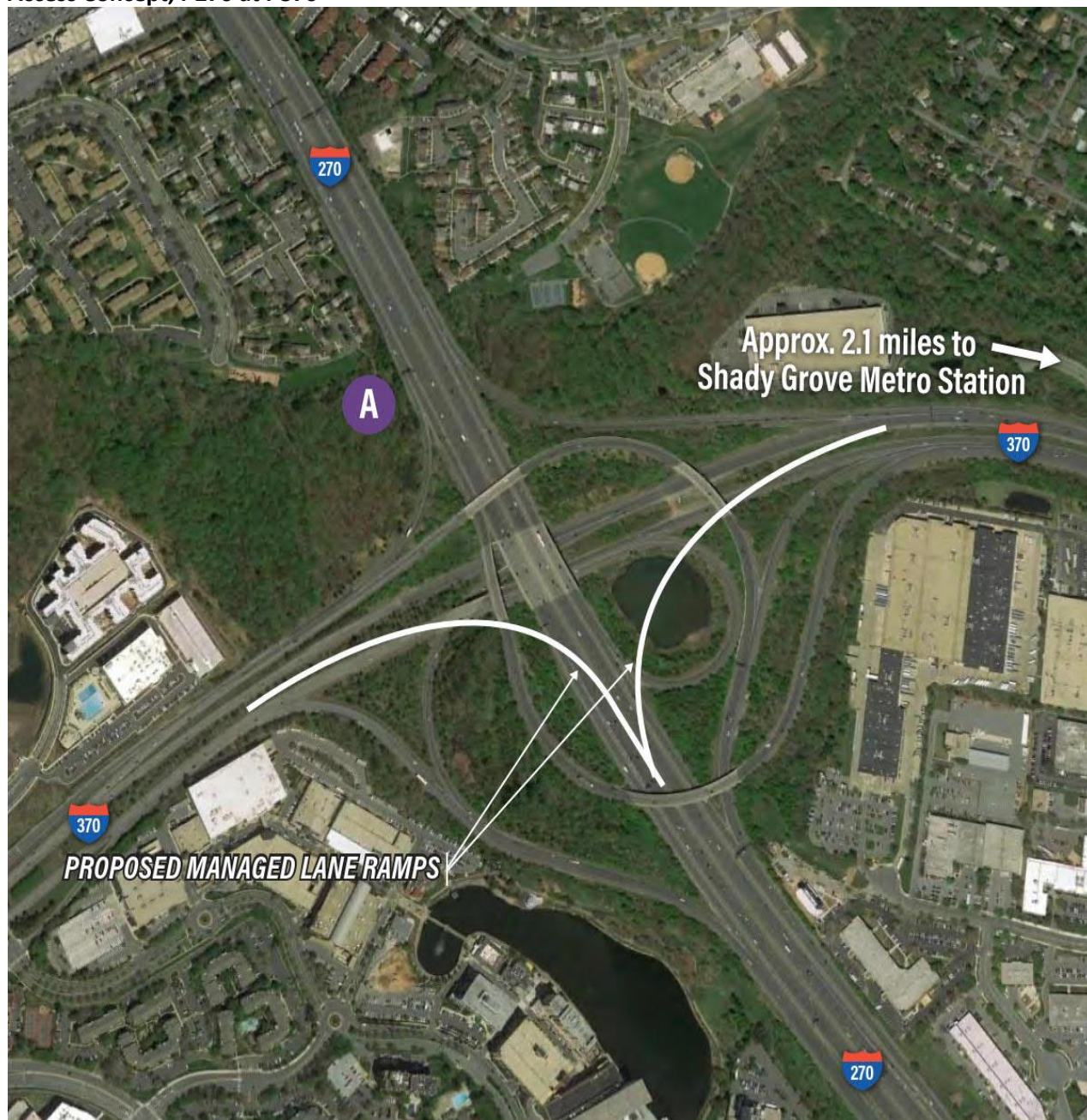


Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The proposed access at (A) I-370 would be in addition to the existing general-purpose lane access. This managed lane access point provides critical access to/from the Shady Grove Metrorail Station, which is approximately 2.1 miles from the interchange. Managed lane access is also currently proposed at (B) Gude Drive, which is also identified on the above Vicinity Map.

Access Concept, I-270 at I-370



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

B: I-270 at Gude Drive

The preliminary access design at (B) Gude Drive would include ramps from the managed lanes in the center of I-270 up to the Gude Drive overpass at a single intersection. There is a similar design at the existing interchange of I-270 at Westlake Terrace (although this existing example is only to/from the north). This access point provides convenient access to Montgomery College Rockville Campus, Shady Grove Metrorail Station, Rockville Metrorail Station, Shady Grove Medical Center and The Universities at Shady Grove Medical Center.

Access Concept, I-270 at Gude Drive



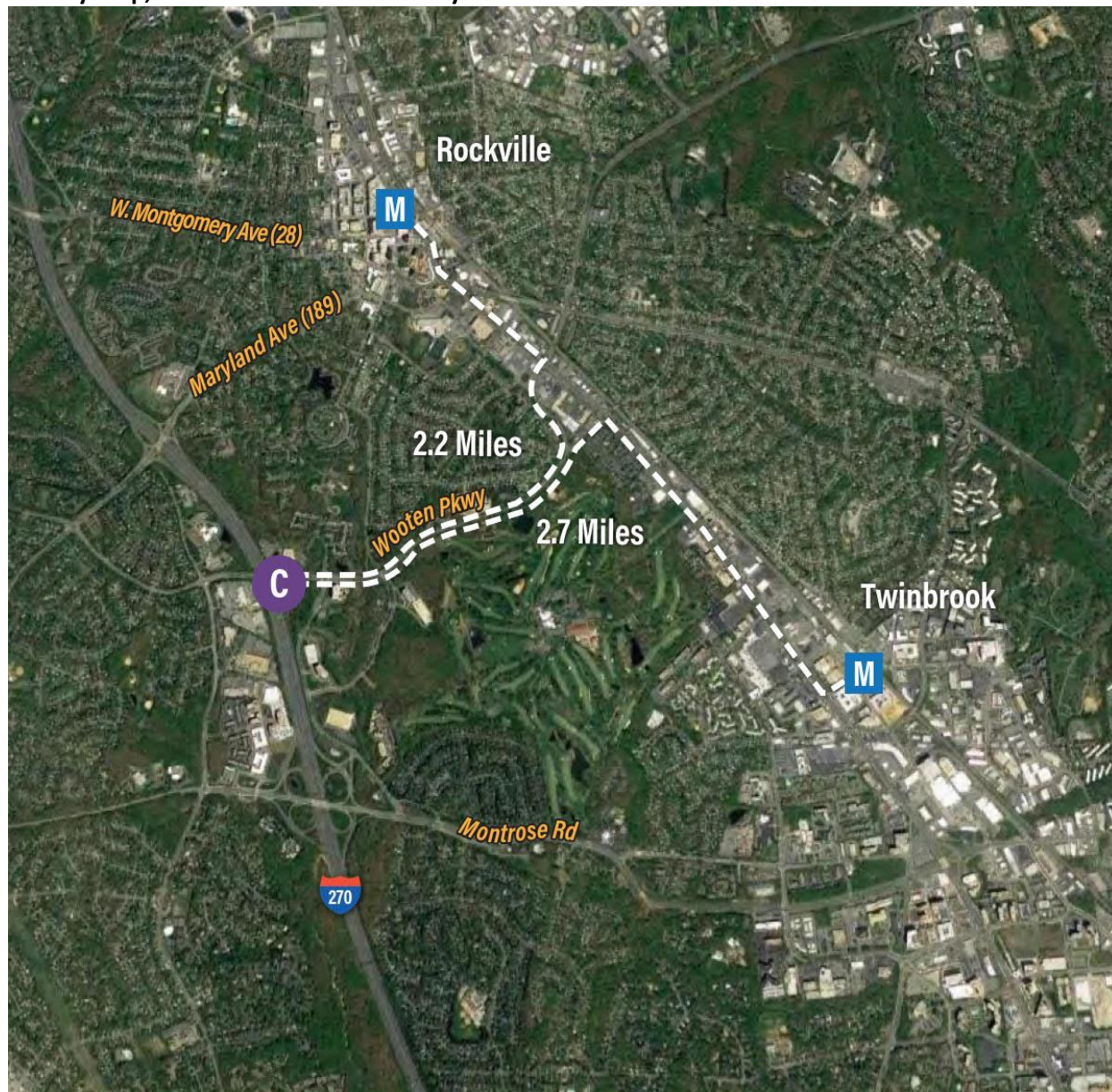
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

C: I-270 at Wooten Parkway

The proposed access point at (C) Wooten Parkway is equally convenient to either the Rockville Metrorail Station or the Twinbrook Metrorail Station.

Vicinity Map, I-270 near Wooten Parkway



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The Wooten Parkway access concept includes ramps up to a single intersection on the Wooten Parkway overpass, similar to the Gude Drive concept.

Access Concept, I-270 at Wooten Parkway



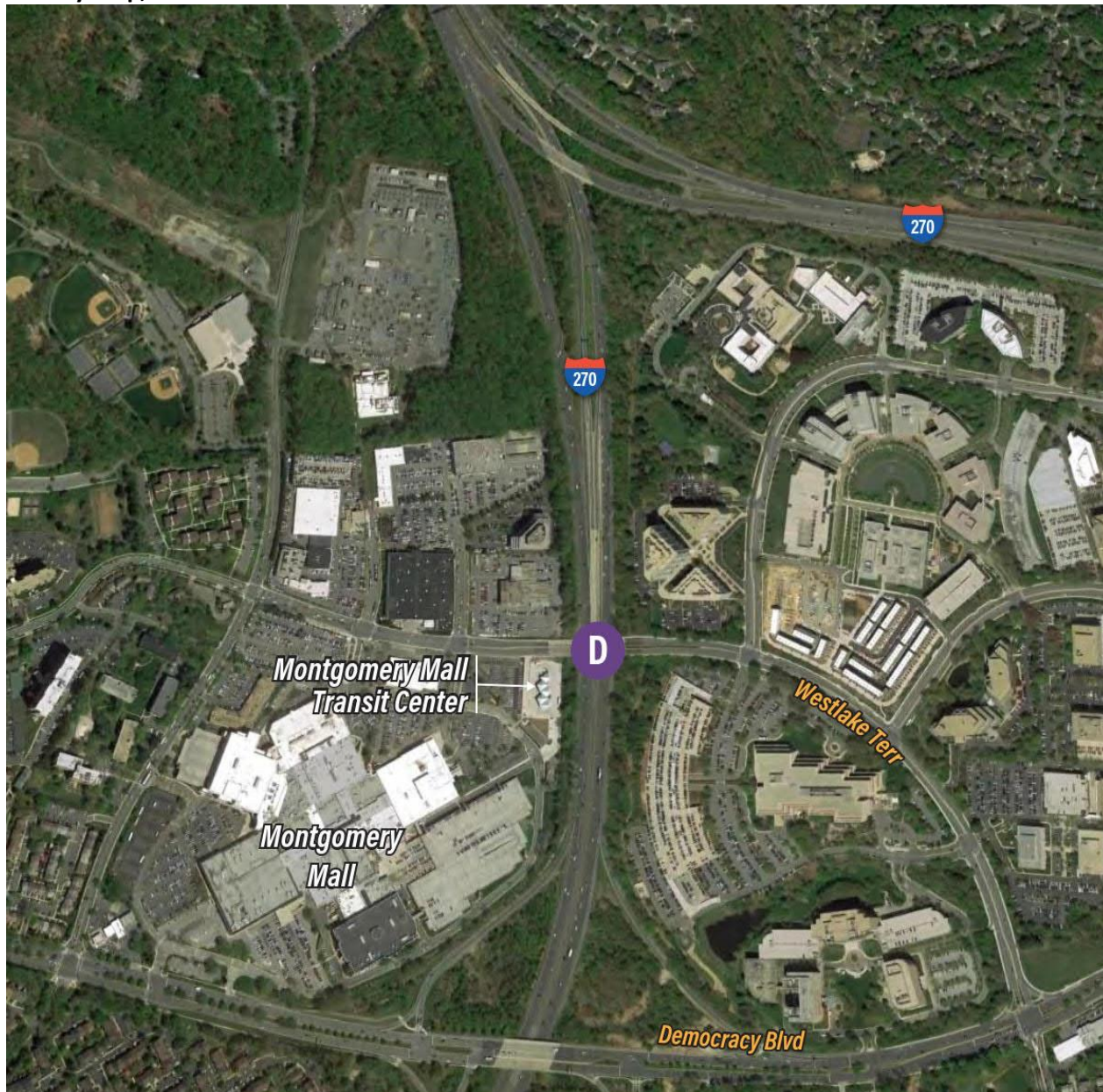
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

D: I-270 Spur at Westlake Terrace

Location D at I-270 and Westlake Terrace is near the Montgomery Mall Transit Center and Rock Springs Business Park.

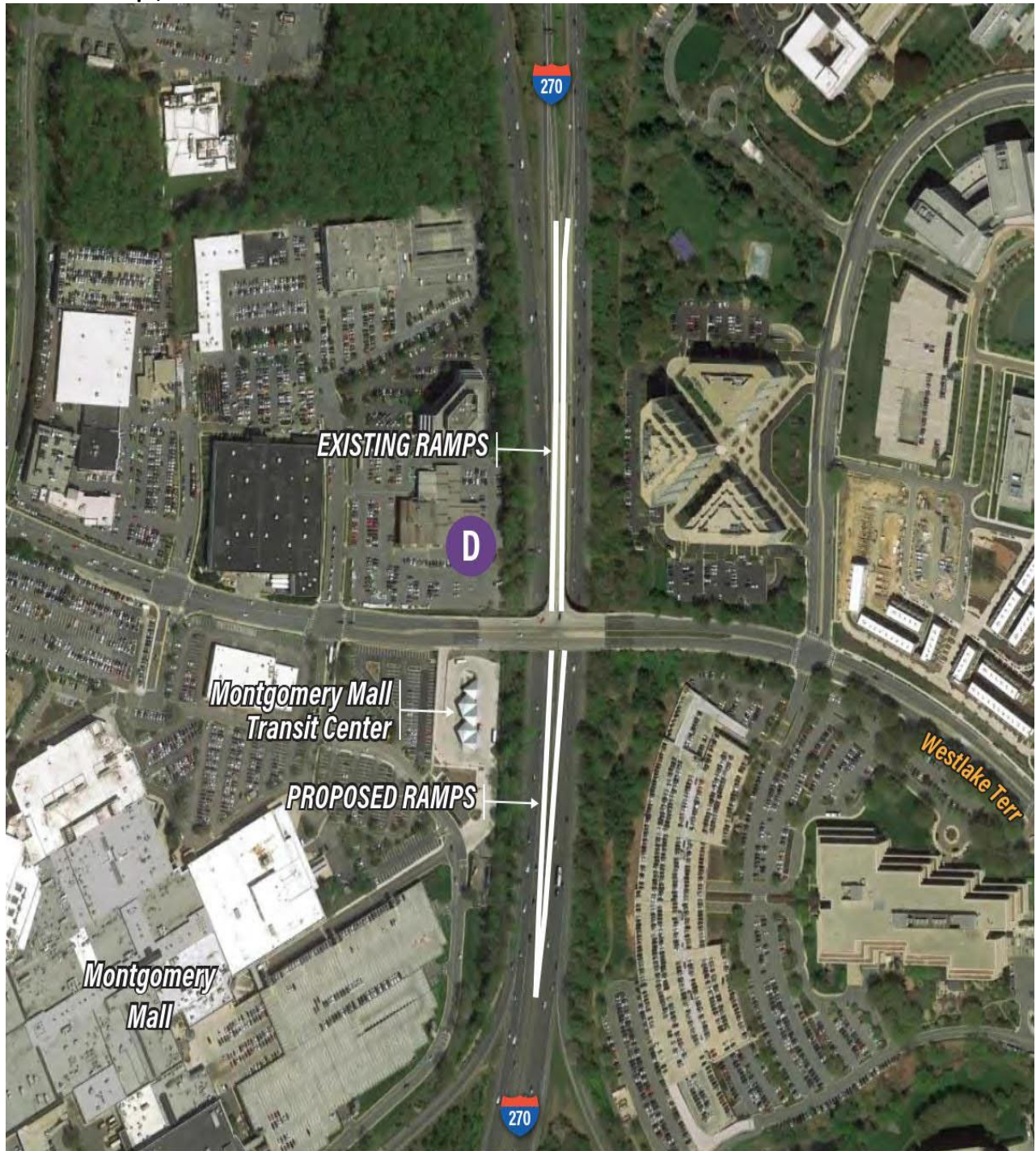
Vicinity Map, I-270 near Westlake Terrace



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access Concept, I-270 at Westlake Terrace



Pre-Decisional, Deliberative

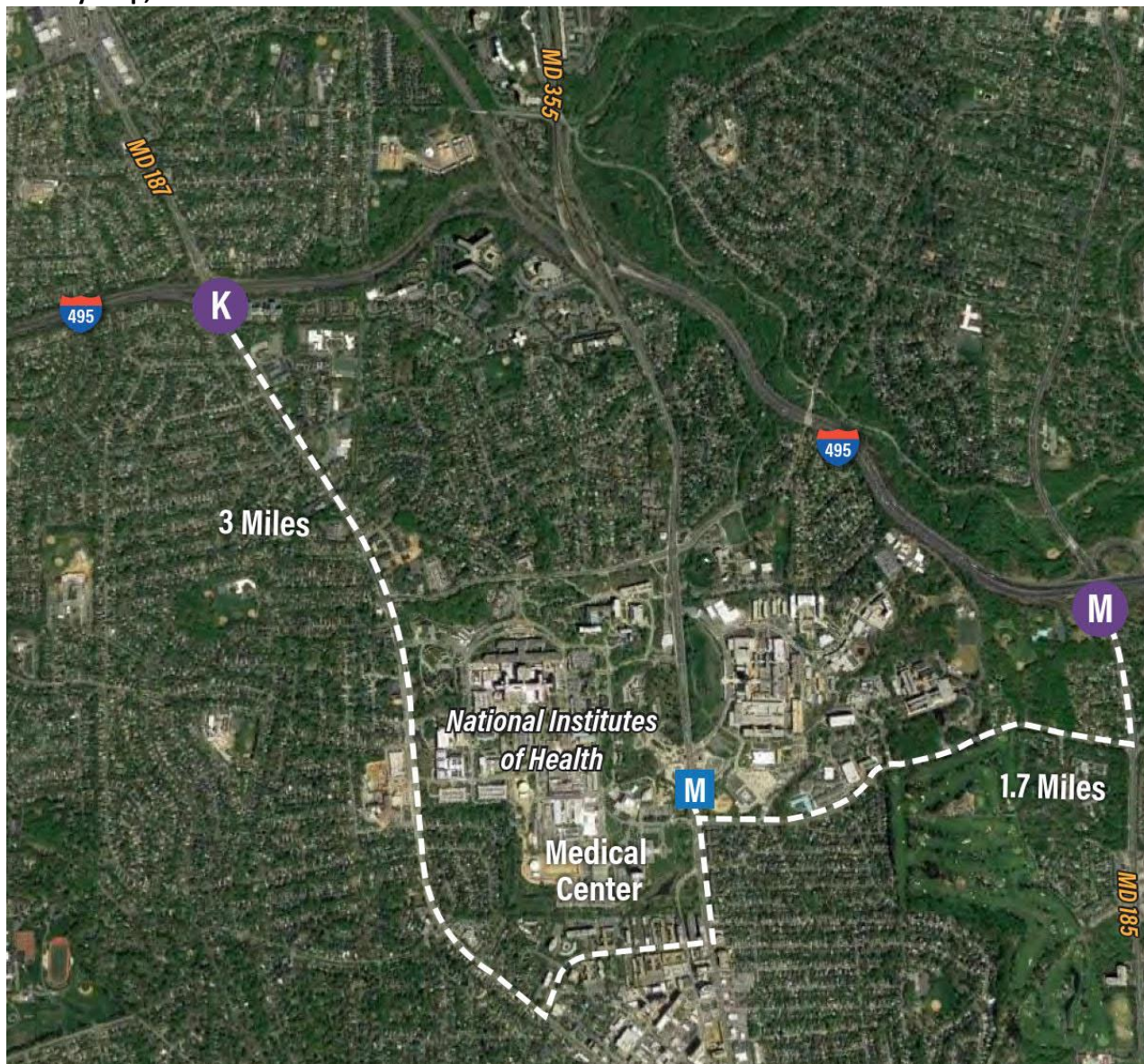
The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access to Westlake Terrace is conceptually provided via ramps from the managed lanes directly to a single intersection on the Westlake Terrace overpass over I-270.

K: I-495 at MD 187

Location K includes access from I-495 to MD 187, providing easy access to the National Institutes of Health, Medical Center Metrorail Station, Bethesda Metrorail Station and downtown Bethesda. Location K, west of MD 355, and Location M, east of MD 355, together make for an excellent system of access from I-495 coming from the east or the west to these destinations.

Vicinity Map, I-495 near MD 187 and MD 185

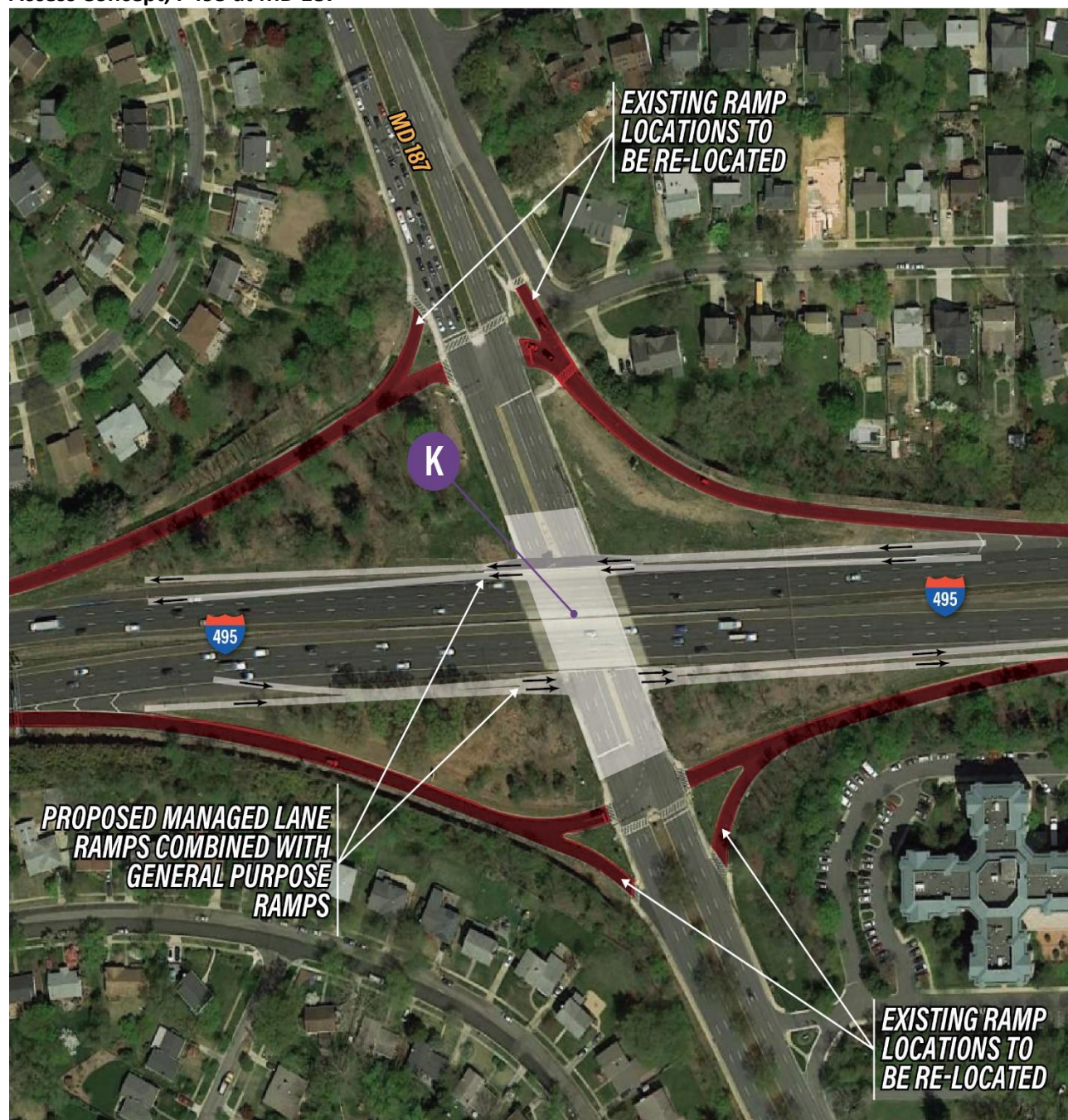


Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The access concept at (K) I-495/MD 187 involves combining the general-purpose ramps and managed lane ramps to new connections with MD 187.

Access Concept, I-495 at MD 187



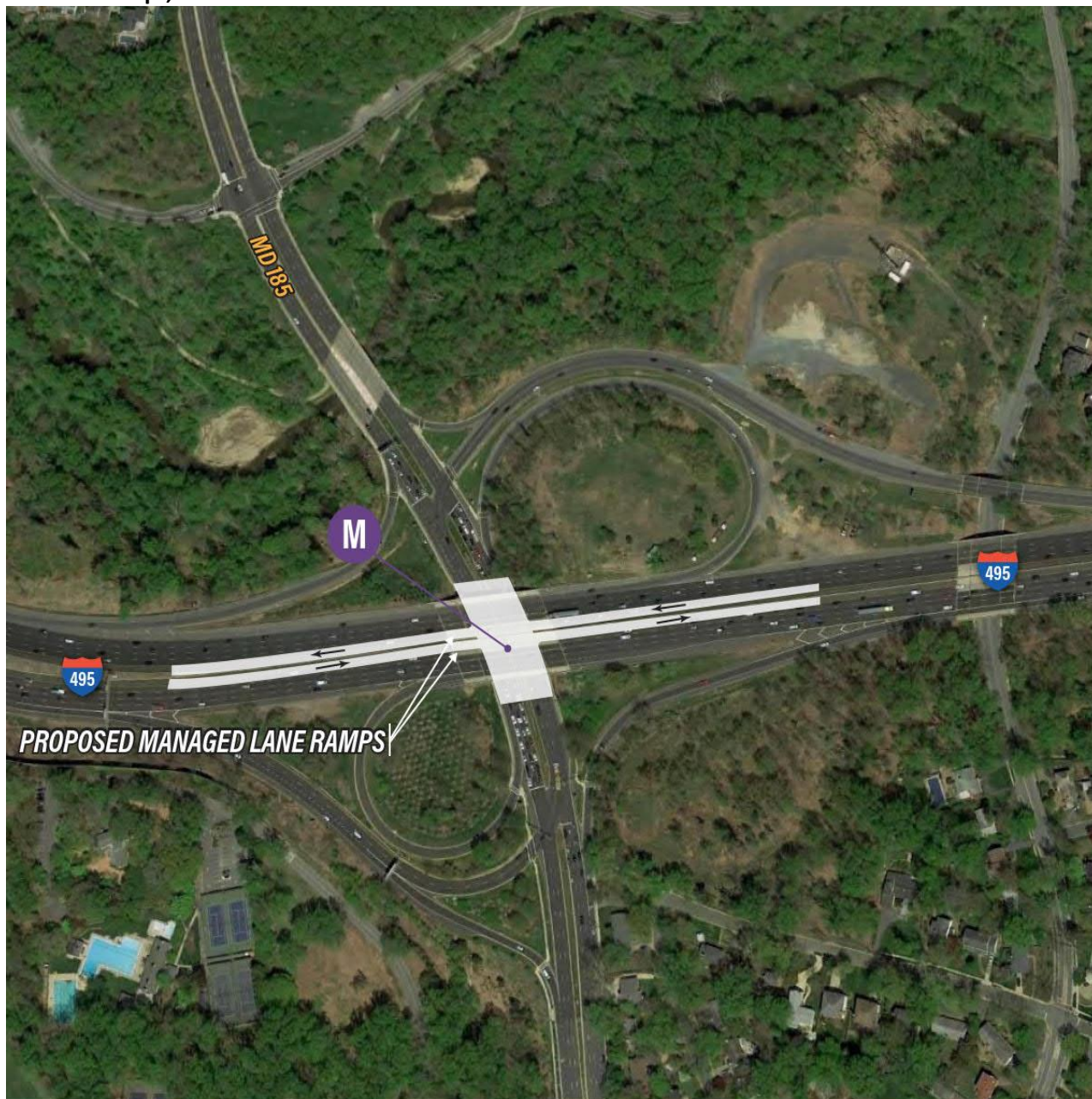
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

M: I-495 at MD 185

The access concept (M) at MD 185 adds managed lane ramps from the center of I-495 to a single intersection with MD 185 on the overpass. The existing general-purpose ramps remain as well.

Access Concept, I-495 at MD 185



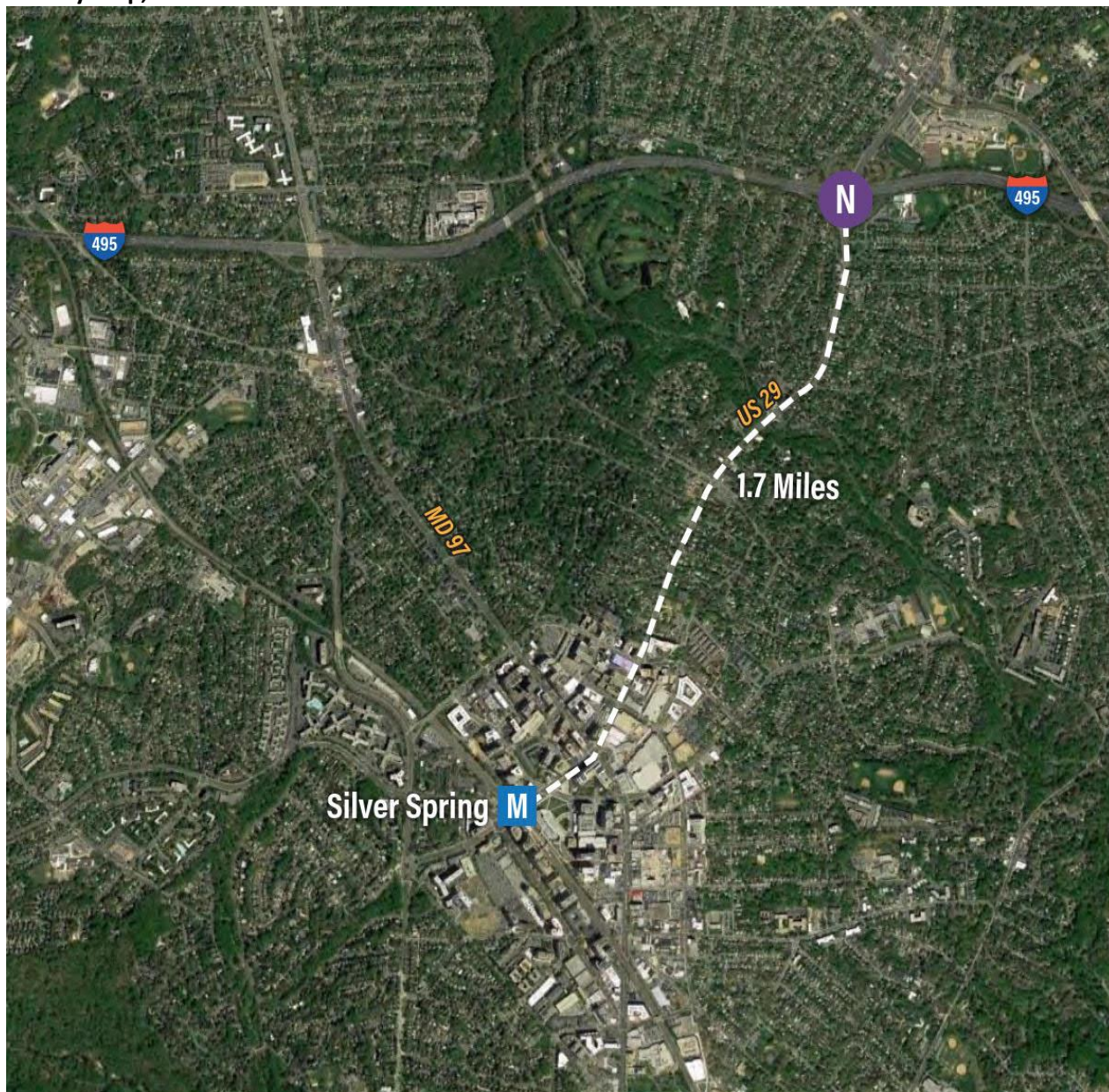
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

N: I-495 at US 29

The planned managed lane access at (N) I-495/US 29 is approximately 1.7 miles north of downtown Silver Spring and the Silver Spring Metrorail Station. Note that BRT improvements are planned along US 29 for Montgomery County's north-south Flash BRT services. The express BRT vehicles from I-495 managed lanes can conceptually use that same corridor infrastructure.

Vicinity Map, I-495 near US 29

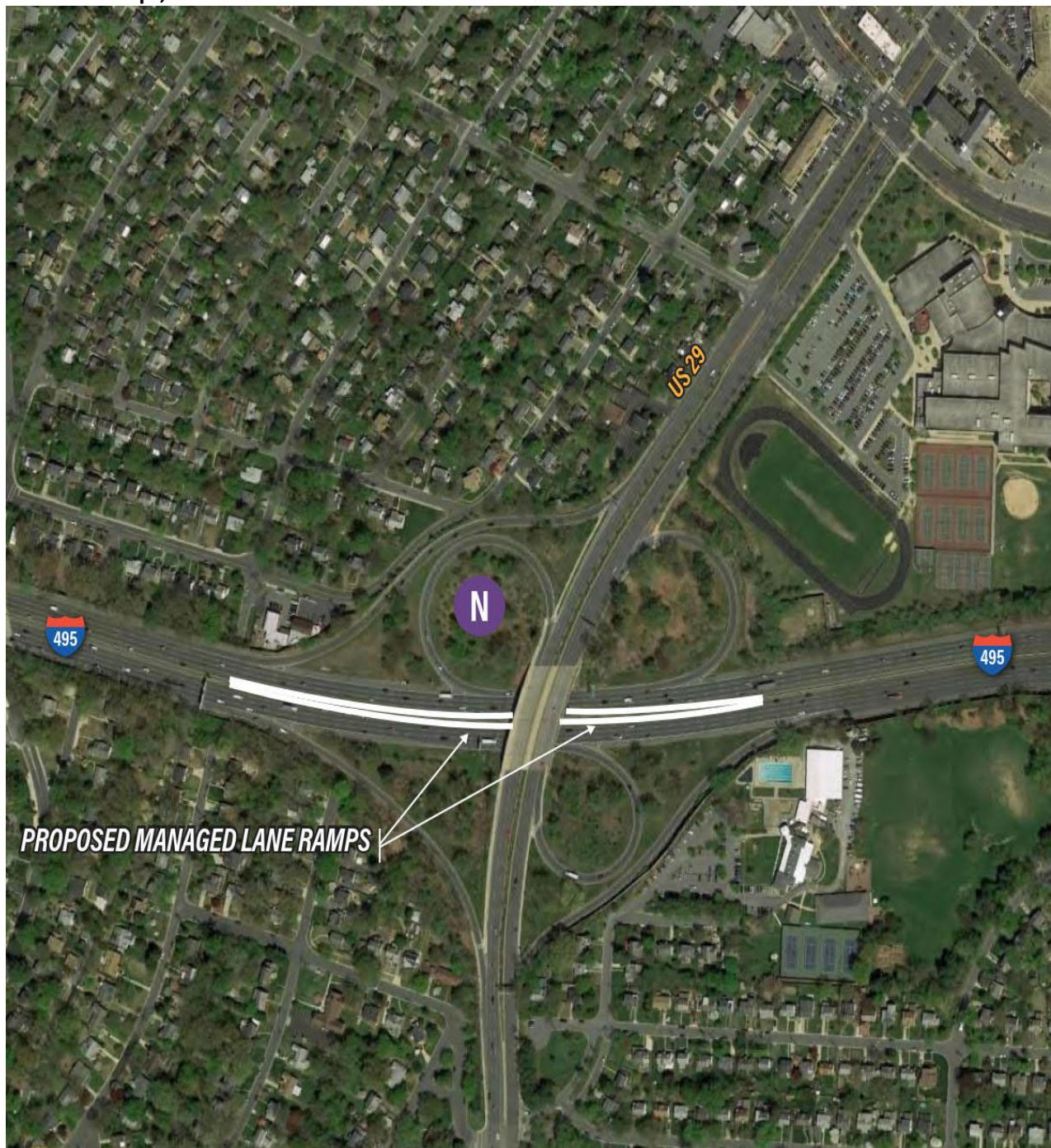


Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The access concept at US 29 adds managed lane ramps from the center of I-495 to a single intersection with US 29 on the overpass. The existing general-purpose ramps remain.

Access Concept, I-495 at US 29



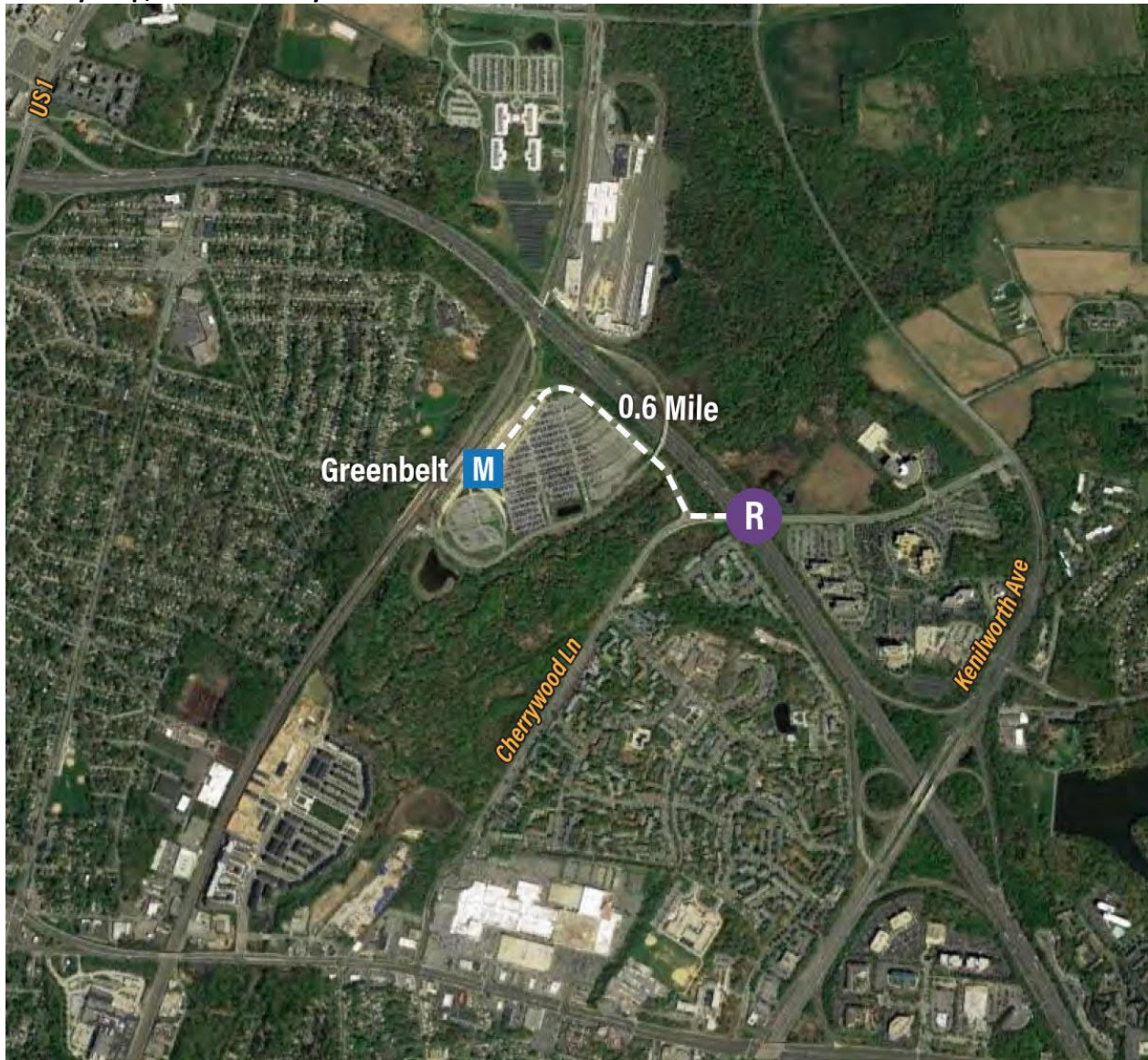
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

R: I-495 at Cherrywood Lane

Location R includes managed lane access from I-495 to Cherrywood Lane, located near the Greenbelt Metrorail Station as well as the addition of general-purpose access from I-495 east to the Greenbelt Metrorail Station. The Greenbelt Metrorail Station is currently accessed by direct ramps from I-495 from the west and from Cherrywood Lane, a surface street connecting to Greenbelt Road (MD 193) to the south, and to Kenilworth Avenue (MD 201) to the north. This proposed location would provide access from the managed lanes in both directions to the Greenbelt Metrorail Station, located about 0.6 miles from the access point, as well as direct, general-purpose ramps from the east to the Metrorail Station.

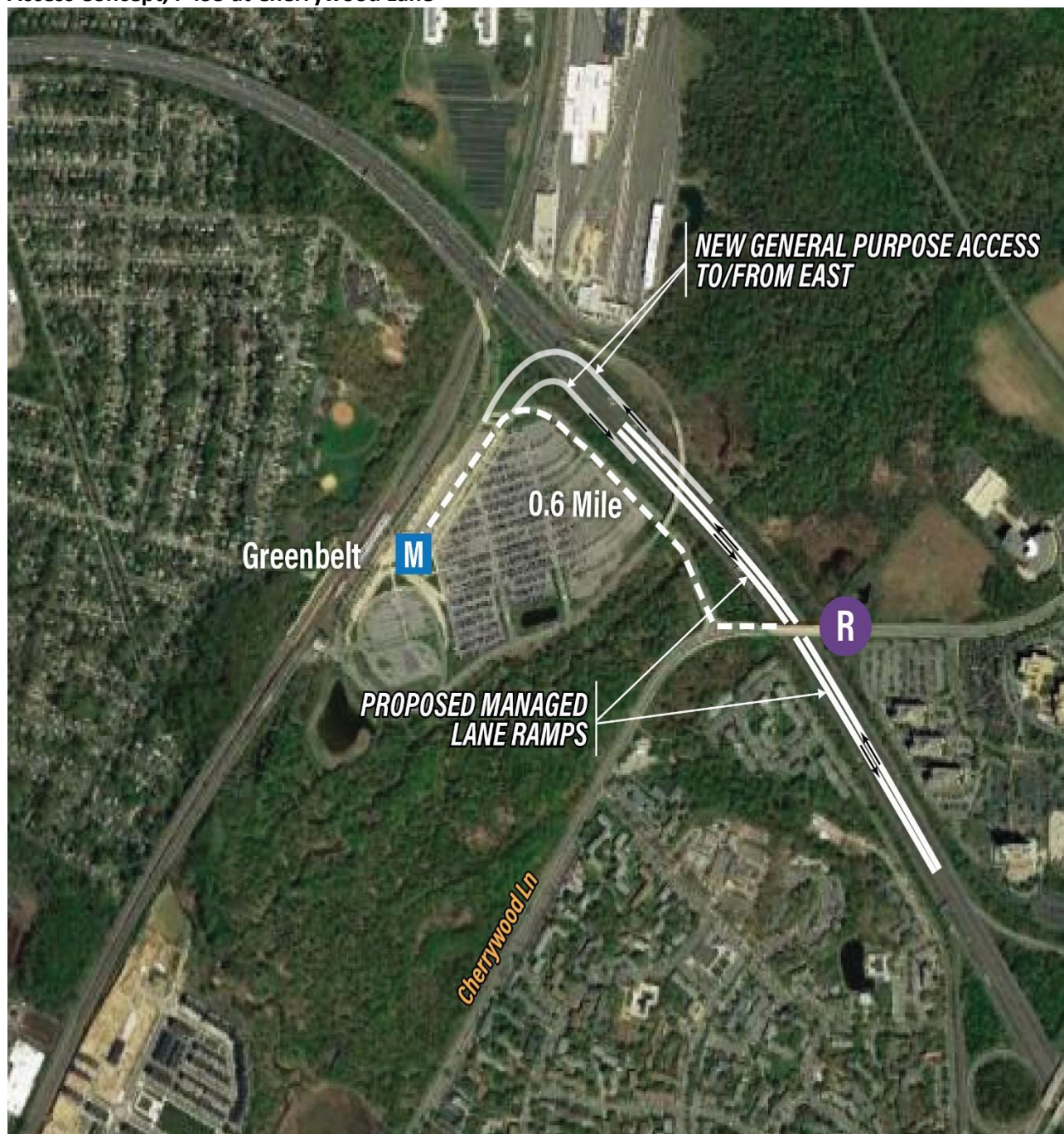
Vicinity Map, I-495 at Cherrywood Lane



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access Concept, I-495 at Cherrywood Lane



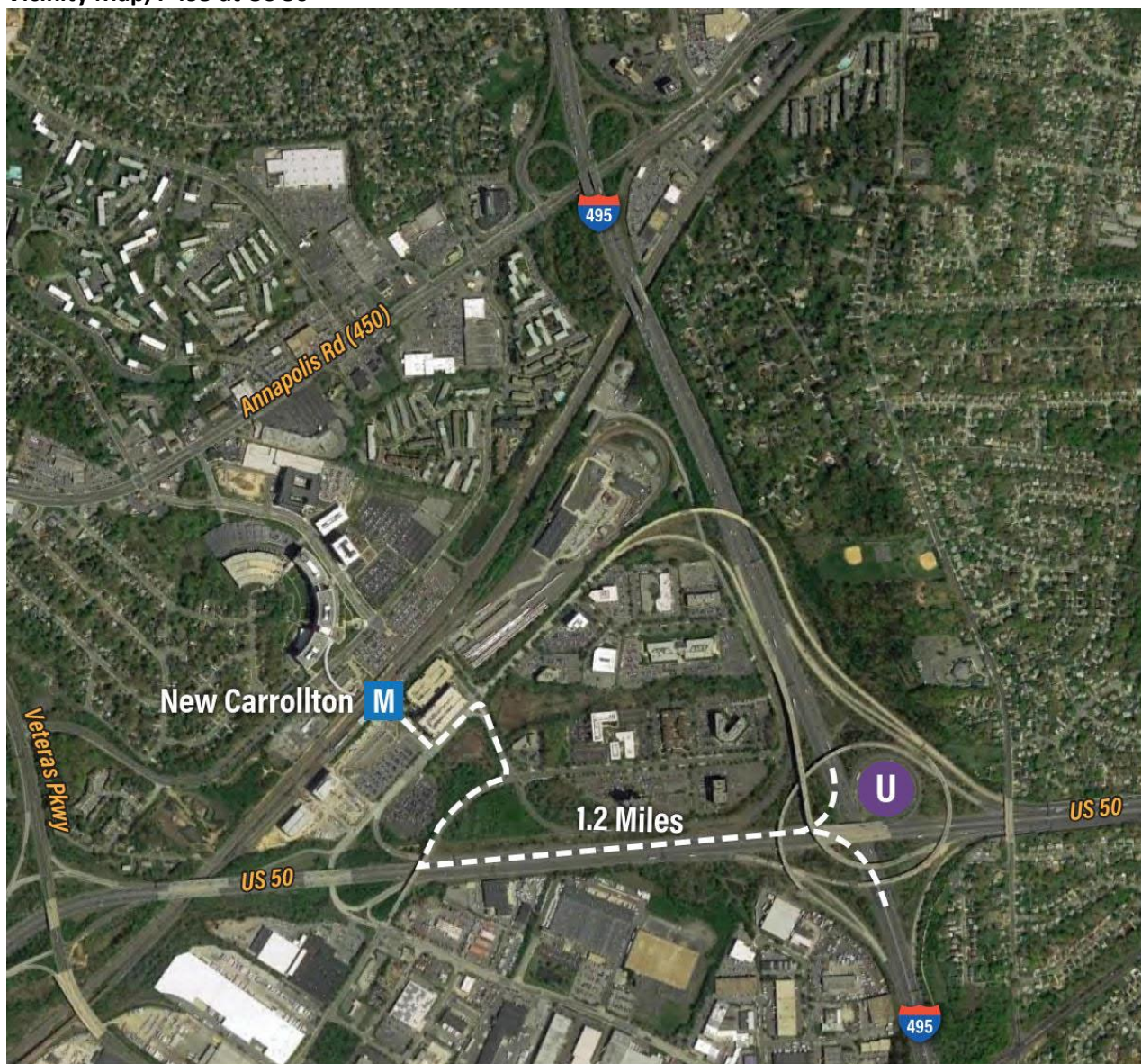
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

U: I-495 at US 50

Managed lane access (U) is planned from I-495 to US 50 to/from the west to the New Carrollton Metrorail Station. This connection is to/from both the north and south on I-495. It should be noted that New Carrollton will also become the eastern end-of-the-line station for the Purple Line. An express bus connection to New Carrollton provides an important intermodal connection to Metrorail, MARC, Amtrak, Purple Line and Metrobus routes.

Vicinity Map, I-495 at US 50

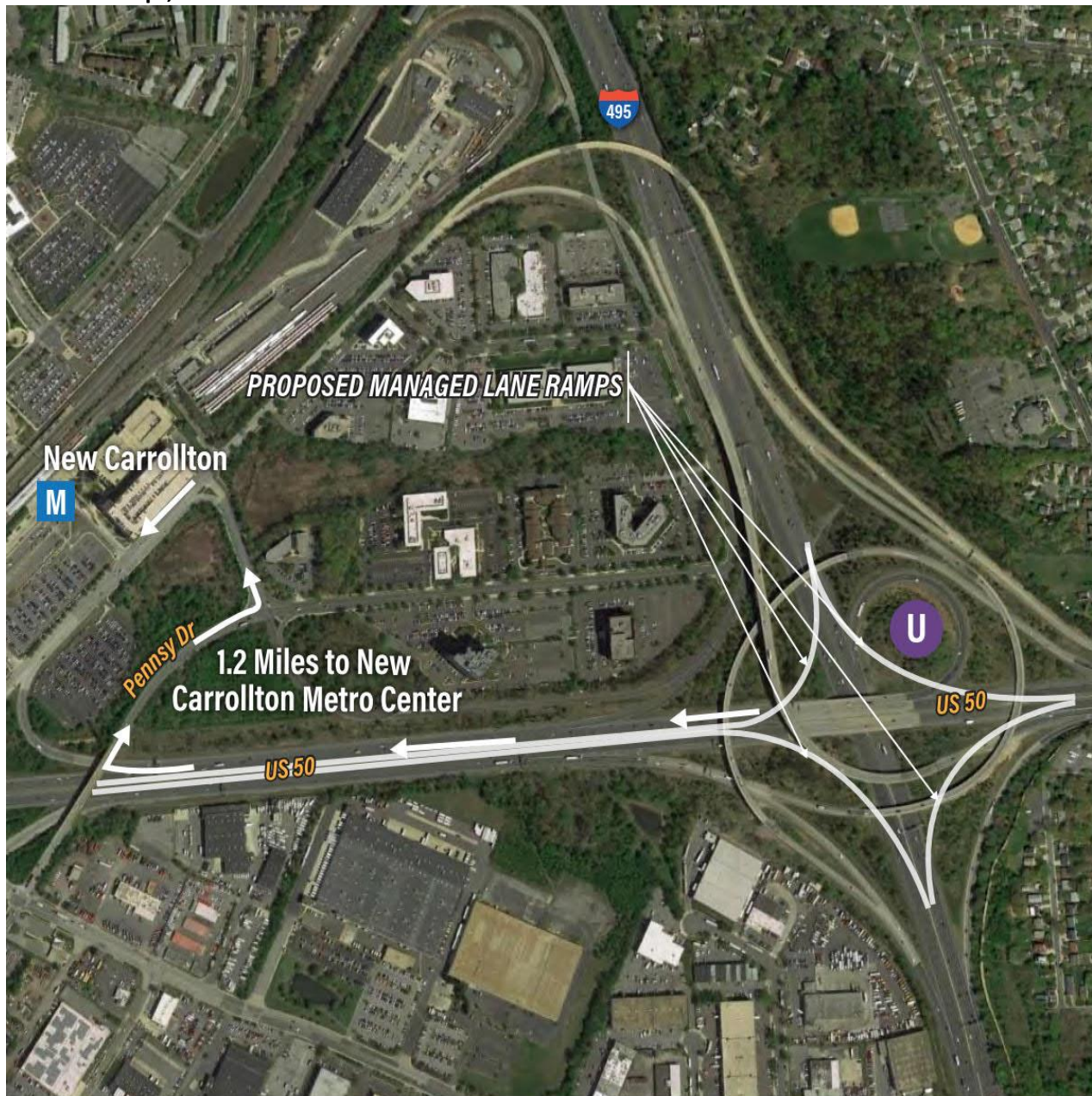


Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The planned access is approximately 1.2 miles to the New Carrollton Metrorail Station. Like the planned access at I-270/I-370, the final designs should consider the operational needs and limitations of buses – particularly as it pertains to lane changing, merging and turning maneuvers. It is expected that express buses destined to the New Carrollton Metrorail Station would be coming from I-95/495 north and south, as well as from US 50 from the east (Bowie and Annapolis).

Access Concept, I-495 at US 50



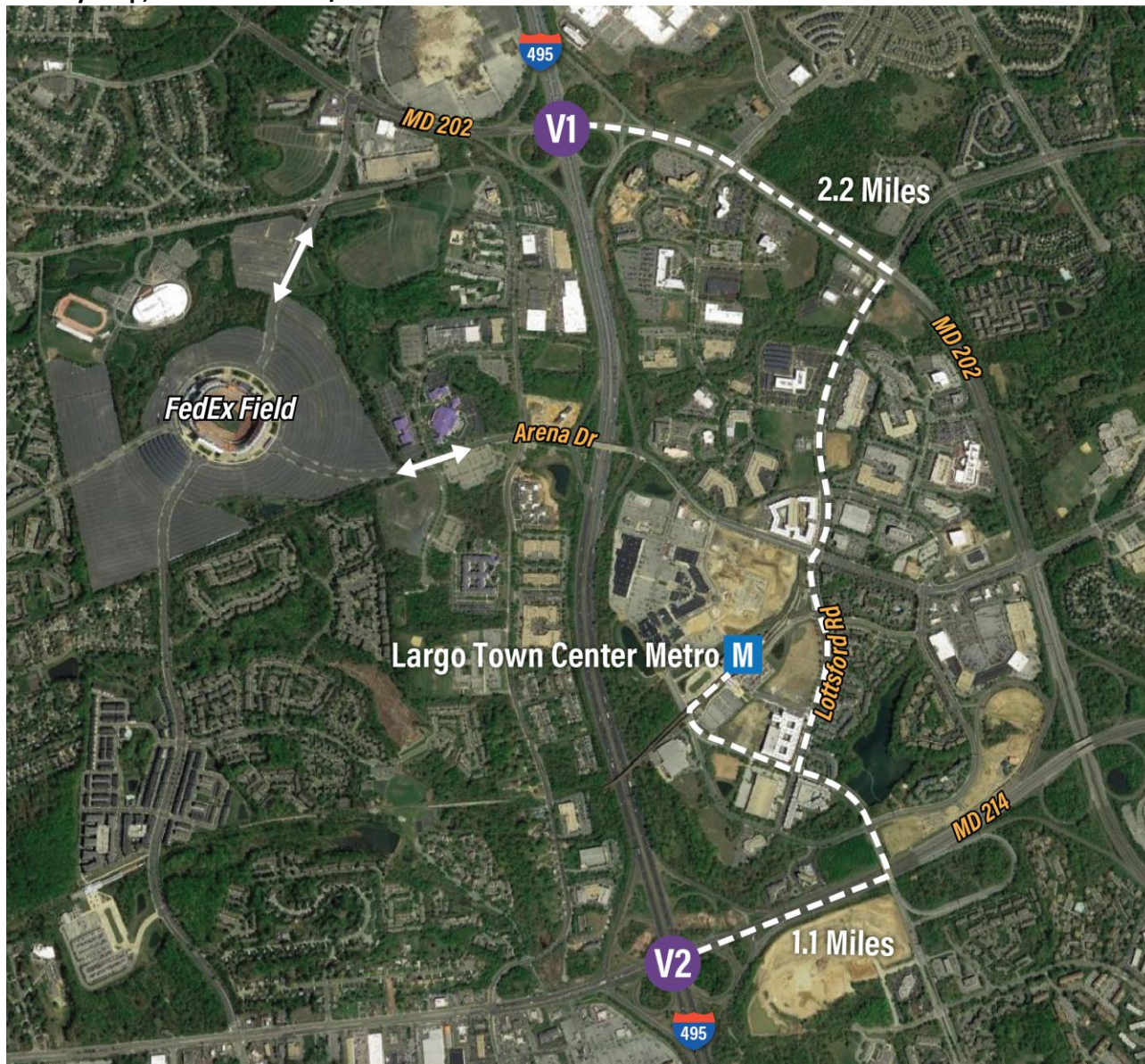
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

V: I-495 at MD 202/MD 214

Access location V is divided between two cross roads, with the north-facing ramps at I-495/MD 202 (labeled V1) and the south-facing ramps at I-495/MD 214 (labeled V2). Access here provides connection to Largo, Largo Town Center Metrorail Station and FedEx Field. In concert with access location X at I-495/Ritchie Marlboro Road to the south, these provide an opportunity for buses from the north to exit the managed lanes at MD 202, serve multiple local destinations and re-enter the managed lanes southbound either at MD 214 or at Ritchie Marlboro Road (and vice versa in the northbound direction).

Vicinity Map, I-495 at MD 202/MD 214



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

The access design concepts at MD 202 and at MD 214 (V1 and V2) provide ramps in the center of I-495 from the managed lanes directly to each cross road. This concept allows access to/from the north at MD 202 and to/from the south at MD 214.

Access Concept, I-495 at MD 202



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access Concept, I-495 at MD 214



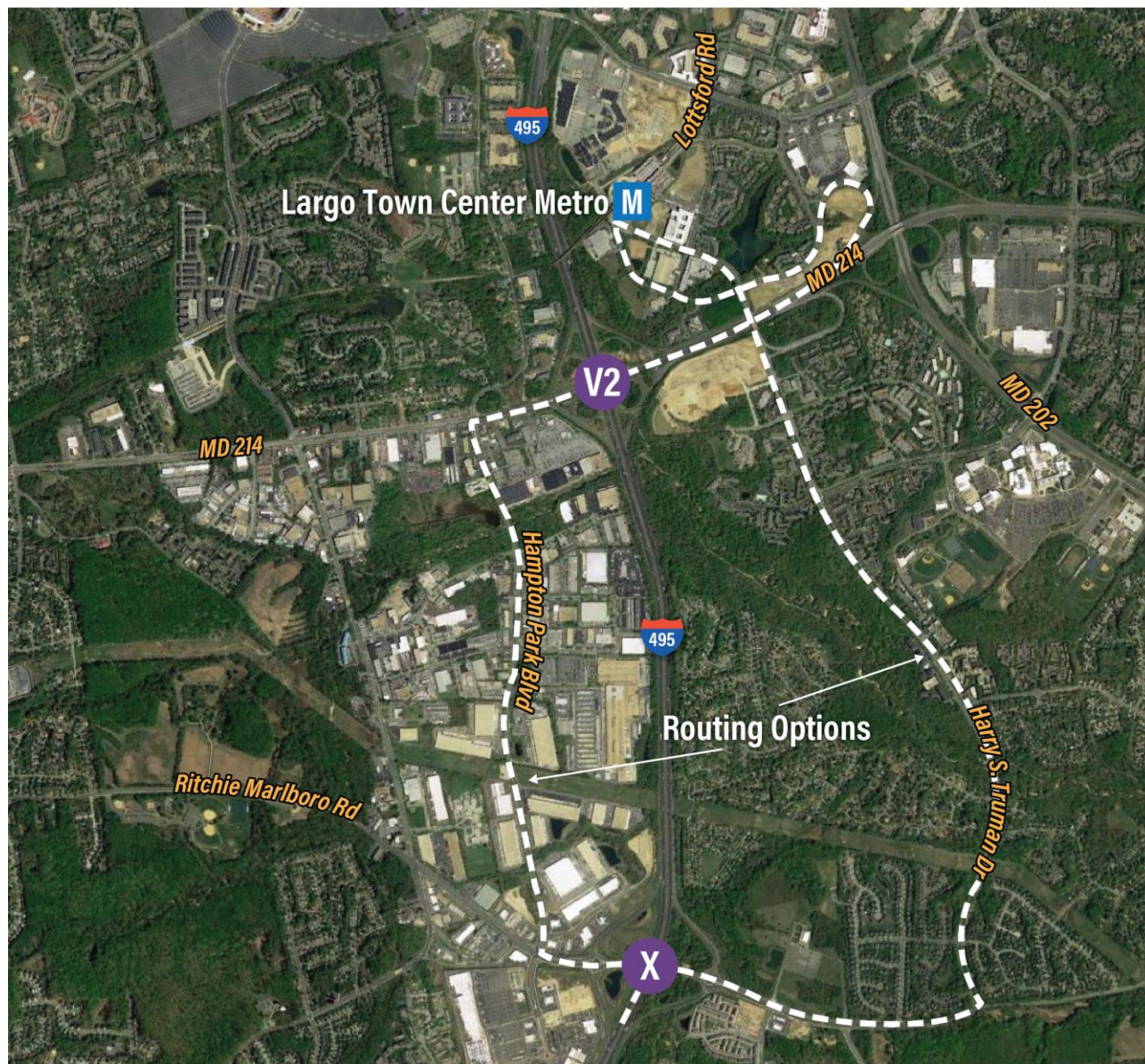
Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

X: I-495 at Ritchie Marlboro Road

Access Point X at I-495 and Ritchie Marlboro Road provides a southerly access to Largo, Largo Town Center Metrorail Station and FedEx Field. In concert with access location V1 at I-495/MD 202 to the north, these provide an opportunity for buses from the north to exit the managed lanes at MD 202, serve multiple local destinations and re-enter the managed lanes southbound either at MD 214 or at Ritchie Marlboro Road (and vice versa in the northbound direction).

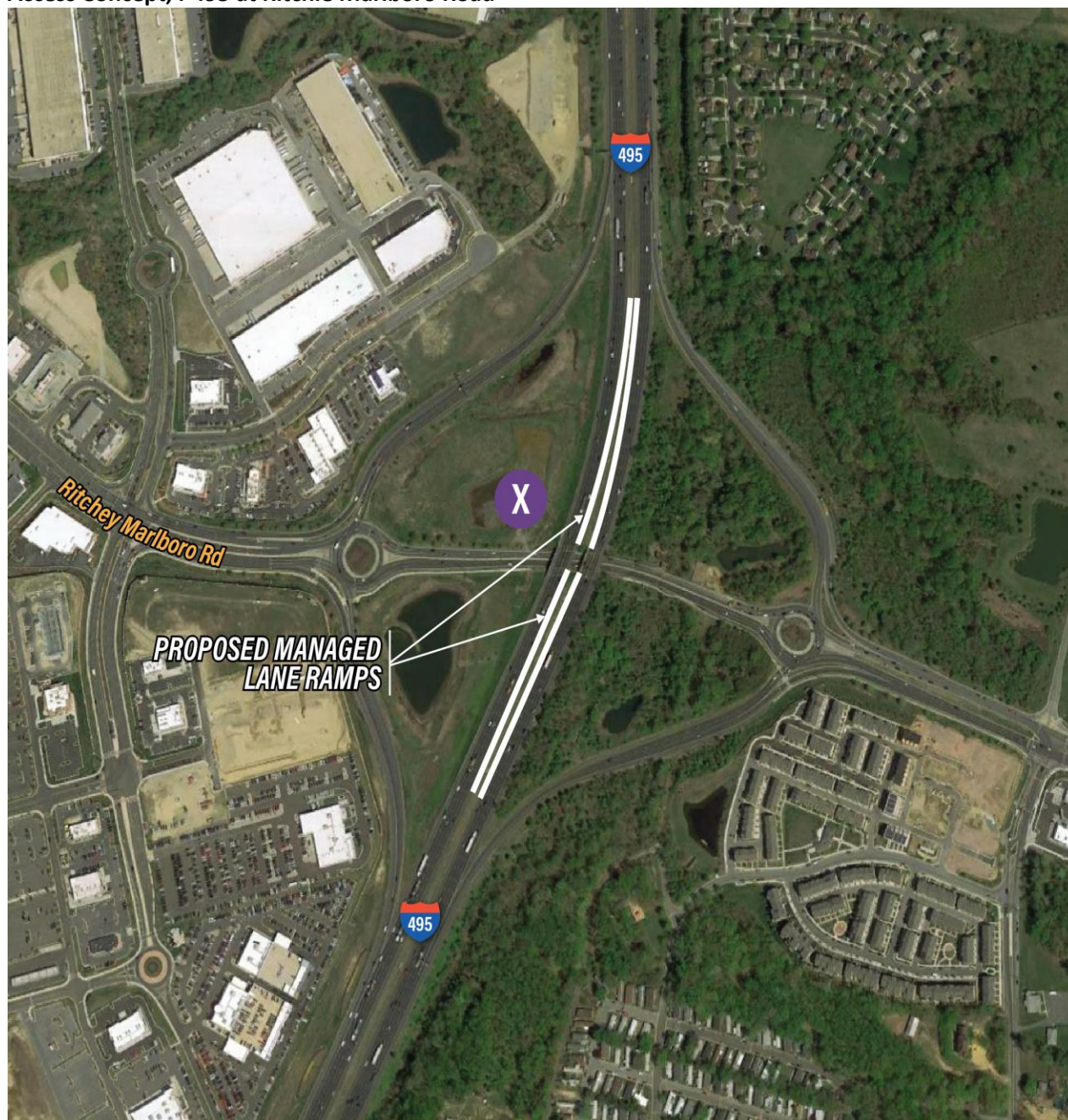
Vicinity Map, I-495 at Ritchie Marlboro Road



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access Concept, I-495 at Ritchie Marlboro Road

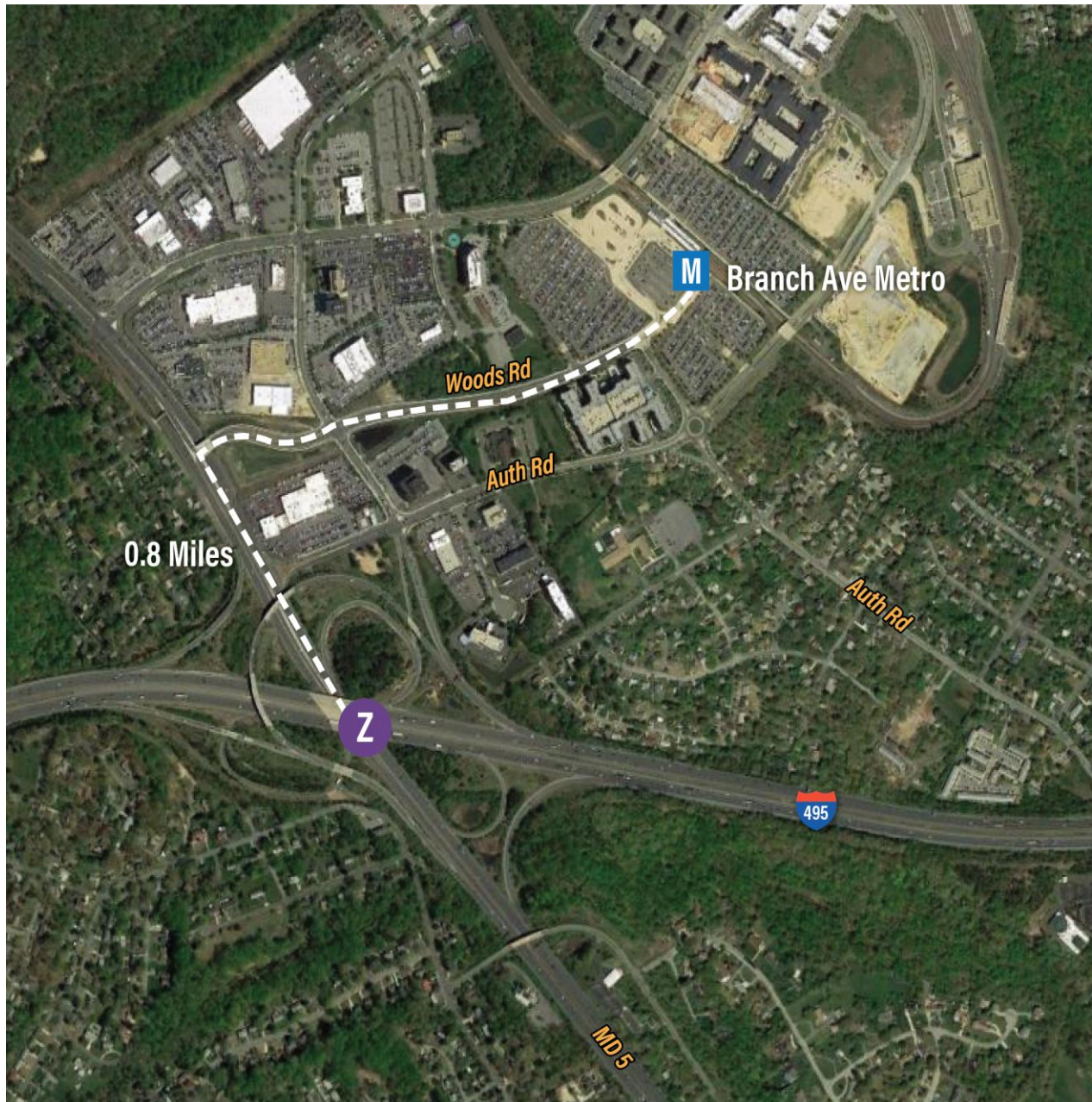


Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Z: I-495 at MD 5 Branch Avenue

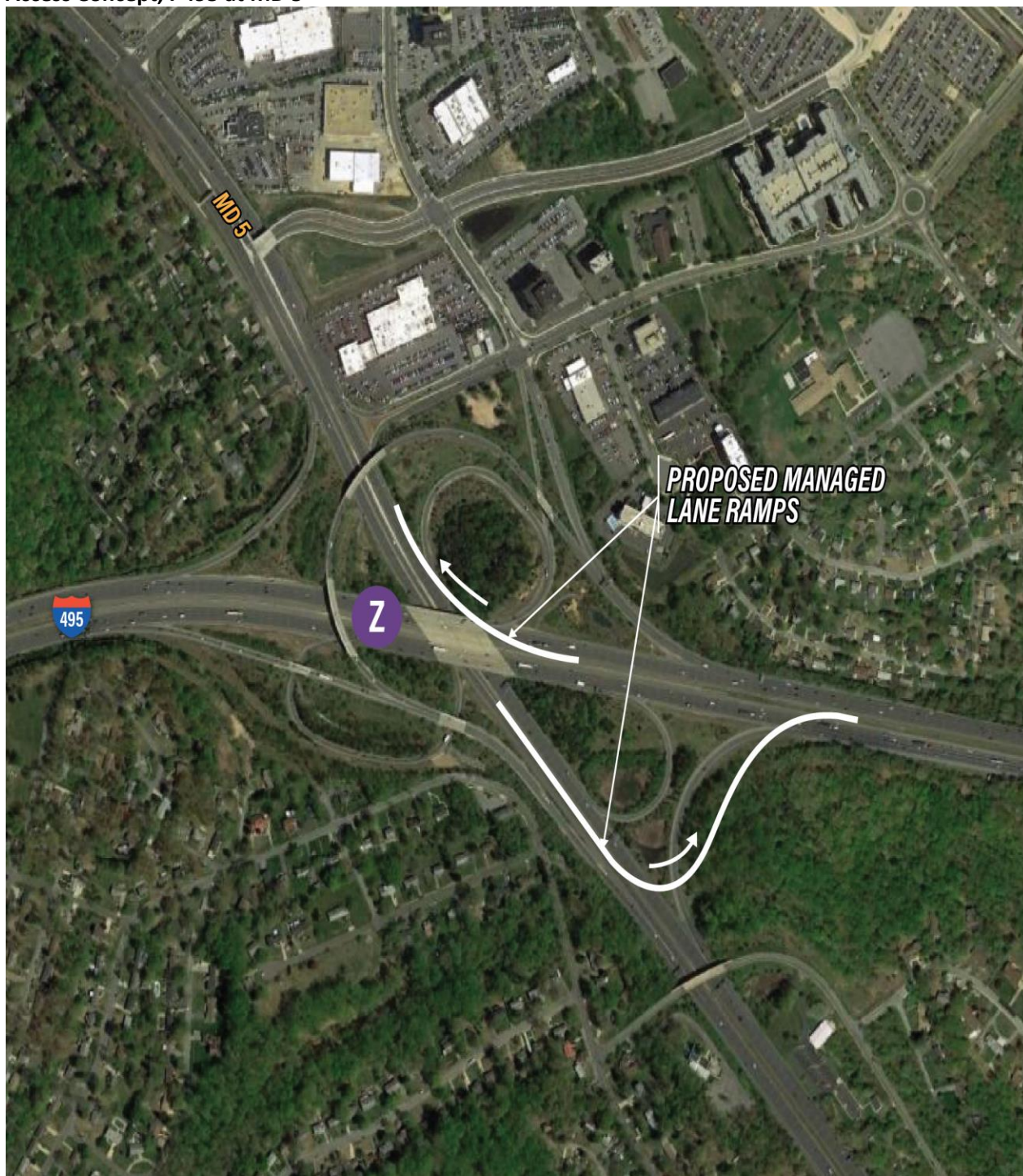
Vicinity Map, I-495 at MD 5



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.

Access Concept, I-495 at MD 5



Pre-Decisional, Deliberative

The proposed managed lanes access points are based on preliminary traffic and revenue analyses and may change as more detailed analyses are completed.