Montgomery Planning

US 29 MOBILITY AND RELIABILITY STUDY, PART 2
ALTERNATIVES SELECTION

Description

The goal of the US 29 Mobility and Reliability Study is to identify improvements on US 29 to complement the investment in US 29 Flash bus service and improve overall corridor travel time and reliability for all modes of transportation. The study evaluates two alternatives: Managed Lanes and Median Bus Lanes. The purpose of this review is to recommend a preferred alternative to the County Council.

COMPLETED: 11-3-2022

MCPB
Item No. 10
11-10-2022

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LOCATION:

US 29 from Sandy Spring Road (MD 198) to Silver Spring Transit Center

MASTER PLAN, ZONE

Master Plan, Zone

PROPERTY SIZE

N/A

APPLICATION

N/A

ACCEPTANCE DATE:

N/A

REVIEW BASIS:

Alternative Selection

Summary

- Montgomery Planning staff recommends transmitting comments to the County Council.
- On November 28, 2022, the County Council's T&E Committee will select a preferred alternative for the US 29 corridor BRT and will consider a supplemental appropriation for preliminary engineering (30% design).

Disclaimer

- The information provided in this staff report is based on a draft PowerPoint presentation provided by the Montgomery County Department of Transportation (MCDOT), as well as supplemental analysis. At the time this staff report was posted, revisions were ongoing to the PowerPoint presentation and so a final presentation that matches the data in this report was not available to include as an attachment. MCDOT will share the final PowerPoint presentation during the Planning Board discussion on November 10, 2022.

CONTENTS

SECTION 1

SUMMARY OF RECOMMENDATIONS

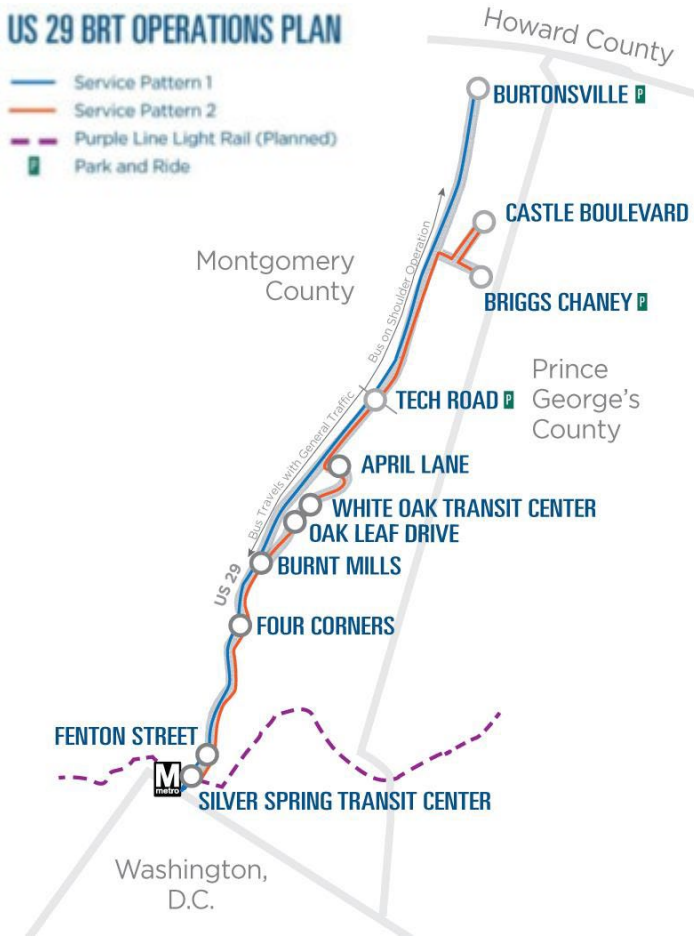
Staff recommends transmitting the following comments to the County Council:

1. Advance the Median Bus Lanes alternative.
2. Defer a decision on improvements to US 29 between Sandy Spring Road (MD 198) and Tech Road until the Fairland and Briggs Chaney Master Plan is approved by the County Council in late 2023.
3. If the Median Bus Lanes alternative is advanced, provide a BRT station at Franklin Avenue.
4. Delay implementation of a second ramp lane from southbound US 29 to westbound I-495. However, if advancing a second ramp lane is deemed essential to traffic operations, this improvement must be accompanied by improvements that eliminate conflicts between motor vehicles and pedestrians/bicyclists with a pedestrian and bicyclist overpass or traffic control on the west side of US 29.
5. If the Median Bus Lanes alternative is advanced, defer a decision on capacity improvements at the intersection of US 29 and Greencastle Road until the Fairland and Briggs Chaney Master Plan is approved by the County Council in late 2023.
6. If the Managed Lanes alternative is advanced:
    a. Do not advance motor vehicle capacity improvements at the intersections of US 29 with Greencastle Road, Tech Road, Stewart Lane or Sligo Creek Parkway.
    b. Consider adding a third southbound lane on US 29 within the New Hampshire Avenue (MD 650) interchange.
7. Do not construct a sidewalk on Sligo Creek Parkway at the northeast corner of the US 29 and Sligo Creek Parkway intersection as part of the US 29 Mobility and Reliability Project. Instead, consider including a sidewalk along the northside of Sligo Creek Parkway from US 29 to Worth Avenue in the US 29 Pedestrian and Bicycle Improvements program.
8. The proposed sidewalk relocation at Burnt Mills East Special Park will need to be reviewed in more detail by Parks staff and will be subject to issuance of a Historic Area Work Permit.
9. Any proposed work on parkland would require Concept Review and Park Construction Permit review and approval.

SECTION 2

BACKGROUND

Bus Rapid Transit (or BRT) is a high-quality and high-capacity bus-based transit system that delivers fast, comfortable, reliable and cost-effective transit service. It does this through a combination of elements that can include the provision of dedicated transit lanes, branded stations and buses, off-board fare collection, real time information, queue jump lanes and fast and frequent operations, among other things. Because BRT contains features similar to a light rail, it is more reliable, convenient and faster than other bus services. With the right features, BRT can avoid the causes of delay that slow local bus services. See Appendix A for a more thorough description of BRT and what distinguishes it from standard local bus service.



Though a project phasing plan has not formally been adopted by the Montgomery County Department of Transportation (MCDOT), for descriptive purposes, implementation of BRT on US 29 can be broken down into several steps.

Step 1 was completed in October 2020 and is branded as the US 29 Flash. It includes a 14-mile transit route along US 29 and local streets, from the Burtonsville and Briggs Chaney Park-and-Ride lots to the Silver Spring Transit Center (SSTC), as shown in the figure to the right, with branded stations and buses, off-board fare collection and real time information. It does not include dedicated transit lanes but does include bus travel on the shoulder north of Tech Road.

Step 2, the US 29 Mobility and Reliability Study, is the subject of this Planning Board review and arose as an add-on to the US 29 Flash project. The focus of this study is between Burtonsville and Sligo Creek Parkway and it seeks to:

- Evaluate three alternatives: No Build, Managed Lanes and Median Bus Lanes
- Examine intersection and traffic improvements along the corridor
- Consider a new station at Franklin Avenue

Step 3 is a recently initiated project by MCDOT to consider piloting curbside bus lanes on US 29 between Sligo Creek Parkway and the Silver Spring Transit Center. This project is not the focus of this Planning Board review.

While the US 29 Mobility and Reliability Study initially included a large number of pedestrian and bicycle access improvements to US 29 Flash stations, most of these improvements have been shifted to a standalone capital program created by the County Council to improve pedestrian and bicycle access to US 29 BRT stations. Specifically, the US 29 Pedestrian and Bicycle Improvements program provides $5.5 million in the FY 23 – FY 28 Capital Improvements Program to address connections to BRT stations along US 29 that were identified as part of the US 29 Mobility and Reliability Study, Part 1. While this amount of funding is insufficient to address all pedestrian and bicycle station access improvements in the corridor, as with other similar funding programs to improve access to Red Line and Purple Line stations, it is likely that funding to improve pedestrian and bicycle access to US 29 BRT stations will increase in the coming years.

SECTION 3

PROJECT DESCRIPTION

The US 29 Mobility and Reliability Study was completed in two parts. The first part was completed in January 2021 with a review by the County Council's T&E Committee. The second part is the subject of this Planning Board review.

US 29 Mobility and Reliability Study, Part 1

Part 1 evaluated three alternatives to improve travel on the US 29 corridor: No Build, Managed Lanes, and Median Bus Lanes.

- No Build Alternative: This alternative evaluated future conditions in the corridor with no additional improvements beyond already funded investments.
- Managed Lanes Alternative: This alternative increased both transit and motor vehicle capacity with a combination of 1) full-time bus/HOV lanes, 2) peak period managed bus/HOV lanes, and, 3) hard shoulder running in multiple segments of the corridor. The alternative included targeted intersection and segment improvements. It did not include dedicated bus lanes as the buses would use the HOV lanes.
- Median Bus Lanes Alternative: This alternative was developed by community members of the US 29 Corridor Advisory Committee and included a single, bidirectional dedicated median bus lane from Tech Road to Sligo Creek Parkway that expanded to two lanes at BRT stations to enable passing and to enable buses traveling in the opposite direction to be stopped at the station at the same time.

On October 15, 2020, the Planning Board reviewed the study and provided comments to the County Council (Attachment 1). Analysis provided by Montgomery Planning staff (see Attachment 2) indicated that while "the Managed Lanes alternative has a higher cost-benefit ratio than the Median Bus Lanes alternative…staff cannot conclusively support this finding based on the analysis that was completed" as the study did not conduct an apples-to-apples comparison of the alternatives. Additionally, Planning staff noted that the study evaluated the Median Bus Lanes alternative as proposed by the community members without any refinements that may have improved the concept (such as the targeted intersection and segment improvements included in the Managed Lanes alternative).

While the Planning Board agreed with Planning staff's analysis, they endorsed the Managed Lanes alternative rather than recommending redoing the analysis of the Median Bus Lanes alternative, because doing so would have further delayed implementation of the project. Their endorsement of the Managed Lanes alternative recommended it as an interim phase in the build out of the master-planned vision of dedicated bus lanes on the entire corridor between Burtonsville and the Silver Spring Transit Center.

On January 27, 2021, the County Council's T&E Committee reviewed the study. Committee members disagreed with the Planning Board and instead supported the Median Bus Lanes alternative and asked MCDOT to conduct additional analysis of the Median Bus Lanes alternative to determine whether the benefits of the Median Bus Lanes alternative could be improved before advancing the project to design. The discussion resulted in a continuation of the study (Part 2) with a focus on improving the performance of the Median Bus Lanes alternative.

US 29 Mobility and Reliability Study, Part 2

In light of the T&E Committee's support for the Median Bus Lanes alternative, Part 2 of the study is focused on improving the Median Bus Lanes alternative and its evaluation by:

- Refining the alternative to improve transit operations and reduce traffic impacts
- Making the alternative more cost effective
- Refining the HOV and transit mode shift assumptions
- Identifying the independent utility of the spot intersection improvements

Planning staff's evaluation of this project is conducted in two parts: corridor alternatives (Section 4) and intersection / interchange improvements (Section 5). Each evaluation includes a description, Planning staff's analysis, master plan consistency and recommendations.

SECTION 4

CORRIDOR ALTERNATIVES

This section of the staff report describes the three corridor alternatives and provides Planning staff's recommendations on a preferred alternative.

Description

The study evaluates three alternatives: No Build, Managed Lanes and Median Bus Lanes. An optional element to provide bus / HOV or bus-only lanes between Sandy Spring Road (MD 198) and Tech Road could be included in both the Managed Lanes and Median Bus Lanes alternatives.

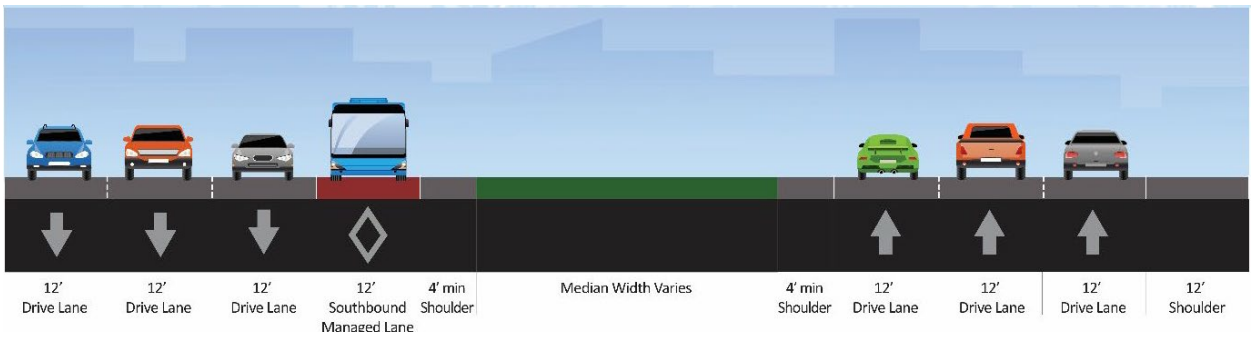
No Build Alternative

The No Build alternative evaluates future conditions in the corridor with no additional improvements beyond already programmed investments.

Managed Lanes Alternative

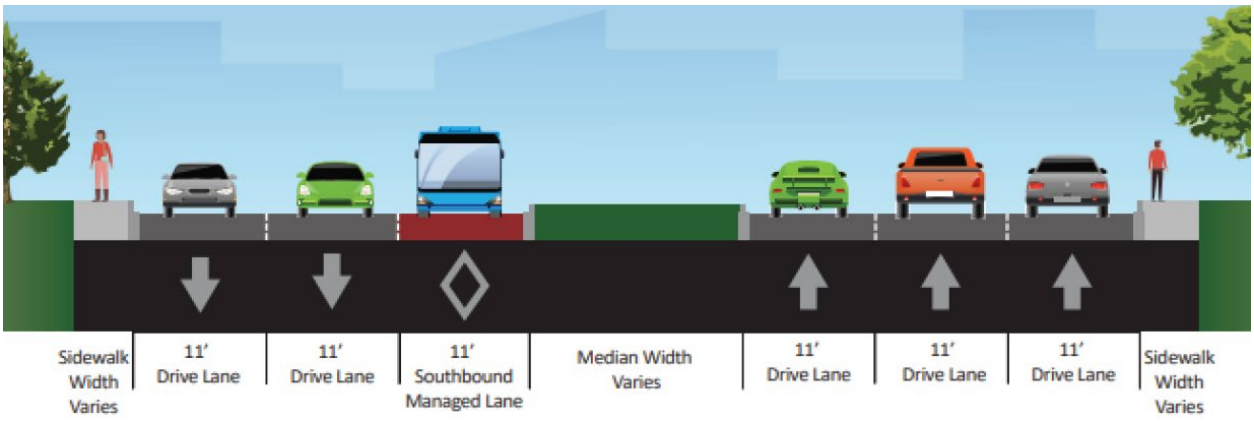
The Managed Lanes alternative includes peak hour, peak period High-Occupancy Vehicle (HOV) lanes from Musgrove Road to Stewart Lane, New Hampshire Ave (MD 650) to Southwood Avenue (southbound) / Burnt Mills (northbound), and Dale Drive to Spring Street. This alternative also adds a traffic signal at Hillwood Drive.

From Musgrove Road to Stewart Lane, the inner lane would become a bus/carpool lane in the southbound direction in the AM peak period and the outside shoulder would be converted to a general-purpose lane. In the PM peak period, the northbound inner lane would become a bus/carpool lane and the outside shoulder would be converted to a general purpose lane.



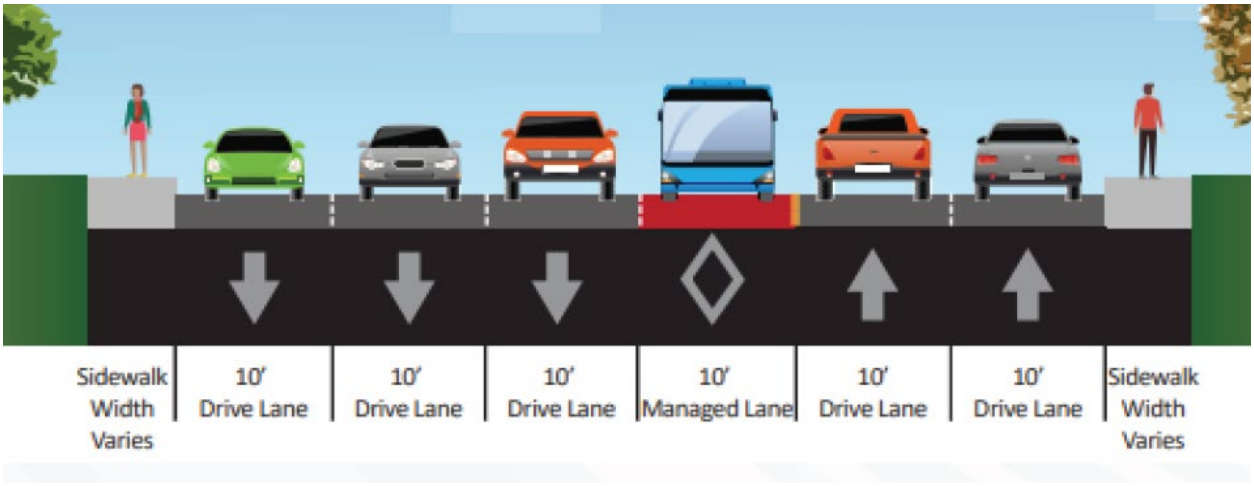
Managed Lanes Operations from Musgrove Road to Stewart Lane (AM Peak Period)

From New Hampshire Ave (MD 650) to Southwood Avenue, the inner lane would become a bus/carpool lane in the southbound direction in the AM peak. In the PM peak, the northbound inner lane would become a bus/carpool lane from Burnt Mills Avenue to New Hampshire Ave (MD 650).



Managed Lanes Operations from New Hampshire Ave (MD 650) to Southwood Avenue (AM Peak Period)

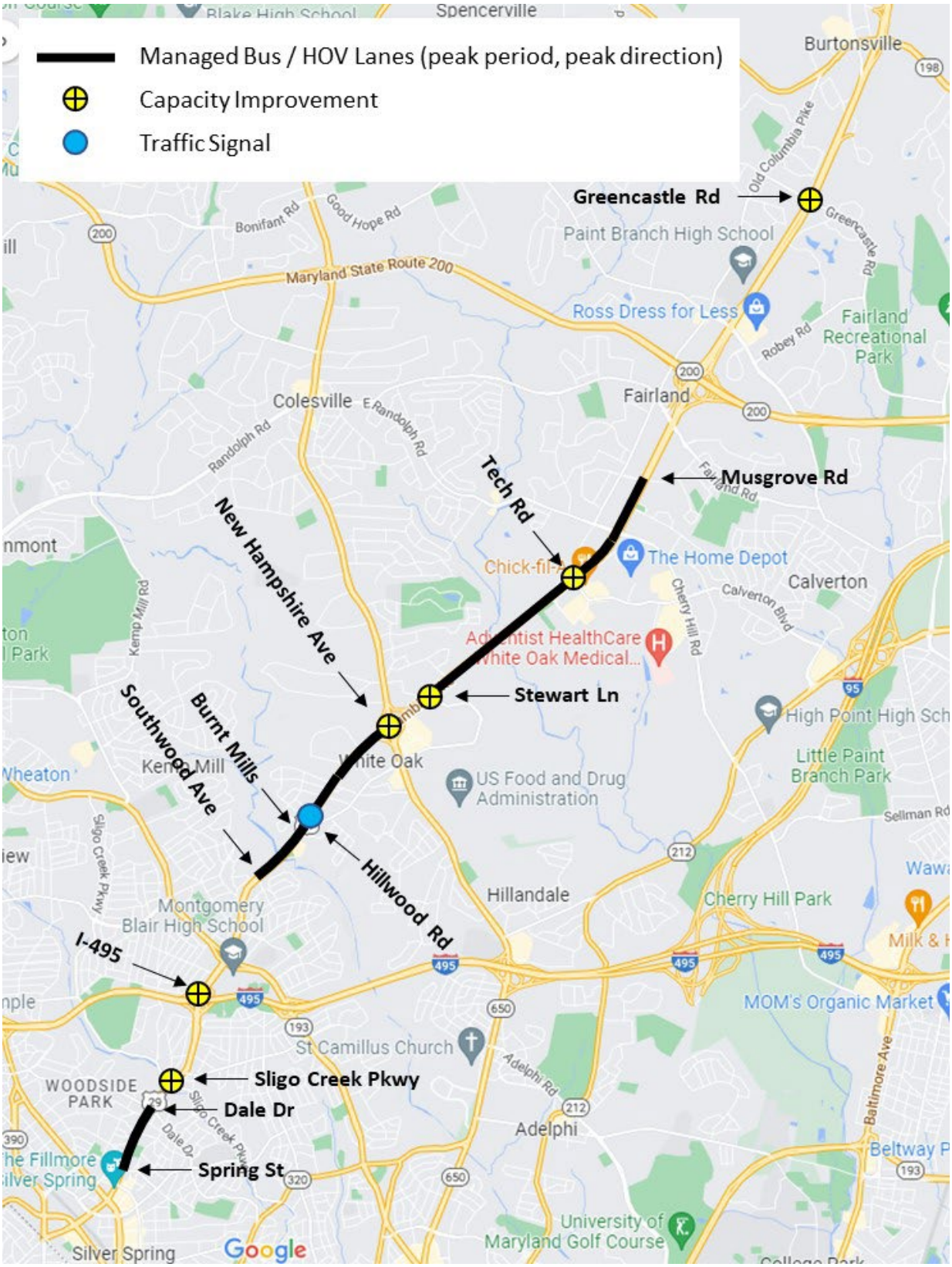
From Sligo Creek Parkway to Spring Street, a change to the existing reversible lane configuration is proposed. In the AM peak period, there would be four southbound lanes, with the left lane serving as a bus/carpool lane, and two northbound lanes. In the PM peak period, the northbound direction would have four lanes, with the inner lane serving as a bus/carpool lane, and two southbound lanes.



Managed Lanes Operations from Sligo Creek Parkway to Spring Street (AM Peak Period)

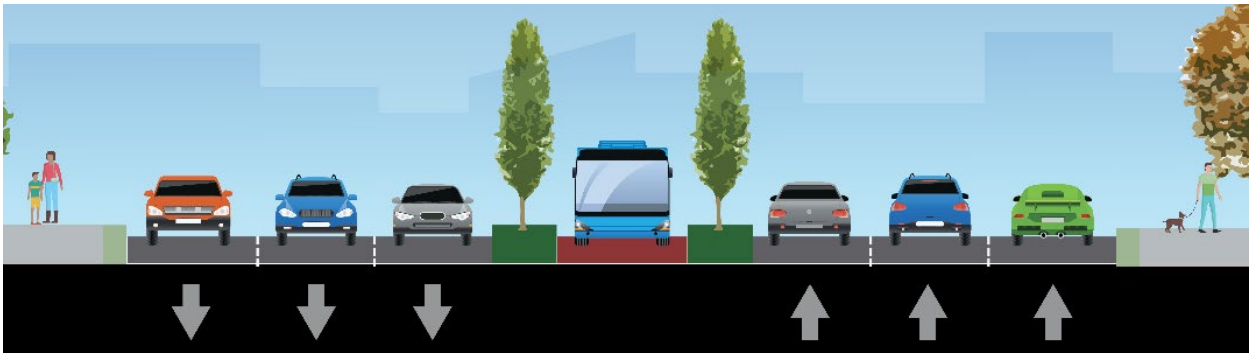
A map displaying the improvements proposed for the Managed Lanes alternative is shown in Figure 1.

Figure 1: Map of Managed Lanes Alternative

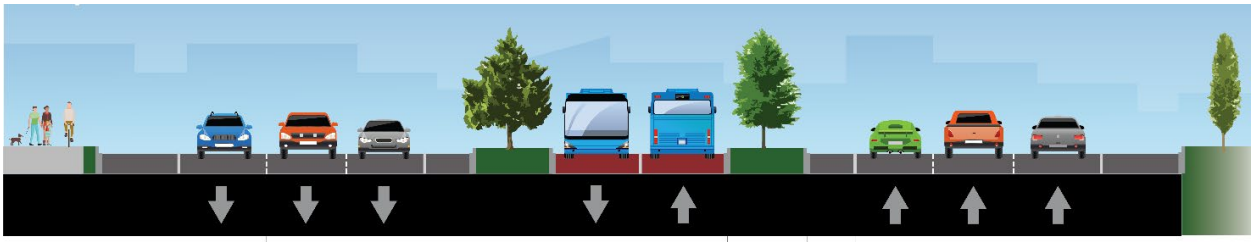


Median Bus Lanes

This alternative includes buses on the shoulder between Tech Road and Stewart Lane, a single, bidirectional median bus lane from Stewart Lane to Timberwood Avenue in Four Corners, dual median bus lanes between Timberwood Avenue and I-495 and a single, southbound median bus lane from I-495 to Sligo Creek Parkway, as shown below. It prohibits motor vehicles from turning left across the transitway in several locations. This alternative could also include a new station at Franklin Avenue and would require relocating the existing US 29 Flash stations from the curb to the median at Burnt Mills and Four Corners. It also adds traffic signals at Hillwood Drive, Crestmoor Drive, Timberwood Avenue and Granville Drive / Hastings Drive.



Single Median Bus Lanes



Dual Median Bus Lanes in Four Corners

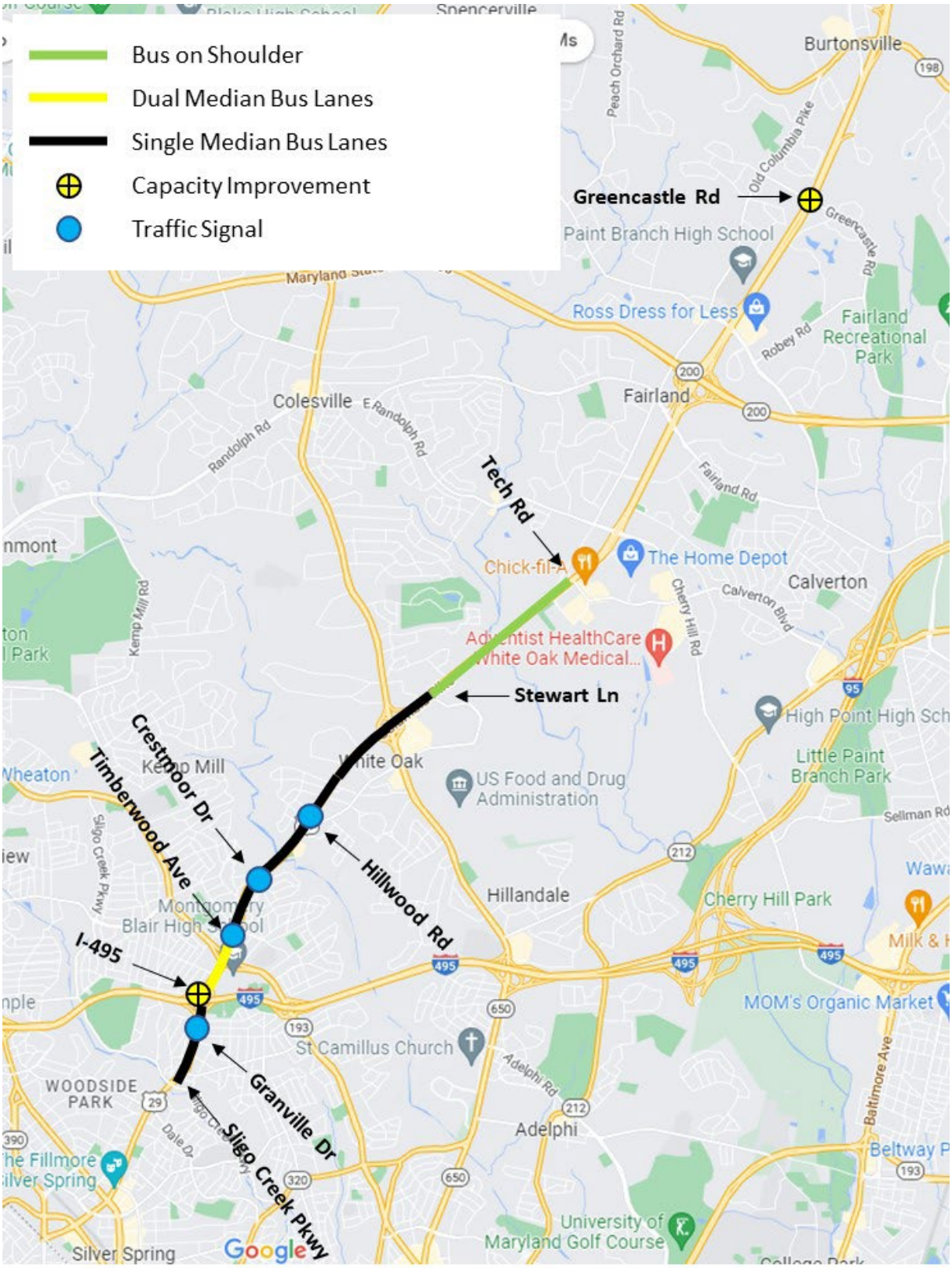
While this alternative also studied bus lanes between Sligo Creek Parkway and the Silver Spring Transit Center, given the reductions in traffic volumes resulting in the post-COVID-19 world and the desire to advance dedicated bus lanes faster than this project would likely be able to accomplish, MCDOT is studying bus lane implementation in the near term as part of a separate project.

A map displaying the improvements proposed for the Managed Lanes alternative is shown in Figure 2.

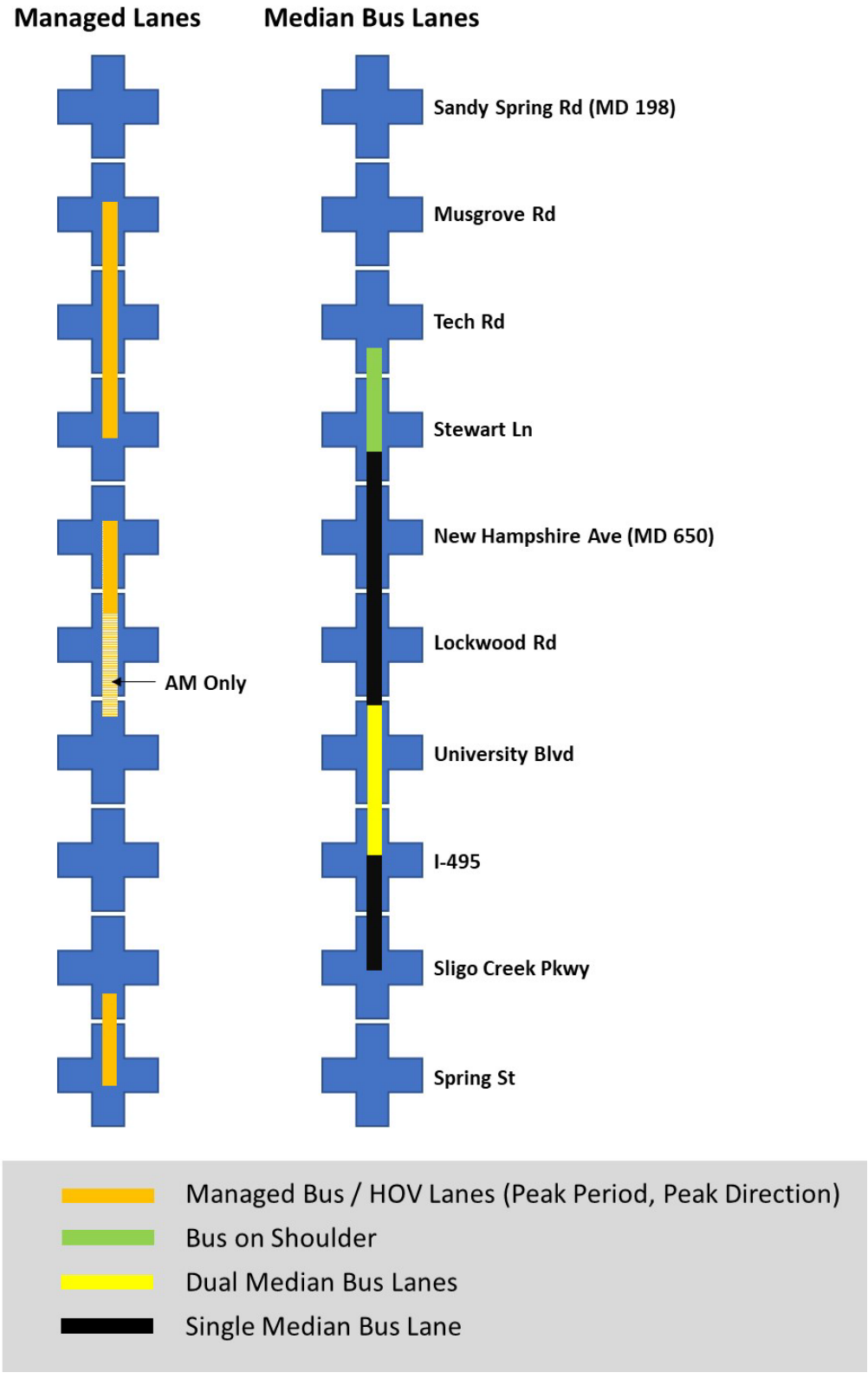
Optional Element

Both the Managed Lanes and Median Bus Lanes alternatives could also include bus / HOV or bus-only lanes between Sandy Spring Road (MD 198) and Tech Road, by upgrading the existing shoulder to support the weight of motor vehicles.

Figure 2: Map of Median Bus Lanes Alternative



A conceptual diagram of the Managed Lanes and Median Bus Lanes alternatives is provided below.



Conceptual Diagrams of Managed Lanes and Median Bus Lanes Alternatives

Analysis

Getting people out of their cars is key to achieving the county's climate change, community development and transportation goals. When people decide whether to take transit or to drive, they make their decision based on several factors, of which two are central to the US 29 Mobility and Reliability Study:

1. How fast will the trip via transit be relative to the trip by automobile?
2. How likely is transit to arrive on time?

While both alternatives achieve the *Thrive Montgomery 2050* goal of improving the travel time for transit, only the Median Bus Lanes alternative can substantially incentivize people to choose transit due to travel times. When one alternative (Managed Lanes) improves both auto and transit travel times, and a second alternative (Median Bus Lanes) only improves transit travel times, it is the second alternative that is going to best incentivize people to make the switch from driving to taking transit. For these reasons, it is no surprise that even though the Managed Lanes alternative reduces travel time for motor vehicles and transit more than the Median Bus Lanes alternative, the Median Bus Lanes alternative generates slightly higher transit volumes, as shown in Table 1.

Furthermore, only the Median Bus Lanes alternative will make travel times reliable. When transit is unreliable – even if occasionally – people are much more likely to drive. In fact, reliability is the main advantage of BRT service over travel by car (including HOV lanes). The main feature that achieves reliability is dedicated median bus lanes. They ensure that bus travel times are predictable from day to day by reducing congestion due to events that are hard to anticipate, including road work, collisions and vehicle breakdowns. The Managed Lanes alternative will be less reliable because private vehicles are likely to encroach into the HOV lanes during heavily congested conditions, as there is no barrier between the HOV lanes and non-HOV lanes. In contrast, the Median Bus Lanes alternative will be more reliable as the BRT will be shielded from the effects of road work, collisions and vehicle breakdowns, since they will be separated from the roadway by a concrete median.

Table 1: Alternatives Evaluation

Metric*		No Build		Managed Lanes		Median Bus Lanes	
		Southbound in AM Peak	**Northbound in PM Peak**	**Southbound in AM Peak**	**Northbound in PM Peak**	**Southbound in AM Peak**	**Northbound in PM Peak**
Travel Time on US 29 (min)	SOV**	46	32	35	19	47	26
	HOV			20	18		
	BRT	47***	36***	23	25	28***	31***
Person Throughput		3,800	4,250	4,550	4,650	3,850	4,250
BRT Weekday Boardings		8,200		11,200		11,500	

* BRT speeds adjusted to reflect slower speeds on the bus on shoulder.
** SOV refers to single occupancy vehicles.
*** Travel times and person throughput are for year 2025. BRT weekday boardings are for 2040.

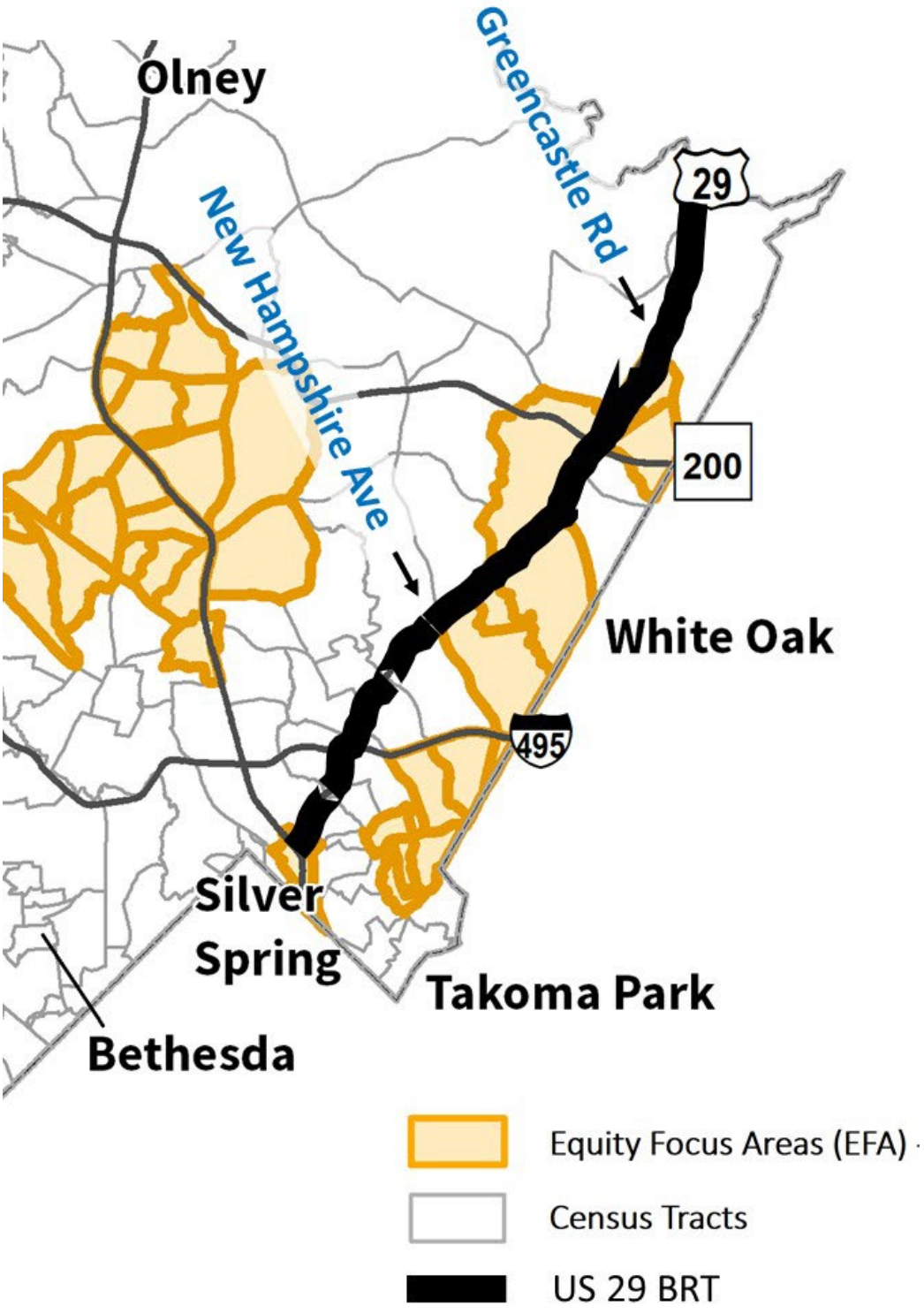
Additionally, the Median Bus Lanes alterative best addresses historical injustices that have resulted in the heaviest traffic volumes in census tracts that Montgomery County defines as Equity Focus Areas. Because the Managed Lanes alternative substantially increases the speed of traffic on US 29, it attracts more cars. But roadways with higher traffic volumes tend to be less safe, have worse air quality, divides communities and create places where people do not want to be. This study predicts that the Managed Lanes alternative will have the greatest increase in traffic volumes overall and that traffic volumes will grow the most in the Equity Focus Areas[1] between Greencastle Road and New Hampshire Ave (MD 650). Table 2 shows that in the northbound direction, the Managed Lanes alternative increases traffic on all segments of the road and by as much as 10 – 12% in the Equity Focus Areas (highlighted red). In contrast, the Median Bus Lanes alternative keeps traffic volumes consistent in the Equity Focus Areas and reduces traffic on the road by as much as 5% in the southern portion of the corridor (highlighted blue). A map identifying the Equity Focus Areas along the US 29 corridor can be found in Figure 3.

[1] Equity Focus Areas are parts of Montgomery County that are characterized by high concentrations of lower-income people of color, who may also speak English less than very well.

Table 2: Change in Traffic Volumes (2040)

Location Name	No Build Daily Traffic Volume	Median Bus Lanes		Median Bus Lanes	
		Northbound	Southbound	Northbound	Southbound
Howard County Line	44,816	2%	1%	1%	0%
Greencastle Rd to Briggs Chaney Rd	42,716	11%	10%	0%	0%
Musgrove Rd to Cherry Hill Rd	46,385	12%	10%	0%	0%
Paint Branch Crossing	45,668	11%	8%	0%	0%
North Branch Crossing	45,843	6%	4%	0%	0%
Lanark Way to University Blvd	44,287	2%	1%	-5%	-5%
Indian Springs Dr to Franklin Ave	42,195	1%	1%	-1%	-2%
Ellsworth Park	39,263	5%	5%	-1%	-5%
Spring St to Georgia Ave	32,258	2%	1%	-1%	-5%

Figure 3: Map Showing the Location of Equity Focus Areas along the US 29 Corridor



Finally, cost is not a meaningful differentiator when considered in the context of other BRT projects. Cost estimates were developed for the two alternatives, estimating $105 million for the Managed Lanes alternative and $125 million for the Median Bus Lanes alternative (see Table 3). The cost of upgrading the existing shoulders between Sandy Spring Rod (MD 198) and Tech Road is $52 million. To put this in context, the cost of the MD 355 BRT was estimated to be as high as $886 million when the project was reviewed by the Planning Board in 2019, including over $100 million for property acquisition in the White Flint area alone.

Table 3: Capital Costs

Segment	No Build	Managed Lanes	Median Bus Lanes
Sandy Spring Road to Tech Road	N/A	$52 million	$52 million
Tech Road to Sligo Creek Pkwy	N/A	$105 million*	$125 million

* Includes cost of optional Burnt Mills ($16.6 million) and Four Corners ($8.7 million) station relocations.

Optional Element

Table 4 shows that the Optional Element that would create bus / HOV or bus-only lanes between Sandy Spring Road (MD 198) and Tech Road by upgrading the existing shoulder to support the weight of motor vehicles would reduce travel times by three to four minutes primarily due to the faster travel speeds that would be possible. As noted previously, this element could be included in either the Managed Lanes or Median Bus Lanes alternatives.

Table 4: Travel Time Benefits of Upgraded Shoulder between Sandy Spring Road (MD 198) and Tech Road

Peak Period / Direction	Existing Shoulder (minutes)	Upgraded Shoulder (minutes)	Travel Time Reduction (minutes)
AM Southbound	11	7	4
PM Northbound	8	5	3

Franklin Street Station

The study estimates that there will be about 200 boardings per day at the proposed Franklin Street Station and that the station would cost about $4 million. As noted previously, the Franklin Street Station is only proposed in the Median Bus Lanes alternative.

Master Plan Consistency

A principal focus of this review is to ensure consistency with Montgomery County's approved master plans. The primary master plans providing direction on transit operations along US 29 are *Thrive Montgomery 2050* and the *Countywide Transit Corridors Functional Master Plan* (2013).

THRIVE MONTGOMERY 2050

Thrive Montgomery 2050 is the recently approved general plan for Montgomery County. The Transportation and Communications Networks chapter identifies the following policy as the main guidance for developing Montgomery County's transit network: "Build a frequent, fast, convenient, reliable, safe, and accessible transit system." This policy includes three relevant practices:

- Build a network of rail, bus rapid transit, and local bus infrastructure and services — including demand-responsive transit service — that make transit the fastest, most convenient and most reliable way to travel to centers of economic, social and educational activity and opportunity, both within and beyond Montgomery County.
- Connect historically disadvantaged people and parts of the county to jobs, amenities, and services by prioritizing investments in increasing access to frequent and reliable morning to late night transit service.
- Improve travel times and the travel costs of transit services to achieve greater parity with automotive travel.

The Median Bus Lanes alternative is the superior alternative in conforming to the policies and practices of *Thrive Montgomery 2050* as it makes transit the most attractive, convenient, and reliable way to travel and makes transit travel times more competitive with automobile travel times.

COUNTYWIDE TRANSIT CORRIDORS FUNCTIONAL MASTER PLAN (2013)

The *Countywide Transit Corridors Functional Master* (2013) is the guiding policy document for BRT in Montgomery County along US 29. The plan identifies 10 bus rapid transit corridors and includes recommendations for:

- Master-planned rights-of-way
- Station locations
- Recommendations for dedicated transit lanes
- Number of additional lanes that can be added to the road to provide dedicated bus lanes

A map depicting the master plan BRT corridors is shown in Figure 4.

Figure 4: Montgomery County's Proposed Bus Rapid Transit Network

The plan recommends dedicated transit lanes along the full extent of the corridor, from Sandy Spring Road (MD 198) to the Silver Spring Transit Center. To achieve dedicated transit lanes, the plan recommends adding up to two additional lanes between Sandy Spring Road (MD 198) and Stewart Lane, but the rest of the corridor is expected to provide the dedicated transit lane by repurposing existing travel lanes. Between Sligo Creek Parkway and Georgia Avenue (MD 97), the six existing general-purpose lanes currently operate during peak hours as four lanes in the peak direction and two lanes in the off-peak direction. The plan recommends that the operation in peak hours include a dedicated transit lane in the peak direction.

While both the Managed Lanes and Median Bus Lanes alternatives represent an improvement to transit service along the corridor and a step towards realizing the long-term vision for the corridor as set out in the *Countywide Transit Corridors Functional Master Plan* (2013), they do so in different ways. While the Managed Lanes alternative improves bus service, it does so by both repurposing existing lanes to create peak period, peak direction HOV lanes south of New Hampshire Avenue (MD 65) and expands the number of lanes north of Stewart Lane, not through dedicated bus lanes. The Median Bus Lanes alternative creates dedicated bus lanes, but it does so by expanding the roadway, not

repurposing traffic lanes. Since dedicated bus lanes are called for in the master plan, the Median Bus Lanes alternative is more consistent with the *Countywide Transit Corridors Functional Master Plan* (2013) than the Managed Lanes alternative. A summary of master plan consistency is provided in Table 5.

Table 5: Evaluation of Master Plan Consistency for Number of General Purpose Lanes and Dedicated Transit Lanes

Roadway Segment	Master Planned			Managed Lanes			Median Bus Lanes		
	General Purpose Lanes	Transit Lanes	Total Lanes	General Purpose Lanes	Transit Lanes	Total Lanes	General Purpose Lanes	Transit Lanes	Total Lanes
MD 198/Sandy Spring to Industrial Pkwy	4-6	1-2	7-8	6	0	6	6	0	6
Industrial Pkwy to Stewart Ln	4-6	1-2	7-8	7*	0	7	6	2	8
Stewart Ln to Southwood Ave	4-5	1-2	6	6**	0	6	6***	1	7***
Southwood Ave to Timberwood Ave	4-5	1-2	6	6	0	6	6	1	7
Timberwood Ave to University Blvd	4-5	1-2	6	6	0	6	6	2	8
University Blvd to I-495	4-5	1-2	6	6	0	6	5	2	7
I-495 to Hastings/Grantville Dr	4-5	1-2	6	6	0	6	6	1	7
Hastings/Grantville Dr to Sligo Creek Parkway	4-5	1-2	6	6	0	6	6	1	7
Sligo Creek Parkway to North Noyes Street	4-5	1-2	6	6**	0	6	6	0	6
North Noyes Street to Spring Street	4	2	6	6**	0	6	6	0	6
Spring Street to Silver Spring Transit Center	4	2	6	6**	0	6	6	0	6

* In peak period / peak direction, uses shoulder to provide HOV lane

** In peak period / peak direction, uses one lane in the off-peak direction to provide a HOV lane

*** US 29 is reduced to two southbound lanes in the vicinity of the interchange at New Hampshire Ave

Number of lanes aligns with master plan recommendations

Number of lanes does not align with master plan recommendations

Additionally, the proposed station at Franklin Avenue is consistent with the *Countywide Transit Corridors Functional Master Plan* (2013).

Recommendations

Advance the Median Bus Lanes alternative. Only Median Bus Lanes can substantially incentivize people to get out of their cars as it will create both a fast and reliable transit service without speeding up car travel, which is critical for achieving the county's climate change, community development and transportation goals. Additionally, the Median Bus Lanes alterative best addresses historical injustices that have resulted in the heaviest traffic volumes (and resulting negative impacts to safety, air quality and community) in areas that Montgomery County defines as Equity Focus Areas. Finally, the Median Bus Lanes are most consistent with *Thrive Montgomery 2050* and the *Countywide Transit Corridors Functional Master Plan* (2013).

Defer a decision on improvements to US 29 between Sandy Spring Road (MD 198) and Tech Road until the Fairland and Briggs Chaney Master Plan is approved by the County Council in late 2023. Given that Fairland and Briggs Chaney Master Plan is currently developing a new vision for this section of the corridor and that the cost of upgrading the existing shoulders is $52 million but MCDOT's analysis shows only three to four minute travel time savings, it is prudent to defer this decision until the completion of the master plan. Deferring this improvement will have no impact on the other components of the project.

If the Median Bus Lanes alternative is advanced, provide a BRT station at Franklin Avenue. This station is recommended in the *Countywide Transit Corridors Functional Plan* (2013) and while anticipated boardings are low (200 per day), the station will provide better transit service to an underserved area and is within the recommended station spacing for BRT corridors (0.5 to 1.0 miles) of the closest stations (Four Corners and Fenton Street).

SECTION 5

INTERSECTION AND INTERCHANGE IMPROVEMENTS

This section of the staff report describes and evaluates intersection and interchange improvements identified in the study and provides staff recommendations.

Description

Both the Managed Lanes and Median Bus Lanes alternatives include additional capacity improvements to reduce vehicle delay along the corridor (e.g., intersection turn lanes). Asterisks (*) indicate a master-planned improvement.

Managed Lanes Alternative

The Managed Lanes alternative includes traffic capacity improvements at six locations.

- US 29 at Greencastle Road
  - Add an eastbound right-turn lane
  - Add second southbound left-turn lane and eastbound receiving lane
- US 29 at Tech Road
  - Add second southbound left-turn lane*
  - Widen the westbound approach to provide additional right-turn lane*
- US 29 at Stewart Lane
  - Add a second southbound left-turn lane*
- US 29 at New Hampshire Avenue (MD 650)
  - Widen US 29 within the New Hampshire Ave (MD 650) interchange to provide three continuous southbound through lanes*
- US 29 at I-495
  - Designate a second exit lane onto the ramp from southbound US 29 to westbound I-495 (Outer Loop)
- Sligo Creek Parkway at US 29
  - Provide a second westbound through lane*

Median Bus Lanes Alternative

The Median Bus Lanes alternative includes traffic capacity improvements at two locations.

- US 29 at Greencastle Road
  - Add an eastbound right-turn lane
  - Add second southbound left-turn lane and eastbound receiving lane
- US 29 at I-495
  - Designate a second exit lane onto the ramp from southbound US 29 to westbound I-495 (Outer Loop)

Analysis

The proposed motor vehicle capacity improvements substantially reduce delay at all four intersections during both the AM and the PM peak periods as shown in Table 6. Reductions in delay at the intersection would also have benefits to mainline traffic and travel times for US 29.

Table 6: Comparison of Intersection Level of Service for the No Action and Managed Lanes Alternatives (2040)

Intersection	AM			PM		
	No Action	Managed Lanes	Median Bus Lanes	No Action	Managed Lanes	Median Bus Lanes
US 29 & Greencastle Rd	F (163)	F (84)	F (102)	F (172)	F (123)	F (103)
US 29 & Tech Road	F (106)	D	n/a	F (156)	D	n/a
US 29 & Stewart Lane	B	A	n/a	E (64)	B	n/a
US 29 & Sligo Creek Parkway	F (152)	F (87)	n/a	F (196)	F (162)	n/a

Note: For LOS E and LOS F, intersection delay (in seconds) is shown in parentheses.

In order to provide dedicated transit lanes through Four Corners, MCDOT found that a second ramp lane is needed from southbound US 29 to westbound I-495 to improve lane utilization along southbound US 29 in the AM peak period and to reduce substantial backups. MCDOT believes this modification is essential to receiving Maryland Department of Transportation approval to add BRT lanes in Four Corners, as it would reduce delay accessing I-495 in the morning for vehicles traveling in the southbound direction by 11 minutes according to the results of the traffic simulation. However, adding a second exit lane onto the ramp from southbound US 29 to westbound I-495 would degrade pedestrian safety. There is currently a single lane unsignalized, marked crossing across the westbound on-ramp to I-495. Pedestrians wait for gaps in traffic, then cross when it is safe to do so. Adding a second ramp lane would require pedestrians to identify a gap in two lanes of traffic, creating a multiple-threat situation. This interchange is surrounded by residential development and adjacent to Montgomery Blair High School, the high school with the largest student enrollment in the county. The study acknowledges that this proposed improvement has safety implications and MCDOT is committed to identifying further pedestrian safety treatment options in future design phases.

Image shows southbound US 29 at the I-495 ramp. The ramp is proposed to be widened from one to two lanes.

On southbound US 29, between the off ramp to New Hampshire Avenue (MD 650) in the direction of Langley Park and the on-ramp from New Hampshire Avenue to southbound US 29, the highway drops from three through lanes to two through lanes, as the rightmost lane becomes the exit ramp. This creates a chokepoint for southbound traffic. An analysis of the travel time benefits of widening US 29 within the New Hampshire Ave (MD 650) interchange by adding a third southbound lane would reduce travel times by about two minutes in the Managed Lanes and Median Bus Lanes alternatives at a cost of $6-7 million.

Image shows that southbound US 29 is currently reduced from three to two through lanes within the interchange with New Hampshire Avenue (MD 650).

Master Plan Consistency

A primary focus of this review is to ensure consistency with Montgomery County's master plans. The primary plans providing direction on intersection and interchange improvements along US 29 are *Thrive Montgomery 2050* and the *White Oak Science Gateway Master Plan* (2014) and the *North and West Silver Spring Master Plan* (2000).

THRIVE MONTGOMERY 2050

The Transportation and Communications Networks chapter of *Thrive Montgomery 2050* identifies the following main policy guiding the development of Montgomery County's transit network: "Develop a safe, comfortable and appealing network for walking, biking, and rolling." This policy includes two relevant practices:

- Prioritize the provision of safe, comfortable, and attractive sidewalks, bikeways, roadway crossings, micromobility infrastructure and services, and other improvements to support walking, bicycling, micromobility, and transit usage in capital budgets, development approvals and mandatory referrals.
- Transform the road network by incorporating complete streets design principles with the goal of eliminating all transportation-related roadway fatalities and severe injuries and supporting the emergence of more livable communities.

Generally, adding turns lanes degrades the safety, comfort and attractiveness of walking and bicycling, and if these improvements move forward, MCDOT will need to consider ways to mitigate

these adverse effects, through enhancements such as protected turn phases, high-visibility crosswalks, and geometric approaches to manage the speed of turn vehicles.

WHITE OAK SCIENCE GATEWAY MASTER PLAN (2014)

Several improvements are consistent with existing master plans, specifically the *White Oak Science Gateway Master Plan* (2014) and the subsequent *White Oak Science Gateway LATR/LATIP* (2019). The addition of a second southbound left-turn lane at both Stewart Lane and Tech Road to accommodate the build out of the Life Sciences/FDA Village Center (including Viva White Oak), is consistent with the capacity projects identified in the master plan, as is the addition of a westbound right-turn lane on Tech Road at US 29. The cost of providing three continuous southbound lanes on US 29 through the MD 650 interchange is also included in the White Oak Science Gateway LATR/LATIP, but this recommendation does not appear to be a project that the LATR/LATIP will fund (see Table 7).

Table 7: White Oak Science Gateway LATR / LATIP Cost Estimating Analysis White Paper, December 2017

Location	Estimated Cost	Identified Needs
US 29 and Stewart Lane	$3,300,000	Add: 1 NBT, 1 SBT, 1 SBL
US 29 and Industrial Parkway	$4,400,000	Add: 1 SBL | Relocation of 2 NBR from intersection
US 29 Spur and Old Columbia Pike		Relocate 2 NBR on US 29 to spur connecting to Old Columbia Pike just south of Industrial Pkwy
Old Columbia Pike and Industrial Pkwy		Signalization |Add: 1 WBR
US 29 and Tech Road	$3,300,000	Add: NBT, SBT, SBL, WBR | Prohibit EBL, WBL
US 29 Ramps at Randolph Rd / Cherry Hill Rd	$2,000,000	Add: 1 EBT | Reconfigure: SBR to shared right-left
MD 650 and Powder Mill Road	$5,000,000	[requires further evaluation]
MD 650 and Lockwood Drive	$1,400,000	Add: 1 NBL, 1 WBT, +receiving lane on west leg
Tech Road and Prosperity Drive	$2,300,000	Signalization | Turn Restrictions: NBR, SBR only
Tech Road and Broadbirch Drive	$1,700,000	Signalization | Add: 1 WBR,1 NBR
Tech Road and Industrial Pkwy	$4,400,000	Signalization | Add: 2 EBL, 1 WBR, 1 SBL
Broadbirch Drive at Cherry Hill Rd	$3,600,000	Add: 1 SBT, 1 SBR, 1 WBT, 1 EBT, 1 EBR
Broadbirch Drive at Plum Orchard Rd		Signalization |Restripe: NB and SB Approaches to 4-lane Cross-Section
TOTAL	**$31,400,000**	

NORTH AND WEST SILVER SPRING MASTER PLAN (2000)

In addition, widening Sligo Creek Parkway to accommodate another through lane is included as a consideration in the *North and West Silver Spring Master Plan* (2000). However, intersection improvements at Greencastle Road and I-495 are not master plan recommendations.

Recommendations

Delay implementation of a second ramp lane from southbound US 29 to westbound I-495. However, if advancing a second ramp lane is deemed essential to traffic operations, this improvement must be accompanied by improvements that eliminate conflicts between motor vehicles and pedestrians/bicyclists with a pedestrian and bicyclist overpass or traffic control on the west side of US 29. Adding a second ramp lane would require pedestrians to identify a gap in two lanes of traffic, creating a multiple-threat situation that degrades pedestrian safety. But traffic volumes on the ramp continue to be below pre-COVID levels (15,100 vehicles per days in 2021 compared to 16,500 in 2019). Therefore, MCDOT should continue to evaluate traffic volumes on the ramp to determine if adding a second lane on the ramp is needed.

If the Median Bus Lanes alternative is advanced:

- **Defer a decision on capacity improvements at the intersection of US 29 and Greencastle Road until the Fairland and Briggs Chaney Master Plan is approved by the County Council in late 2023.** As the Fairland and Briggs Chaney Master Plan is currently developing a new vision for this section of the corridor with a strong focus on pedestrian safety, it is prudent to defer this decision about intersection improvements at Greencastle Road pending approval of the master plan by the County Council. Delaying this improve will impact travel times for both the Managed Lanes and Median Bus Lanes alternatives.

If the Managed Lanes alternative is advanced:

- **Do not advance motor vehicle capacity improvements at the intersections of US 29 with Greencastle Road, Tech Road, Stewart Lane or Sligo Creek Parkway.** As the Fairland and Briggs Chaney Master Plan is currently developing a new vision for this section of the corridor, it is prudent to defer this decision about intersection improvements at Greencastle Road pending approval of the master plan by the County Council. While the Tech Road and Stewart Lane intersection improvements are necessary to accommodate the growth in traffic associated with Life Sciences / FDA Village Center (including Viva White Oak) and White Oak Center, these improvements are intended to be funded by private development projects through the White Oak Science Gateway LATIP fee, not Montgomery County. Additionally, the Parks Department has indicated that an additional westbound through and receiving lane at Sligo Creek Parkway will not be approved as it will have significant Parkland impacts and does not align with M-NCPPC parkway management goals.
- **Consider adding a third southbound lane on US 29 within the New Hampshire Avenue (MD 650) interchange.** Reducing travel times by two minutes at a cost of $6-7 million is reasonable investment and is consistent with approved master plans.

SECTION 6

PARKS

The study corridor crosses three Stream Valley Parks (SVPs):

- Sligo Creek Stream Valley Park (Units 2 and 3)
- Northwest Branch Stream Valley Park (Units 3 and 4)
- Paint Branch Stream Valley Park (Units 4 and 5)

Other M-NCPPC Parks within the Study Corridor (within 200 feet of pavement) include:

- Calverton NCA
- Stonehedge LP
- Hasting NCA
- Ellsworth UP
- Gene Lynch UP
- Silver Spring Transit Center Plaza UP
- Burnt Mills East SP
- Burnt Mills West SP

In addition, one existing hard surface park trail and two natural surface park trails (one existing, one proposed) cross US 29:

- Hard Surface: Sligo Creek Trail, at grade and signalized, at Sligo Creek Parkway
- Natural Surface: Northwest Branch Trail/Rachel Carson Greenway Trail (uncontrolled); Paint Branch Trail (proposed) under the US 29 bridge over Paint Branch stream.

The following streams on parkland pass under U.S. 29:

- Sligo Creek: Use Class I - non-tidal stream
- Northwest Branch: Use Class IV - recreational trout waters
- Paint Branch: Use Class III - on-tidal cold water, naturally reproducing trout stream

The Northwest Branch Stream Valley Units are considered a Best Natural Area and the Paint Branch Stream Valley Units are considered a Biodiversity Area. These designations require special consideration and mitigation for all proposed impacts to the sensitive natural resources within these park areas.

Corridor improvements will likely impact at least one of the above parks and will have impacts to the streams. At the time of more detailed planning and design for the selected improvements, Montgomery Parks will provide detailed comments, including opportunities to improve trail connections, protect natural resources, and to improve stormwater discharge into streams on parkland.

As part of the Managed Lanes and Median Bus Lanes alternative, MCDOT is adding and relocating short segments of sidewalks, including on parkland. This includes adding a sidewalk on Sligo Creek Parkway on the northeast corner of US 29 at Sligo Creek Parkway, which was recently removed and does not connect to anything. It also includes a sidewalk along Burnt Mills East Special Park that will need to be reviewed in more detail as the project advances to consider pedestrian safety, historic compatibility, and facilitating access to this unique park.

Recommendations

Do not construct a sidewalk on Sligo Creek Parkway at the northeast corner of the US 29 and Sligo Creek Parkway intersection as part of the US 29 Mobility and Reliability Project. Instead, consider including a sidewalk along the northside of Sligo Creek Parkway from US 29 to Worth Avenue in the US 29 Pedestrian and Bicycle Improvements program. While improved walking conditions are needed on the north side of Sligo Creek Parkway, the sidewalk currently shown on concept plans would have little benefit and instead should be evaluated as part of a larger sidewalk project.

The proposed sidewalk relocation at Burnt Mills East Special Park will need to be reviewed in more detail by Parks staff and will be subject to issuance of a Historic Area Work Permit.

Any proposed work on parkland would require Concept Review and Park Construction Permit review and approval.

SECTION 7

PUBLIC ENGAGEMENT

Throughout the study, public engagement was performed to solicit input on transportation issues and concerns, existing condition data, alternatives to be evaluated and draft recommendations. Public meetings were held in November 2021, December 2021 and June 2022. Additional recurring stakeholder coordination occurred with the Maryland DOT State Highway Administration, the Planning Department, and County Council/ Executive.

Public meetings on the study recommendations were conducted on Thursday, October 6 and Thursday, October 13. In addition, an online survey was posted soliciting feedback on the options. Key takeaways from these meetings includes:

- Feedback during the public meetings voiced support for improving transit, with support for both the Median and Managed Lane alternatives. Preliminary survey results show a slight preference for the Median Bus Lane (12) over the Managed Lane (7) and the No Build (7).
- People voiced interest in adding a station at Franklin Avenue during the public meeting, in written comments, and through the survey.
- Safety is a concern for many residents along the corridor. Many people raised concerns regarding pedestrian crossings and traffic calming.
- Community members are concerned about traffic worsening along US 29 and the potential result of non-local traffic using neighborhood streets (i.e. cut-through traffic).
- Neighborhoods are concerned that additional turn restrictions and signals will have negative impacts on the ability to access their neighborhoods.

ATTACHMENTS

Attachment 1: Planning Board Letter to County Council re US 29 Mobility and Reliability Study, October 19, 2022

Attachment 2: US 29 Mobility and Reliability Study Staff Report, October 8, 2020

APPENDIX A: WHAT IS BUS RAPID TRANSIT?

This section of the staff report provides a description of several BRT components, including transitway types, operational improvements and station enhancements.

TRANSITWAY TYPES

Transit service can be provided via a variety of transitway types: a dedicated two-lane median transitway, a dedicated one-lane median transitway (to accommodate transit service in one direction or in both directions), dedicated curb lanes transitway, or running in mixed traffic. The transitways can be mixed and matched along the corridor to provide the best solution within the existing constraints and needs of the area. These transitway types are described in more detail below.

Dedicated Two-Lane Median Transitway

Two lanes located in the center of the roadway that are dedicated for use by the BRT vehicle and may be physically separated from traffic by a raised curb or median. Median BRT lanes minimize conflicts with general purpose traffic lanes and allow the BRT vehicle to travel with faster speeds and greater travel time reliability. To avoid conflicts with BRT vehicles, general traffic is only permitted to make left turns at signalized intersections. Two-lane median transitways require the most space and are therefore the most costly and impactful to implement. An example of a two-lane median transitway is the Metroway on US 1 in Alexandria.

The Metroway BRT Service Operates in a Two-Lane Median Transitway

Dedicated One-Lane Median Transitway

Multiple types of BRT operations are being considered utilizing a single BRT lane, including: bi-directional, fixed direction, and reversible transit operations.

In bi-directional operations, BRT vehicles traveling in both directions share a single dedicated lane in the center of the roadway. Since the BRT vehicles travel within this one lane in both directions, passing zones are created, generally at station locations, so BRT vehicles moving in opposite directions do not conflict with each other.

In fixed-direction operations, a single median BRT lane is used solely by the BRT vehicles in one direction. The BRT vehicles travel in general purpose traffic lanes in the other direction.

In reversible-direction operations, the direction of the BRT vehicle in the one-lane median varies depending on the time of day. BRT vehicles traveling in the peak direction use the median BRT lane and BRT vehicles traveling in the non-peak direction use the general traffic lanes. An example of a one-lane median transitway is the Emerald Express in Eugene, Oregon.

One-lane median transitways are most appropriate on roadways where the directional split of travel varies by the time of day. In the peak direction it provides fast speeds and reliability but is less costly and impactful than two-lane median transitways. On roads where the directional split of travel is balanced, one-lane median transitway result in slower speeds and less travel time reliability for the direction of travel that uses general traffic lanes.

A One-Lane Median Transitway in Eugene, Oregon (Credit: Google Maps)

Dedicated Curb Lanes Transitway

The lanes adjacent to the curb are used exclusively by the BRT vehicle, local buses, and right-turning vehicles. The roadway surface may be painted or otherwise marked to reinforce the lane designation. Similar to the median guideways, multiple types of dedicated curb lane operations are being considered including two lanes (one on each side of the roadway), and one curb BRT lane in locations where existing constraints make additional widening impactive and where off-peak BRT vehicles can efficiently operate in mixed traffic. This transitway is less costly and impactful than the two-lane and one-lane median transitways, but speed and travel time reliability will suffer due to right turning vehicles and non-recurring congestion. An example of a curb lane transitway is in Washington, DC.

Curb Lane Transitway in Washington, DC

Mixed Traffic

The BRT vehicle travels in the same lanes as traffic. It would not have lanes dedicated for its use.

OPERATIONAL IMPROVEMENTS

Transit Signal Priority

Transit Signal Priority (TSP) gives priority to BRT vehicles when certain conditions are met by either extending a green light or shortening a red light by a few seconds to allow an approaching BRT vehicle to pass through the intersection. TSP was implemented on the MD 355 corridor between Medical

Center and the Lakeforest Transit Center as part of Ride On extRa service and on US 29 as part of the US 29 Flash service implementation in 2020.

Queue Jumps

Queue jumps are a short section of widened roadway or an existing right turn lane to allow BRT vehicles to bypass congestion or delays at intersections. In most applications, queue jumps are used in conjunction with TSP to provide a lane and dedicated BRT signal that allows BRT vehicles to enter an intersection and "jump" ahead of the other vehicles stopped at the light. In some locations where constraints allow, the roadway is widened to provide a receiving lane that allows the BRT vehicle to merge into traffic beyond the signal. This is beneficial if there is no "BRT Only" signal phase.

TRANSIT VEHICLES

Premium Transit Vehicles

BRT vehicles offer a higher quality of service than typical transit vehicles.

US 29 Flash Vehicle (Photo Credit: MCDOT)

Level Boarding

Like Metrorail, BRT services often provide level boardings, which allows persons with mobility challenges to board the BRT vehicle more easily.

Level Boardings on the US 29 Flash (Photo Credit: MCDOT)

Enhanced Stations

BRT services include enhanced stations with weather protection, seating, lighting, off-board fare collection, real time information displays, landscaping/hardscaping and bicycle accommodations.

An Enhanced Station on the US 2 Flash (Photo Credit: Montgomery Planning)

Off-Board Fare Collection

Like Metrorail, BRT services collect fares from passengers before they board the vehicle, to reduce travel time delay.

Off-Board Fare Collection on the US 29 Flash (Photo Credit: MCDOT)