

# GERMANTOWN MULTIMODAL IMPROVEMENTS STUDY: ALTERNATIVES ANALYSIS

## Description

The Germantown Multimodal Improvements Study identifies several potential alternatives for improving pedestrian and bicycle conditions along sections of Wisteria Drive (Great Seneca Highway to Germantown Road) and Middlebrook Road (Great Seneca Highway to Germantown Road).

Completed: 2/22/2024

MCPB

Item No. 8

2/29/2024

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## Summary

- Montgomery County Department of Transportation is studying potential options to improve pedestrian and bicycle travel in Germantown along Wisteria Drive and Middlebrook Road
- Staff recommends supporting the phased approach to this project as described below, and sharing that perspective with the County Council
- Staff also recommends transmitting additional comments to MCDOT for further project refinement

### LOCATION

Wisteria Drive between Germantown Road (MD 118) and Great Seneca Highway (MD 119)

Middlebrook Road between Germantown Road (MD 118) and Great Seneca Highway (MD 119)

### MASTER PLAN

2018 Bicycle Master Plan, 2019 MARC Rail Communities Sector Plan

### APPLICANT

Montgomery County Department of Transportation

### ACCEPTANCE DATE

N/A

### REVIEW BASIS

N/A

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## SECTION 1 – RECOMMENDATIONS

Planning Staff recommends transmitting the following comments to Montgomery County Council's Transportation and Environment Committee and the Montgomery County Department of Transportation:

### Comments

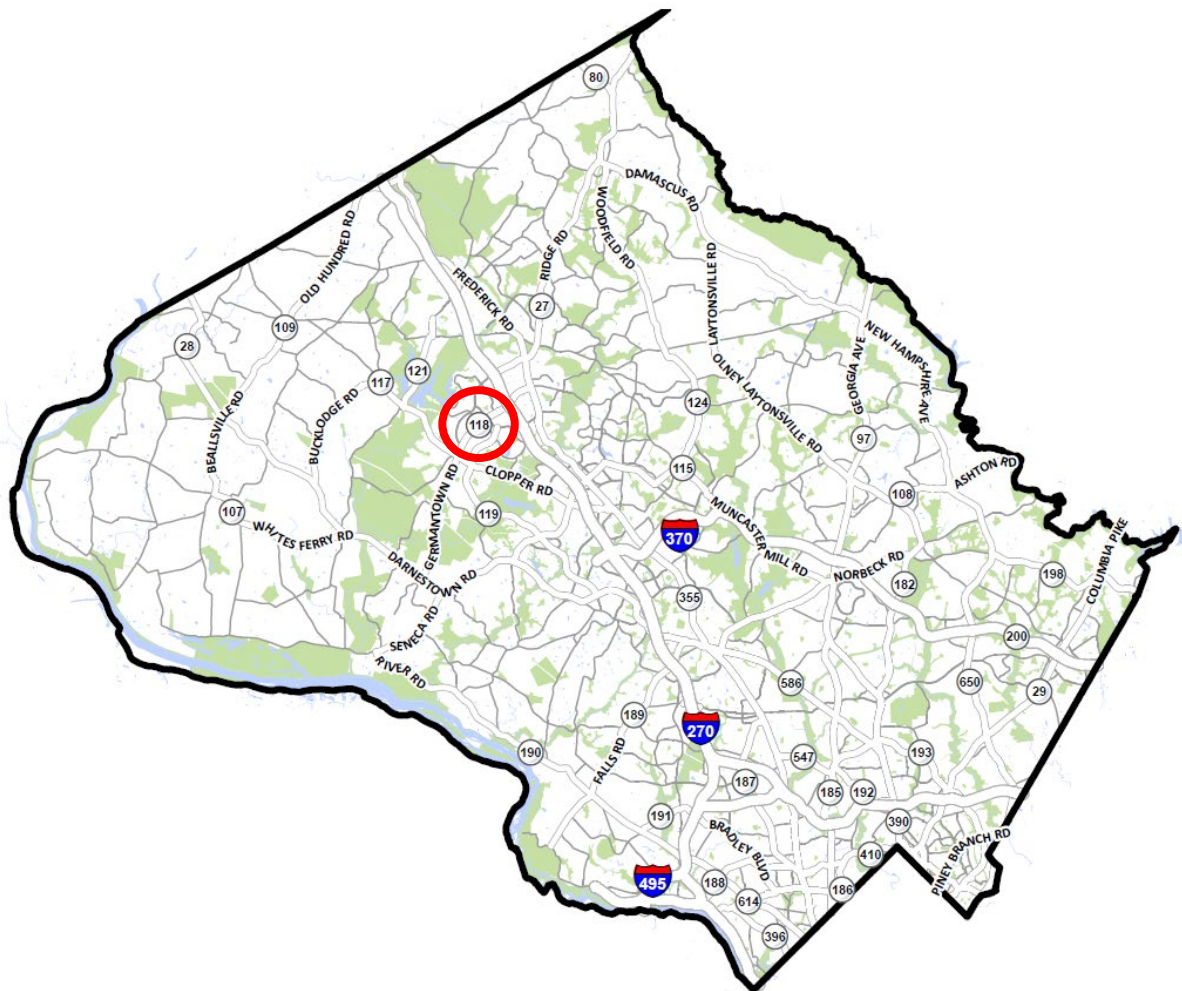
- Wisteria Drive
  - Project Phasing: Advance Alternative 1 as the Interim Bikeway, as it can be constructed relatively quickly with minimal negative impacts. Over time, upgrade the bikeway to Alternative 2a, the Permanent Bikeway, which would provide more permanent separation from traffic.
  - Alternative 2a Modifications: Transition the on-road separated bike lanes to off-road separated bike lanes just east of the CVS driveway and continue the off-road separated bike lanes to Germantown Road.
- Middlebrook Road
  - Project Phasing: Advance Alternative 1 as the Interim Bikeway, as it can be constructed relatively quickly with minimal negative impacts. Over time, upgrade the bikeway to Alternative 2, the Permanent Bikeway, which would provide more permanent separation from traffic.
  - Alternative 1 and Alternative 2 Modifications: Extend the separated bike lanes from the Bank of America driveway to Germantown Road.
  - Alternative 2 Modifications: Upgrade the existing separated bike lanes on the south side of Middlebrook Road as part of Alternative 2.
- Future Considerations
  - Ensure all intersections comply with Montgomery Planning's Protected Intersection Checklist to the extent possible.

## SECTION 2 - PROJECT DESCRIPTION

### Background

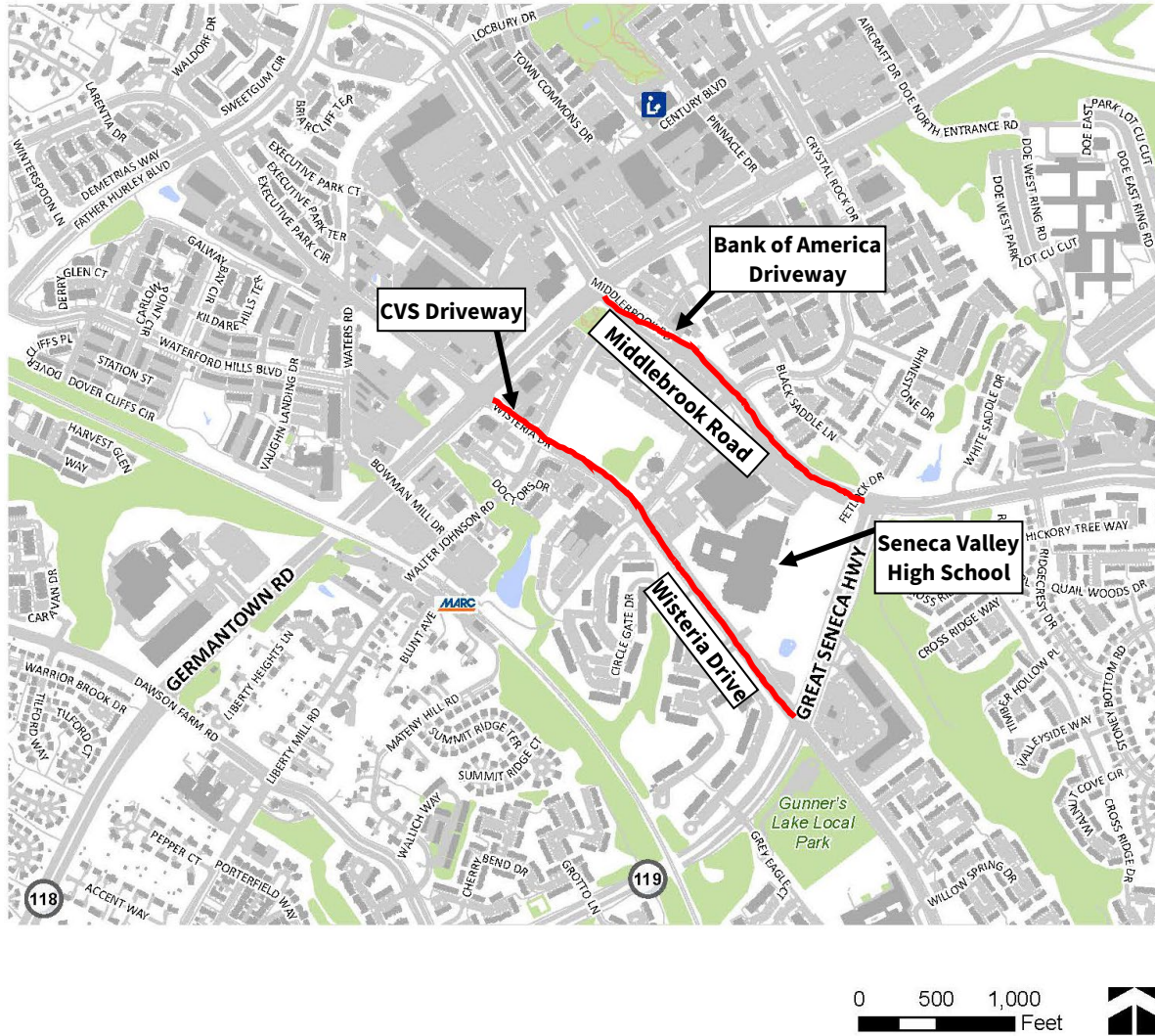
The Montgomery County Department of Transportation (MCDOT) is investigating alternatives for constructing bicycle and pedestrian improvements in Germantown along the Wisteria Drive and Middlebrook Road corridors, in the region identified in Figure 1 by a red circle. The project is funded under Facility Planning – Transportation (CIP NO. 509337). It is not currently funded for final design or construction.

Figure 1: Project Area Map (Countywide)



The Wisteria Drive study area is approximately 0.6 miles long and extends between Germantown Road (MD 118) and Great Seneca Highway (MD 119). The Middlebrook Road study area is a 0.4-mile-long section between Germantown Road (MD 118) and Great Seneca Highway (MD 119), as shown in Figure 2.

Figure 2: Study Corridors



Wisteria Drive is a two-lane, undivided roadway. Middlebrook Road is a five-lane divided roadway. Both roadways travel in an east-west direction. Both roadways are classified as Town Center Boulevards in the Master Plan of Highways and Transitways. The target speed for Wisteria Drive is 25mph, while the posted speed limit is 30mph. The target speed for Middlebrook Road is 35mph, and the posted speed limit is 35mph.

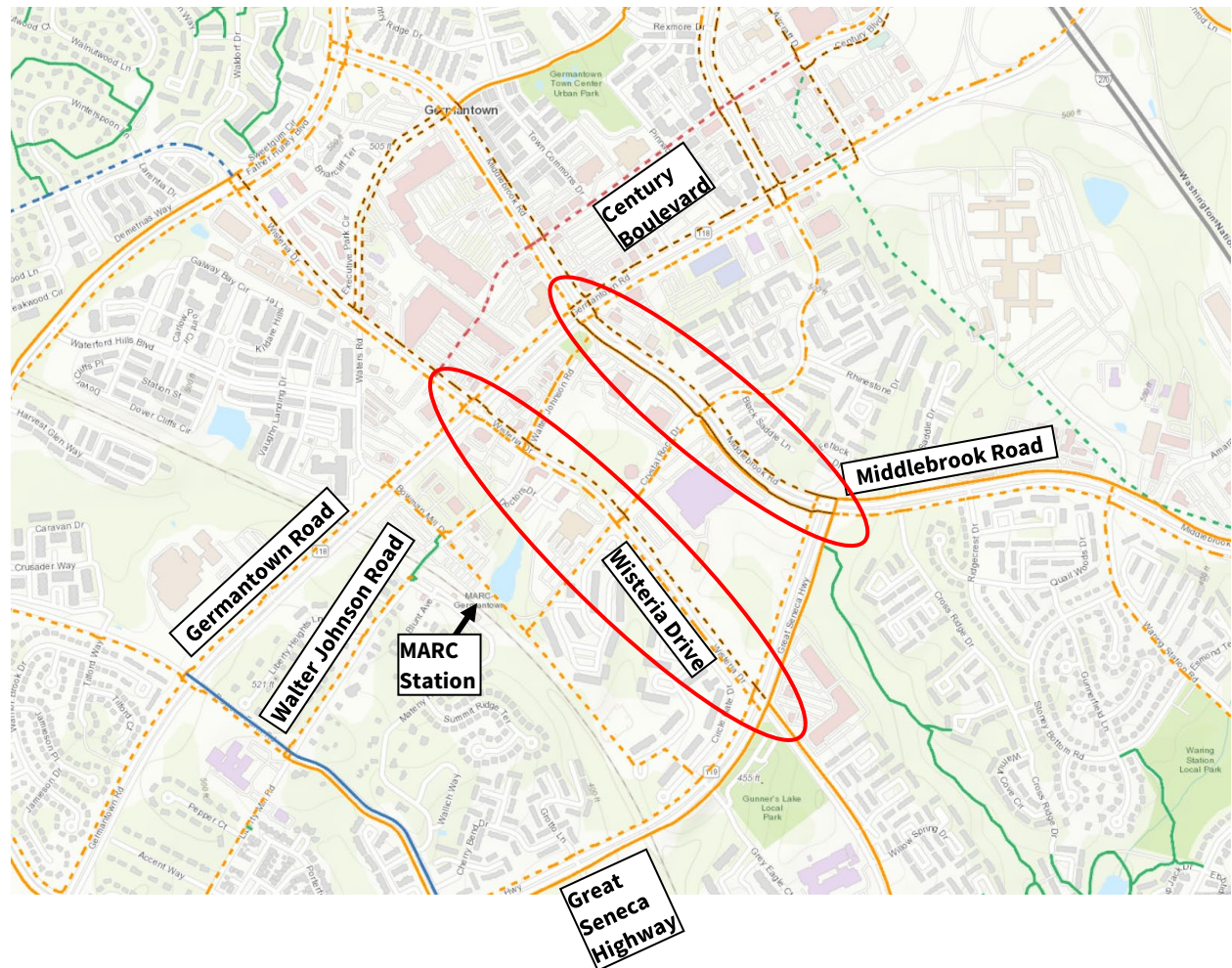
Land use within the study area includes both commercial/residential zoning and some medium density residential areas. In addition, Seneca Valley High School is bounded by the two study roadways on the west and east, Crystal Rock Drive on the north and Great Seneca Highway on the south.

As master-planned, Wisteria Drive and Middlebrook Road will ultimately provide essential east-west bicycle connectivity across Germantown Road, connecting Seneca Valley High School and

southeastern Germantown to the town center area, Century Boulevard and points northwest like Black Hill Regional Park. Figure 3 highlights the role these corridors play in the master-planned bikeway network. The project would allow for connections to an existing sidepath along Great Seneca Highway, a sidepath along the north side of Wisteria Drive to Waring Station Road, the Gunners Lake trail network and the Germantown MARC station via Walter Johnson Road, including a new to-be-constructed twelve-foot-wide sidepath along the LIDL Germantown frontage. A two-way separated bike lane also already exists along the south side of Middlebrook Road in the study corridor.

The project advances pedestrian and bicycle safety along Germantown area roadways that have a history of motor vehicle crashes resulting in severe injury or fatality. Middlebrook Road is one of the roadways in the county’s High Injury Network (roadways with the highest incidences of serious and fatal collisions). Wisteria Drive in the study area is the site of two fatal pedestrian crashes involving school-age children, one in 2012 and one in 2023.

Figure 3: Master-Planned Bikeways in Germantown



## Project Description

The project developed four conceptual alternatives along Wisteria Drive and two conceptual alternatives along Middlebrook Road to improve bicycling conditions. All Wisteria Drive alternatives include a new traffic signal at the Walter Johnson Road intersection. Each bikeway alternative provides additional buffer space for pedestrians, better separating them from motor vehicle traffic. After a preferred alternative is selected and additional funding is identified, detailed design will include bus stop improvements to mitigate bicyclist-transit user conflicts, including elements like floating bus stops, potential new bus shelters, and other treatments. The alternatives are phased by the level of investment required for construction. A general description and typical sections of each alternative follows.

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### WISTERIA DRIVE ALTERNATIVES

MCDOT proposes to improve conditions for bicycling on Wisteria Drive between Germantown Road and Great Seneca Highway as part of a three-phased project:

**Short Term:** Minimal investments to provide two-way separated bike lanes on the north side with a painted buffer using existing roadway space.

**Medium Term:** Moderate investment to *either* provide two-way separated bike lanes with a median buffer using existing roadway space *or* replace the existing sidewalk with a sidepath on the north side.

**Long Term:** Major investments to provide two-way separated bike lanes on the north side with a painted buffer by widening the roadway.

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### SHORT TERM: BIKEWAY IMPROVEMENTS WITH MINIMAL INVESTMENT

#### **Alternative 1**

This alternative provides eight-foot-wide two-way separated bike lanes along the north side of Wisteria Drive between Walter Johnson Road and Great Seneca Highway. A striped buffer and occasional on-street parking separate the bikeway from motor vehicle travel lanes. Space for the separated bike lanes comes from reclaiming roadway pavement: either removing an existing second lane on some blocks or narrowing an existing wide lane on other blocks. At the intersection with Walter Johnson Road, the separated bike lanes transition into an existing sidepath that runs along the north side of Wisteria Drive between Walter Johnson Road and Germantown Road. This enables MCDOT to maintain an existing right-turn lane so that motor vehicle Level of Service is not degraded at the Germantown Road intersection (Figure 6). Additionally, the project provides an eight-foot sidepath along the south side of Wisteria Drive.



Figure 4: Wisteria Alternative 1. Walter Johnson Road to Crystal Rock Drive (Looking East)

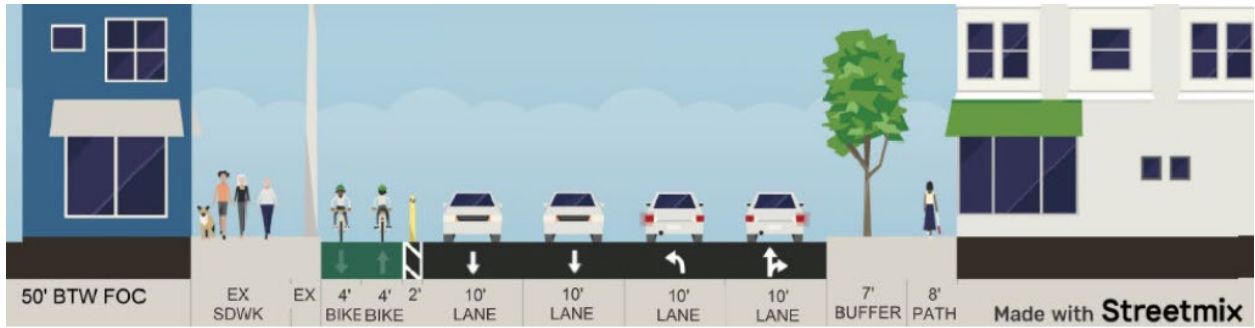


Figure 5: Wisteria Alternative 1. Crystal Rock Drive to Great Seneca Highway (Looking East)

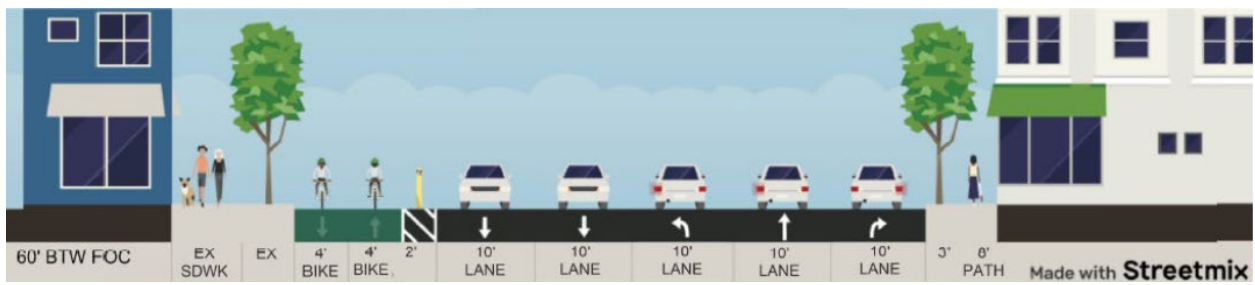
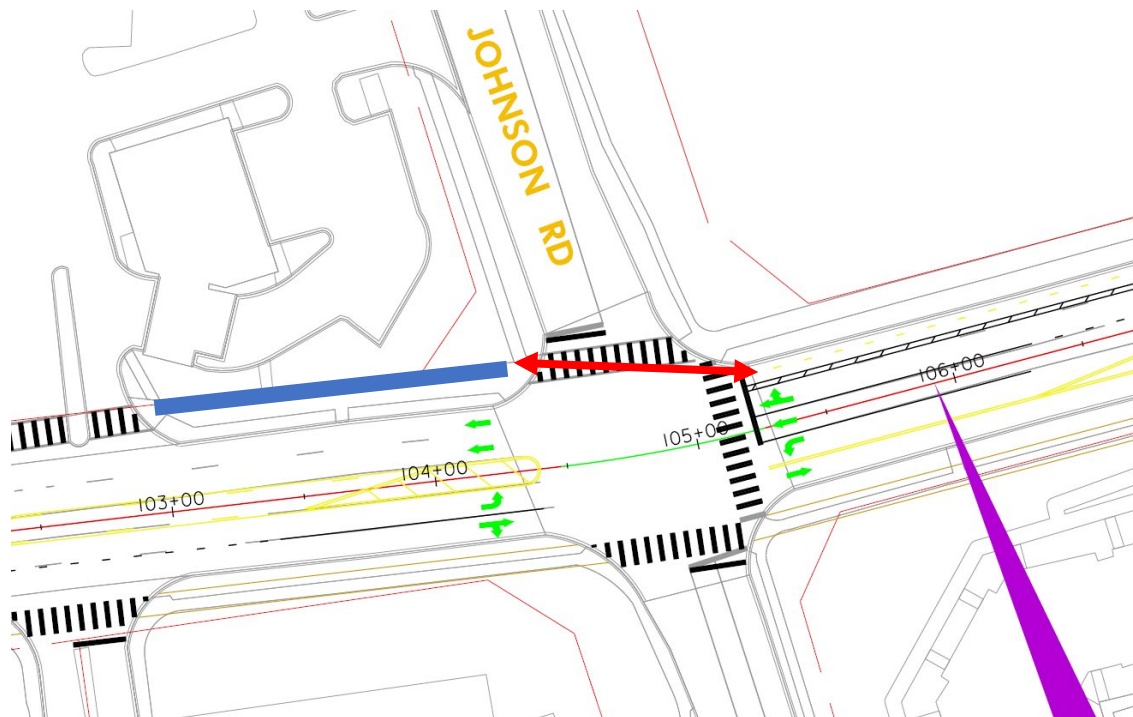


Figure 6: Wisteria Alternative 1. Western Terminus



## MEDIUM TERM: BIKEWAY IMPROVEMENTS WITH MODERATE INVESTMENT

### Alternative 2a

This alternative provides twelve-foot-wide two-way separated bike lanes along the north side of Wisteria Drive between the CVS driveway 300' east of Germantown Road and Great Seneca Highway. A raised median separates the bikeway from motor vehicle travel lanes. Space for the separated bike lanes comes from reclaiming roadway pavement: either removing an existing second lane on some blocks or narrowing an existing wide lane on other blocks. At the CVS driveway, the separated bike lanes transition to an existing sidepath that runs along the north side of Wisteria Drive between Walter Johnson Road and Germantown Road. This alternative maintains the existing curb line and provides an eight-foot sidepath along the south side of Wisteria Drive within the study limits.

Figure 7: Wisteria Alternative 2a. Walter Johnson Road to Crystal Rock Drive (Looking East)

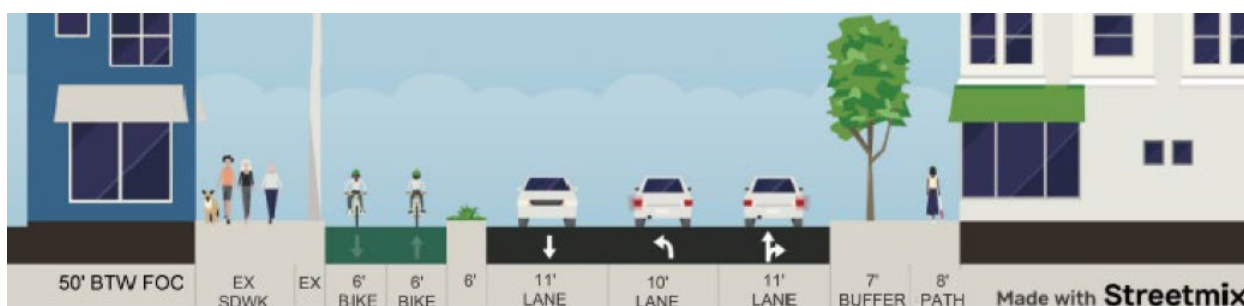
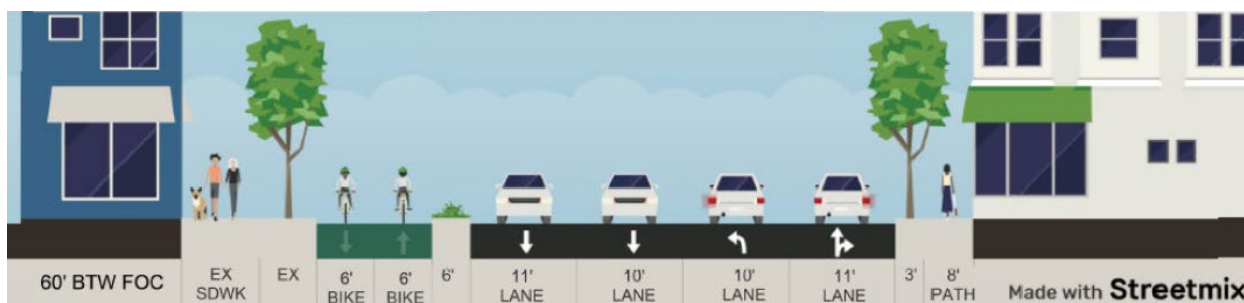


Figure 8: Wisteria Alternative 2a. Crystal Rock Drive to Great Seneca Highway (Looking East)



### Alternative 2b

This alternative provides a fourteen-foot sidepath along the north side of Wisteria Drive between Germantown Road and Great Seneca Highway. This alternative maintains the existing vehicular lane configuration and is constructed entirely outside the roadway. It does not move curbs. This alternative includes a minimum three-foot grass buffer between the sidepath and motor vehicle travel lanes. It also provides an eight-foot sidepath along the south side of Wisteria Drive within the study limits.

Figure 9: Wisteria Alternative 2b. Walter Johnson Drive to Crystal Rock Drive (Looking East)

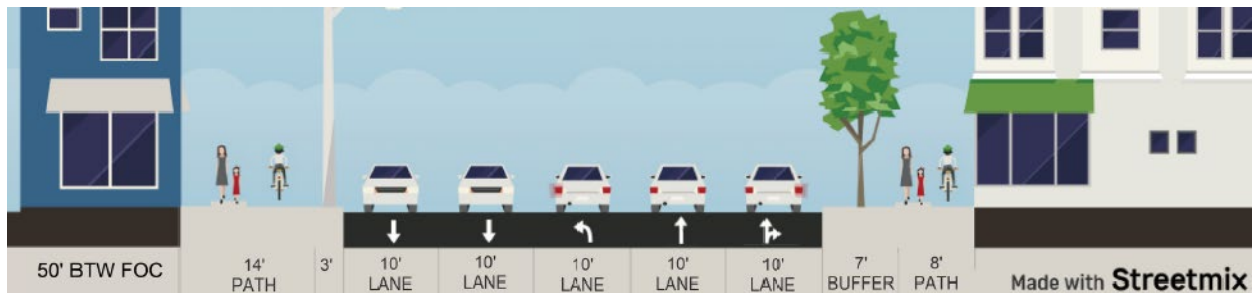
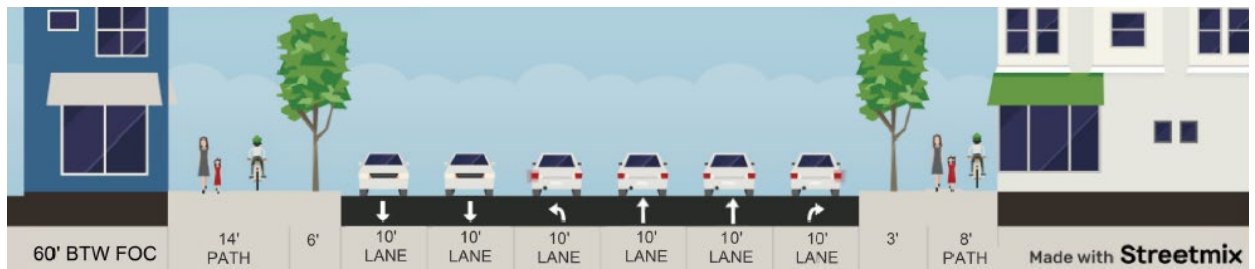


Figure 10: Wisteria Alternative 2b. Crystal Rock Drive to Great Seneca Highway (Looking East)

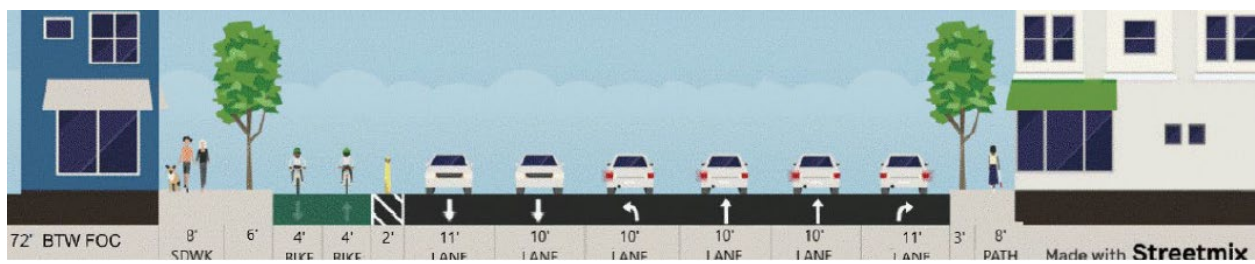


**LONG TERM: BIKEWAY IMPROVEMENTS WITH MAJOR INVESTMENT**

**Alternative 3**

This alternative provides an eight-foot two-way separated bike lane along the north side of Wisteria Drive from Germantown Road to Great Seneca Highway separated with pavement markings and occasional on-street parking from adjacent motor vehicle travel lanes. To accommodate all modes, the existing 50' roadway would be widened to 72'. This alternative also provides an eight-foot sidepath along the south side of Wisteria Drive within the study limits.

Figure 11: Alternative 3. Wisteria Drive Corridor (Looking East)



**MIDDLEBROOK ROAD ALTERNATIVES**

MCDOT also proposes to improve conditions for walking and bicycling on the north side of Middlebrook Road between Germantown Road and Great Seneca Highway as part of a two-phased

project. This would complement the existing two-way separated bike lanes on the south side of Middlebrook Road that MCDOT completed in 2020.

Short Term: Minimal investments to provide two-way separated bike lanes on the north side with a painted buffer by removing a lane of traffic.

Medium Term: Moderate investment to upgrade the painted buffer implemented in the short-term to a raised median buffer.

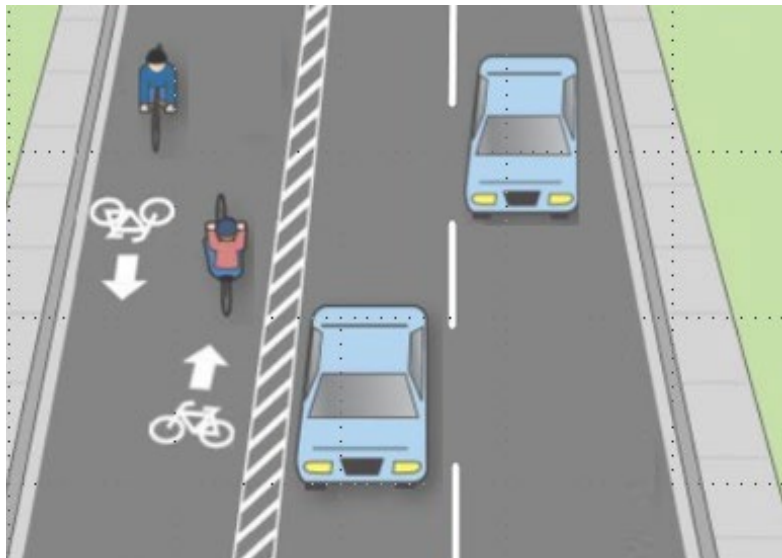
#### SHORT TERM: BIKEWAY IMPROVEMENTS WITH MINIMAL INVESTMENT

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##### **Alternative 1**

This alternative mimics the two-way separated bike lane built along the south side of Middlebrook Road. It converts the outermost travel lane into a twelve-foot two-way separated bike lane with a three to four-foot painted buffer with flexposts separating it from motor vehicle traffic. The bikeway extends from Great Seneca Highway on the east side to the Bank of America driveway short of the Germantown Road intersection on the west side.

Figure 12: Alternative 1. Middlebrook Road Corridor (Looking East)



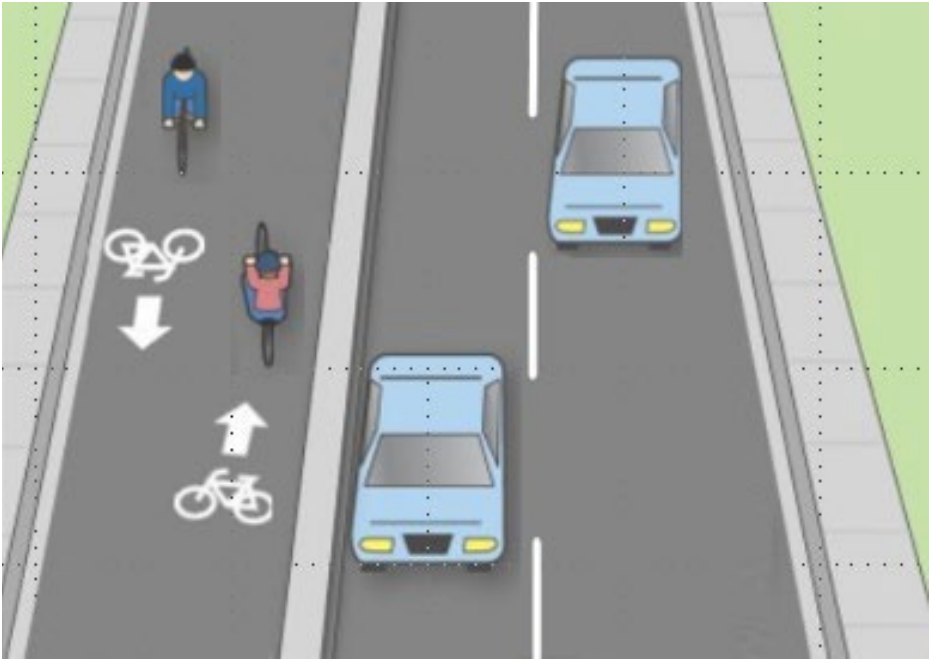
#### MEDIUM TERM: BIKEWAY IMPROVEMENTS WITH MODERATE INVESTMENT

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##### **Alternative 2**

This alternative is similar to Alternative 1, but it uses a raised median to separate the two-way separated bike lane from motor vehicle traffic instead of a painted buffer and flexposts.

Figure 13: Alternative 2. Middlebrook Road Corridor (Looking East)



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## POTENTIAL COSTS AND IMPACTS

Below is a summary of the estimated property impacts and construction costs for each alternative.

Table 1: Estimated Construction Costs and Property Impacts

	Wisteria Alt 1	Wisteria Alt 2a	Wisteria Alt 2b	Wisteria Alt 3	Middlebrook Alt 1	Middlebrook Alt 2
Property Impacts	19,000 Sq Ft	19,000 Sq Ft	34,000 Sq Ft	25,000 Sq Ft	0 Sq Ft	0 Sq Ft
Widening Needed?	No	No	No	Yes	No	No
Estimated Construction Cost	\$2.3 million	\$3.0 million	\$3.0 million	\$4.8 million	\$1.2 million	\$2.4 million

Concept drawings for all alternatives are provided in *Attachment A*.

## SECTION 3 – ANALYSIS AND FINDINGS

### Master Plan Consistency

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#### BICYCLE MASTER PLAN

The 2018 *Bicycle Master Plan* prioritizes bikeway recommendations through a tiered system. Tier 1 represents the highest priority bikeways for construction over the life of the plan and are largely located in major downtowns. Tier 4 represents the lowest priority bikeways. Over half of all bikeways are not prioritized for construction during the life of the plan and are only included in the plan if unforeseen opportunities arise to implement them.

The *Bicycle Master Plan* identifies bikeways on Wisteria Drive and Middlebrook Road as Tier 2 priorities – these bikeways are located in Bicycle and Pedestrian Priority Areas that likely have less demand for bicycling than those identified as Tier 1. These bikeways are prioritized below 93 miles of bikeways, but higher than 660 miles of bikeways.

#### BIKEWAY TYPE

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Along Wisteria Drive, the *Bicycle Master Plan* recommends separated bike lanes along the north side and a sidepath along the south side. Along both sides of Middlebrook Road, two-way separated bike lanes are recommended.

Among Wisteria Drive alternatives, 1, 2a, and 3 provide the master-planned bikeways. Alternative 2b does not because it proposes a sidepath on the north side while separated bike lanes are the master-planned facility.

Both Middlebrook Road alternatives provide the master-planned bikeways.

## BIKEWAY DIMENSIONS

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The *Bicycle Master Plan* indicates that two-way separated bike lanes should be ten feet wide with eleven feet preferred, though interim installations can be as narrow as eight feet. In general, the recommended buffer between bike lanes and travel lanes is six feet wide, but if on-street parking is provided, the buffer can be narrowed to three feet.

Wisteria Drive Alternative 1 is a short-term, interim treatment that includes eight-foot separated bike lanes and a three-foot buffer and occasional on-street parking, while Alternative 2a provides a twelve-foot separated bike lane and a six-foot buffer. The Alternative 1 buffer does not achieve the master plan minimum width.

Both Middlebrook Road alternatives provide a twelve-foot-wide separated bike lane and a three to four-foot buffer. The buffer does not achieve the master plan minimum width.

The *Bicycle Master Plan* notes that trails and sidepaths will be a minimum of ten feet wide, although eight feet is acceptable in areas with an environmental or historic constraint. A minimum five-foot street buffer width is identified as well. The sidepath identified along the south side of Wisteria Drive in all alternatives is only eight feet wide, which is substandard, but meets the recommended buffer width with a seven-foot street buffer.

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## MARC RAIL COMMUNITIES SECTOR PLAN

Both roadways are included within the 2019 *MARC Rail Communities Sector Plan* boundary. The plan has several recommendations that relate to this project:

- 1) Improve pedestrian and bicycle access to the Germantown MARC Station.
- 2) Support county efforts to implement Vision Zero.
- 3) Transform the MARC station area from an auto-dominated environment to an interconnected street network that is safe and comfortable for pedestrians, bicyclists, transit riders, and motorists.
- 4) Provide special design considerations for roads in the Seneca Valley High School vicinity to ensure safety and access for an expanded student population.
- 5) Provide a double row of tall-growing shade trees along both sides of Middlebrook Road.
- 6) Evaluate relocating existing overhead utilities underground to provide room for a shade tree canopy and unobstructed pedestrian and bicycle facilities.

The proposed alternatives address recommendations 1 through 4, and design has not yet advanced far enough for recommendations 5 and 6 to be incorporated at this time.



## Alternatives Analysis

MCDOT intends to construct bikeways on Wisteria Drive and Middlebrook Road and improve them over time. The following tables identify the differences between the alternatives.

Table 2: Wisteria Drive Alternatives

	From	To	Type	Buffer	Direction	Impacts to Lanes
<b>Short Term Alternative 1</b>	Walter Johnson Road	Great Seneca Hwy	Separated Bike Lanes	Painted	Westbound	Lane Diet / Remove lane
<b>Medium Term Alternative 2A</b>	300 ft east of Germantown Road	Great Seneca Hwy	Separated Bike Lanes	Raised Median	Westbound	Lane Diet / Remove lane
<b>Medium Term Alternative 2B</b>	Germantown Road	Great Seneca Hwy	Sidepath	Grass Median	Westbound	None
<b>Long Term Alternative 3</b>	Germantown Road	Great Seneca Hwy	Separated Bike Lanes	Painted	Westbound	None, widened roadway section

Table 3: Middlebrook Road Alternatives

	From	To	Type	Buffer	Direction	Impacts to Lanes
<b>Alternative 1</b>	300 ft east of Germantown Road	Great Seneca Hwy	Separated Bike Lanes (Painted)	Painted	Westbound	Remove lane
<b>Alternative 2A</b>	300 ft east of Germantown Road	Great Seneca Hwy	Separated Bike Lanes (Median)	Raised Median	Westbound	Remove lane

### SHORT TERM

Planning Staff recommends that MCDOT advance the Wisteria Drive Alternative 1 and Middlebrook Road Alternative 1 concepts. These improvements can be made relatively quickly with minimal negative effects. Traffic analysis conducted as part of preliminary design indicated that neither Alternative 1 would have a significant negative traffic impact. Specifically, all intersections would maintain their existing level of service, and the addition of a traffic signal at Walter Johnson Road and Wisteria Drive would improve level of service at certain intersection approaches from D to C during the

AM and school peak periods. Travel time along the respective corridors would increase by less than 15 seconds.

Earlier analysis for Wisteria Lane that continued Alternative 1 to the Germantown Road intersection, requiring the removal of a westbound right turn lane, led to more significant modeled traffic impacts, including a 78% increase in delay in the PM peak and 119% in the school dismissal peak. This version of the alternative was not ultimately advanced in MCDOT's internal analysis.

Similar analysis for connecting Middlebrook Road Alternative 1 to the Germantown Road intersection indicated that there would be a significant increase in delay for motor vehicles traveling westbound between Crystal Rock Drive and Germantown Road, including a 54% travel time increase in the PM peak.

Planning Staff have comments below about how to improve Middlebrook Road Alternative 1 to provide enhanced bicycling comfort and connectivity while continuing to minimize motor vehicle delay.

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## MEDIUM TERM

Along Middlebrook Road, Alternative 2 is the only alternative provided. Like Middlebrook Road Alternative 1, extending the bikeway to the Germantown Road intersection within the curbs was modeled to create a fairly significant westbound motor vehicle delay in the PM peak period.

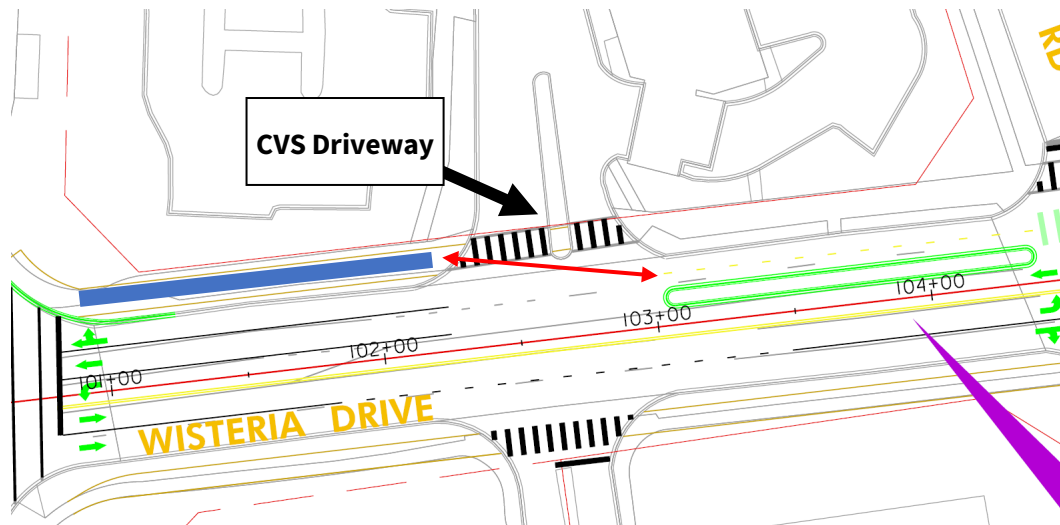
Along Wisteria Drive, the main difference between the medium-term alternatives is that Alternative 2a includes a two-way separated bike lane on the north side, while Alternative 2b includes a sidepath. Both arrangements have benefits and drawbacks.

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## WISTERIA DRIVE ALTERNATIVE 2A

Two-way separated bike lanes are the master-planned bike facility for the north side of Wisteria Drive. Separated bike lanes are the default bikeway type in downtowns and town centers because in locations where more pedestrians and bicyclists are expected, separating these modes reduces conflicts. The project's location in Germantown Town Center and adjacent to Seneca Valley High School indicates that there will likely be significant pedestrian and bicycle activity. Modal separation will make pedestrians and bicyclists more comfortable in this area, and more likely to use the bicycling facilities. At the same time, Alternative 2a does not extend to the Germantown Road intersection. It stops at the CVS driveway as shown in Figure 14.

Figure 14: Western Terminus of Alternative 2a

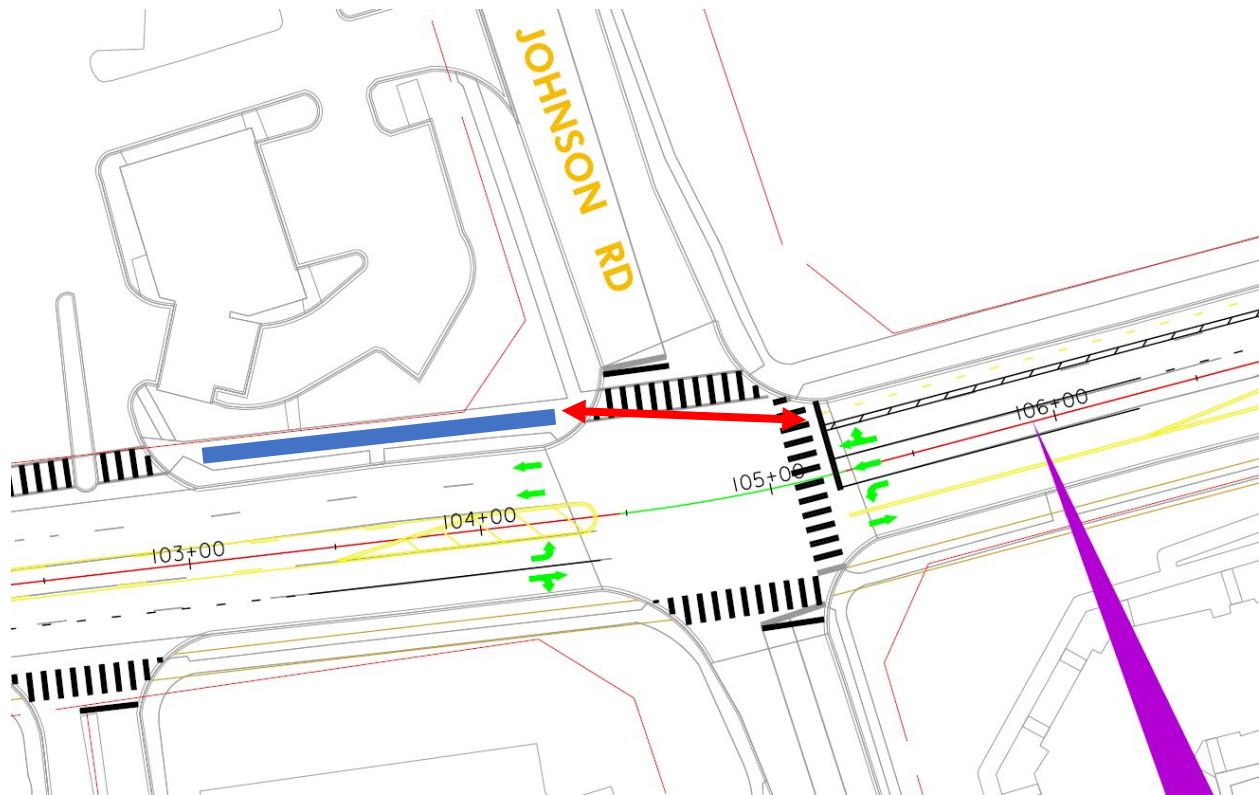


Ostensibly, bicyclists are intended to transition to and from the sidepath (identified in blue above) across the CVS entrance as they travel to or from Germantown Road and the larger Germantown area. This is unacceptable, and worse than transitioning the separated bike lanes to the sidepath at a signalized intersection with Walter Johnson Road, as proposed in the short-term Alternative 1, shown in Figure 15. A transition from an on-road bikeway to an off-road bikeway at the unsignalized CVS driveway will likely create right-of-way and visibility conflicts.

Traffic analysis conducted as part of preliminary design indicated that Alternative 2a would not have a significant negative traffic impact, though the Wisteria Drive/Great Seneca Highway intersection level of service would decrease from C to D during the PM peak. Additionally, eastbound travel times along the corridor would increase by 25 to 30 seconds during peak periods and travel speeds would drop between Crystal Rock Drive and Great Seneca Highway by three to five miles per hour.

Earlier analysis for Wisteria Lane that continued Alternative 2a to the Germantown Road intersection, requiring the removal of a westbound right turn lane, led to more significant modeled traffic impacts for westbound motor vehicles at the Germantown Road intersection, including a 62% increase in delay in the PM peak period and 97% in the school dismissal peak period. This version of the alternative was not ultimately advanced in MCDOT's internal analysis, though the bikeway would provide much better connectivity for users.

Figure 15: Northern Terminus of Alternative 1



### WISTERIA DRIVE ALTERNATIVE 2B

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The sidepath does not have the same transition issues at Germantown Road as the separated bike lane in Alternative 2a because it is outside the curb for the entire project extent, so bicyclists cross the CVS driveway and other conflict points at sidewalk-level. However, as discussed above, it is very likely that pedestrian and bicyclist volume in this area will be high, especially at peak hours, so a shared pedestrian-bicycle facility will make both modes uncomfortable and lead to conflicts. Additionally, while the 14' sidepath exceeds the minimum width standards, the three-foot minimum street buffer width is too narrow. Bicyclists would likely shy away from the street-side of the sidepath on sections with narrow street buffers.

Because the bikeway is completely outside the curbs, there are no traffic impacts.

### PREFERRED MEDIUM TERM ALTERNATIVE

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With these benefits and drawbacks in mind, staff recommends pursuing Alternative 2a with proposed modifications detailed in the comments section below. Alternative 2a's challenges can be mitigated, while still providing a high-quality experience for all. Alternative 2b would build a substandard facility with inherent modal conflicts that could not reasonably be addressed in the future and should not be advanced.

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## LONG TERM

Alternative 3 is the only long-term concept developed for Wisteria Drive. There is no long-term concept for Middlebrook Road.

Staff recommends not proceeding with Alternative 3 as the long-term concept for Wisteria Drive. It would provide a substandard bicycling experience at high cost due to the significant roadway widening envisioned. Instead, staff recommends considering Alternative 2a (as modified to reflect staff comments) as the permanent design.

Traffic analysis for Alternative 3 shows minimal negative impacts, largely because the included roadway widening enables the bikeway to be constructed without reducing the number or length of motor vehicle lanes.

Traffic analysis for the MCDOT proposed alternatives can be found in *Attachment B*. Traffic analysis for the alternatives with separated bike lanes connecting directly to Germantown Road that were not advanced to conceptual design can be found in *Attachment C*.

## Comments

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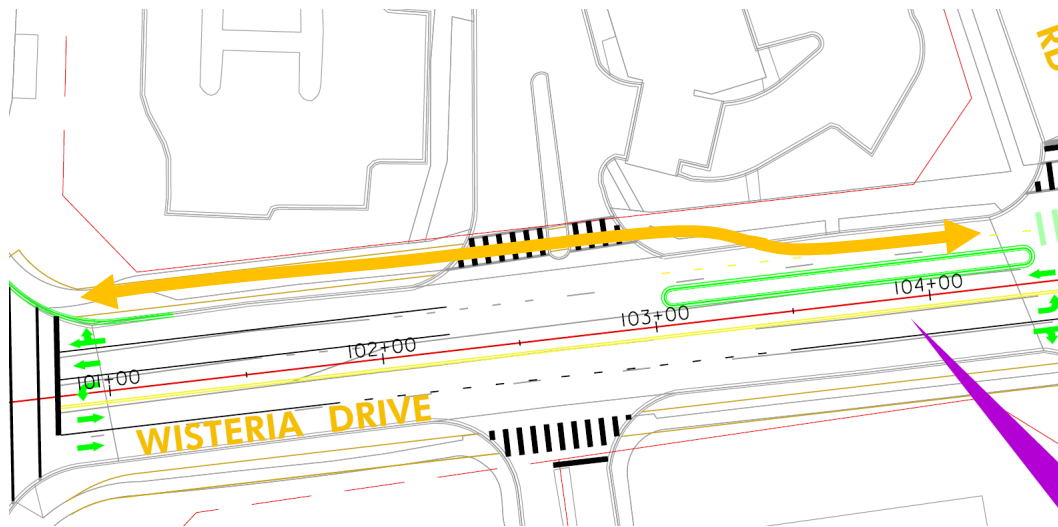
### WISTERIA DRIVE

**Project Phasing: Advance Alternative 1 as the Interim Bikeway, as it can be constructed relatively quickly with minimal negative impacts. Over time, upgrade the bikeway to Alternative 2a, the Permanent Bikeway, which would provide more permanent separation from traffic.**

**Alternative 2a Modifications: Transition the on-road separated bike lanes to off-road separated bike lanes just east of the CVS driveway and continue the off-road separated bike lanes to Germantown Road.**

The current Alternative 2a design does not include a direct, safe connection between the CVS driveway and Germantown Road. This connection is essential for the buildout of a low-stress bicycling network in the Germantown area.

Figure 16: Western Terminus of Alternative 2a



To address this concern, the separated bike lanes should transition to outside the roadway curb east of the CVS driveway as illustrated by the orange line in Figure 16. Instead of providing a 14-foot-wide sidepath at this location as described in Alternative 2b, the 14-foot space could be divided into 8-foot-wide separated bike lanes and a six-foot-wide sidewalk. This is shown in Figure 17 with the bikeway (orange arrow) adjacent to the sidewalk (blue arrow). This change would likely require additional right-of-way and result in utility impacts, but would create a high-quality permanent facility.

Figure 17: View of Proposed Change to Alternative 2a



#### MIDDLEBROOK ROAD

**Project Phasing: Advance Alternative 1 as the Interim Bikeway, as it can be constructed relatively quickly with minimal negative impacts. Over time, upgrade the bikeway to Alternative 2, the Permanent Bikeway, which would provide more permanent separation from traffic.**

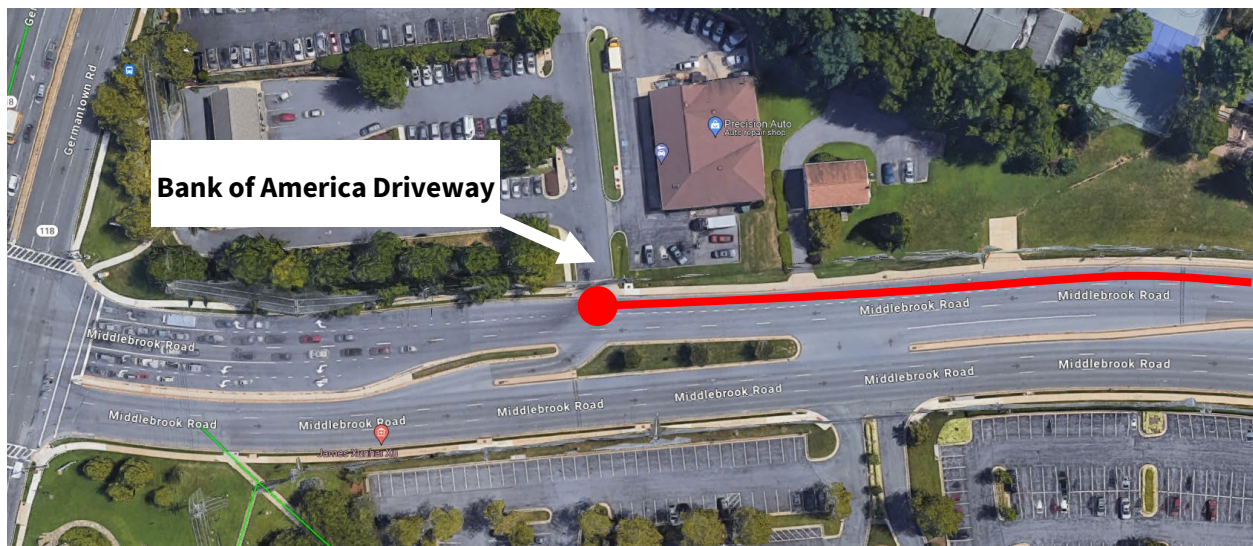
**Alternative 1 and Alternative 2 Modifications: Extend the separated bike lanes from the Bank of America driveway to Germantown Road.**

MCDOT materials do not include corridor drawings for the Middlebrook Road concepts. However, their project description makes clear that in both Middlebrook Road alternatives the bikeway ends at the entrance to the Bank of America property (as illustrated by the red line in Figure 18). This is problematic because bicyclists will be required to travel along a five-foot sidewalk and then transition

to/from an on-street separated bike lane across a heavily used, but unsignalized, commercial driveway to continue biking. Bicycling along the sidewalk creates conflicts with pedestrians, and crossing the unsignalized driveway creates conflicts with motor vehicles – neither support a low-stress experience.

Traffic analysis for scenarios where the Middlebrook Road alternatives were extended to Germantown Road indicate significant increases in westbound peak hour delay. However, as design progresses, the separated bike lanes should be extended to Germantown Road to allow bicyclists to safely travel throughout the Germantown area.

Figure 18: Middlebrook Bikeway Concepts Approaching Germantown Road



If extending the bikeway to the intersection within the existing roadway is not feasible, shifting the bikeway behind the curb west of the Bank of America driveway should be explored, even if there are steep slopes, utility impacts, or other issues. As a last resort, it may make sense to instead transition the on-street separated bike lane onto a rebuilt, wider sidepath that connects to the Germantown Road intersection starting at Crystal Rock Drive, as shown in Figure 19. The bikeway is not a relevant low-stress option for most potential bicyclists if it does not connect directly to the Germantown Road intersection.



Figure 19: Potential Middlebrook Road Transition from On-Road Separated Bike Lane to Sidewalk



**Alternative 2 Modification: Upgrade the existing separated bike lanes on the south side of Middlebrook Road as part of Alternative 2.**

The existing separated bike lanes on the south side of Middlebrook Road are separated from motor vehicle traffic using pavement markings, flex posts, and concrete parking stops, as shown in Figure 20. This is the intended configuration for the Middlebrook Road Alternative 1. When MCDOT implements Middlebrook Road Alternative 2 on the north side of the road with raised medians as illustrated in Figure 13, it should also upgrade the south side buffer to a concrete median.

Figure 20: Existing Middlebrook Road South Side Separated Bike Lane



#### FUTURE CONSIDERATIONS

**Ensure all intersections comply with Montgomery Planning’s Protected Intersection Checklist to the extent possible.**

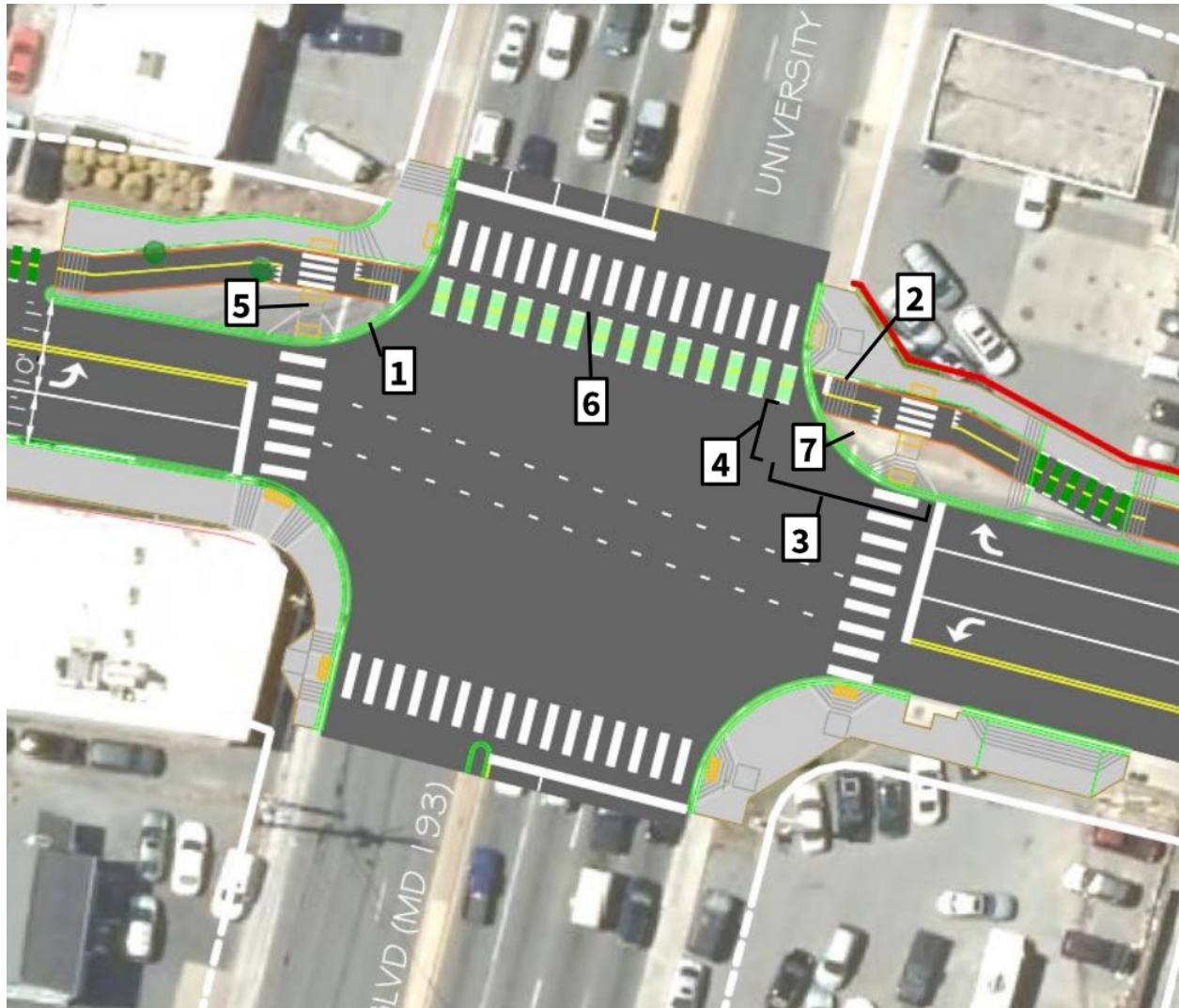
It is a best practice when designing sidepaths and separated bike lanes to use protected intersection treatments at applicable intersections to ensure bicyclists and pedestrians using these facilities can safely cross. These treatments should be applied at intersections in the project area. The identified concepts along Wisteria Drive and Middlebrook Road are still in a preliminary stage of design, but as design advances, protected intersection features should be included.

High-quality protected intersection design includes the following elements shown in Figure 15 and discussed in detail in Montgomery Planning’s Protected Intersection Checklist, which was developed in collaboration with MCDOT (*Attachment D*):

- 1) A *Corner Island* to physically separate the bikeway up to the intersection crossing point where potential conflicts with turning motor vehicles can be more easily controlled.
- 2) *Bicycle Queuing Space* to provide a waiting area for stopped bicyclists that is fully within the view of motorists waiting at the stop bar.
- 3) The *Clear Distance* maintains the necessary sight lines between motorists, bicyclists, and pedestrians to stop (or yield) as appropriate.

- 4) The *Motorist Yield Zone* is the space for turning motorists to yield to bicyclists and pedestrians. Research shows safety benefits at locations where bicycle crossings are offset from the motorist travelway at a distance of between 6 feet and 16.5 feet. This offset:
  - a. improves a motorist's view of approaching bicyclists and pedestrians by reducing the need for motorists to scan behind them,
  - b. creates space for a motorist to yield to bicyclists and pedestrians without blocking traffic approaching from the rear (for right turns) or the side (for left turns across two-way streets), and
  - c. provides more time for all users to react to each other and negotiate the crossing.
- 5) A *Pedestrian Refuge* is a space within the street buffer where pedestrians can wait between the bikeway and general-purpose travel lanes. This is not necessary for protected intersections for sidepaths.
- 6) *Crossings and Markings* increase visibility of crossing bicyclists and pedestrians and clarify where pedestrians and bicyclists should cross the street.
- 7) *Signalization* is an approach to separate bicyclists/pedestrians and motor vehicles in time either by providing a bicycle-only signal (if appropriate) or allowing bicyclists to cross the street using the pedestrian signal. Providing bicyclists separate signal phases from motorists can reduce conflict between these modes.

Figure 21: A proposed protected intersection included in the Amherst Avenue Separated Bike Lane project



#### SECTION 4 – COMMUNITY OUTREACH

MCDOT held one public meeting about this project on November 8, 2023. Community members were invited to participate in-person or virtually. Two people attended in-person and fifteen participated online. Attendees viewed design materials and provided feedback that will be incorporated into future design development. Feedback has been generally supportive of the project.

## SECTION 5 – ATTACHMENTS

Attachment A: Corridor Engineering Drawings

Attachment B: Alternative Traffic Analysis

Attachment C: Alternatives Connecting to Germantown Road Traffic Analysis

Attachment D: Montgomery Planning Protected Intersection Checklist