



City of Rockville

Fleet and Monroe Streets, Complete Streets Study

PREPARED FOR THE CITY OF ROCKVILLE BY

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INTRODUCTION

The City of Rockville received funding through MWCOG's Transportation Land Use Connections (TLC) technical assistance program to study the feasibility and impacts of expanding dedicated and separated bike facilities out from the Town Center core, leveraging previous dedicated biking infrastructure to reach more destinations and amenities.

Dedicated biking facilities along Monroe Street and Fleet Street will extend planned bike lanes along East Middle Lane southward to the Rockville Metro Station pedestrian bridge, Richard Montgomery Highschool (and the shared used path that surrounds it), and to Maryland Ave and points south. When complete, these facilities will provide a comfortable and safe dedicated connection for cyclists and micromobility commuters, complementing the existing sidewalk and street grid, allowing residents and visitors convenient non-vehicular access to and throughout the Town Center.

Project Need, Goals, And Objectives

The City of Rockville seeks to extend its biking infrastructure and to increase connectivity to the Rockville Metro Station, County office buildings and local schools. This feasibility study explores potential options for expanding dedicated bike facilities, separated from vehicle traffic, and analyze the impacts, benefits, and constructability of each.

Objective

Connect under-construction bike lanes on Middle Lane to Fleet Street and Monroe Street via a dedicated and protected bike path or lanes that are separated from vehicular traffic.

Goals

Primary goals for the proposed projects include:

- Increase recreational and commuting options to local destinations from residential neighborhoods.
- Reduce vehicle miles traveled in the Town Center.
- Connect existing biking infrastructure to provide Complete Streets throughout Rockville Town Center.
- Provide proof of concept design (e.g., no fatal flaws, minimized traffic impacts, constructable, etc.).

PROJECT INFLUENCES AND PRIOR PLANNING EFFORTS

The desired alignment for dedicated bike facilities builds upon prior work by the City along East Middle Lane and along Washington Street. These plans are complete and were provided by the City as part of the prior planning efforts. For the purpose of developing conceptual alignments, these plans were incorporated into base mapping efforts as *existing conditions*.

To assist with the feasibility analysis, the City of Rockville provided signal timing for all locally-owned traffic signals as well as available traffic count data. Remaining signal timing was obtained from Montgomery County and additional traffic counts were collected in the Winter of 2022. Additional City directives that drove the conceptual designs include:



- If proposing a road diet, keep general travel lanes at 11 feet width.
- Turn lanes can be 10 feet wide.
- Curbside *unprotected* bike lanes are undesirable.
- Mixing of pedestrians and cyclists on a shared use path is allowable, but separate pedestrian and bike facilities are desirable.
- City has previously been against 2-way cycletracks in the past.

Stakeholders

While the City of Rockville is the project originator, other government representatives that are stakeholders include:

- City of Rockville Department of Public Works
- Rockville Bicycle Advisory Committee (RBAC) / Rockville Pedestrian Advocacy Committee (RPAC)
- Montgomery County Government offices
- Maryland Department of Transportation State Highway Administration (MDOT SHA)
 - Owner of MD 28 / Monroe Street intersection
- RideOn bus service

CONCEPT DEVELOPMENT

Opportunities and Constraints

Fleet Street and Monroe Street are both fully developed with office, commercial, and residential properties. Additionally, there is limited public right of way for constructing bike facilities behind existing curb and adjacent to existing sidewalk. Also, existing travel lanes are narrow (11 to 12 feet), limiting the ability to use extra space from wide travel lanes to construct on-street bike facilities. Finally, there is on-street curb side parking along Fleet Street and Monroe Street, the latter of which is often fully-occupied.

Despite, these constraints, there are opportunities to construct dedicated bike facilities, adjacent to existing sidewalks, within the public right-of-way. Primarily, both Fleet Street and Monroe Street have ample traffic capacity, such that there is a possibility to reduce the number of general travel lanes and repurposing them for other modes. Additionally, because the Rockville Town Center area is a grid-based network of roads, there is potential to shift turn movements – and therefore dedicated turn lanes – to other intersections where capacity allows it, which also can free of pavement for repurposing. Finally, by providing safe and convenient biking options, short term vehicle trips can now be made by biking, reducing vehicle traffic.

Design Process & Study Methodology

Developing alternative concepts began with an extensive field review and CAD base mapping effort for the Fleet Street and Middle Lane corridors. County-level GIS data was supplemented with in-the-field data collection. The field survey allowed for verification of existing mapping libraries and to note any recent construction projects. It also allowed for determining potential construction impacts that can be significant cost drivers – such as utility pole relocation, inlet relocation, need for retaining structure, etc. The base mapping included all existing sidewalk, curb and gutter, utility poles, driveways, large trees, and two-foot contour lines. To this, all public right of way information and lot lines were added, in



addition to pavement markings, street signs and dimensions. Concept designs were developed using the following design standards and guidelines:

- AASHTO
- NACTO
- PROWAG
- MUTCD
- ADAAG
- MDOT SHA
- Montgomery County DOT Standards

Field Observations:

Field observations were conducted in early December 2022. The following observations were made:

AM Peak Hour Observations:

- Monroe St is generally low volume with moderate to high bus traffic.
- Several school age pedestrians and cyclists observed crossing Jefferson Street to Richard Montgomery High School.
- Monroe St at Jefferson St approximate average queue lengths noted were:
 - Eastbound left lane: 2 cars
 - Eastbound through lanes: 7 cars
 - Westbound lanes: 9 cars
 - Northbound lane: 2 cars
 - Southbound lane: 2 cars
- Monroe St at Middle Ln
 - Northbound queues are typically less than 2 vehicles.
 - A school bus was observed making an eastbound right onto Monroe St southbound.
- Monroe St at Montgomery Ave
 - Minimal queues observed on all approaches.
- Monroe Pl at Monroe St
 - Minimal queues observed on all approaches.
 - Monroe Pl is the nearest available EBL turn to MD 355 NB
- Monroe St at Fleet St
 - Queues on all approaches are less than 5 vehicles.

PM Peak Period Observations:

- Monroe St is generally low volume with moderate to high bus traffic.
- Many peds were observed crossing mid-block west of Monroe St from courthouse to parking garage.
- Monroe St at Jefferson St:
 - Inside north-south through lanes act as de facto left turn lanes.
 - 90% of eastbound left-turning traffic turn makes a northbound right turn at Monroe Pl toward MD 355



- Buses observed making eastbound left and encroaching on through lane due to narrow lane width.
- Average queue lengths are:
 - Eastbound left lane: 1 car
 - Eastbound through lanes: 7 cars
 - Westbound lanes: 7 cars
 - Northbound lanes: 3 cars
 - Southbound lanes: 1 car
- Northbound queues increased to about 10 vehicles around 5:30PM when the Jury parking lot dismissed; however, queues were primarily in the outer northbound travel lane.
- Jury parking lot queue was extensive (over 30 vehicle long) when drivers were leaving at once.
- No cycle failure observed at intersection.
- Monroe St at Middle Ln
 - EB queues occasionally spill beyond Monroe St intersection from downstream signal at MD 355
 - NB queues less than 3 vehicles
 - Observed several mid-block U-turns from northbound.
- Monroe St at Montgomery Ave
 - Minimal queues less than 3 vehicles on any approach
- Monroe Pl at Monroe St
 - Minimal queues less than 3 vehicles on any approach
 - Monroe Pl is the nearest available eastbound left turn to MD 355 northbound.
- Monroe St at Fleet St
 - Southbound queues less than 5 vehicles maximum

Initial opportunities based on traffic observations include:

Alternative design ideas based on field observations.

- Consider one-way operations on Monroe St from Middle Ln to Monroe Pl
 - Alternatively, remove parking and curb extensions on west side.
- Consider a road diet on Monroe St from Monroe Pl to Fleet St
 - Reduce four lane section to a three-lane section with a two-way center turn lane.
- Fleet St from Monroe St to MD Ave
 - Reduce four lane section to a three lane section with a two-way center turn lane.

Traffic Impacts of a 4-lane to 3 Lane Road Diet

Based on the observations of peak period traffic and the potential for a road diet, a traffic analysis was performed to determine if, in fact, a conversion of Fleet and Monroe Streets from four lanes to three lanes was feasible and what the overall impacts were.

The City of Rockville provided counts at: Fleet St at Monroe St and Fleet St at Maryland Ave. These were supplemented by new counts conducted in late Fall of 2022 at: MD 355 at MD 28; MD 28 (Jefferson St) at Monroe St; and Monroe St at East Middle Lane. Traffic signal timing were obtained from the City and



Montgomery County for all relevant signals. Both the signal timing and traffic volumes were used to develop a traffic model of the *existing conditions* traffic network in Synchro™ modeling software – an industry standard software used by local jurisdictions to time traffic signals and analyze traffic impacts. Standard measures of effectiveness of traffic modeling include: average vehicle delay, volume-to-capacity ratio (V/C), level of service (LOS), and vehicle queue lengths, and are generally developed for both an AM and a PM peak commuting hour. The existing conditions traffic model was validated based on field observations, allowing it to be modified to reflect real-world impacts of geometric changes, such as replacing a travel lane. Traffic counts can be found in Appendix A. The high-level results of the road diet analysis are summarized in Table 1.

Table 1: Intersection capacity analysis results between existing conditions and proposed concepts

ID	Intersection	Approach	Existing			Build - Shared Use Path			Build - Exclusive Phase Opt 1			Build - Exclusive Phase Opt 2		
			Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C
1	Monroe St & E Middle Ln	Control Type	Stop (2 - Way)			Stop (2 - Way)			Stop (2 - Way)			Stop (2 - Way)		
		Overall	0.0 (0.0)	A (A)	0.10 (0.20)	0.0 (0.0)	A (A)	0.10 (0.20)	0.0 (0.0)	A (A)	0.10 (0.20)	0.0 (0.0)	A (A)	0.10 (0.20)
2	Monroe St & E Montgomery Ave	Control Type	Stop (All-Way)			Stop (All-Way)			Stop (All-Way)			Stop (All-Way)		
		Overall	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)
3	Monroe St & Monroe Pl	Control Type	Stop (All-Way)			Stop (All-Way)			Stop (All-Way)			Stop (All-Way)		
		Overall	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)	0.0 (0.0)	A (A)	0.00 (0.00)
4	Monroe St & E Jefferson St	Control Type	Signal			Signal			Signal			Signal		
		Overall	17.9 (23.9)	B (C)	0.48 (0.55)	18.1 (24.9)	B (C)	0.50 (0.61)	29.3 (52.2)	C (D)	0.52 (0.64)	24.3 (33.2)	C (C)	0.51 (0.64)
5	Monroe St & Fleet St	Control Type	Signal			Signal			Signal			Signal		
		Overall	13.1 (10.1)	B (B)	0.59 (0.48)	17.2 (16.1)	B (B)	0.59 (0.54)	17.2 (16.1)	B (B)	0.59 (0.54)	14.6 (17.6)	B (B)	0.56 (0.56)
6	Maryland Ave & Fleet St	Control Type	Signal			Signal			Signal			Signal		
		Overall	29.3 (79.8)	C (E)	0.67 (0.88)	29.3 (81.2)	C (F)	0.67 (0.88)	29.3 (81.2)	C (F)	0.67 (0.88)	31.2 (82.1)	C (F)	0.67 (0.88)
7	MD 355 & E Jefferson St	Control Type	Signal			Signal			Signal			Signal		
		Overall	46.2 (69.0)	D (E)	0.67 (0.78)	46.2 (68.6)	D (E)	0.67 (0.78)	46.2 (68.6)	D (E)	0.67 (0.78)	46.2 (68.6)	D (E)	0.67 (0.78)

Several assumptions were made in this initial traffic analysis, because there are additional signal modifications needed, depending on the type of facility created for cyclists. Specifically, in addition the existing conditions model, a shared-use path for cyclists and scooters (adjacent to sidewalk) could have different signal phasing requirements than an *on-street* two-way cycletrack. Accordingly, the 4 scenarios in Table 1 reflect the following assumptions:

1. Existing conditions
2. Side Path behind a new curb line, adjacent to sidewalk
3. On-street cycletrack that would require exclusive WALK phasing for cyclists crossing Jefferson St.
4. On-street cycletrack that would require a protected WALK phase for cyclists crossing Jefferson St. while prohibiting northbound left turn across the cycletrack but permitting all other northbound vehicle movements simultaneously with the WALK phase. Additionally, this option also assumes a short turn pocket for NBL on Monroe St at Fleet St.

These options will be discussed in further detail in the *Impacts* section.

HCM and queuing reports for each option can be found in [Appendix B](#).

Initial Concept Development and Stakeholder Discussion

The following concepts present alignment options discussed with City Staff and stakeholders:

- Bike/scooter raised path (behind a curb) along the south side of Fleet Street and the west side of Monroe Street.
- In-road two-way cycletrack along the south side of Fleet Street and the west side of Monroe Street.



Figure 1 and Figure 2 show the existing and proposed typical sections for each concept.

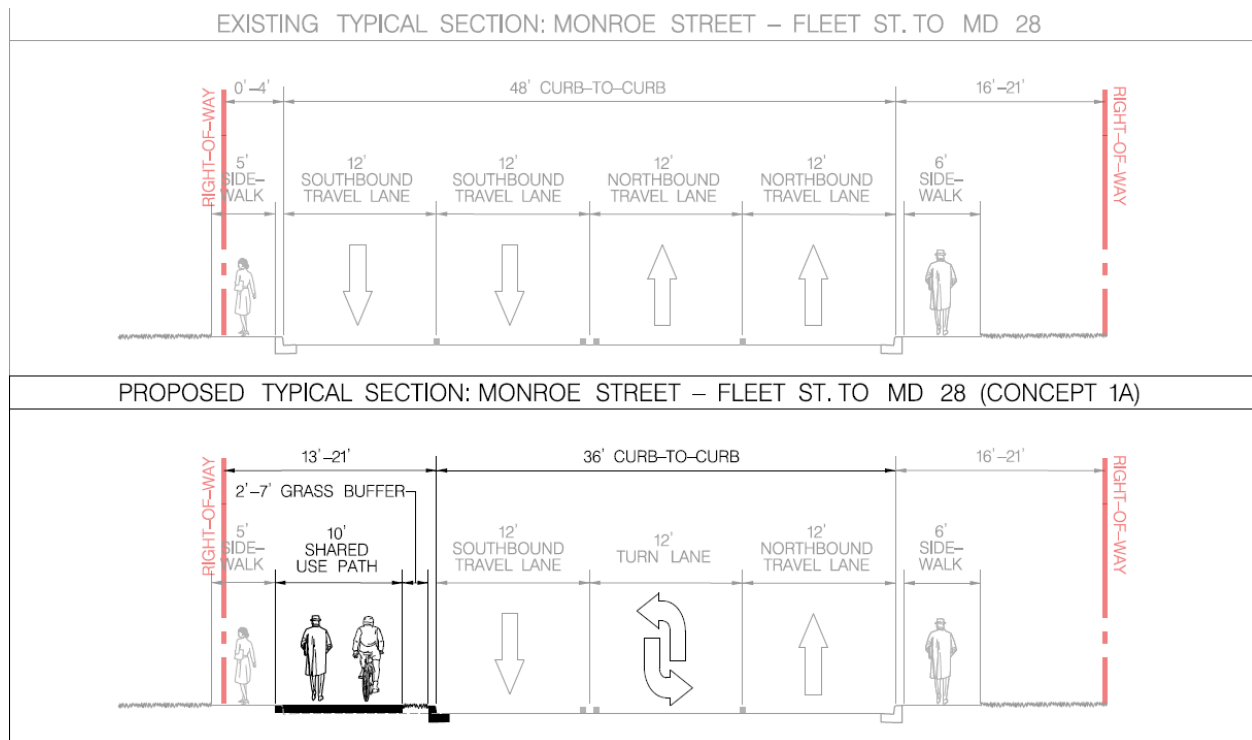


Figure 1: Existing and proposed typical cross section for raised bike path option.

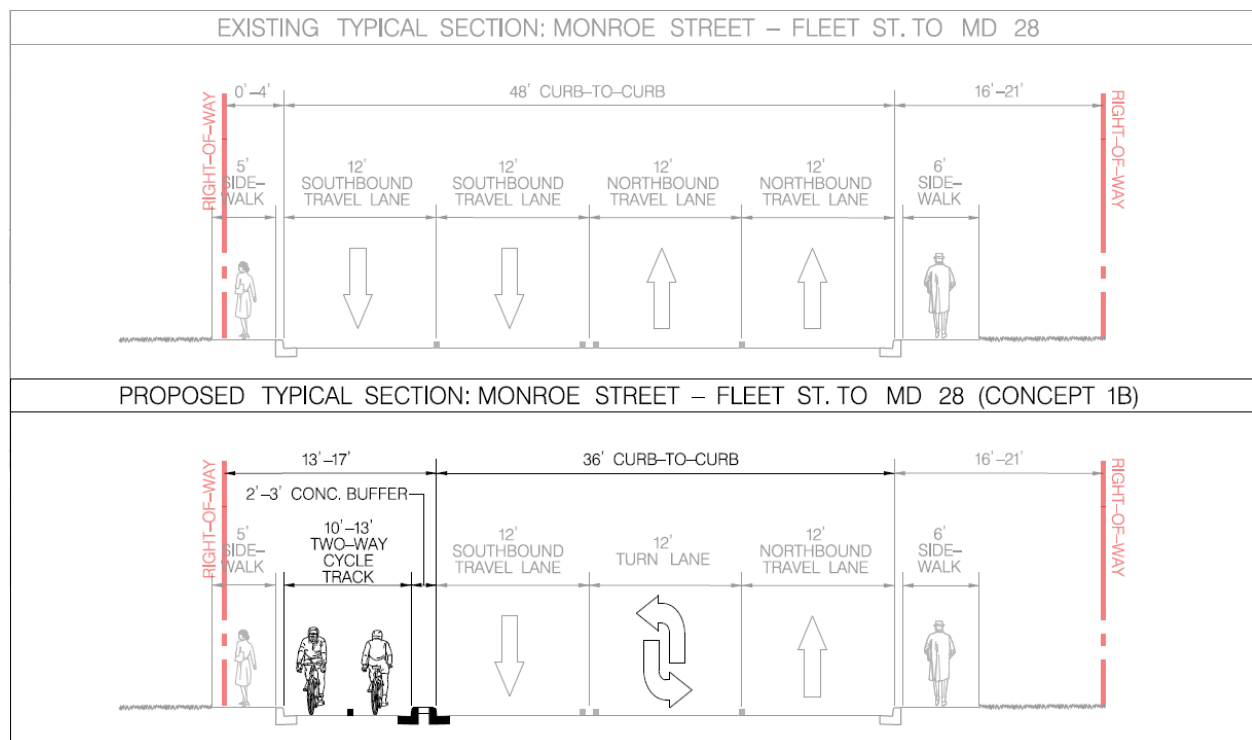


Figure 2: Existing and proposed typical section for on-street two-way cycle track option.



Both of these typical sections represent generally the same idea of removing a general purpose travel lane and dedicating it for bike infrastructure, leaving existing sidewalk in place. Additionally, both options propose reducing Monroe Street to one-way northbound only from Montgomery Ave to East Middle Lane. However, each option has different impacts with regard to intersection treatments. Both the raised bike path and the two-way cycletrack were conceptually drawn in plan-view for a preliminary discussion with the City of Rockville and MDOT SHA. Additionally, these concepts were discussed with MC-DOT, particularly with regard to bus stop treatments for the County's RideOn bus service, which has multiple stops along the Fleet Street and Monroe Street. An example of the preliminary conceptual layouts discussed with City, County, and State stakeholders is shown below:

- Example of raised path on Fleet Street (Figure 3)
- Example of two-way cycle track on Fleet Street (Figure 4)
- Example of one-way traffic operations on Monroe Street from Montgomery Ave to East Middle Lane (Figure 5)

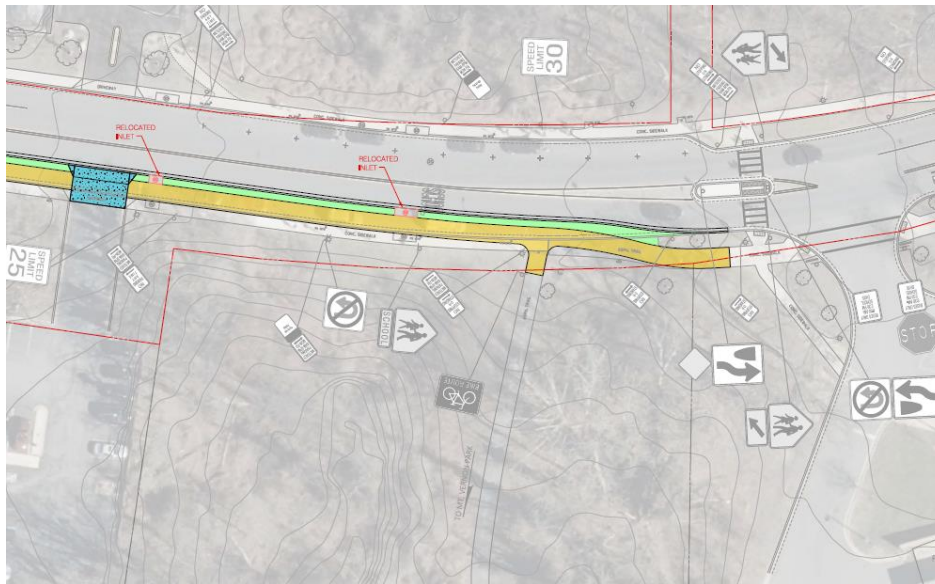


Figure 3: Example of a raised path concept on Fleet Street

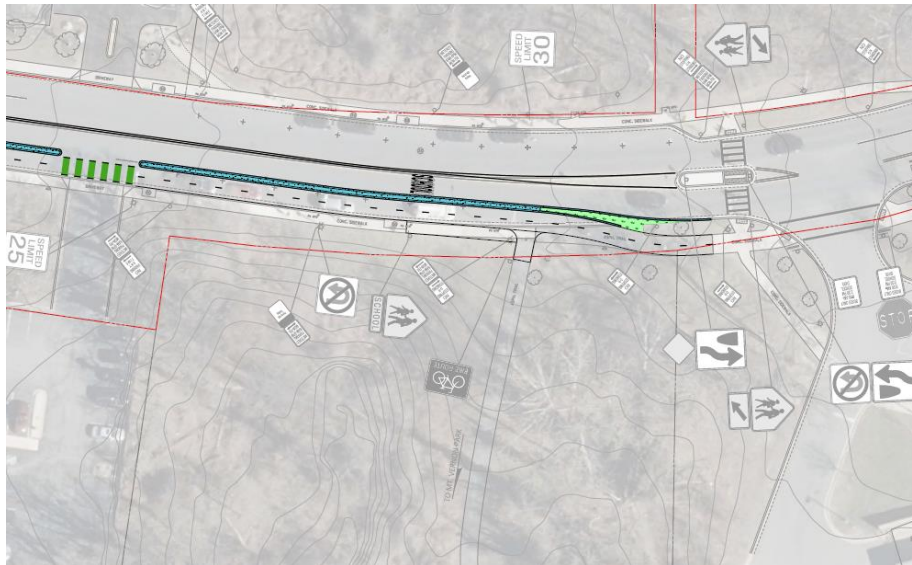


Figure 4: Example of a two-way cycletrack concept on Fleet Street

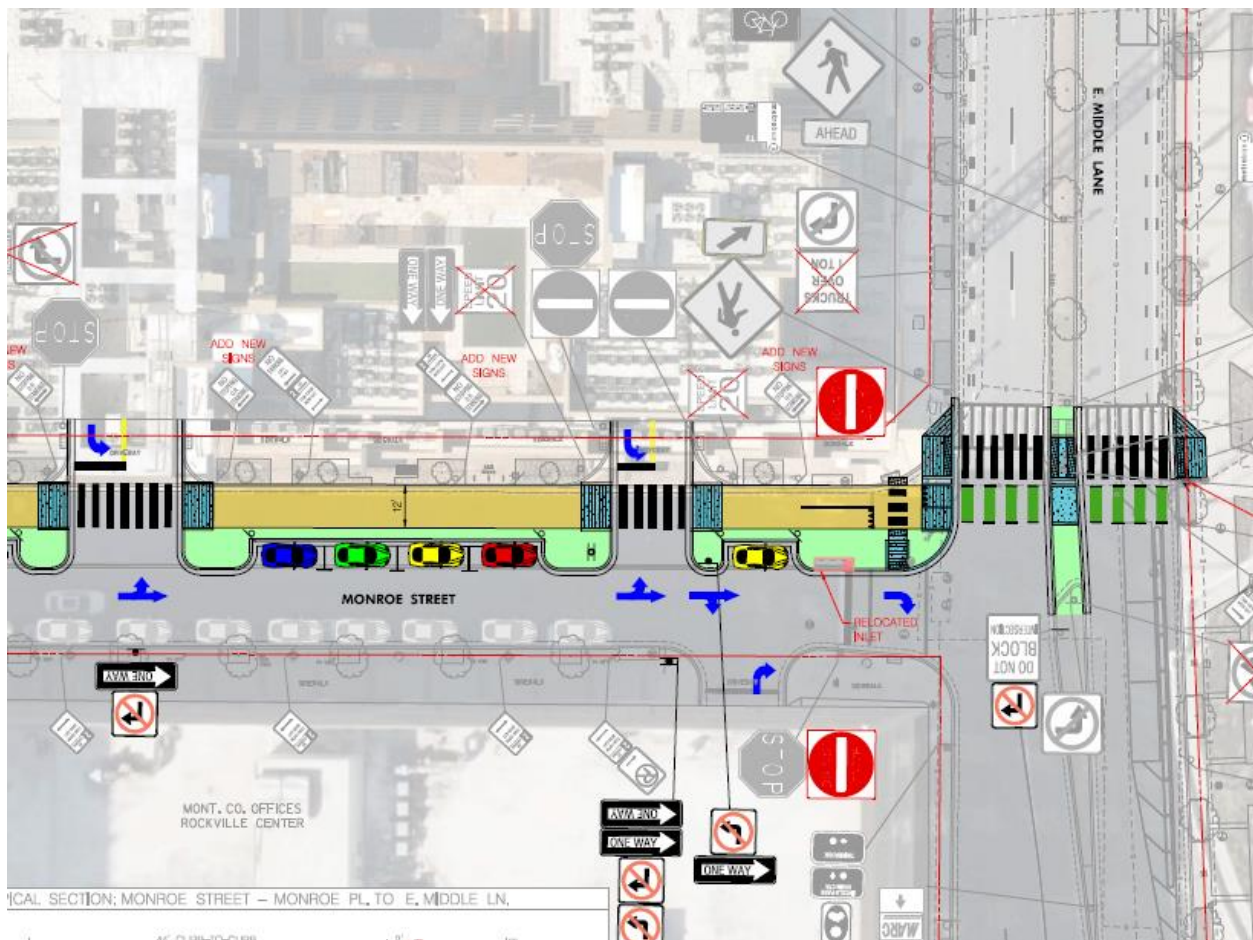


Figure 5: Example of a one way operations on Monroe Street, south of East Middle Lane



Initial Stakeholder Comments

The following is a summary of all concept comments and how they are addressed – either in this current preliminary design phase or the next design phase (30% Design). Solutions/next steps related to the refinements of the concepts *are in italics*.

- Maintain consistency with crosswalks bikewalks. Provide continental-style crosswalks only (global comment). MDOT SHA prefers green ladder style for bike crosswalks.
 - *All crosswalks will be shown as continental style.*
- Add transit crossings at all bus stops.
 - *Per discussions with MCDOT, all transit crossings will have wide crosswalks to accommodate both doors of a bus, and the crossings will be at grade with the bus stop.*
- If the bike path option is selected, then existing APS/CPS needs to be relocated. Also, crossing any ADA ramps should get you immediately to pedestrian facility – not into the path of a cyclist.
 - *If bike path option is selected, design will reflect ADA detectable warning surface between path and existing sidewalk.*
- May need to evaluate impacts of local apartments that have driveways onto Monroe Street, if the latter is turned into one-way northbound.
 - *Traffic along southbound Monroe Street is low, ~100 cars per day. Additionally adjacent apartments have garages with exits onto parallel roads (e.g., Helen Heneghan Way)*
- Ensure that northbound Monroe street at Middle Lane only allows right turns only.
 - *Northbound left turns and through movements are proposed to be eliminated by continuing the median along Middle Lane through the intersection, such that only right turns are feasible.*
- Consider how to terminate facilities, so that they integrate into future bike lanes on Middle Lane.
 - *Bike path or lane will have separate green bike crosswalk. Additionally, median break at Middle Lane is proposed to be closed.*
- Ensure no ADA warning surfaces on the bike path – only for shared-use bike/pedestrian paths.
 - *ADA warning surfaces along bike path are removed from concepts.*
- If the cycletrack option is selected, refer to Montgomery County's draft guidelines for floating bus stops.
 - *Concepts will reflect these guidelines.*
- Include a conceptual option for parking removal along Monroe Street – between Middle Lane and Montgomery Ave – to retain two-way traffic.
 - *Optional concept is included.*
- General question regarding how to tell cyclists when it is okay to cross signalized intersections. When should cyclist movements be protected from all/some vehicle turn movements? MDOT SHA has guidance for protection of cycletracks across State-owned intersections.
 - *For both options, the intersection of Fleet St at Monroe is designed as a protected intersection, with cyclists crossing with the WALK indication. The facility type selected will determine the type of crossing protection given to cyclists for crossing the MD 28 intersection. For a bike only path adjacent to the sidewalk and behind a curb, MDOT SHA may allow a similar crossing indication, where cyclists cross with the WALK phase (concurrent with northbound and southbound green vehicle green phases), assuming*



that cyclist speed can be reduced at the intersection. For the cycletrack option, MDOT SHA only allows a dedicated WALK phase, meaning that while pedestrians can cross concurrently with cyclists, northbound and southbound vehicle traffic must be prohibited from crossing the cycletrack, i.e., only northbound through movements or right turns are allowed and southbound through movements and left turns are allowed.

- Street lighting along both Monroe Street and Fleet Street needs to be improved. It is too dark for pedestrians during the nighttime.
 - *Comment noted. Additional lighting will be evaluated during future design phases.*

Finalized Concepts

The following section describes each of the two potential concepts and provides an analysis of impacts and overall construction feasibility. Impact analysis generally relates to cost, permitting needs, right of way acquisition, utility relocations, as well as any parking loss. A conceptual design plan for each project is presented in [Appendix C](#). As shown in Figure 6, the limits of the proposed bike facilities are:

- West Side of Monroe Street, joining proposed bike lanes on Middle Lane in the north to Fleet Street in the South.
- South side of Fleet Street, joining Maryland Ave to the existing shared use path at Richard Montgomery High School

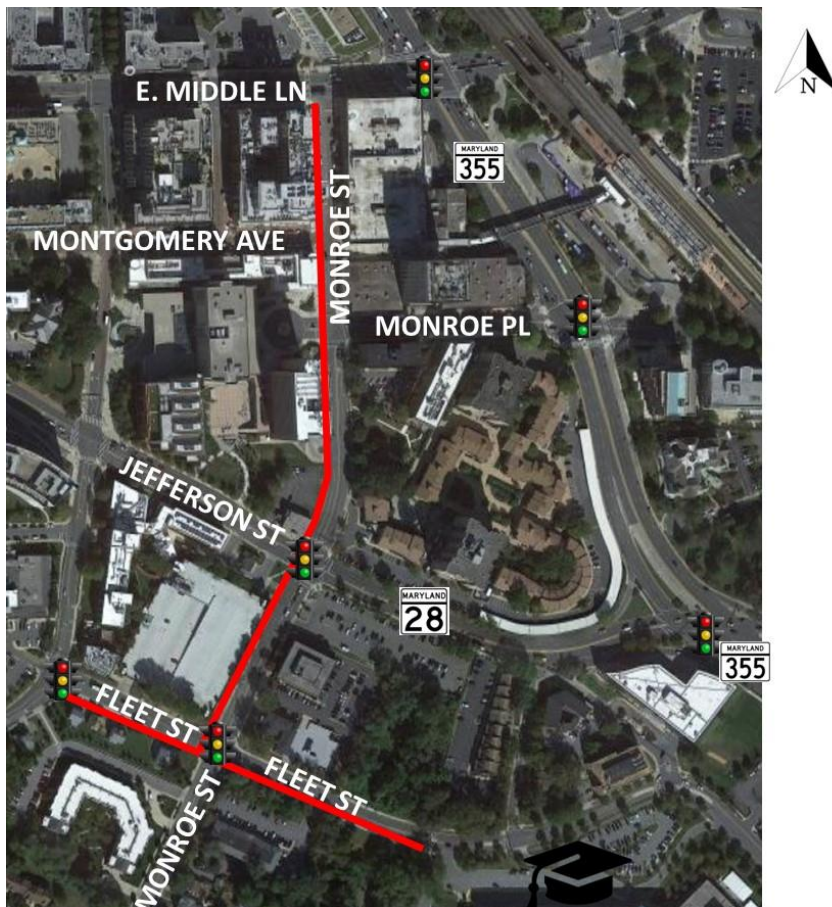


Figure 6: Bike facility project limits and location



Concept 1: Bike Path behind curb

As shown in Figure 7, the bike path begins in the west at the southeast quadrant of Maryland Ave at Fleet Street, where the current sidewalk landing will be widened to a shared bike/pedestrian landing, before the sidewalk and bike path split.

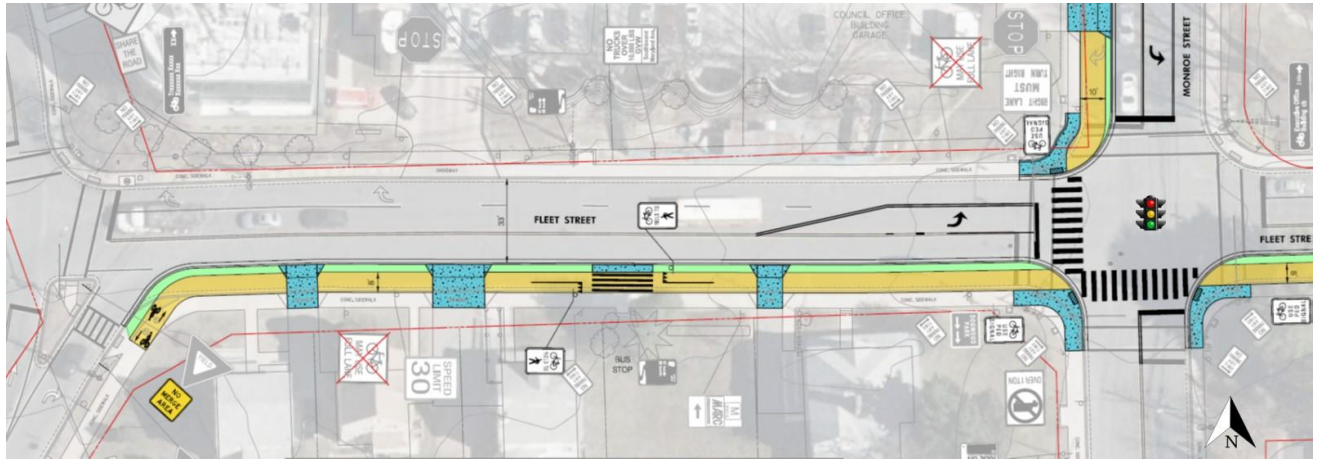


Figure 7: West terminus of bike path option

The path, along with a buffer from the roadway, replaces the outside eastbound travel lane of Fleet Street. The path crosses three existing residential driveways, whose aprons will have to be reconstructed. Additionally, the path crosses a transit stop; as shown in Figure 7, a wide crosswalk is provided across the path, to which cyclists must yield when bus riders board or alight. Additionally, the bike path and sidewalk utilize the same crosswalks at the intersection of Fleet St at Monroe St, both modes crossing with the WALK signal. Of note, the southbound bike path bends toward the west, as it approaches Fleet Street, which forces cyclists to slow down at the crossing and also places them more into drivers' cones of vision, as they turn into the crosswalk from the north or south. Finally, the westbound left turn lane (at Maryland Ave) is shown as substantially longer than the eastbound turn lane at Monroe Street; this is due to the much larger left turn volume onto southbound Maryland Ave, when compared to the left turn volume onto northbound Monroe Street.

Figure 8 shows the eastern terminus of the separated bike path. The path meanders south, just prior to the midblock crossing at the RMHS entrance, where it ties into the existing sidewalk and ultimately the existing side use path in front of the school. Of note, existing curbside inlets will have to be relocated to the new curb line.

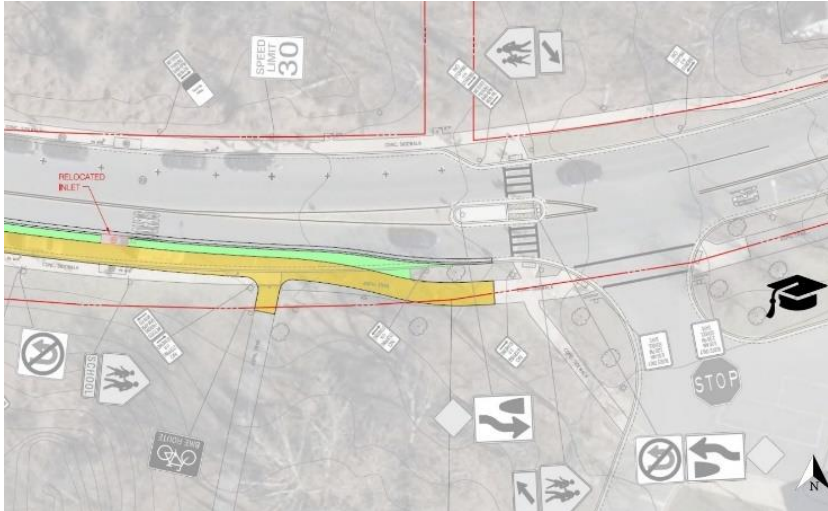


Figure 8: Eastern terminus of proposed bike path at RMHS

Additionally, this segment of Fleet Street has 7 metered curbside spaces along the south side of the road that will be eliminated with this design.

Figure 9 shows the bike path option crossing Jefferson street (MD 28). At this intersection, Monroe Street has somewhat wider lanes that allow the bike path to have ample buffer from the roadway, which pushes the shared use crosswalk (both for pedestrians and cyclists) back from the road edge. This allows for turning vehicles to have more opportunity to see fast moving cyclists through the crosswalk, who use the WALK phase, like pedestrians. In addition to the curb being relocated, this concept reconfigures the driveway apron for the County parking garage and the pedestrian ramps for crossing Jefferson Street.

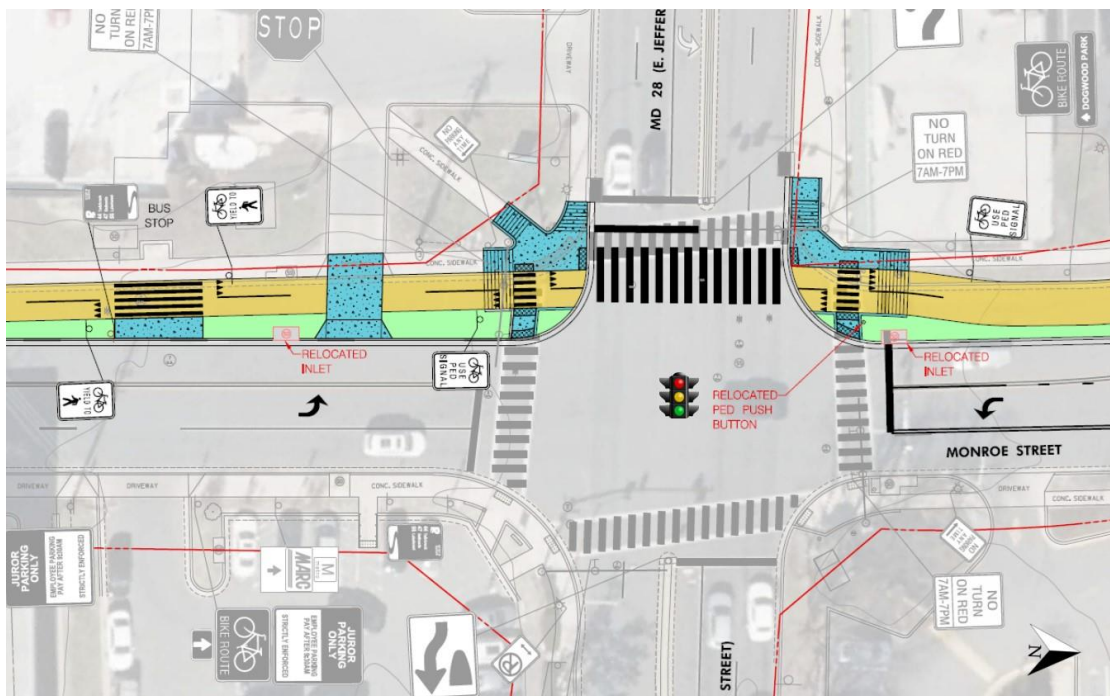


Figure 9: Bike path option, crossing Jefferson Street



As on Fleet street, the bus stop remains at grade through the path. Northbound and southbound left turn lanes on Monroe Street remain in this option.

As the bike path terminates in the north at East Middle Lane, there is limited opportunity to install a bike path, while also retaining curbside parking on both sides of Monroe Street and two travel lanes. Accordingly, the proposed concept eliminates the southbound travel lane, turning Monroe Street into one-way northbound from Montgomery Ave to East Middle Lane, as shown in Figure 10.

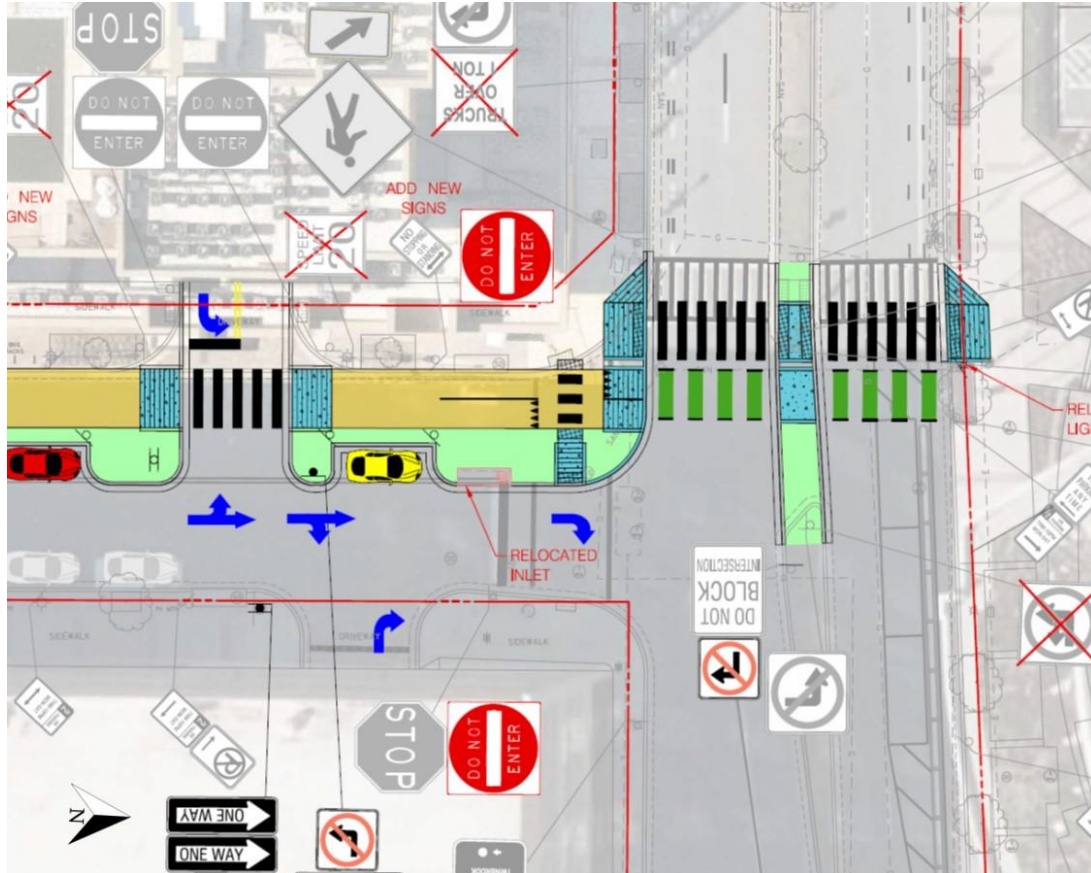


Figure 10: Bike path concept, northern terminus and crossing at East Middle Lane

This design retains all existing curbside parking. This block of Monroe Street sees only about 1000 vehicles per day, with a 90%/10% northbound/southbound split. It is reasonable to expect that those 100 daily southbound trips can be absorbed into the City's grid network with minimal impacts. Additionally, the bike path terminates with a green bike crosswalk that connects it to the pending bike lanes on East Middle Lane. Finally, the existing median is proposed to be closed, since westbound lefts and northbound lefts through the median opening are already prohibited.



Concept 2: Two-way inroad cycletrack

As shown in Figure 11, the cycletrack option begins in the west, similar to the bike path option with a shared pedestrian/bike landing area off of Maryland Ave. The on-road two-way cycletrack option replaces the outside eastbound travel lane with a 9-foot two-way bike facility and 3-foot buffer shown as pre-cast concrete curbs.

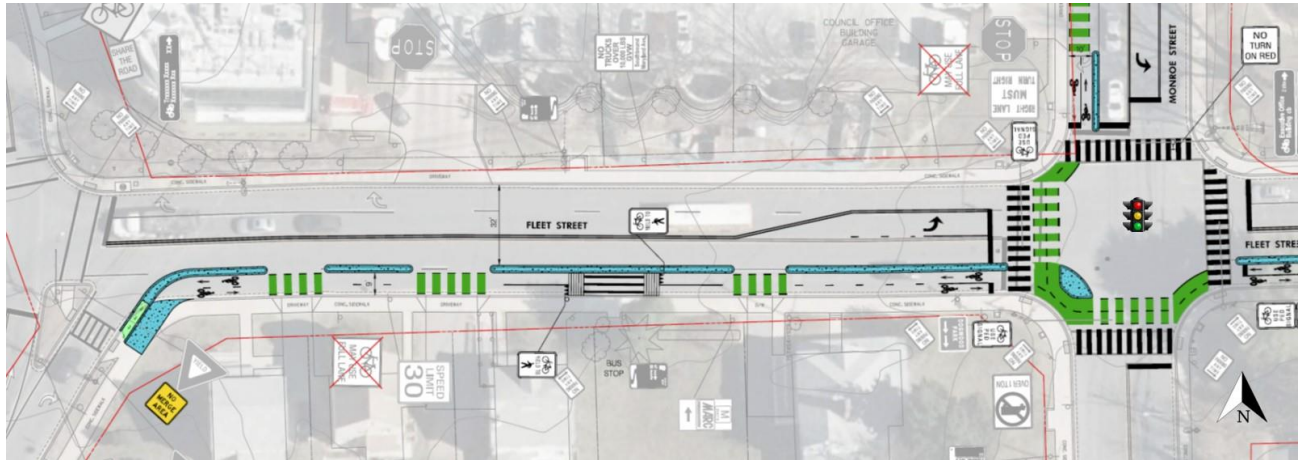


Figure 11: West terminus of cycletrack option

Because the cycletrack is at the same grade as the roadway, the bus stop crossing is shown as a raised ramp through the cycletrack, and a crosswalk is shown to allow ADA-compliant crossing for transit users. A partially-protected intersection is proposed at the intersection of Fleet Street and Monroe Street, where cyclists would cross with pedestrians using the WALK phase. The bike crosswalks are situated to maximize the visibility of cyclists in the crosswalk by right- and left-turning drivers. Similar to the bike path, the southbound bike lanes along Monroe Street bend away from the intersection on the approach to Fleet Street, in order to increase the visibility of cyclists to turning motorists. Generally, the turn volumes in the peak hours are low, such that protected-only bike movements through the intersection are not necessary.

As shown in Figure 12, the cycletrack terminates at RMHS, where it merges with the existing sidewalk and connects to the existing shared use path by the midblock crossing.

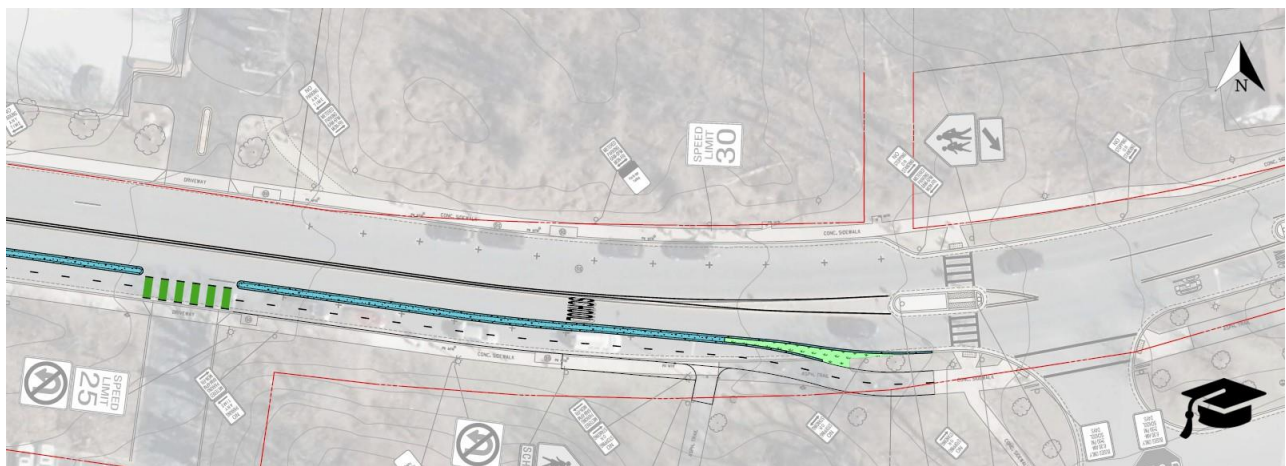


Figure 12: Eastern terminus of proposed cycletrack at RMHS



A final option is for the WALK phase for bikers and pedestrians to be activated only, such that users need to request the WALK phase via a pedestrian push button. It should be noted that Rockville is moving away from these type of activated WALK phases – particularly in the Town Center area.

North of Monroe Place, the proposed cycletrack transitions to an off-road bike path, identical to the first option discussed – as shown previously in Figure 10. This transition from on-road to off-road occurs due to Monroe Street road width narrowing and bumpouts, north of Monroe Place.

Appendix C contains the full conceptual drawing set for the on-road cycletrack option.

IMPACTS ANALYSIS

Table 2 shows the estimated impacts as well as construction quantities for each of the two concepts. An impact analysis was also conducted on additional concept that represented a combination of the first two, where a cycletrack is proposed for Fleet Street, where bike/pedestrian activity is lower than the Town Center core, and an off-road bike path on Monroe Street, where pedestrian and bike activity is greater and off-road non-vehicle facilities are more amenable and familiar to drivers.

Table 2: Estimated Impacts and Quantities for off-road bike path and on-road cycletrack options

Metric	Cycletrack	Side Path	Combination (cycletrack only on Fleet)
LOD (sf)	7,500	34,500	22,000
Impervious area change (sf)	500 reduction	2500-3000 reduction	2000-2500 reduction
Inlets relocated	2	8	6
Utility/light poles relocated	2	2	2
Driveways reconstructed	0	9	5
parking spaces lost	0 or 4 on Middle & 7 on Fleet	0 or 4 on Middle & 7 on Fleet	0 or 4 on Middle & 7 on Fleet
Change in traffic LOS	LOS is unchanged	LOS is unchanged	LOS is unchanged
Bike Level of Stress	LTS 1	LTS 1	LTS 1
Estimated Cost	\$400,000	\$1,000,000	\$760,000
Other Notes	lowest cost	SUP more commonplace; highest cost	Removes need for bike phases

As shown in the table above, the Limits of Disturbance (LOD) is highest for the off-street bike path; the LOD impacts the size of the stormwater management mitigation needed to serve the project. However, both concepts, as well as the combination of the two described earlier, have a net reduction in overall impervious pavement, due largely to each concept replacing an existing asphalt travel lane.

Parking and traffic impacts

All concepts will remove 7 paid meter spaces along the south side of Fleet Street. Depending on the alternative chosen, there can as little as zero spaces lost on Monroe Street if it is converted to one-way



operations north of Monroe Place. If two-lane operations are to remain for this segment, then 4 southbound curbside spaces would be removed between Monroe Place and Montgomery Ave, and 5 southbound curbside spaces would be removed between Montgomery Ave and Middle Lane.

Traffic impacts are minimal, due to the excess roadway capacity on Fleet Street and Monroe Street. The overall LOS for each intersection would remain unchanged – even before accounting for any signal timing changes that would likely occur with a road diet. As shown in Table 3, the bike path has no impact on the intersection LOS for each study area intersection.¹ Also, note that in the PM peak hour, the intersection of MD 28 (Jefferson St) at Monroe place degrades from a C to a D. This degradation happens under the assumption that the WALK phase for bikes is an exclusive phase, with no other vehicles permitted to enter the intersection. Since this is not a specific requirement, per MDOT SHA, a traffic analysis shows that (in the last column of Table 3) the intersection has no changes in LOS, under the assumption that all northbound Monroe Street traffic through the intersection is permitted and that left turn traffic is prohibited. Other similar traffic assumptions would yield similar results, such as permitting southbound left turns and providing northbound traffic with a green light, while providing northbound left turns with a red arrow.

Table 3: Intersection-level traffic impact summary, LOS AM (PM)

Intersection	Existing Conditions	Bike Path	2-way Cycletrack with Exclusive WALK across MD 28	2-way Cycletrack with concurrent northbound traffic at MD 28
Monroe St & E Middle Ln	A (A)	A (A)	A (A)	A (A)
Monroe St & E Montgomery Ave	A (A)	A (A)	A (A)	A (A)
Monroe St & Monroe Pl	A (A)	A (A)	A (A)	A (A)
Monroe St & E Jefferson St	B (C)	B (C)	C (D)	C (C)
Monroe St & Fleet St	B (B)	B (B)	B (B)	B (B)
Maryland Ave & Fleet St	C (E)	C (F)	C (F)	C (F)

Construction Costs

Based on the estimated quantities for each concept, the planning level construction cost is:

- Concept 1, Off-road bike path: \$1,000,000
- Concept 2, On-road cycletrack: \$400,000
- Concept 3, Combination of off-road path and on-road lanes: \$760,000

These estimates include a cost for relocating overhead utilities, relocating drainage inlets, driveway apron reconstruction, new curb and gutter, new asphalt path, new traffic signals, signing and pavement markings. The cost estimate breakdown is shown in [Appendix D](#).

Public Meeting

On May 4, 2023, a virtual public meeting was held with City residents. The meeting was advertised by the City's Department of Public Works, and it coincided with the publishing of a presentation and conceptual drawings set on the City's website. The public meeting consisted of a presentation, review of the concept plans and discussion of the different options. The presentation can be found in [Appendix](#)

¹ While the LOS in the PM peak hour at the intersection of Maryland Ave at Fleet Street degrades from an E to F, in reality the average vehicle delay only degrades from 80 seconds to 81 seconds, which happens to be the numerical threshold between the assigned letter grades for LOS.



E and generally covered the project's purpose and need; concept overview; impacts; design assumptions, and next steps in project process. A question and answer session with residents followed the presentation, with a summary of the comments/questions below:

- Proposed parking removal (7 spaces) on Fleet Street, east of Monroe Street, is acceptable, since there is rarely any vehicle parked there.
- Given the added activity expected on Fleet Street, provide better pedestrian/bike lighting.
- Preference for scooter drop off areas and public bike racks along Fleet and Monroe Streets
- Pedestrian waiting areas at intersections are crowded; during the next design stage of the project, incorporate large pedestrian landing areas at all quadrants of Fleet/Monroe.
- The current configuration of Fleet Street has two off-set eastbound/westbound shared-left lanes at the east and west approaches to Monroe Street. When there is a left-turning vehicle in each of the lanes at the same time, they obscure each other from seeing upstream traffic, making left turn maneuvers difficult. Request for a left arrow was made.
 - *Note: Both proposed options reduce Fleet Street to 3 lanes with opposing (i.e., not offset) left turn only lanes. This configuration will substantially reduce vehicle obstruction of upstream through traffic for both eastbound and westbound drivers.*

DESIGN CONSIDERATIONS AND NEXT STEPS

Design Summary and Future Considerations

Generally speaking, design considerations for each concept include:

- Complete Streets can be accommodated on both Monroe Streets and Fleets by incorporating dedicated bike (and micromobility) only facilities, because sidewalk exists on both sides of both roads. Additionally, these bike facilities can provide a buffer between pedestrians and vehicle traffic and maintain vertical and horizontal separation of the SUP from vehicle traffic. By providing a wide-enough SUP, cyclists and pedestrians could mix with obstructing each other.
- The on-road option is shown having a horizontal and vertical buffer from the vehicle travel lanes, consisting of a three foot wide precast concrete curb. There are other less expensive buffers such as a painted hatched buffer with alternating flex posts and wheel stops. A key design requirement is ample horizontal buffer (minimum 3 feet) and a vertical buffer. The raised bike-only side path generally has a 3-foot buffer between it and the curb. This buffer is shown as grass to accommodate roadside signage, where needed.
- Bike facility width is between 9 and 10 feet. Because the path or cycletrack is not a shared use, eight-foot wide pinch points can be allowed to avoid utility pole or light post relocation. If the bike path is immediately adjacent to the sidewalk, a different material than concrete should be used. Additionally, bike markings should be applied along the path.



- Design should incorporate ADA compliance through bus stops, per Montgomery County's bus stop design guidelines.
- If a cycle track is chosen for Fleet Street, the buffers between the bike lanes and travel lanes need to have ample openings to allow a vehicle to safely back out of the residential driveways (see Figure 14).
- Design should minimize mature tree removal.
- Design should minimize expensive utility relocations, such as above ground utility poles, by meandering a bike path or narrowing at spot locations.
- Design should consider ease of long-term maintenance.
- To minimize costs for the raised bike path option, consider channel drain can be utilized in lieu of relocating inlets, where the curb line is moved. See Figure 15.
- Because each option has over 5,000 square feet of disturbance, stormwater management mitigation is required.
- A protected intersection is recommended at the intersection of Fleet Street and Monroe Street, as shown in the concepts, however, protected only phasing for cyclists is likely not needed as turn volumes are generally low.
- Coordination with MDOT SHA during the design phase of the project is required to address crossing MD 28. A on-road cycletrack will require protected, but not exclusive WALK phase (coincident with the pedestrian WALK phase), but an offroad bike path adjacent to the sidewalk may not require a distinct phase for crossing MD 28, depending on the design of the crosswalk. A shared bike and pedestrian crossing, for example, may eliminate the need for a dedicated WALK phase for cyclists. Irrespective of the selected concept, modification of the northbound and southbound lane usage, as well as minor signal timing adjustments, will maintain the intersection with an LOS D or better.
- Bike wayfinding signage and destination markers are recommended during the next design phase.

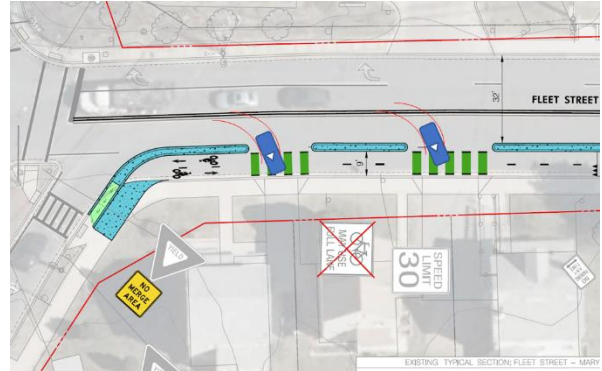


Figure 14: Vehicles backing up onto Fleet Street



Figure 15: example of channel drain under sidewalk

Preferred Option and Next Steps in the Design Process

The next step in the design process is to select a concept for advancement into 30% design and then secure funding for 30% design. Based on follow-up discussions, City Staff is recommending the grade-separated bike path option for advancement into 30% design. This design stage will include topographic survey and a boundary survey to locate exact lot lines and public right of way limits, as well as any existing easements. This stage will also evaluate options for stormwater mitigation and identify any additional permits required for construction. 30% design also entails a more accurate construction cost estimate. Additionally, all public and private stakeholders should be identified and notified of the next design stage, even if all construction occurs in public right of way. An additional public meeting should be held during the 30% design phase to ensure that all public comments from this current stage were addressed.

During the 30% design phase, the process should begin to secure funding for 65% Design and Final Design. During the 65% design phase, all necessary permits are obtained including SWM approval by Montgomery



County DPS. The final step is to secure funding for, and begin, construction. Note, that construction (and even design) can occur in phases, as this project has the potential to be both costly and could require a significant amount of time if utility relocation is needed.

FUNDING OPPORTUNITIES

Funding for projects can often be an obstacle to implementation. In addition to using local funds, there are several state/federal grant programs that offer monetary support for implementing the recommended bicycle facilities in this study. Some of the following funding sources identified as applicable include:

Transportation Alternatives Program (TAP). This program is administered and supported by the Maryland State Highway Administration, with reimbursement from the Federal Highway Administration, for the purpose of funding projects that enhance the cultural, aesthetic, historic, and environmental aspects of the State’s intermodal transportation system. The program is set up to sub-allocate fifty percent of the funding directly to local Metropolitan Planning Organizations who are the responsible reviewers of proposed projects within their jurisdiction. Recommendations under this study would be eligible as they meet the requirements of 1) related to surface transportation; and 2) meet at least one of the ten qualifying TAP categories – such as New Walking and Biking Connections and Facilities; or Safe Routes to School (SRTS); or related environmental mitigation. Project sponsors are responsible for design, management, construction, implementation, and permits as well as a minimum of 20% of all project costs. MDOT recently updated their tap manual at: https://roads.maryland.gov/OPPEN/TAP_Manual_2022.pdf.

Maryland Bikeways Program. Supported and administered by the Maryland Department of Transportation, the goal of the program is to fill in the gaps in Maryland’s bike network to support biking and bikeshare programs. An eligible project meets one of the following criteria: 1) located substantially within the Priority Funding Area (PFA) and/or located within three miles of a rail transit station or major bus transit hub, 2) provide or enhance bicycle access along any gap identified in the Statewide Trails Plan “A Greener Way to Go”, and/or 3) identified as a transportation priority in a County’s most recent annual priority letter submitted to MDOT. Note that all projects in this report are within a PFA (either State or Municipal PFA) and all projects are within the three miles of rail transit. The local match requirements are a) zero percent for priority minor retrofit, b) twenty percent for other priority projects, and c) fifty percent for non-priority projects. The match may include cash or in-kind services contributing to the project such as expenditures up to twenty-four months prior to a Bikeways project award.

Safe Routes to Schools. Administered by the State Highway Administration and supported by an 80/20 federal to local match, this program funds infrastructure and non-infrastructure projects that support safe and sustainable routes for K-8 aged children to walk, roll, or bicycle to school. Projects categorized as safe routes to school must be requested through the larger Transportation Alternatives Program. Eligible project types that overlap with the recommendations under this study include traffic calming and speed reduction improvements, bike/pedestrian crossing improvements, and bicycle parking. This program would be applicable, as Richard Montgomery High School is located within the project area – allowing the City or County to qualify for Safe Routes to School funding.

MWCOG Transportation Land Use Connections (TLC) Grants. As members of MWCOG, Rockville and Montgomery County can apply for Planning and Design grants to fund studies or designs for planned projects. The TLC Program will provide consultant assistance, valued between \$30,000 - \$60,000 for



planning projects and up to \$80,000 for design or preliminary engineering projects, for projects that promote mixed-use, walkable communities and support a variety of transportation alternatives. These are annual grants and are competitive among the jurisdictional members.

MWCOG Transit Within Reach Program (TWR) Grants. The Transit Within Reach Program provides funding for design and preliminary engineering (up to 30% design) for projects that improve biking and walking connections to existing high-capacity transit stations, including include Metrorail, commuter rail, light rail, streetcar, bus rapid transit, and multimodal stations. Project categories may include (but are not limited to): Cost estimates of improvements; engineering systems description and analysis; preliminary or schematic drawings with site plans and elevations; renderings of site massing, elevation, or facility interior/exterior spaces; Site surveys. Grants are currently offered on a biennial cycle between FY 2021 and FY 2026. Approximately \$80,000 will be available per grant.