Montgomery Lane Bike Lanes (CIP Project No. 500119), Mandatory Referral No. MR2019023

DESCRIPTION

Construction of 0.3-mile-long two-way separated bike lanes along the south side of Montgomery Lane and Montgomery Avenue between Woodmont Avenue and Pearl Street.

- Applicant: Montgomery County Department of Transportation
- Bethesda Downtown Master Plan Area
- Filing Date: July 1, 2019. 60-day review extended by consent of MCDOT

Staff Recommendation: Approval to Transmit Comments

MANDATORY REFERRAL REVIEW

This proposal for the construction of two-way separated bike lanes requires the Mandatory Referral review process under the Montgomery County Planning Department’s Uniform Standards for Mandatory Referral Review. State law requires all federal, state, and local governments and public utilities to submit proposed projects for a Mandatory Referral review by the Commission. The law requires the Planning Board to review and approve the proposed location, character, grade and extent of any road, park, public way or ground, public (including federal) building or structure, or public utility (whether publicly or privately owned) prior to the project being located, constructed or authorized.

The applicant agreed to a Planning Department staff suggested extension to the 60-day window for review and comment. The original 60-day window extended to August 30, 2019. This was increased 20 days to September 19, 2019.

RECOMMENDATIONS

Staff recommends Approval to transmit the following comments to the Montgomery County Department of Transportation:
1. Consider constructing protected intersections as described in the Bicycle Master Plan at all intersections.

If MCDOT determines that protected intersections are not feasible, construct the following:

   a. At the western leg of the intersections of Montgomery Lane/Montgomery Avenue with East Lane, Wisconsin Avenue, Waverly Street, and Pearl Street, shift the pedestrian crossing west to provide forward queuing space for bicyclists. This change improves visibility for all road users and creates preferred perpendicular pedestrian crossings at these locations.
   
   b. Provide two-stage turn queue boxes at all intersections where they are currently not designed.

2. At all locations where floating transit island are provided (East Lane, Pearl Street), consider installing:

   a. Raised pedestrian crossings between the floating transit island and the sidewalk to allow transit users to cross the separated bike lanes at a continuous elevation and encourage bicyclists to slow down and yield to transit users crossing the bikeway.
   
   b. Tactile directional indicators that inform pedestrians where the edge of the sidewalk is located and direct them to the preferred crossing location.
   
   c. Lean rails along the back of the floating bus stops to define the space and prevent conflict between bicyclists and transit users.
   
   d. Pavement markings that indicate bicyclists should yield to pedestrians.

3. Continue coordinating with the Commission on People with Disabilities on floating bus stop design.

4. Consider the use of right-turn-on-red restrictions at all traffic signals along the bikeway.

5. Provide signs that state that southbound bicyclists at intersecting streets can turn right onto the separated bike lanes on Montgomery Lane.

6. Improve the ability of eastbound bicyclists to continue traveling past Pearl Street by altering the proposed curb extension at the southeast corner of Montgomery Avenue and Pearl Street.

7. Provide the following pedestrian improvements:

   a. At the intersection of East Lane and Montgomery Lane, add a crosswalk on the east legs and install perpendicular curb ramps at the northeast corners.
   
   b. At 4550 Montgomery Avenue, provide an ADA-compliant pedestrian clear zone across the parking garage driveway.
   
   c. At the intersection of Pearl Street and Montgomery Avenue, add a crosswalk on the east leg and install curb ramps on the northeast and southeast corners.

8. Existing street trees should be protected during construction and any changes to existing curbs, including construction of new curb ramps, should allow for water infiltration to maintain tree health.

PROPOSAL

Project Description
The Montgomery County Department of Transportation (MCDOT) proposes to construct a 0.3-mile two-way separated bike lane along Montgomery Lane and Montgomery Avenue between Woodmont Avenue and Pearl Street in downtown Bethesda. The western project limit connects to a planned two-way separated bike lane on Woodmont Avenue that will ultimately connect north to the National Institutes of Health and south to the Capital Crescent Trail. The eastern project limit will connect to a bikeway on Pearl Street that extends north to Jones Bridge Road and extends south to the Capital Crescent Trail. The proposed bikeway is adjacent to commercial, office, and mixed-use residential/commercial properties and provides comfortable, low-stress east-west bicycle connectivity for people of all ages and bicycling abilities.

Within the project area, Montgomery Lane and Montgomery Avenue are classified as a Business District Streets. They travel one-way eastbound with a speed limit of 25 miles per hour. Currently, Montgomery Lane has four travel lanes between Woodmont Avenue and Wisconsin Avenue. Between Wisconsin Avenue and Pearl Street, Montgomery Avenue has three travel lanes. The proposed design is to be constructed between the existing roadway curbs by narrowing the existing travel lanes and converting one travel lane to the bikeway.
### Status and Phasing

The bikeway will be constructed in three segments. The first segment is under construction between Wisconsin Avenue and Waverly Street as part of the Avocet Tower Development project at 7359 Wisconsin Avenue (Figure 2). The project received site plan approval from the Planning Board in June 2019 and is anticipated to be complete in Spring 2021. The second and third segments of the project are currently in the 30 percent design phase and are fully funded for construction under Capital Improvement Program #500119. The segment between Woodmont Avenue and Wisconsin Avenue will likely begin construction second, as this segment provides value independent of the rest of the project. The segment between Waverly Street and Pearl Street will be constructed last, as this segment provides little value without the other two segments. An interim condition for the intersection of Montgomery Lane and Wisconsin Avenue is included in this Mandatory Referral’s supplementary materials.

![Figure 2: Separated bike lane and lay-by to be constructed by Avocet Tower project](image2.png)

### Separated Bike Lane Design

#### Overview

The proposed two-way separated bike lanes will be located on the south side of Montgomery Lane and Montgomery Avenue between Woodmont Avenue and Pearl Street. They are proposed to be constructed at street-level. Generally, the bikeway is ten-feet wide with a curbed buffer that varies between six and eight feet wide. The bikeway narrows to eight feet for a short distance as it passes behind the bus stop at East Lane. Cross-sections are shown in the attached project plan documents.

#### Floating Bus Stops

There are two bus stops in the project area that will be upgraded to floating bus stops as part of this project (see Figure 3 for the floating bus stop at Pearl Street). Floating bus stops (Figure 4) eliminate the conflict between bicyclists traveling in the road...
and buses that must pull to the side of the road to load and unload passengers by routing the bikeway behind the bus stop.

Accessible On-street Parking
There are two locations between Wisconsin Avenue and Pearl Street along the bikeway that provide accessible on-street parking for accessing the businesses in the area by people with disabilities: in front of the Avocet Tower and 4550 Montgomery Avenue (see Figure 5). The parking areas are a minimum eight feet wide with a five-foot buffer between the parking lane and the bikeway to facilitate safe vehicle ingress and egress. The buffer between the parking and the bikeway consists of flexposts spaced ten feet apart, which provide sufficient space for people using mobility devices to exit a vehicle on the passenger side, traverse the buffer and the bikeway, and access the ramps that connect to the sidewalk.

Intersections
At the intersection of Montgomery Lane and Woodmont Avenue, the Montgomery Avenue / Montgomery Lane bikeway connects to the planned two-way separated bike lanes on Woodmont Avenue. The design of this intersection (Figure 6) is being coordinated with both projects.
At the western leg of the intersection of Montgomery Lane and Wisconsin Avenue, the project proposes to remove the “free right” and repurposes the space for the separated bike lane (Figure 7: "Free Right" from Montgomery Lane to southbound Wisconsin Avenue to be removedFigure 7). This design will improve safety for all road users by reducing the speed of right turning traffic and improving visibility.

At the intersection of Montgomery Avenue and Pearl Street, a two-stage queue box is provided on the south leg of the intersection to help bicyclists travel north (Figure 8). Curb extensions are provided on both the southeast and southwest corners to reduce pedestrian crossing distance.

Analysis

Master Plan Conformance
The project is in substantial conformance with the May 2017 Bethesda Downtown Plan, the November 2018 Bicycle Master Plan, and the 2018 Master Plan of Highways and Transitways.

The Bethesda Downtown Plan discusses two approaches for reconfiguring the East-West Highway/Montgomery Lane/Avenue one-way couplet:

“Consider reconfiguration of the East-West Highway (MD 410)/Montgomery Lane/Old Georgetown Road (MD 187)/Woodmont Avenue one-way pair into a two-way street system. Conversion of these one-way streets to two-way operation would slow vehicular traffic, improve bicycle accommodation (by virtue of slower vehicular traffic) and enliven the street for pedestrians. This operational change would also increase visibility to commercial establishments along the one-way segment and provide new opportunities for placemaking. From a traffic operation perspective, this change would also make car travel less confusing and more easily navigable.
Alternatively: Reconfigure the East-West Highway (MD 410)/Montgomery Lane/Old Georgetown Road (MD 187)/Woodmont Avenue one-way pair using a “road diet” approach. A road diet is a technique by which an existing roadway is reconfigured to accommodate bicycle facilities, wider sidewalks, etc. by repurposing a travel lane. The future configuration should include two travel lanes, an on-street parking lane and a bike lane. Consideration should be given to the provision of a two-way bike lane.” (Bethesda Downtown Plan, page 36)

The Bicycle Master Plan recommends two-way separated bike lanes on the south side of Montgomery Lane from Woodmont Avenue to Wisconsin Avenue and two-way separated bike lanes on the south side of Montgomery Avenue from Wisconsin Avenue to East-West Highway.

This project is in conformance with the “alternative” approach in the Bethesda Downtown Plan and with the Bicycle Master Plan by repurposing an existing travel lane as a two-way separated bike lane.

**Environmental Guidelines**

The project is entirely within the existing public right-of-way. The project is 0.52 acres or 22,651.2 square feet. Under Section 22A-4 of the Forest Conservation Law, project disturbing less than 40,000 square feet are not subject to the law. Therefore, this project is exempt from submitting a Forest Conservation Plan and/or an exemption. The project received approval for its stormwater concept in March 2019.

**RECOMMENDATIONS**

1. **Construct protected intersections as recommended in the Bicycle Master Plan at all intersections.**

   As mentioned previously, the Bicycle Master Plan recommends protected intersections at any location where separated bike lanes “cross major highways, arterial roads, business district streets or other high-volume streets.” As all streets that intersect this project fall into one of
these street types, the project should be modified to provide protected intersections at each intersection.

Protected intersections are a feature of separated bike lanes, not an add-on, that extend the low-stress bicycling experience through the intersection by physically separating bicyclists and motor vehicles, making it easier for all road users to see each other, and prioritizing bicyclist and pedestrian right-of-way. Without protected intersections, separated bike lanes are incomplete.

The original design for this project included protected intersections, but those features were removed over concerns about heavy vehicle turning movements and the small size of the curb islands that would be required. Staff recommends these protected intersection features be reinstated in the design.

While staff strongly recommends protected intersections, if MCDOT finds that protected intersections are not feasible, these treatments should be constructed:

a. **At the western leg of the intersection of Montgomery Lane/Avenue with East Lane, Wisconsin Avenue, Waverly Street, and Pearl Street, shift the pedestrian crossing west to provide forward queuing space for bicyclists.**

   Rather than queuing behind the pedestrian crosswalk, the bicyclist stop bar should be in front of it, as shown with a red circle in Figure 10. This change improves visibility for all road users by moving bicyclists further ahead of motor vehicles and creates right angle pedestrian crossings at these locations.

   Forward queuing space gives bicyclists a head start on motor vehicles when traffic signals turn green and – depending on the distance between the motor vehicle stop bar and the bicyclist stop bar – may make bicycling more safe by allowing bicyclists to pass through the intersection before turning vehicles enter it.

b. **Provide two-stage turn queue boxes at all intersections where they are currently not designed.**

   At the intersections of East Lane, Wisconsin Ave and Waverly Street, it is unclear how bicyclists are supposed to exit the bikeway and travel north. Two-stage turn queue boxes are a type of treatment that can facilitate this movement and should be installed at these locations.

2. **At all locations where floating transit island are provided (East Lane, Pearl Street), consider installing:**
a. **Raised pedestrian crossings between the floating transit island and the sidewalk to allow transit users to cross the separated bike lanes at a continuous elevation and encourage bicyclists to slow down and yield to transit users crossing the bikeway.**

A raised bikeway, where bicyclists ramp up to sidewalk-level, reinforces that bicyclists are passing through pedestrian space and must yield.

![Figure 11: Floating bus stop with raised pedestrian crossings from AC Transit Multimodal Corridor Guidelines](image)

b. **Tactile directional indicators that inform pedestrians where the edge of the sidewalk is located and direct them to the preferred crossing location.**

While the curb between the sidewalk and the bikeway provides a detectable edge that helps those with low or no vision navigate safely and remain on the sidewalk, raising the bikeway along floating bus stops removes this detectable edge. Half domes are a common tactile treatment on ramps in the United States to warn those with low or no vision that they are approaching a decision point or conflict; they do not provide guidance as to the safe direction of travel. To provide more directional information to those with low or no vision, jurisdictions in Japan, Australia, and parts of Europe install tactile directional indicators.
Installing tactile directional indicators along the flush sidewalk edge (Figure 12) allows those with low or no vision to follow the direction of the tactile indicators with either a cane, their feet or other means to access the designated crossings.

Additionally, tactile directional indicators are often installed perpendicular to a designated bus stop or crossing to direct people to the designated crossing, like the example in Figure 13.

c. **Lean rails along the back of the floating bus stops to define the space and prevent conflict between bicyclists and transit users.**

Lean rails are shown in Figure 11 along the back of the bus stop. They channel transit users to designated bikeway crossings while also providing those waiting for the bus a place to lean against.

d. **Pavement markings that indicate bicyclists should yield to pedestrians.**

3. **Continue coordinating with the Commission on People with Disabilities on floating bus stop design.**

While floating bus stops eliminate conflicts between bicyclists and buses, as well as improve transit operations by allowing buses to stop in the travel lane, they create new conflict points between bicyclists and transit users who must cross the bikeway to get to the transit stop. MCDOT has been working closely with members of the community, particularly the Commission on People with Disabilities, to construct floating bus stops as part of several projects in the County in a way that prioritizes transit users and promotes bicyclist yielding, mitigating the conflicts. The Commission on People with Disabilities continues to have concerns with floating bus stops and staff strongly supports continued coordination around the design of these bus stops.
4. **Consider the use of right-turn-on-red restrictions at all traffic signals along the bikeway.**

Two-way separated bike lanes are often preferable to two one-way separated bike lanes because they require less space, but they create a situation where motorists do not expect bicyclists traveling in the opposite direction of traffic. To mitigate this conflict, right-turn-on-red restrictions should be applied at East Lane, Waverly Street, and Pearl Street.

It may also be helpful to reinforce the right-turn-on-red restriction by moving the vehicular stop bar on intersecting streets further back, as shown at East Lane in red in Figure 14. Recessing the stop bar would likely have the additional benefit of improving the ability for larger vehicles to safely navigate the protected intersection treatments proposed in Recommendation #1 at these locations by allowing a wider effective turning radius, as shown in Figure 15.

5. **Provide signs stating that southbound bicyclists at intersecting streets can turn right onto the separated bike lanes on Montgomery Lane.**

Currently, there are right-turn prohibitions on southbound streets that intersect Montgomery Lane and Montgomery Avenue. This is appropriate as these streets are currently one-way streets in the eastbound direction for motor vehicles and bicycles. When the bikeway is constructed, bicycle travel will become two-way along these roads, so the intersections should be signed appropriately to indicate that right turns for bicyclists into the bikeway are permissible.
6. Improve the ability of eastbound bicyclists to continue traveling past Pearl Street by altering the proposed curb extension at the southeast corner of Montgomery Avenue and Pearl Street.

While many bicyclists will choose to continue north along Pearl Street and utilize the two-stage queue box as designed, others will want to continue east on Montgomery Avenue toward East-West Highway. This movement needs to be accommodated.

One idea is to design a treatment similar to the one in Figure 17 from the Planning Department’s Bicycle Facility Design Toolkit. This treatment allows eastbound bicyclists to transition into a lane shared with traffic after passing through the intersection, rather than in the intersection as currently designed. Transitioning after the intersection is preferable from a safety standpoint because the bicyclist can establish themselves in the travel lane with no motor vehicles behind them.

7. Provide the following pedestrian improvements:
   a. At the intersection of East Lane and Montgomery Lane, add a crosswalk on the east legs and install perpendicular curb ramps at the northeast corners.
   b. At 4550 Montgomery Avenue, provide an ADA-compliant pedestrian clear zone across the parking garage driveway.
   c. At the intersection of Pearl Street and Montgomery Avenue, add a crosswalk on the east leg and install curb ramps on the northeast and southeast corners.

8. Existing street trees should be protected during construction and any changes to existing curbs, including construction of new curb ramps, should allow for water infiltration to maintain tree health.
PUBLIC OUTREACH

A public meeting was held for this project on October 9, 2018. All public meeting presentation materials are available on MCDOT’s website here: https://www.montgomerycountymd.gov/dot-dte/Resources/Files/Bethesda%20Bikeways%20Public%20Meeting.pdf.

CONCLUSION

Based on information provided by the Applicant, Staff recommends approval of the Mandatory Referral with comments listed at the front of this report to be transmitted to the Montgomery County Department of Transportation.

ATTACHMENT

a. Project plan documents.
1. ALL ELEVATIONS SHOWN ON THIS PLAN ARE IN ACCORDANCE WITH THE FOLLOWING: HORIZONTAL—MARYLAND COORDINATE SYSTEM (STATE PLANE GRID) BASED ON NORTH AMERICAN DATUM OF 1983 (NAD 83); VERTICAL—NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

2. ALL STRIPING AND SIGNS WORK SHALL COMPLY WITH THE LATEST APPLICABLE MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL (MMDUTC) AND MCDOT STANDARDS AND SPECIFICATIONS. SIGNS SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION (MCDOT) AND MARYLAND STATE HIGHWAY ADMINISTRATION (MDSHA) STANDARDS AND SPECIFICATIONS.

3. ALL EXISTING PAVEMENT MARKINGS MAY NOT BE SHOWN. ALL EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED PAVEMENT MARKINGS SHALL BE ERADICATED BY A METHOD APPROVED BY MCDOT.

4. ALL CONSTRUCTION MATERIALS AND PROCEDURES SHALL BE GOVERNED BY THE MONTGOMERY COUNTY DIVISION OF TRANSPORTATION ENGINEERING DESIGN STANDARDS AND MDSHA STANDARDS.

5. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING MISS UTILITY PRIOR TO BEGINNING WORK. ANY DAMAGE TO UTILITIES MUST BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

6. UTILITIES MUST BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

7. THE CONTRACTOR SHALL TAKE ADEQUATE PRECAUTION TO PROTECT ALL GRADING, SIDEWALKS AND FEATURES OUTSIDE THE LIMITS OF WORK AND SHALL REPAIR AND REPLACE OR OTHERWISE MAKE GOOD AS DIRECTED BY THE ENGINEER ANY SUCH OR CAUSED BY THE CONTRACTOR’S OPERATIONS AT NO ADDITIONAL COST TO MCDOT.
TYPICAL SECTIONS
MONTGOMERY LANE
WOODMONT AVE TO EAST LN.
STA. 12+00 TO 13+00
EXISTING CURB, TYP.
EXISTING SIDEWALK, TYP.

TYPICAL SECTIONS
MONTGOMERY AVENUE
WOODMONT AVE TO WISCONSIN ST.
STA. 16+25 TO 17+00
STA. 20+75 TO 21+25

TYPICAL SECTIONS
MONTGOMERY AVENUE
WAVERLY ST. TO WISCONSIN AVE.
STA. 18+25 TO 19+50
STA. 20+75 TO 21+25

TYPICAL SECTIONS
MONTGOMERY AVENUE
WAVERLY ST. TO PEARL ST.
STA. 24+00 TO 24+75

TYPICAL SECTIONS
MONTGOMERY LANE
WOODMONT AVE TO EAST LN.
BUS STOP
STA. 13+25 TO 13+75

TYPICAL SECTIONS
MONTGOMERY AVENUE
WAVERLY ST. TO PEARL ST.
BUS STOP
STA. 24+00 TO 24+75

TYPICAL SECTIONS
MONTGOMERY LANE
EAST LN. TO WISCONSIN AVE.
STA. 14+00 TO 14+75

TYPICAL SECTIONS
MONTGOMERY AVENUE
WAVERLY ST. TO PEARL ST.
BUS STOP
STA. 24+00 TO 24+75

11' EB TRAVEL LANE
10' EB TRAVEL LANE
10' EB TRAVEL LANE
8' BUFFER
10' BIKE PATH

VARIES
6'-8'

10'
10'

11' EB TRAVEL LANE
11' EB TRAVEL LANE
10' EB TRAVEL LANE
7'
7.4'

10'
10'

10.5'
10'

10.5'
10'

10.5'
10'

8'
8'

10'
10'

10'
10'

8'
8'
MATCHLINE STA. 14+50 SEE SHEET C4.1 AT FULL SIZE

LEGEND
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE
- PROPOSED BRICK PAVERS
- PROPOSED DETECTABLE WARNING SURFACE
- PROPOSED WALL AND OVERLAY
- PROPOSED FULL DEPTH ASPHALT PAVEMENT
- EXISTING RIGHT OF WAY LINE
- PROPOSED SWALE CUT

PROPOSED CURB AND GUTTER
PROPOSED CONCRETE
PROPOSED BRICK PAVERS
PROPOSED DETECTABLE WARNING SURFACE
PROPOSED WALL AND OVERLAY
PROPOSED FULL DEPTH ASPHALT PAVEMENT
EXISTING RIGHT OF WAY LINE
PROPOSED SWALE CUT

NOT FOR CONSTRUCTION
EB TRAVEL LANE

2-WAY BIKE LANE

WIDTH VARIES BY BLOCK. SEE CHART BELOW

CONCRETE, TYP.

PROPOSED CURB AND GUTTER

PROPOSED BRICK PAVERS

PROPOSED DETECTABLE WARNING SURFACE

PROPOSED MILL AND OVERLAY

PROPOSED FULL DEPTH ASPHALT PAVEMENT

EXISTING RIGHT OF WAY LINE

PROPOSED SAW CUT

CONCRETE ISLAND DETAIL

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>TYPICAL CONCRETE ISLAND WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOODMONT AVE TO EAST LN</td>
<td>6'</td>
</tr>
<tr>
<td>EAST LN TO WISCONSIN AVE</td>
<td>4.5'</td>
</tr>
<tr>
<td>WISCONSIN AVE TO WAVERLY ST</td>
<td>7.4'</td>
</tr>
<tr>
<td>WAVERLY ST TO PEARL ST</td>
<td>2.3'</td>
</tr>
</tbody>
</table>

LEGEND

PROPOSED CURB AND GUTTER

PROPOSED BRICK PAVERS

PROPOSED DETECTABLE WARNING SURFACE

PROPOSED MILL AND OVERLAY

PROPOSED FULL DEPTH ASPHALT PAVEMENT

EXISTING RIGHT OF WAY LINE

PROPOSED SAW CUT

SCALE

PROPOSED CONCRETE

PROPOSED MILLED PAVERS

PROPOSED MILL AND OVERLAY

PROPOSED NEW CURB AND GUTTER

PROPOSED BRICK PAVERS

PROPOSED DETECTABLE WARNING SURFACE

PROPOSED MILL AND OVERLAY

PROPOSED FULL DEPTH ASPHALT PAVEMENT

EXISTING RIGHT OF WAY LINE

PROPOSED SAW CUT

NOT FOR CONSTRUCTION
1. All pavement markings are thermoplastic unless otherwise noted. All linear white markings to be installed on concrete surfaces must be installed with black contrast tape, 3M Stamark or approved equal.

2. All signs shall be high intensity reflective sheeting meeting the requirement of AASHTO M28.

3. Proposed signs shall be installed so that no portion of the sign panel overhangs adjacent roadway pavement, i.e., shall not hang in front of a face of curb.

4. Proposed sign posts shall be located a minimum of 2 feet behind any adjacent face of curb. If located in or adjacent to sidewalks, a 2" minimum clear and 48" preferred passing space on existing and proposed sidewalks shall be maintained.

5. Proposed signs and relocated existing signs shall be installed so they do not block the visibility of any existing signs or signals, or obstruct sight lines at intersections.

6. Proposed signs and posts shall be clear of existing fire hydrants, surface utility, and overhead utility equipment a minimum of 10 feet.

7. For new post installation, the contractor shall verify that there are no conflicting underground or overhead utilities.

8. New post installation shall comply with MD SHA standard MD 802.04 and MD 813.05-1.

9. Signs mounted to existing light, signal or utility poles shall be fastened with a manufactured steel banding system per MD SHA standard MD 813.08. Poles shall not be drilled directly. The contractor shall submit manufacturer information on the banding system to the engineer for approval prior to installation.

10. If sign installation is shown on a pole that is not owned by the county, written permission must be obtained from the owner (utility company or property owner). The contractor is responsible for obtaining the required permission.

11. All crosswalks shall be installed connecting the curb ramps such that the curb ramps fall within the marked crosswalk. Minimum crosswalk width is 10 feet. Maximum crosswalk width is 20 feet. Diagonal corner curb ramps shall have a clear space of four feet within the crosswalk markings. Crosswalk markings shall be approved by the engineer prior to final installation.

**MARKING LEGEND**

<table>
<thead>
<tr>
<th>EXISTING</th>
<th>PROPOSED</th>
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<tbody>
<tr>
<td><strong>SIGN AND POST</strong></td>
<td><strong>BICYCLE LANE SYMBOL (REFER TO MUTCD)</strong></td>
</tr>
<tr>
<td>5&quot; SOLID WHITE LANE LINE (E.G., INSIDE BIKE LANE LINE)</td>
<td>10&quot; SOLID WHITE LANE LINE (E.G., OUTSIDE BIKE LANE LINE)</td>
</tr>
<tr>
<td>5&quot; BROKEN WHITE LANE LINE (10' STRIPE, 30' SKIP)</td>
<td>5&quot; DOTTED WHITE LANE LINE (2' STRIPE, 4' SKIP)</td>
</tr>
<tr>
<td>5&quot; SOLID YELLOW LANE</td>
<td>10&quot; DOTTED WHITE LANE LINE (2' STRIPE, 4' SKIP)</td>
</tr>
<tr>
<td>5&quot; SOLID YELLOW CENTERLINE (CYCLE TRACK)</td>
<td>5&quot; DASHED YELLOW CENTER LINE (CYCLE TRACK - 2' STRIPE, 9' SKIP)</td>
</tr>
<tr>
<td>5&quot; SOLID YELLOW LANE LINE WITH 5&quot; BROKEN YELLOW LANE LINE (10' STRIPE, 30' SKIP)</td>
<td><strong>8&quot; SOLID WHITE/BLACK CONTRAST TAPE (SUGGESTED MANUFACTURER: 3M STAMARK OR APPROVE E: UAL)</strong></td>
</tr>
<tr>
<td>5&quot; SOLID YELLOW CENTERLINE</td>
<td>10&quot; SOLID WHITE CHANNELIZATION LINE (45&quot; TYP.)</td>
</tr>
<tr>
<td>10&quot; SOLID YELLOW CHANNELIZATION LINE (40&quot; TYP.)</td>
<td>16&quot; STOP LINE</td>
</tr>
<tr>
<td><strong>CROSSWALK WITH 2 SWL - 6&quot; O.C. ALIGNED WITH DIRECTION OF TRAFFIC UNLESS OTHERWISE NOTED</strong></td>
<td><strong>WHITE PAVEMENT ARROW, REFER TO MDMUTCD</strong></td>
</tr>
<tr>
<td><strong>GREEN PAINTING MARKING MATERIAL, PREFORMED THERMOPLASTIC OR LI: UD EPOXY-BASED AS SHOWN ON PLANS</strong></td>
<td><strong>SIGN</strong></td>
</tr>
<tr>
<td><strong>ADVANCE SPEED HUMP MARKING, REFER TO MDMUTCD</strong></td>
<td><strong>YIELD AHEAD TRIANGLE SYMBOLS, REFER TO MDMUTCD</strong></td>
</tr>
</tbody>
</table>
SEPARING BIKE LANE SYMBOL PLACEMENT NOTES:
1. DO NOT PLACE SYMBOLS ON LANE LINES.
2. PLACE LANE SYMBOLS WITHIN CENTER OF EACH CYCLE TRACK LANE.
3. SEE PLAN SHEETS FOR SYMBOL LOCATIONS.

**TYPICAL CYCLE TRACK LANE SYMBOL AT INTERSECTIONS**

**TYPICAL VEHICLE TRAVEL LANE PAVEMENT MARKING ARROW PLACEMENT, UNLESS OTHERWISE NOTED ON PLANS**

**TYPICAL CYCLE TRACK LANE SYMBOL AT INTERSECTIONS**

**NOTE:**
- LATERAL PAVEMENT MARKING DIMENSIONS ARE TYPICALLY MEASURED TO AN ADJACENT FACE OF CURB OR TO THE CENTERLINE OF AN ADJACENT PAVEMENT MARKING AS SHOWN IN THE DRAWINGS.

**NOTE:**
- LATERAL PAVEMENT MARKING DIMENSIONS ARE TYPICALLY MEASURED TO AN ADJACENT FACE OF CURB OR TO THE CENTERLINE OF AN ADJACENT PAVEMENT MARKING AS SHOWN IN THE DRAWINGS.

**GREEN PREFORMED THERMOPLASTIC PAVEMENT MARKING, AS SHOWN ON PLANS**

**5" PREFORMED THERMOPLASTIC DOTTED WHITE LINE (2' MARK-4' GAP) TYP.**

**5" PREFORMED THERMOPLASTIC DOTTED YELLOW LINE (2' MARK-4' GAP) TYP.**

**5" PREFORMED THERMOPLASTIC DOTTED WHITE LINE (2' MARK-4' GAP) TYP.**

**THERMOPLASTIC PAVEMENT MARKING, ARROW, REFER TO MDMUTCD FOR DETAILS**

**3" SYL (TYP.)**

**16" OR 24" STOP LINE (TYP.)**

**BICYCLE LANE SYMBOL—SEE THE MARYLAND MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MDMUTCD) FOR MORE DETAILS**

**NOTE:**
- LONGITUDINAL PAVEMENT MARKING DIMENSIONS ARE TYPICALLY MEASURED TO EXISTING OR PROPOSED PAVEMENT MARKING CROSSWALK OR STOP LINES, CURB RADIUS PC'S AND PT'S, OR PERPENDICULAR FACES OF CURB AS SHOWN IN THE DRAWINGS.
ACCESSIBLE ON-STREET MOTOR VEHICLE PARKING (MID-BLOCK)

POST IS RETAINED TO BASE WITH 2 PINS

SHOWN WITH TYPICAL REFLECTIVE TAPE APPLIED

2" WHITE FLEXIBLE CHANNELIZER POST DETAIL

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DIMENSIONS, MATERIALS, AND ATTACHMENTS MAY VARY BETWEEN MANUFACTURERS.
3. COLOR OF POST SHALL MATCH COLOR OF APPLICABLE EDGE LINE.
4. SUGGESTED MANUFACTURERS INCLUDE: FILTRON EXTRUSIONS, SAFE-HIT, CARBONITE COMPOSITES, QMCK KURB, BENT MANUFACTURING, & IMPACT RECOVERY SYSTEMS.

12" THERMOPLASTIC SOLID WHITE LINE

5" THERMOPLASTIC SOLID WHITE LINE

GREEN PREFORMED THERMOPLASTIC PAINT

WHITE PREFORMED THERMOPLASTIC BIKE LANE SYMBOL WITH TURN ARROW

TWO-STAGE QUEUE BOX

12" THERMOPLASTIC SOLID WHITE LINE

5" THERMOPLASTIC SOLID WHITE LINE

TURNING VEHICLES
STOP FOR BIKES AND PEDESTRIANS

R10-15R MOD. - "TURNING VEHICLES, STOP FOR BIKES AND PEDESTRIANS" SIGN

DRAFT
NOT FOR CONSTRUCTION

TOOLE DESIGN

MONTGOMERY COUNTY
DEPARTMENT OF TRANSPORTATION
DIVISION OF TRANSPORTATION ENGINEERING
MONTGOMERY LANE / MONTGOMERY AVE
TWO-WAY SEPARATED BIKE LANE
IMPROVEMENTS "A" TO "C" STREET BOXES

DESIGN AND MARKING DETAILS
MATCHLINE STA. 14+50 SEE SHEET C7.1 AT FULL SIZE NOT FOR CONSTRUCTION DRAFT 8484 GEORGIA AVENUE, SUITE 800, SILVER SPRING, MD 20910 PHONE: (301) 927-1900 FAX: (301) 927-2800 www.tooledesign.com SHEET NO. DESIGNED BY DRAWN BY CHECKED BY DATE OF DATE OF DATE OF LB SE JAC DWD. MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION ROCKVILLE, MARYLAND MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION DIVISION OF TRANSPORTATION ENGINEERING MONTGOMERY LANE / MONTGOMERY AVE TWO-WAY SEPARATED BIKE LANES BETHESDA, MD 02/01/19 SCALE WORK ZONE CHANNELIZING DEVICES LEGEND PHASE 2 SEE THIS SHEET FOR PHASE 2 COMPLETED WORK PHASE 2