



Needwood Road Bike Path/Trail, CIP No. 501304, Mandatory Referral No. 2015021

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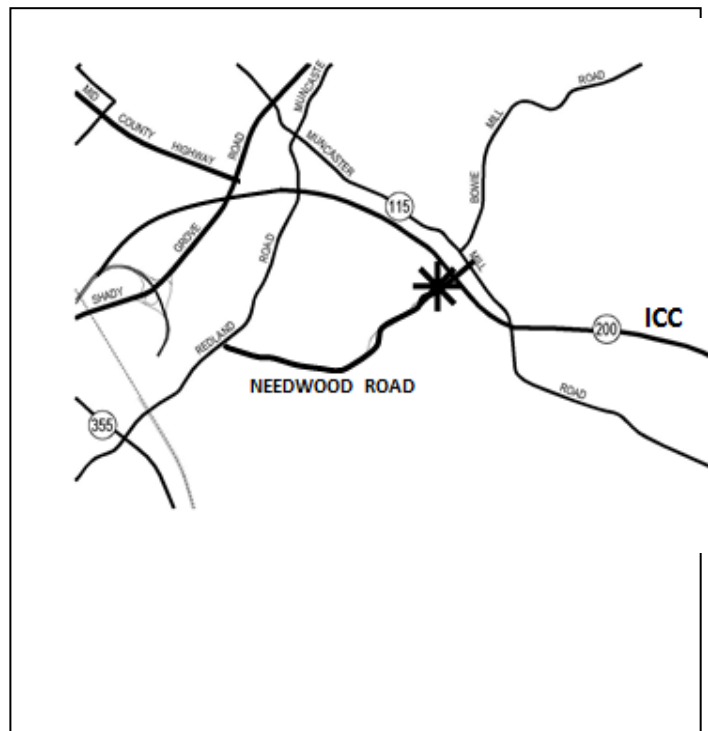
Completed: 06/11/15

Description

Mandatory Referral approval is requested for the Montgomery County Department of Transportation’s project to construct an 8-foot-wide shared use path along 1.9 miles of Needwood Road Bike Path between Deer Lake Road and Muncaster Mill Road (MD115).

In addition to providing a significant part of the connection between the ICC Trail and the Shady Grove Metrorail station, the shared use path along Needwood Road between Beach Drive and the western side of Lake Needwood would serve as an important link in a Blue Heron loop park trail experience (circumnavigating Lake Needwood) in Rock Creek Regional Park (see Attachment 1).

The project is located within the Upper Rock Creek Sector Plan area. See Vicinity Map to the right.



Summary

We recommend that the Board approve this project with the following comments to MCDOT:

1. Construct one of the two alternatives below as the permanent solution to be included as a condition of the park permit, with completion of the selected alternative to occur as part of the Phase 2 construction:
 - a. Construct a 10-foot-wide raised shared use path adjacent to a five-foot-wide eastbound bike lane; or
 - b. Install guardrail in the buffer at a one-foot-wide offset from the ten-foot-wide eastbound travel lane and provide a twelve-foot-wide two-way shared use path behind the guardrail.

2. Increase the width of the buffer between Needwood Road and the proposed shared use path to five feet in the segment from the western intersection of Deer Lake Road to just east of Oak Meadow Drive.
3. Provide a 42 inch high (minimum) fence at the back of the shared use path to protect users from steep slopes and drop-offs.
4. Provide a wooden rubrail wherever the back of a guardrail would abut the shared use path.
5. Provide sufficient trail signage to ensure safe operation of the proposed trail.
6. Construct all retaining walls on parkland included in this project of concrete with a stone formliner and capstone to ensure that they blend in with the natural setting and enhance and maintain the character of the corridor approaching the Needwood Mansion historic property and environmental setting, as well as to complement the aesthetic environment of the Needwood Golf Course. Where appropriate, native shrubs should be planted to reduce the visual impact of the walls. MCDOT should work with Parks staff to achieve a mutually agreed upon treatment, which will be made a condition of the park permit.
7. Hold a pre-construction meeting after the limits of disturbance have been staked prior to clearing and grading and must be attended by the project manager, private arborist, construction superintendent, forest conservation inspector, and the sediment control inspector.

Previous Board action

None.

Master Plan Consistency

The Upper Rock Creek Master Plan (2004) classifies Needwood Road as a two-lane Primary Residential Street (P-8) in a minimum 70-foot right-of-way. The Countywide Bikeways Functional Master Plan (2005) recommends that Needwood Road have both bike lanes and a shared use path (DB-14).

The proposed project would retain the existing two travel lanes but would reduce their width to ten feet, as recommended in the County's standard cross-sections (see Attachment 2). The master plan-recommended shared use path would be provided but the master plan-recommended bike lanes would not be provided.

The proposed shared use path would be built in the existing eastbound shoulder of Needwood Road. The existing westbound shoulder of Needwood Road would remain. The photo below illustrates the existing roadway typical section in the most constrained segment of the project, which is on top of the earthen causeway between the main part of Lake Needwood and the forebay. It measures approximately one-quarter mile. The bike lanes in this segment would not be provided and could be made more difficult to construct in the future.



The ICC Limited Functional Master Plan Amendment (2008) included bikeway accommodation on some roadways, including Needwood Road to replace trail segments that were deleted from the ICC project (see Attachment 3). The State of Maryland committed – as part of the ICC Record of Decision – to help fund improvements between the ICC Bike Path terminus at Needwood Road and the Shady Grove Metro Station. The State’s contribution to the construction of Phase 1 is intended to honor that commitment.

Analysis

A shared use path is proposed to be constructed on the south side of Needwood Road between the western intersection of Deer Lake Road and Muncaster Mill Road, a distance of approximately 1.9 miles, about two-thirds of which is on parkland. There is a 900-foot segment of path included in these limits that has already been constructed as part of the Intercounty Connector (ICC) project. (See map in Project Phasing below.)

The proposed shared use path would be built at a width of eight feet, which is less than the recommended minimum ten feet recommended by the American Association of State Highway and Transportation Officials (AASHTO) in their Guide for the Development of Bicycle Facilities. However, AASHTO allows the path width to be reduced to eight feet under certain circumstances, which this project meets (see Attachment 4) since:

- The volume of pedestrian traffic will be relatively low;

- The path will not be regularly used by maintenance vehicles; and
- The available right-of-way width is frequently constrained by environmental features and the Lake Needwood causeway.

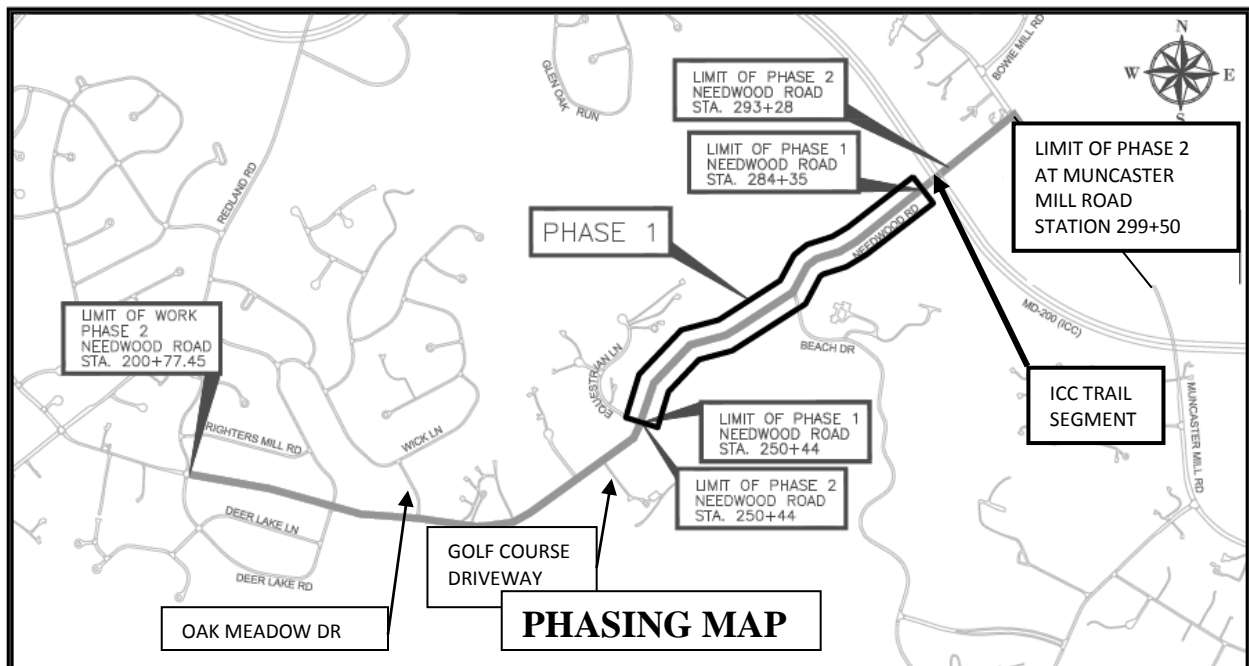
Attachment 5 shows an aerial photo of the constrained area at the causeway.

There is approximately eight feet of space between the existing edge of roadway pavement and face of existing vehicular guardrail. To get sufficient space for a buffer, the proposed project would restripe the roadway travel lanes to ten feet, creating a three-foot-wide buffer for the proposed shared use path. In addition, this segment of trail is parallel to the steep slope along the Lake Needwood causeway, which restricts any substantial widening of the shoulder. The current proposed design would provide only a rumble strip in the buffer.

Project Phasing

This project will have two phases (see map below). Phase 1 of the project is between Equestrian Lane and just west of the ICC, a distance of 3,380 feet. Phase 1 has State funding, but there is a time constraint to get the construction under contract shortly. The Phase 1 project area includes a 900-foot segment of trail that was already constructed as part of the ICC project.

The rest of the shared-use path would be constructed as Phase 2. Phase 2 of the project originally included a 700-foot segment of sidewalk along Muncaster Mill Road from Needwood Road to Colonel Zadok Magruder High School, but since a Water Quality Plan has not yet been prepared, MCDOT requested that the sidewalk be dropped from the project being reviewed by the Board.



From the western intersection of Deer Lake Lane to 200 feet east of Oak Meadow Drive
 The typical section for this Phase 2 segment, which is outside park property, includes only a 3.5-foot offset between the roadway and the proposed shared use path. AASHTO recommends that a

minimum of five feet of separation be provided between the edge of roadway and the path (see Attachment 6). We recommend that the offset be increased to five feet in this segment.

From 200 feet east of Oak Meadow Drive to 1,000 feet east of Needwood Golf Course Driveway

The typical section for this Phase 1 segment, which is on park property, includes a five to ten-foot wide buffer between the roadway and the proposed shared use path, meeting AASHTO recommendations.

From 1,000 feet east of Needwood Golf Course Driveway to just west of the ICC

The typical section for this Phase 1 segment, which is on park property, includes a buffer from the roadway which varies from three feet to about 94 feet. The reason for the generally greater buffer width is that there is no concern about affecting individual homeowners and in some cases, a greater offset from the road was desirable to allow the path to avoid large trees. The latter segment of path generally follows the existing alignment of the existing natural surface Blue Heron Trail, but would have to be regraded to meet ADA requirements.

The most constrained segment of the project is approximately one-quarter mile long and centered on the bridge. There are multiple issues with the proposed design in regard to national design standards that need to be evaluated and reconciled:

Consistency with National Design Standards: AASHTO recommends that a two-foot minimum clearance to lateral obstructions be provided on each side of a shared use path (see Attachment 7). For almost the entire constrained segment, only a one-foot clearance would be provided.

For the edge of the shared use path adjacent to the roadway, AASHTO recommends that a minimum of five feet of separation be provided between the edge of roadway and the shared use path (see Attachment 6); where the separation is less than five feet, a physical barrier or railing should be provided to prevent path users from straying into the roadway and to reinforce that the path is an independent facility. Only a three-foot wide buffer is proposed in the submitted design but MCDOT has expressed a willingness to include bollards or flexposts in the buffer. This would meet AASHTO's requirement aimed at preventing path users from straying to the roadway but not our concern about vehicles straying into the path; presence of the bollards would reduce the effective width of the buffer from three feet to about one foot to the lateral obstruction posed by the bollard.

AASHTO's Highway Safety Design and Operations Guide recommends that when a guardrail is located along sections of a roadway that also has a sidewalk, the sidewalk should be located behind the guardrail (see Attachment 8). The reason for this recommendation is that the purpose of the guardrail is to protect errant vehicles from going down the tall, steep slope by redirecting them along the face of the guardrail until they get back into the travel lane. Where there is a sidewalk or shared use path, the redirected vehicle would travel along the sidewalk and potentially endanger path users until it returns to the travel lane. Having the guardrail between the travel lane and sidewalk would protect both drivers and, in this case, pedestrians and bicyclists on the

shared use path. If the guardrail is moved, a 42-inch high (minimum) fence should be provided at the back of the shared use path to protect users from the steep slope.

Recommendations on Typical Section in this Constrained Segment

There are four main safety objectives that we are trying to meet:

- A. Preventing drivers from leaving the roadway and going down a hazardous slope,
- B. Preventing pedestrians and bicyclists from leaving the shared use path and going down a hazardous slope,
- C. Deterring pedestrians and bicyclists from inadvertently entering the roadway and being hit by a vehicle, and
- D. Preventing drivers from leaving the roadway and hitting pedestrians or bicyclists.

MCDOT's proposed typical section includes a guardrail at the back of the proposed shared use path that would be topped by a bike-safe railing which would address Objectives A and B. Their agreed-upon addition of bollards in the buffer area between the travel lane and shared use path would address concern C.

Summary: MCDOT's proposed typical section meets objectives A, B, and C, but would not meet Objective D and would make achieving the master plan-recommended bike lanes more difficult.

We see two potential solutions that would meet Objective D, and provide the master plan-recommended bike lanes. Both involve shifting the centerline of the roadway three feet to make use of a portion of the eight-foot-wide paved shoulder on the opposite side of the roadway without increasing the overall pavement width. A five-foot-wide bike lane would be provided in the remaining shoulder of westbound Needwood Road, as shown in the County standard on Attachment 2. A comparison of the typical sections in the constrained area for the proposed condition and the two alternatives is shown as Attachment 9.

The first alternative would be to construct a 10-foot-wide raised shared use path adjacent to a five-foot-wide eastbound bike lane. While the curb would not provide as much protection for path users as relocating the guardrail, it would deter errant vehicles to some extent. The drawback to this alternative is that the presence of a curb would channel stormwater runoff that would have to be collected and discharged. This alternative would meet the master plan recommendation for a dual bikeway in the constrained area.

Summary: Alternative 1 typical section meets all Objectives (A, B, C, and D) and would achieve the master plan-recommended bike lanes.

The second alternative would be to install a guardrail in the buffer at a one-foot-wide offset from the ten-foot-wide eastbound travel lane. This would leave twelve feet of space for pedestrians and bicyclists rather than the proposed ten feet (the eight-foot-wide path plus a one-foot-wide buffers on either side of the path). The wider space would provide more flexibility for path users and would minimize conflicts between bicyclists and pedestrians who will naturally stay as far away from the roadway as they can. This segment of Needwood Road is at the base of two hills and cars tend to naturally increase their speed above the 30 mph posted limit as they approach this area, so the guardrail

would provide an additional measure of safety. This alternative would not meet the master plan recommendation for a dual bikeway since an eastbound bike lane would not be provided, but since the shared use path would be at the same level as the roadway and pedestrian volumes are likely to be low, we believe Alternative 2 would be an acceptable compromise.

Summary: Alternative 2 typical section meets all Objectives (A, B, C, and D); it also does the best job of meeting objective C by preventing rather than deterring path users from inadvertently straying into the roadway. It would achieve a westbound bike lane but would not achieve a dedicated eastbound bike lane; however, the wide shared use path would be easily accessible since it would be at the same elevation as the future bike lanes leading up to it and would also be protected from traffic by the guardrail.

There has been a lot of discussion between Planning staff and MCDOT and its consultants on the issue of what AASHTO recommends in regard to various design elements. One of the problems in coming to resolution on these issues has been that there are multiple AASHTO documents/design policies that are applicable and need to be pieced together and reconciled. One of the keys to achieving the best balance of issues in constrained situations such as this is to pay close attention to the wording in each document.

MCDOT's consultant is concerned that the guardrail would be too close to the travel lane. The AASHTO Roadside Design Guide says that the suggested shy line offset for a 30 mph design speed is 4'; this distance is set so that a roadside object will not be perceived as an obstacle that might result in a motorist's reducing speed or changing vehicle position on the roadway. It goes on to say, "*For long, continuous runs of railing, this offset distance is not so critical, especially if the barrier is first introduced beyond the shy line and gradually transitioned near the roadway.*" At 300 feet and 900 feet, both segments of guardrail qualify as long continuous runs where the offset distance is not so critical. Also, this shy distance is a suggested value whereas the placement of the guardrail between the roadway and sidewalk/path is a recommended practice. The latter is stronger than "suggested" and should be the governing consideration. This would also not be a unique condition. See the photos below of Norbeck Road (MD28) and Veirs Mill Road (MD586) as two examples.



MCDOT is under a time constraint to get Phase 1 of this project, which includes the constrained segment in question, under contract in the very near term. A delay to modify the design could jeopardize the State funding. Therefore, we recommend that the proposed design of Phase 1 be permitted as an interim construction. We recommend that one of the two alternatives above be chosen as the permanent solution and be included as a condition of the park permit, with completion of the selected solution to occur as part of the Phase 2 construction.

The above recommendation would result in a facility that would optimize pedestrian and bicyclist safety on the proposed shared use path, as well as further the completion of the master-plan recommended bike lanes.

From just east of the ICC to Muncaster Mill Road Intersection

The typical section for this Phase 2, easternmost and last segment of the project, which is outside park property, includes a five to ten-foot wide buffer between the roadway and the proposed shared use path, meeting AASHTO recommendations.

Additional Trail Considerations on Parkland

Trail Segment East of Beach Drive

The segment of trail just east of the existing Beach Drive entrance to Rock Creek Regional Park and the Lake Needwood amenities has additional safety concerns that would be resolved by the inclusion of a guardrail between the roadway and path. Westbound trail users would abruptly face vehicular traffic head-on (only three to four feet away) after descending a 10 percent slope at a tight curve in the trail with little advanced warning because of the limited sight distance.

The photo below shows the existing condition with the proposed trail in red.



Longitudinal Trail Slope / ADA Guidelines

Parks staff initially requested that the longitudinal slope of the proposed trail be 7.8% maximum, reflecting the ADA Guidelines for Outdoor Developed Areas (“Trails ADA”) but later concurred with Planning staff that the ADA Guidelines for Pedestrian Facilities in Public Rights-of-Way (“Roadway ADA”), which have a maximum 5 percent slope, was the appropriate standard. The latter is more consistent with the policy guidance outlined in the 2005 Bikeways Master Plan and the trail will be part of Needwood Road, which is the reason MCDOT is pursuing this project. The latter guidelines allow a shared use path to exceed the maximum 5 percent slope as long as it follows the general longitudinal slope of the adjacent roadway. One area of particular concern though is a segment of proposed trail that sharply descends from the Needwood Mansion property down to Lake Needwood, following the existing alignment of the Blue Heron natural surface trail. Along some segments of this descent, the proposed longitudinal slope exceeds 11 percent for 250 continuous feet.

Reducing this longitudinal slope will result in significant disturbance and impacts to the adjacent slope and trees and require retaining walls exceeding 6-8 feet along most of the descent of about one thousand (1,000) linear feet of trail. Staff recommended to MCDOT that basic Hard Surface Trail Signage be provided in advance of this segment and other segments within the project to ensure safe conditions for trail users, but MCDOT has responded that trail signage is not included within this proposal. We recommend that the Board endorse our previous comment.

Trail segment parallel to Needwood Golf Course

The current design of this segment requires retaining walls and impacts to golf course elements. We believe that special attention should be paid to this area so that existing golf course elements and the surrounding rural character are maintained and enhanced where possible. As the design progresses, additional retaining walls may be needed, such as replacing retaining walls adjacent to the golf course cart path. We recommend that all retaining walls included in this project be constructed of concrete with a stone formliner and capstone to ensure that they blend in with the natural setting and enhance and maintain the character of the corridor approaching the Needwood Mansion historic property and environmental setting. Where appropriate, native shrubs should be planted to reduce the visual impact of the walls. The agreed upon treatment will be made a condition of the park permit.

Environmental Guidelines

The project area contains environmental buffers, streams, and other sensitive features. The project is within the Upper Rock Creek watershed, a USE IV designation. The Countywide Stream Protection Strategy (CSPS) rates the water quality in this watershed as in poor condition.

The project proposes 1.25 acres of forest removal, and impacts 1.44 acres of Stream Valley Buffer (SVB) and 3.42 acres of 100-Year-Floodplain. The environmental impacts are necessary and unavoidable to achieve the design standards of creating the new pathway, and those impacts have been minimized to the greatest extent possible.

Forest Conservation

The project is exempt from submission of a forest conservation plan. A forest conservation exemption (#42015127E) was granted under the provisions of Section 22A-5(e) as “a state or county highway project”. The exemption was confirmed on February 27, 2015.

While the project is exempt, the applicant is still required under section 22A-9 of the County code to:

- a) Minimize forest cutting, clearing, and loss of specimen trees to the extent possible while balancing other design, construction, and environmental standards. The constructing agency must make a reasonable effort to minimize the cutting or clearing of trees and other woody plants.
- b) If the forest to be cut or cleared for a County highway project equals or exceeds 20,000 square feet, the constructing agency must reforest a suitable area at the rate of one acre of reforestation for each acre of forest cleared.
- c) Mitigation for loss of specimen or champion trees. Mitigation amounts are based on the size and character of the tree.

The applicant has minimized the limits of disturbance, minimizing the amount of forest clearing and impacts to large and specimen trees. However, the project still has impacts to forest and specimen trees. The Applicant has provided a plan to highlight forest loss/mitigation, tree save, and specimen tree mitigation.

Forest loss/mitigation

Even with minimizing the LOD and altering some design aspects there are some necessary and unavoidable impacts to forest. The project proposes to remove 1.25 acres (54,450 square feet) of forest which is above the forest clearing threshold of .46 acres (20,000 square feet) allowed under the exemption. Therefore, the Applicant is required to reforest a suitable area at the rate of one acre of reforestation for each acre of forest cleared or 1.25 acres. The applicant intends to meet the full requirement at the Great Seneca Creek Reforestation site.

Tree Save

The applicant has submitted a tree save plan (TSP) in conjunction with the Mandatory Referral process to show how the impacts have been minimized and what stress reduction methods are being used to further minimize impacts on trees. Six (6) significant and specimen trees are being removed by this project, four (4) of which are specimen size.

Mitigation

In addition to forest loss the exemption also requires mitigation for removal of specimen trees. In this case we have four (4) specimen trees being removed. Two (2) of the specimen trees are located within the 1.25 acres of forest clearing and mitigation is already being applied in the form of the reforestation plantings. However, two (2) of the specimen trees are not located within the forest cleared area and not accounted for in the reforestation plantings.

The two (2) specimen trees are T-38, a 74.8" DBH Silver Maple and ST-41, a 30" DBH Red Cedar. Mitigation should be at a rate that approximates the form and function of the trees removed. Therefore, staff is recommending that replacement occur at a ratio of approximately 1" DBH for every 4" DBH removed. This means that for the 104.8 caliper inches of trees removed, the applicant will provide 26 caliper inches of trees as mitigation.

Since this project is linear in nature and only the area within the LOD is considered onsite, staff recommends that the 26 caliper inches of mitigation gets translated into additional reforestation acreage in the Great Seneca Creek Reforestation site. The standard rate of reforestation planting

using 1.5-2” caliper trees is 100 trees per acres. The applicant would need to plant 13 two-inch trees to achieve the 26 caliper inches required, or roughly an additional 0.13 acres in the Great Seneca Creek Reforestation site.

Total mitigation to be provided for the project is 1.38 acres of reforestation in the Great Seneca Creek Reforestation site.

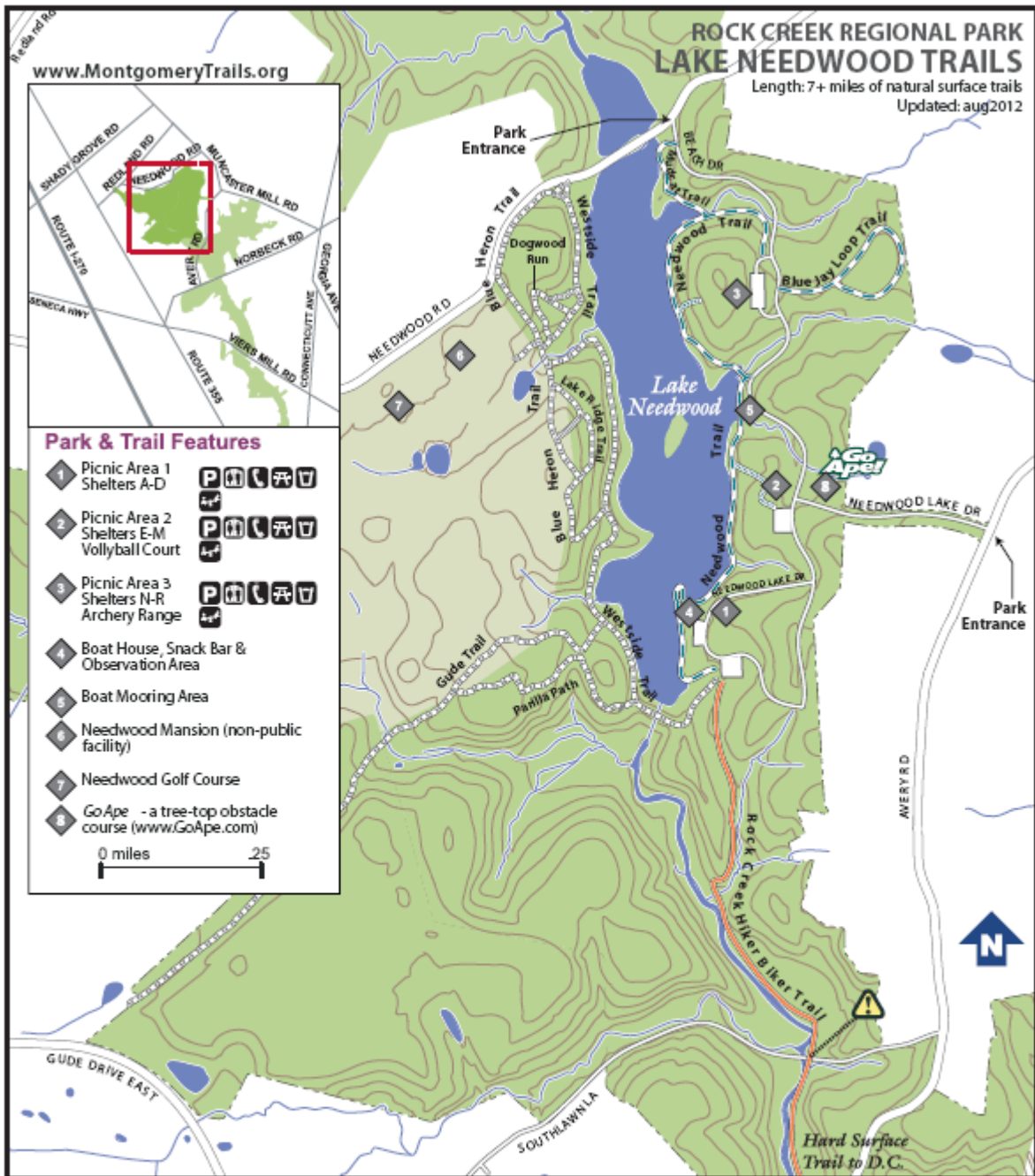
Outreach

A notice of the Mandatory Referral was sent to area citizens associations. In addition, MCDOT has held a:

- Public Meeting on January 8, 2015, and
- Public Hearing on April 15, 2015.

Conclusion

We recommend that this project be approved with the comments enumerated above.



www.MontgomeryTrails.org

ROCK CREEK REGIONAL PARK LAKE NEEDWOOD TRAILS

Length: 7+ miles of natural surface trails
Updated: aug2012

Park & Trail Features

- 1 Picnic Area 1
Shelters A-D
- 2 Picnic Area 2
Shelters E-M
Volleyball Court
- 3 Picnic Area 3
Shelters N-R
Archery Range
- 4 Boat House, Snack Bar &
Observation Area
- 5 Boat Mooring Area
- 6 Needwood Mansion (non-public
facility)
- 7 Needwood Golf Course
- 8 GoApe - a tree-top obstacle
course (www.GoApe.com)

0 miles 0.25

- Hard Surface Trail
- Trail Connector
- Natural Surface Trails**
- Hiker / Biker Only Trail
- Trail Connector
- Hiker Only
- Trail Connector
- Parklands & Topography
- Streams & Ponds

- Wheelchair Accessible
- Playground
- Use caution crossing road
- Parking
- Bathrooms
- Steep Slope
- Phone
- Picnic Area
- Drinking Water

Trail Issues: Service Center 301.670.8080
service.center@montgomeryparks.org
Emergency: Park Police 301.949.3010
Non-emergency: Park Manager 301.948-5053

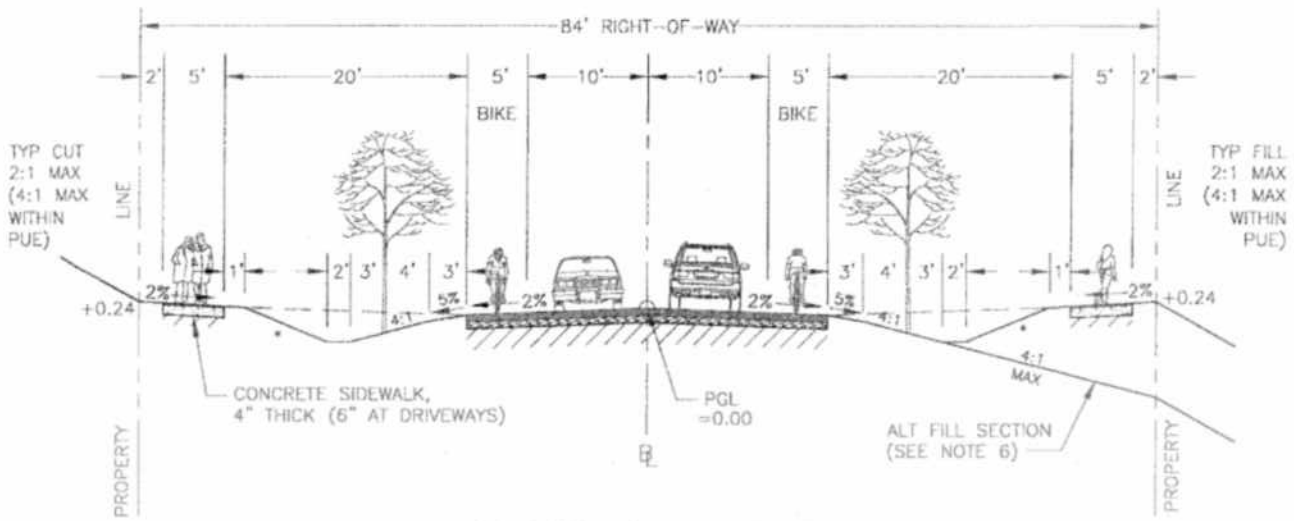


Trail Lengths

Blue Heron	0.75	Mudcat	0.18
Blue Jay Loop	0.43	Needwood	1.15
Dogwood Run	0.20	Panilla Path	0.40
Lake Ridge	0.20	Westside	1.20
Gude Trail	1.05		

Please Note: Trail Connectors are shown solely for neighborhood access. They are not part of the main park trail system and may not be signed or maintained to park standards.

Typical Section (NOT TO SCALE)



Paving Detail

	3" BITUMINOUS CONCRETE SURFACE (TWO EQUAL LAYERS)
	5" BITUMINOUS CONCRETE BASE
	APPROVED SUBGRADE

Design Data

GEOMETRIC DESIGN SHALL CONFORM TO MOST RECENT AASHTO "GREEN BOOK" METHODS.

TARGET SPEED (MPH)	SUPERELEVATION	MAX GRADE
N/A (30 MPH SIGHT DIST.)	NONE (-2% MAX)	8% FOR PRIMARY 10% FOR PRINCIPAL SECONDARY

MIN ALLOWABLE \bar{R} RADIUS = 300'

General Notes

- LATEST EDITION OF THE MARYLAND STATE HIGHWAY ADMINISTRATION SPECIFICATIONS SHALL APPLY FOR MATERIALS AND METHODS OF CONSTRUCTION.
- PUBLIC UTILITY EASEMENTS (PUEs) ARE SUBJECT TO "DECLARATIONS OF TERMS AND PROVISIONS OF PUBLIC UTILITY EASEMENTS" RECORDED AS LIBER 3834, FOLIO 457 IN THE LAND RECORDS OF MONTGOMERY COUNTY.
- STANDARD ELEVATION AT PROPERTY LINE, RELATIVE TO PGL, SHALL NOT VARY AT DRIVEWAYS.
- PAVING DETAIL DEPICTS THE MINIMUM REQUIRED SECTION. IF SUFFICIENT SUBGRADE SUPPORT IS NOT ASSURED, AN ENGINEERED PAVING DESIGN USING SHA METHODOLOGY WILL BE REQUIRED.
- NOTE THAT WITHIN A GIVEN CONTEXT, THIS STANDARD MAY NEED TO BE MODIFIED TO PROVIDE ADDITIONAL REQUIRED FEATURES SUCH AS MASTER PLANNED BIKEWAYS, AUXILIARY LANES AT INTERSECTIONS, OR STORMWATER MANAGEMENT FACILITIES. ADDITIONAL RIGHT-OF-WAY MAY BE NECESSARY TO ACCOMMODATE SUCH FEATURES.
- THE SIDE DITCH IN FILL SLOPES MAY BE ELIMINATED IN AREAS WHERE SIDEWALKS ARE NOT REQUIRED ONLY AFTER OVERLAND FLOW PATH AND EROSION POTENTIAL ARE CONSIDERED.
- ALL UNPAVED AREAS WITHIN THE LIMITS OF DISTURBANCE SHALL BE STABILIZED WITH ESTABLISHED GRASS TURF OR APPROVED LANDSCAPING.
- STREET TREES OF APPROVED TYPE, SIZE AND SPACING SHALL BE PLANTED AT LOCATIONS SHOWN.

STANDARD DEVELOPED AND IMPLEMENTED IN CONFORMANCE WITH COUNCIL RESOLUTION 16-809 ADOPTED DEC. 9, 2008

Keith H. Hogg
 DIRECTOR, DEPARTMENT OF TRANSPORTATION
Robert E. John
 CHIEF, DIVISION OF TRANSPORTATION ENGINEERING

25 JAN 12
 DATE

1/21/2012
 DATE

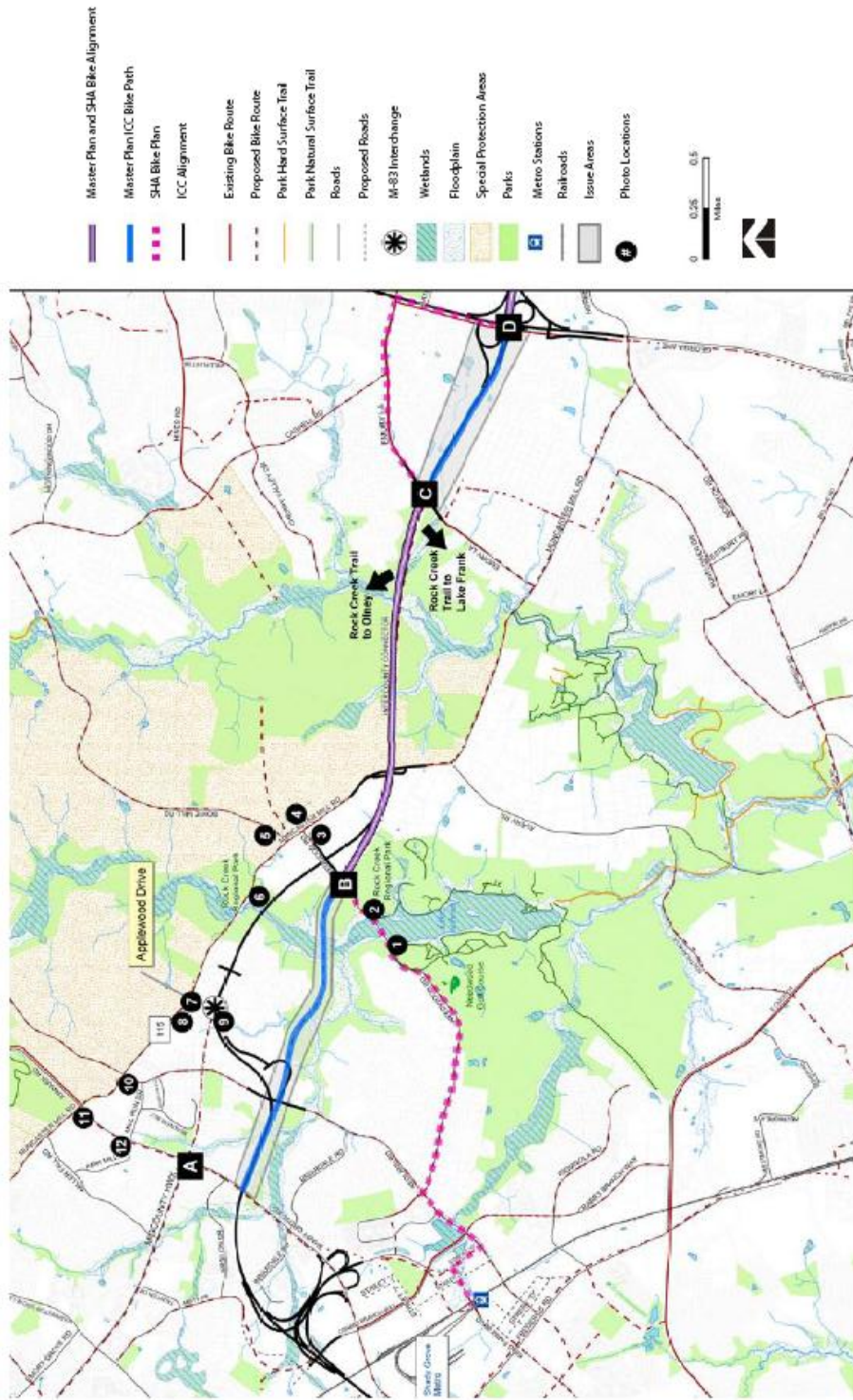
MONTGOMERY COUNTY
 DEPARTMENT OF TRANSPORTATION

PRIMARY/PRINCIPAL SECONDARY
 RESIDENTIAL STREET
 OPEN SECTION

STANDARD NO. MC-2003.14

Intercounty Connector Limited Functional Master Plan Amendment

Figure 3 Needwood Road and Vicinity



studies. However, it is generally assumed that the speed of youth bicyclists is lower than adult bicyclists. Since much of the design criteria in this guide is based on design speed, children will be accommodated to a large extent. When considering criteria unrelated to design speed, engineering judgment should be used when modifying these values for children. Throughout this chapter, several design measures are recommended which are based primarily on pedestrian research. It is presumed that these measures will also benefit bicyclists and other path users, although the research has not been conducted to support this assumption.

5.2.1 Width and Clearance

The usable width and the horizontal clearance for a shared use path are primary design considerations. Figure 5-1 depicts the typical cross section of a shared use path. The appropriate paved width for a shared use path is dependent on the context, volume, and mix of users. The minimum paved width for a two-directional shared use path is 10 ft (3.0 m). Typically, widths range from 10 to 14 ft (3.0 to 4.3 m), with the wider values applicable to areas with high use and/or a wider variety of user groups.

In very rare circumstances, a reduced width of 8 ft (2.4 m) may be used where the following conditions prevail:

- Bicycle traffic is expected to be low, even on peak days or during peak hours.
- Pedestrian use of the facility is not expected to be more than occasional.
- Horizontal and vertical alignments provide frequent, well-designed passing and resting opportunities.
- The path will not be regularly subjected to maintenance vehicle loading conditions that would cause pavement edge damage.

In addition, a path width of 8 ft (2.4 m) may be used for a short distance due to a physical constraint such as an environmental feature, bridge abutment, utility structure, fence, and such. Warning signs that indicate the pathway narrows (W5-4a), per the MUTCD (7) should be considered at these locations.

A wider path is needed to provide an acceptable level of service on pathways that are frequently used by both pedestrians and wheeled users. The *Shared Use Path Level of Service Calculator* is helpful in determining the appropriate width of a pathway given existing or anticipated user volumes and mixes (9). Wider pathways, 11 to 14 ft (3.4 to 4.2 m) are recommended in locations that are anticipated to serve a high percentage of pedestrians (30 percent or more of the total pathway volume) and high user volumes (more than 300 total users in the peak hour). Eleven foot (3.4 m) wide pathways are needed to enable a bicyclist to pass another path user going the same direction, at the same time a path user is approaching from the opposite direction (see Figure 5-2) (8). Wider paths are also advisable in the following situations:

- Where there is significant use by inline skaters, adult tricycles, children, or other users that need more operating width (see Chapter 3);
- Where the path is used by larger maintenance vehicles;

Needwood Road at Needwood Lake Causeway



In some situations, it may be better to place one-way sidepaths on both sides of the street or highway, directing wheeled users to travel in the same direction as adjacent motor vehicle traffic. Clear directional information is needed if this type of design is used, as well as appropriate intersection design to enable bicyclists to cross to the other side of the roadway. This can reduce some of the concerns associated with two-way sidepaths at driveways and intersections; however, it should be done with the understanding that many bicyclists will ignore the directional indications if they involve additional crossings or otherwise inconvenient travel patterns.

A wide separation should be provided between a two-way sidepath and the adjacent roadway to demonstrate to both the bicyclist and the motorist that the path functions as an independent facility for bicyclists and other users. The minimum recommended distance between a path and the roadway curb (i.e., face of curb) or edge of traveled way (where there is no curb) is 5 ft (1.5 m). Where a paved shoulder is present, the separation distance begins at the outside edge of the shoulder. Thus, a paved shoulder is not included as part of the separation distance. Similarly, a bike lane is not considered part of the separation; however, an unpaved shoulder (e.g., a gravel shoulder) can be considered part of the separation. Where the separation is less than 5 ft (1.5 m), a physical barrier or railing should be provided between the path and the roadway. Such barriers or railings serve both to prevent path users from making undesirable or unintended movements from the path to the roadway and to reinforce the concept that the path is an independent facility. A barrier or railing between a shared use path and adjacent highway should not impair sight distance at intersections, and should be designed to limit the potential for injury to errant motorists and bicyclists. The barrier or railing need not be of size and strength to redirect errant motorists toward the roadway, unless other conditions indicate the need for a crashworthy barrier. Barriers or railings at the outside of a structure or a steep fill embankment that not only define the edge of a sidepath but also prevent bicyclists from falling over the rail to a substantially lower elevation should be a minimum of 42 in. (1.05 m) high. Barriers at other locations that serve only to separate the area for motor vehicles from the sidepath should generally have a minimum height equivalent to the height of a standard guardrail.

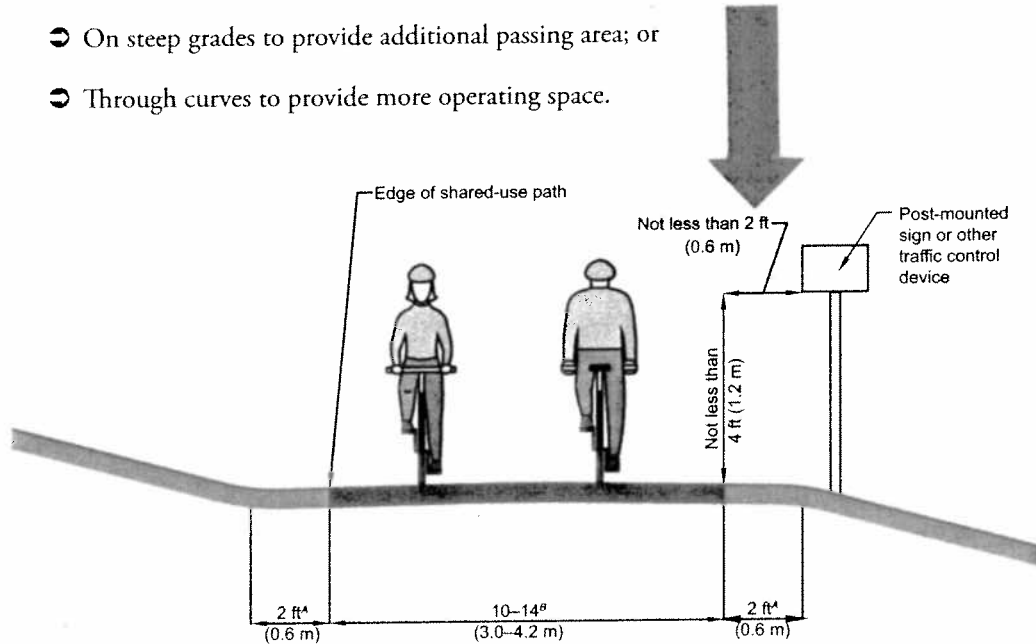
When a sidepath is placed along a high-speed highway, a separation greater than 5 ft (1.5 m) is desirable for path user comfort. If greater separation cannot be provided, use of a crashworthy barrier should be considered. Other treatments such as rumble strips can be considered as alternatives to physical barriers or railings, where the separation is less than 5 ft (1.5 m). However, as in the case of rumble strips, an alternative treatment should not negatively impact bicyclists who choose to ride on the roadway rather than the sidepath. Providing separation between a sidepath and the adjacent roadway does not necessarily resolve the operational concerns for sidepaths at intersections and driveways. See Section 5.3.4 for guidance on the design of sidepath intersections.

5.2.3 Shared Use with Mopeds, Motorcycles, Snowmobiles, and Horses

Although in some jurisdictions it may be permitted, it is undesirable to mix mopeds, motorcycles, or all-terrain vehicles with bicyclists and pedestrians on shared use paths. In general, these types of motorized vehicles should not be allowed on shared use paths because of conflicts with slower moving bicyclists and pedestrians. Motorized vehicles also diminish the quiet, relaxing experience most users seek on paths. Motorized wheelchairs are an exception to this rule, and should be permitted to access shared use paths. In cases where mopeds or other similar motorized users are permitted and are expected to use the pathway, providing additional width and improved sight lines may reduce conflicts. Signs that emphasize appropriate user etiquette may also be useful.



- On steep grades to provide additional passing area; or
- Through curves to provide more operating space.



Notes:

^A (1V:6H) Maximum slope (typ.)

^B More if necessary to meet anticipated volumes and mix of users, per the *Shared Use Path Level of Service Calculator* (9)

Figure 5-1. Typical Cross Section of Two-Way, Shared Use Path on Independent Right-of-Way

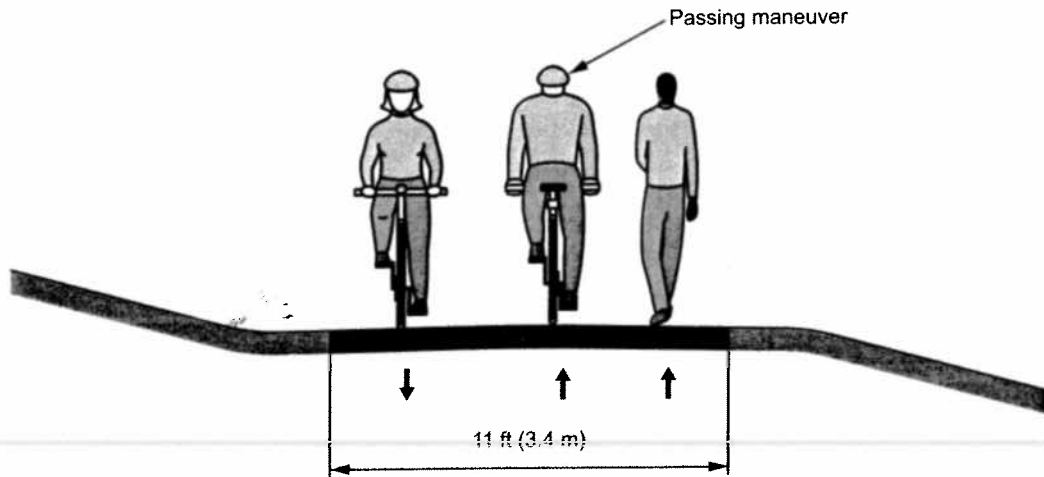


Figure 5-2. Minimum Width Needed to Facilitate Passing on a Shared Use Path

Under most conditions, there is no need to segregate pedestrians and bicyclists on a shared use path, even in areas with high user volumes—they can typically coexist. Path users customarily keep right except to pass. Signs may be used to remind bicyclists to pass on the left and to give an

- Central business districts. Level-of-service analyses should be conducted according to the methods outlined in the *Highway Capacity Manual*.³
- Commercial/industrial areas outside a central business district. A minimum width of 1.5 m, with a planting strip of at least 1.2 m or a 2.5-m sidewalk with no planting strip should be planned.
- Residential areas outside a central business district:
 - Arterial and collector streets—A minimum width of 1.5 m is desirable away from the roadway; a 0.6-m separation is the minimum acceptable to prevent vehicles from sideswiping pedestrians.
 - Local streets—A minimum width of 1.5 m should be planned.

Bridge structures planned to accommodate pedestrian and bicycle traffic on high-speed highways should be designed with a crashworthy bridge rail separating the vehicular from the pedestrian and bicycle traffic and an approved pedestrian/bicycle rail on the outboard side of the walkway. It is often desirable to provide a separate structure to accommodate pedestrian or bicycle traffic, depending on the vehicular traffic pattern and volumes as well as on the configuration of the bridge structure itself.

When a guardrail is located along sections of a roadway that also has a sidewalk, it is desirable to locate the sidewalk at least 1.5 m behind the guardrail. When lateral constraints preclude the 1.5-m clearance, a rub rail on the back side of the guardrail posts at rail level should be used to prevent injury to pedestrians or bicyclists while passing behind the guardrail. Figure 5-5 shows a protective rub rail on the backside of the guardrail adjacent to the sidewalk.

In suburban areas where sidewalks are not provided, their installation is generally beneficial in areas near schools, churches, and any other location where high traffic speeds are combined with high vehicular and pedestrian volumes. Other suburban

areas meriting consideration for the installation of sidewalks are those with large numbers of pedestrian trips of known origin-destination points and areas surrounding recreational sites.

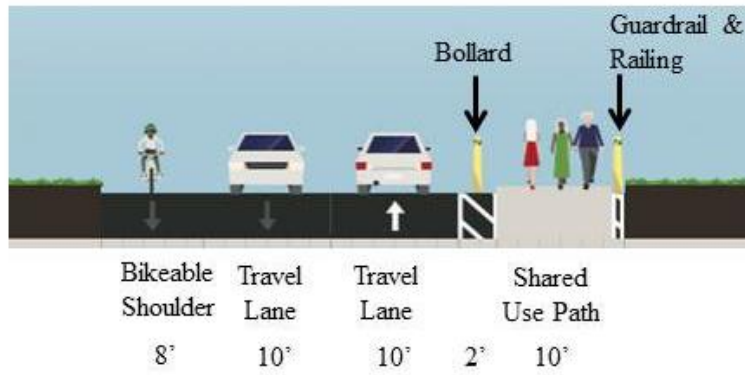
It is recommended that paved shoulders at 1.2 m in width be provided on applicable roadways within 8 km of an urban area to accommodate pedestrian and bicycle travel. Along a higher-speed suburban arterial, sidewalks should be provided for pedestrians and additional areas provided for bicyclists. Nonadjacent paths should be considered to provide a reasonable level of safety.

The Americans with Disabilities Act requires that curb ramps be installed at all marked crossings, corners, and any other locations where pedestrian crossings can be predicted (such as midblock crossings). An exception to this requirement is where there is insufficient space to install a properly designed ramp. Ramps should be given a contrasting surface texture to allow the sight-impaired pedestrian to distinguish the curb ramp from the surrounding flat sidewalk surface. There should be no lip at the bottom of the ramp because a lip can impede persons in wheelchairs as they try to climb the ramp. The ramp and corner area must be kept

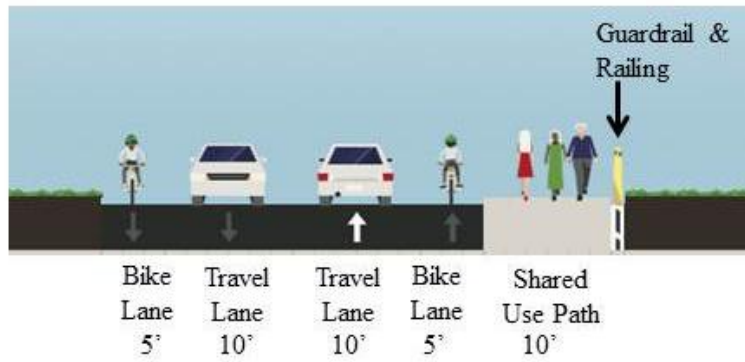


Figure 5-5. Protective rail on the backside of a guardrail adjacent to the sidewalk.

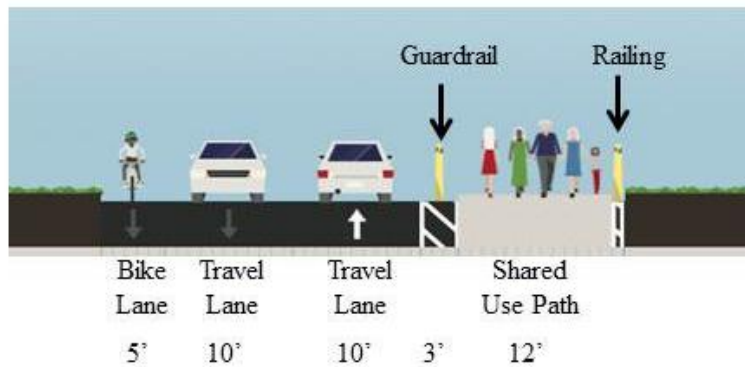
MCDOT Proposal



Staff-Recommended Alternative 1



Staff-Recommended Alternative 2



Note: To simplify the graphic comparison, the width of the shared use path has been adjusted to incorporate the effective buffer widths.