



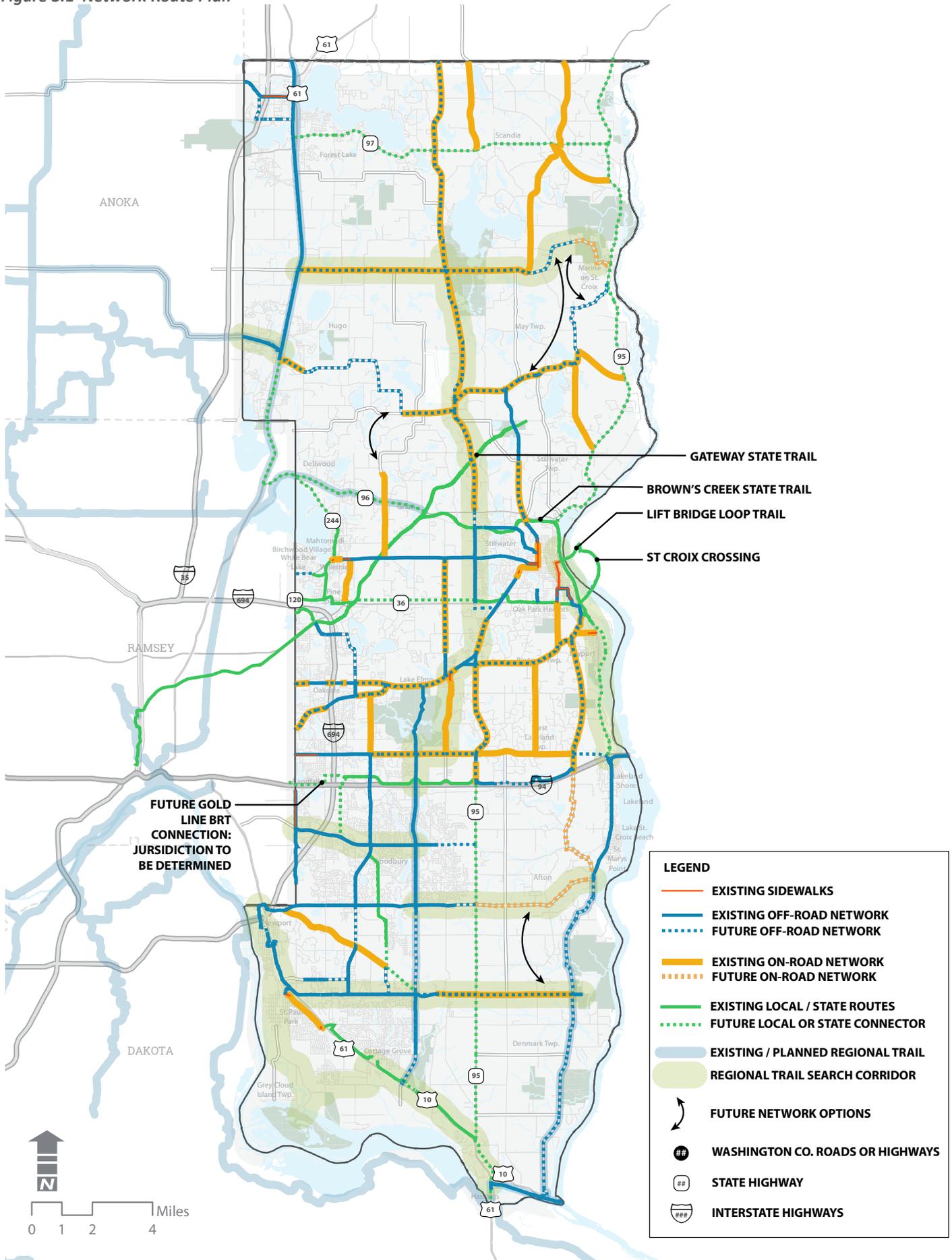
03. NETWORK PLAN

GOALS FOR THE NETWORK

A successful network for pedestrians and bicyclists consists of clearly defined routes that connect users to relevant destinations with a consistent experience throughout the start and end of their trip. Today, the network of pedestrian and bicycle facilities throughout Washington County's system is primarily built as trails or sidepaths (trails aligned with existing roadways) and paved shoulders that are actively used by pedestrians and bicyclists as their comfort level allows.

In the development of a plan for the future county-wide network, the following goals were established through collaboration with county staff and influenced by feedback gathered through community engagement. These goals will continue to serve as guidance for future alignment, identification, and implementation of the network and supporting pedestrian and bicycle facilities.

Figure 3.1 Network Route Plan



NETWORK GOALS



Goal 1: The Washington County network for pedestrian and bicyclists will primarily focus on creating and maintaining longer segment connections between cities, regional and state parks, and other destinations throughout the county, providing pedestrian and bicycle connections at a range of intervals of every 2 miles (in urban or suburban areas) up to every 4 miles (rural areas).



Goal 2: The planned Washington County system will connect to existing local and state trail networks, and future segments within the county's system will avoid duplication of similar routes owned by other agencies.

The Washington County network will continue to serve an existing and enthusiastic community of recreational bicyclists, as well as support a growing population of people interested in integrating biking and walking into daily commutes to work or school.



Goal 3: The Washington County network will continue to consist primarily of two types of facilities: off-road trails and paved shoulders. New network segments and improvements to existing segments will be constructed and planned with consistency and with accepted state and national standards and guidance applicable to the appropriate rural, suburban, or urban transects of Washington County.



Goal 4: The Washington County Network Plan will build off of previous comprehensive planning efforts. The Network Plan will support the ongoing planning and construction of the Regional Bicycle Transportation Network (RBTN). Search corridors and alignments previously identified will remain part of the future county-wide network, with additionally planned segments that will augment and support these routes.



Goal 5: The county road and public right-of-way network will connect various public realm amenities for a range of modes and activities (walking, biking, driving, roller-blading, etc.), and will support how residents travel to and from destinations such as schools, parks/open space, restaurants and other businesses.

NETWORK PLAN

The Network Plan was developed to guide the next 10 years of bicycle and pedestrian routes within Washington County, and is intended to clearly build off of recent and concurrent multi-modal planning efforts throughout the county. The Network Plan is compatible with the County's 2040 Comprehensive Plan, as well as future corridor search areas for regional trails. These routes have been determined through analysis and synthesis of the existing conditions (as outlined in Chapter 2), as well as combined input from county staff and residents of Washington County through community engagement.

The primary focus of the Network Plan in Figure 3.1 identifies:

- » Existing and future off-road network segments as trails or sidepaths as shown in blue.
- » Existing and future on-road network segments as paved shoulders as shown in orange.
- » Existing local or state connector routes that support the county-wide system today, or will potentially support in the future as shown in green.

ROUTE TYPES

OFF-ROAD NETWORK

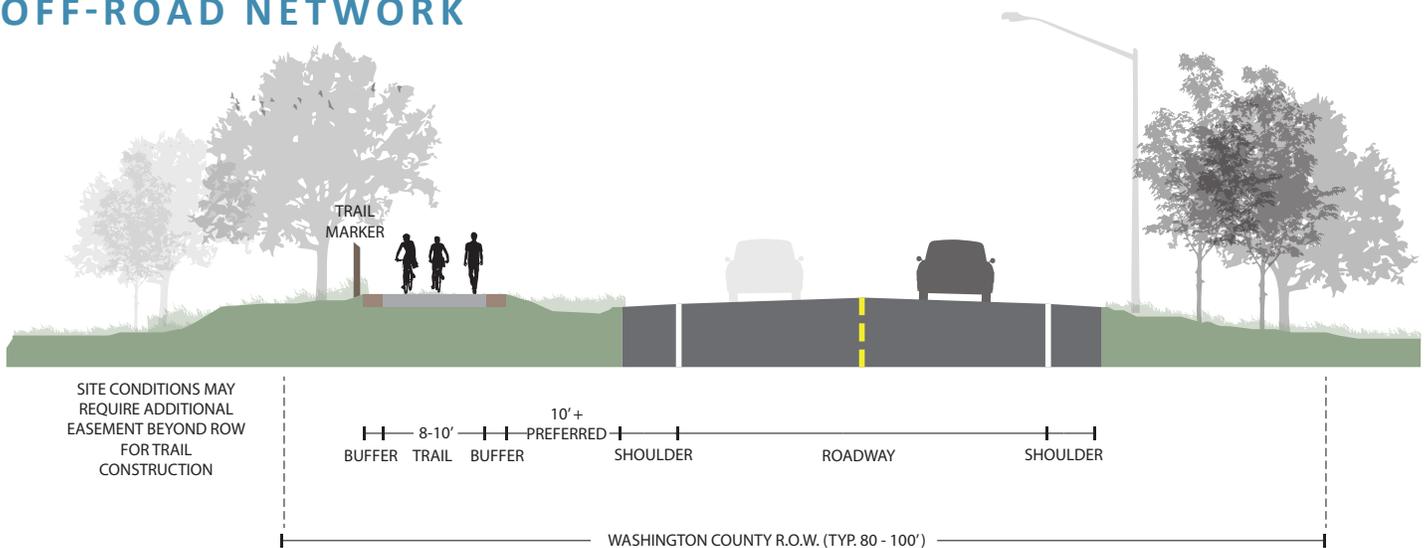


Figure 3.2 Typical Off-Road Network Route Section

The existing off-road network consists of paved shared-use trails that are aligned with county roadways and are built almost exclusively within the county right-of-way. The proposed off-road network builds off of the existing built segments to fill gaps, creating connections for longer distance travelling throughout the county for recreational and transportation purposes. This route type is intended to provide a continuous trail experience, separated from the roadway, that is comfortable for use by all ages and skill levels. This route type is intended to be used by pedestrians and bicyclists, as well as in-line skaters and other non-motorized transportation users. Whether a trail is located on one or both sides of the roadway will be determined at the time of implementation, and will be driven by projected use and connection to nearby destinations. Roadways with trails along one side of the roadway should have extra attention paid at roadway crossings, to ensure that trail users can connect safely and comfortably to other trail connections and to community destinations.

An effort should be made to provide continuous connection to nearby existing local, state, and county trails and sidewalks where possible, and may require spurs or additional connections that are not in alignment with the adjacent roadway.

OFF-ROAD NETWORK RECOMMENDED DESIGN FEATURES

Existing trails throughout the county vary in width and design. As new trail segments are built, or as trails are improved or upgraded, the following recommendations should be considered for design:

- » 8-10' in width with a preferred minimum 10' vegetated buffer between the trail and adjacent roadway
- » 2' gravel or vegetated buffer on either side of the trail
- » Continuous bituminous (asphalt) surface
- » ADA curb ramps installed at all roadway crossings, along with high visibility crosswalk markings as necessary
- » Maximum of 5% running slope wherever possible, with a 1-2% cross slope
- » Intermittent trail markers or directional signage to nearby landmarks or intersections
- » Communication of on-road network to be done through a county-wide map, available through the county website and posted at county parks

See page 3-18 for further specific guidance on trail / sidepath design.

OFF-ROAD NETWORK: REGIONAL TRAIL

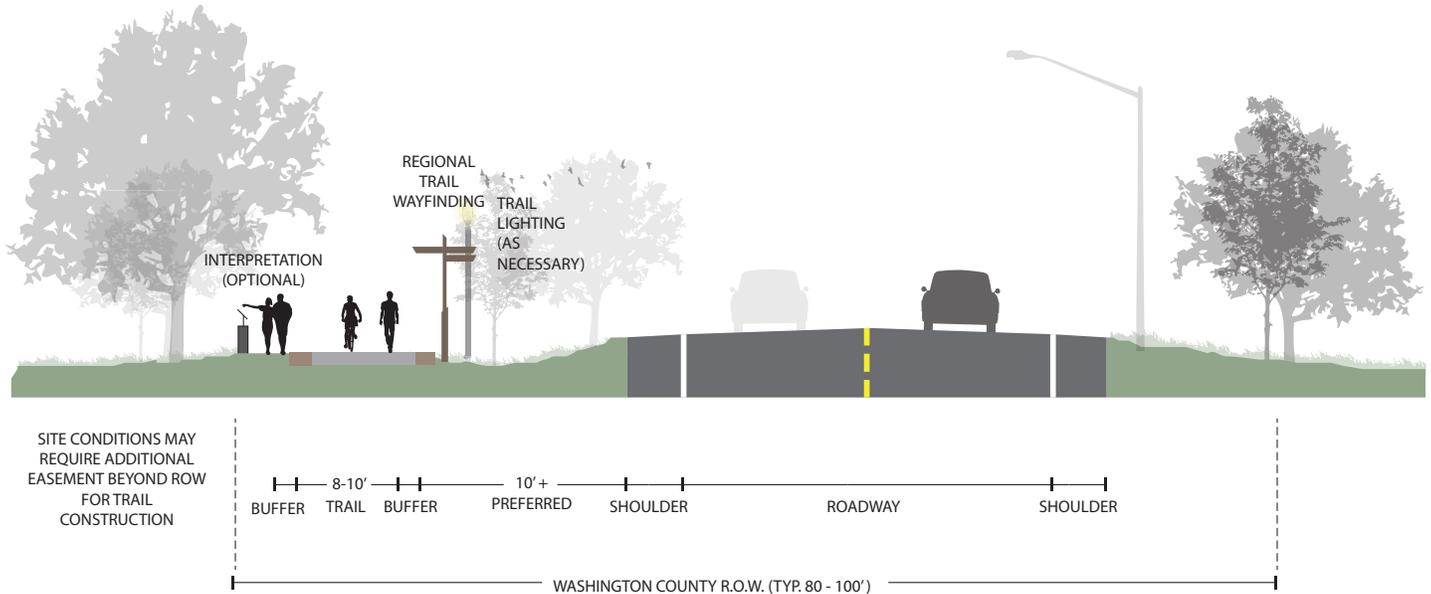


Figure 3.3 Typical On-Road Network Route Section for a

The off-road network includes segments that have been previously planned as a future regional trail, or fall within a regional trail search corridor. Regional trails are intended to serve as high-quality recreational routes for non-motorized use. Most often, the regional trail networks connect to natural and scenic areas, as well as connect to and through regional and local park systems. Wayfinding and interpretive elements are often integrated into the trail experience to provide interest and information about regional destinations, history, and/or ecology.

OFF-ROAD NETWORK: REGIONAL TRAIL RECOMMENDED DESIGN FEATURES

In addition to the recommended design features outlined for the off-road network routes (as shown on page 3-4), off-road network segments within the Washington County bicycle and pedestrian network should be considered for the following design elements:

- » Regional trail name and placemaking elements such as wayfinding signage, trailheads, and interpretive elements
- » Trail lighting (either pedestrian-scale lighting with dark sky features or trail bollards with lighting) where appropriate
- » Observation platforms or scenic viewing locations at places of interest
- » Other possible trail amenities such as drinking fountains, bike fix-it stations, trash/recycling receptacles
- » Trail markers or directional signage directing users to nearby landmarks or intersections
- » Communication of on-road network to be done through a county-wide map, available through the county website and posted at county parks



Trailhead along Hardwood Creek Regional Trail with seating, information kiosk, and trash/recycling receptacles (Photo: Star Tribune)

ON-ROAD NETWORK

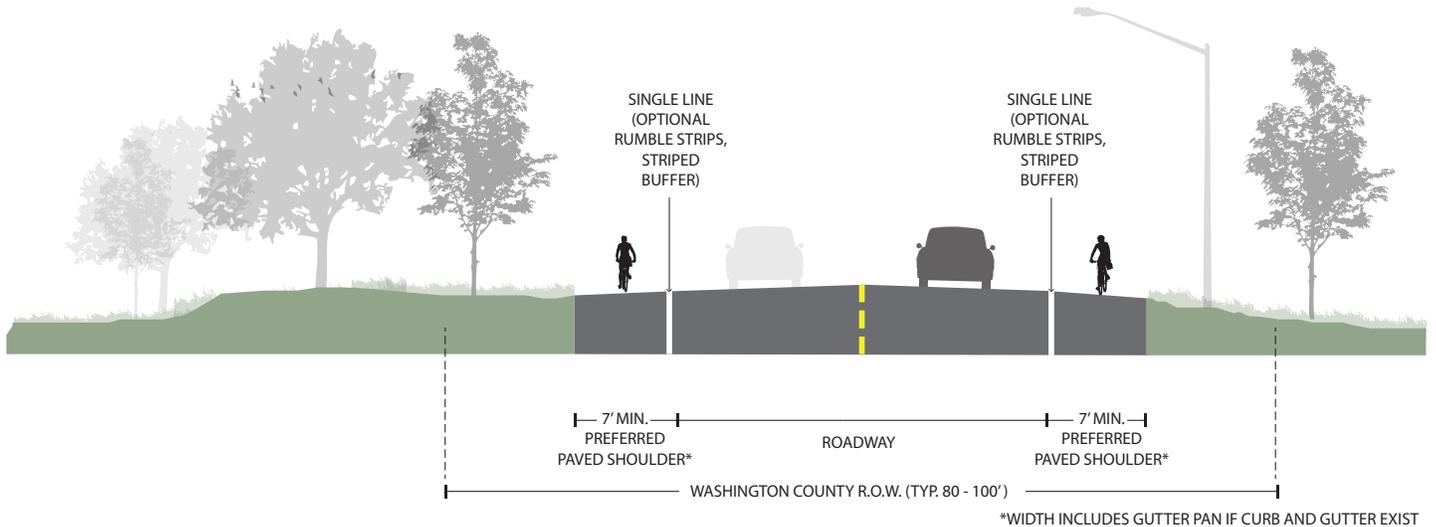


Figure 3.4 Typical On-Road Network Route Section

The on-road network consists of paved shoulders that are wide enough for bicyclists or pedestrians to use. These paved shoulders exist today, throughout county, and vary in width and comfort for use. The Network Plan identifies existing paved shoulder segments that are at least 5.5' in clear width as part of the existing network. A handful of new segments for the on-road network are proposed in the Network Plan.

The planned on-road network:

- » Supports connections to the off-road network
- » Acknowledges the existing on-road bicycle routes used today by cyclists who are comfortable travelling alongside vehicle traffic, and
- » Fills gaps in the overall county-wide network where a separated trail is likely not feasible due to land constraints (topography, tree cover, private land ownership, etc.), high costs, and low projected use.

Today, the county does not have any bike lanes and shared-use lanes have been constructed sparingly. This plan does not include specific recommendations to include these types of on-road facilities in the near future within the county system, as there has been

a general preference voiced for focus on separated trails that are comfortable for a wider range of abilities and comfort levels. The on-road network comprised of paved shoulders will take advantage primarily of existing roadways and routes that are in-use today by cyclists.

ON-ROAD NETWORK RECOMMENDED DESIGN FEATURES

On-road network segments within the Washington County bicycle and pedestrian network should be considered with the following design elements:

- » 7' clear width for paved shoulders is preferable for these routes and future roadway upgrades
- » Optional rumble strips or striped buffer
- » Optional wayfinding or directional signage
- » Communication of on-road network to be done through a county-wide map, available through the county website and posted at county parks

See page 3-19 for further specific guidance on paved shoulder design

STATE AND LOCAL CONNECTORS

It is not possible to provide an evenly distributed route network across the entire county by relying solely on Washington County roadways and landholdings. Each municipality within the county has an existing trail and sidewalk network, and there are state trails (Gateway and Browns Creek Trails) that provide significant connection to destinations today. The Washington County Network Route Plan identifies some of the existing state and local trails and facilities that are already in-place today to support the county-wide network. Often these are longer route segments that connect trail users across longer distances.

Future state and local connector routes are also identified on the Network Route Plan. These are segments that could serve to support the county-wide network in the future. However, these areas are not within Washington County jurisdiction. They have been identified in this plan as potential projects that, if initiated by the local or state jurisdictions, could also serve to supplement the county bike and pedestrian network.

INTERSECTION CASE STUDIES

County-wide crash data from 2013 to 2018, along with information gathered through the public engagement process, guided the identification of areas throughout the county that warranted further study to address safety at intersections. Efforts were made to understand how future facility improvements (e.g., crossing aids, crosswalk markings, signage, trail or pavement design) could potentially address safety issues for pedestrians and bicyclists as they use or connect to the Washington County pedestrian and bicycle network.

A number of common intersection types were identified as safety and comfort concerns for pedestrian and bicyclists:

- » Roundabout intersections
- » Trail crossings at side streets
- » Crossings at wide roadways due to trail gaps
- » Signalized intersections near commercial / community destinations

The following case studies examine these example intersection conditions found throughout the county to better understand the public's safety concerns. The case studies also provide potential improvement considerations and resources for further exploration.

There are many intersections throughout the county roadway system where pedestrians and bicyclists will potentially cross at some point, either with or without adjacent trails or paved shoulders. Enhanced crossing treatments, signals, and signage do not necessarily make intersections safer for pedestrians, reduce speeds of drivers, or improve behaviors. All options should be explored, including dissuading pedestrians from crossing at unsafe locations.



Browns Creek State Trail in Stillwater

1 CASE STUDY: ROUNDABOUT INTERSECTION

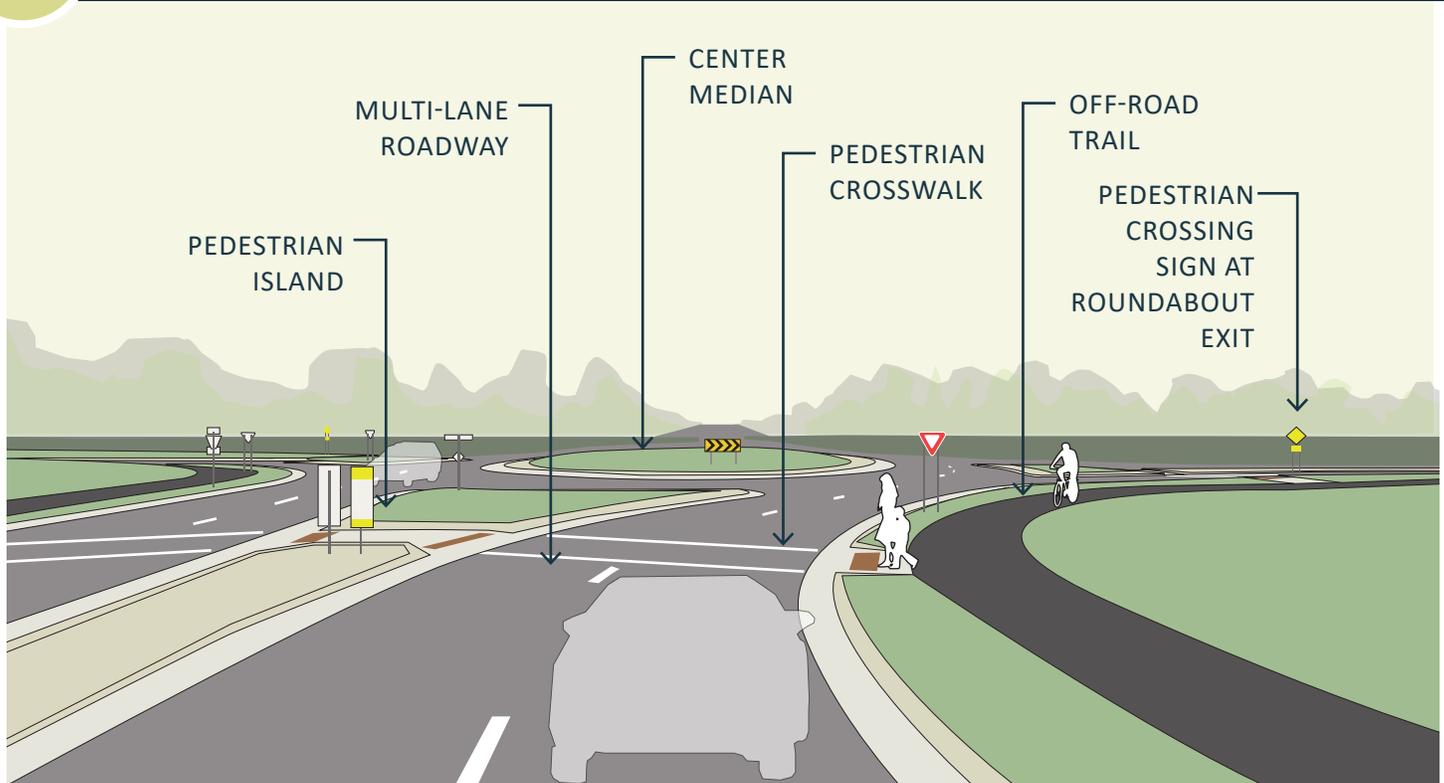


Figure 3.5 Illustration of an example roundabout

ROUNDABOUT:

- » Intersections designed as an alternative to signal-controlled or stop-controlled intersections.
- » Generally, vehicles enter the intersection at lower speeds (compared to typical intersections).
- » Vehicles are required to yield to vehicles from the left, as well as yield to pedestrians and bicyclists.
- » Crossing distances for pedestrians and bicyclists at roundabouts are generally shorter, with pedestrian islands.
- » Single-lane roundabouts typically offer shorter crossing distances and lower speeds than multi-lane roundabouts.

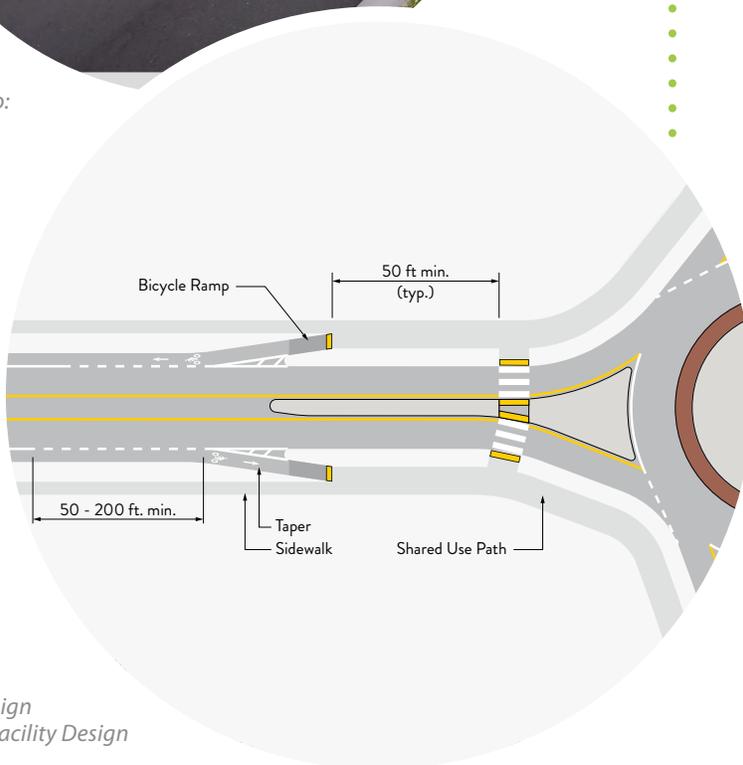
SAFETY CONCERNS:

- » Drivers entering the roundabout intersection are generally looking ahead and to the left for conflicting vehicles, and can fail to see pedestrians and bicyclists crossing the intersection from the right side of the roadway. This situation is not exclusive to roundabouts and occurs at standard intersections as well.
- » Drivers exiting the roundabout may fail to see a pedestrian in a crosswalk.
- » Roundabouts can be complex for drivers that aren't familiar with them.
- » Crosswalks with multiple lanes of approach, at roundabouts or elsewhere, can cause crosswalk users to become hidden from view behind stopped traffic creating a potential hazard.
- » Bicyclists using the roadway may be uncomfortable mixing with traffic as they move through the roundabout.

Roundabout design with separated pedestrian and bicycle crossing, entry pedestrian crossing signs, high visibility crosswalks and low vegetation in medians. Note that this example includes on-road bike lanes. Also note that diamond signs are not included in Minnesota State guidelines. (Image: MassDOT Separated Bike Lane Planning and Design Guide)



Example of crosswalk design (Photo: Carmanah Traffic)



Slip ramp design (MN Bicycle Facility Design Manual)

BICYCLE AND PEDESTRIAN CONSIDERATIONS AT ROUNDABOUTS:

- » Consider signs at roundabout, including pedestrian crossing signs at vehicle approach of the roundabout intersection.
- » Continue to provide protected pedestrian islands at crosswalks.
- » Continue to provide continental-style crosswalk markings and other high-visibility crosswalk treatments.
- » Consider Rectangular Rapid Flashing Beacons (RRFB) or other user-activated pedestrian signal at roundabout crossing where applicable, such as high-volume locations.
- » Continue to integrate protected shoulders or shared-use paths at roundabouts. Consider installing a slip ramps, with considerations for maintenance and ADA standards.
- » Continue to opt for a single-lane roundabout design if traffic volumes permit.
- » Continue to design roundabouts to allow for proper deflection angles to promote slower speeds throughout.

RESOURCES:

- » MN Bicycle Facility Manual (2020), page 7-13
- » MnDOT Road Design Manual, Chapter 12
- » NCHRP Report 672 - Roundabouts: An Informal Guide

2 CASE STUDY: TRAIL CROSSING AT SIDE STREET



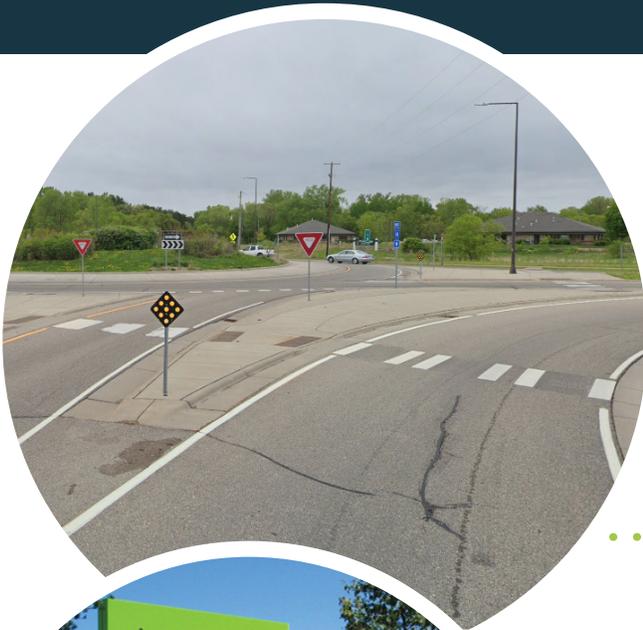
Figure 3.6 Illustration of an example trail crossing at a side street

SIDE STREET TRAIL CROSSING:

- » The Washington County bicycle and pedestrian network primarily exists in alignment with the county roadway network.
- » Separated trails (also known as sidepaths) are generally located parallel to major roadways.
- » Local (municipal) streets intersect the trail network with variations in crossing treatments.
- » Roadway width, lighting, topography, continuity and connection with other trail networks, and signage contribute to the visibility of trail users to vehicles, as well as contribute to the overall comfort of trail users.

SAFETY CONCERNS:

- » Drivers approaching from sidestreets may not anticipate a trail crossing at the intersection.
- » Inconsistencies in design of signage, crosswalk markings, or pedestrian curb ramps between local and county jurisdictions could pose confusion for trail or roadway users.
- » Wide distances between the roadway and the trail provide a more comfortable trail experience between intersections. However, the crossing might be set back from drivers' desired stopping location.
- » Drivers approaching the intersection from a side street may be looking in one direction for a gap in traffic and do not see a cyclist on the trail coming from the other direction.
- » Cyclists from the side street might be in the driver's blind spot as they approach the intersection.



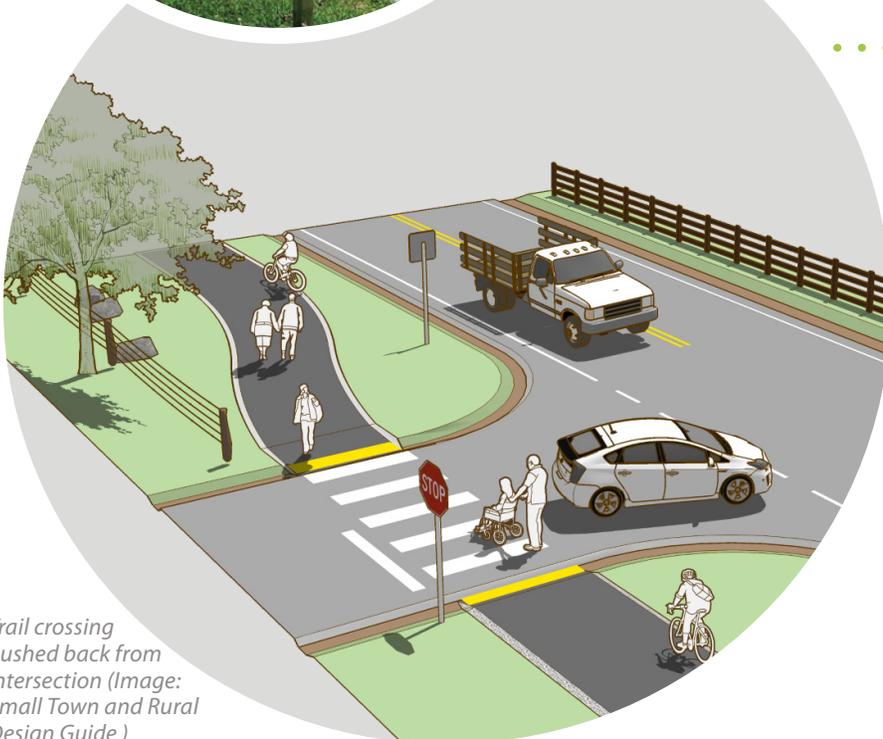
Continental style crosswalk markings (left) and Seattle-style markings (right) at CR 14 and Stillwater Boulevard in Lake Elmo. Washington County has had success with the Seattle-style markings, as they reduce degradation from repeated tire crossing. (Photo: Google Streetview)

BICYCLE AND PEDESTRIAN CONSIDERATIONS AT SIDE STREET TRAIL CROSSINGS:

- » Continue to install continental-style or Seattle-style crosswalk markings at trail crossings. This may require collaboration with local municipalities. Consider forward stop bars (see lower image), where necessary, to reinforce safety at crosswalk for pedestrians and bicyclists.
- » Provide consistent and highly visible wayfinding signage at key trail intersections.
- » Consider trail lighting along the trail, as well as along the side street leading to the intersection.
- » Consider providing clear cone of vision for vehicles approaching the intersection from the side streets, minimizing obstructions, unnecessary objects and tall vegetation.
- » Consider alternative trail designs at intersections. One strategy that has been used with varying degrees of success has involved pushing the trail crossing back from the intersection to allow approaching vehicles the ability to stop prior to the crosswalk, and then move forward to check for oncoming traffic. This, and other types of alternative designs will require further site-specific study to determine applicability.



Highly visible and consistent trail wayfinding can assist with navigating trail network and provide a visual cue to drivers (photo: SEGD)



Trail crossing pushed back from intersection (Image: Small Town and Rural Design Guide)

RESOURCES:

- » Small Town and Rural Design Guide
- » MN Bicycle Facility Manual (2020), page 5-27
- » MnDOT Best Practices and Guidance in At-Grade Trail Crossing Treatments

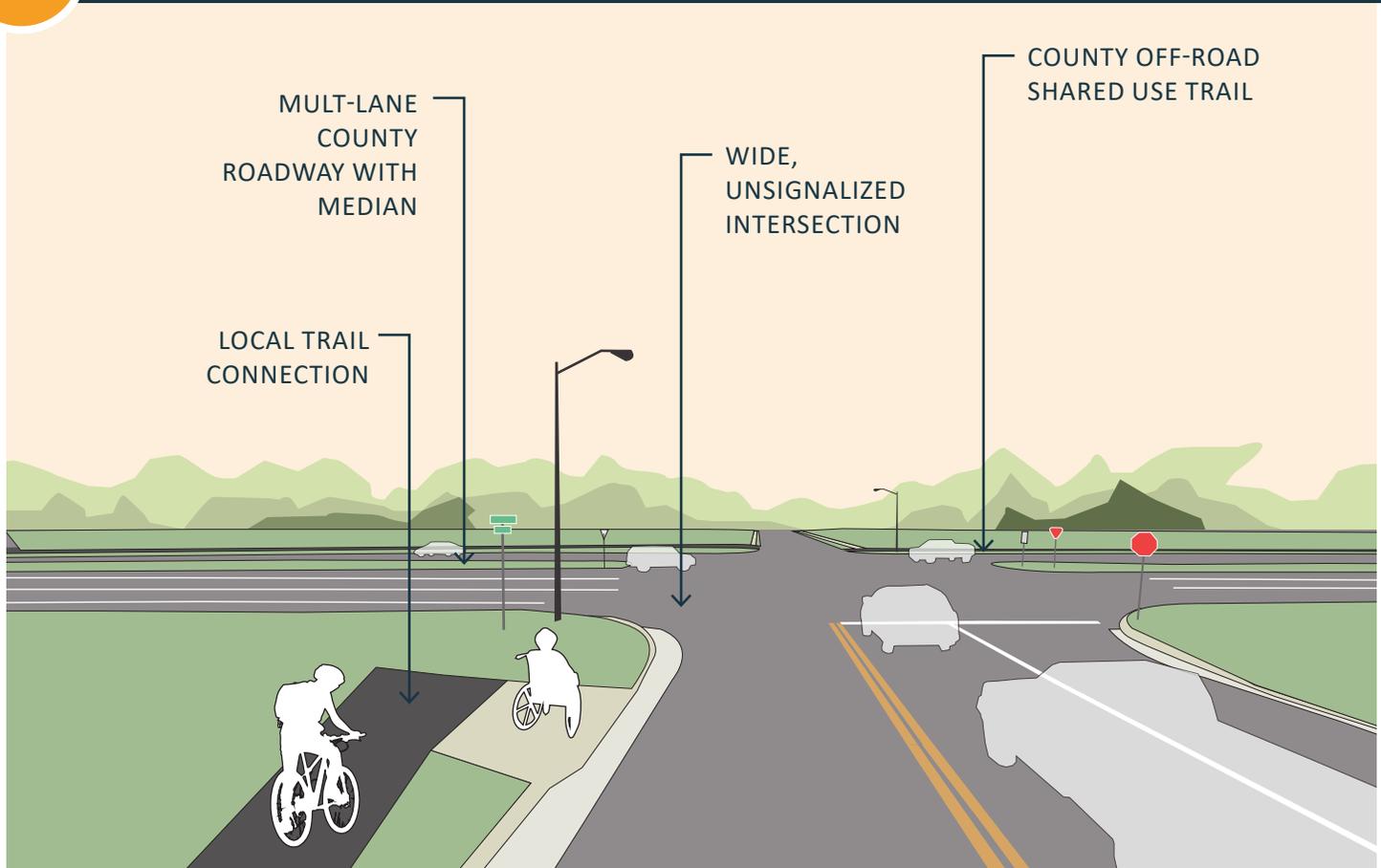


Figure 3.7 Illustration of an example wide roadway with a gap in trail connection

WIDE ROADWAY / TRAIL GAP:

- » The Washington County bicycle and pedestrian network primarily exists in alignment with the county roadway network.
- » Separated trails (also known as sidepaths) are generally located parallel to major roadways.
- » Local (municipal) streets intersect the trail network with variations in crossing treatments, pedestrian curb ramps, lighting, crosswalk markings, and signage.
- » Local and county trail segments may exist only on one side of the roadway.
- » Gaps in the local and county trail network, even on just one of four legs of an intersection, can create a significant barrier for continuous pedestrian or bicycle travel.

SAFETY CONCERNS:

- » Crossing at an unsignalized intersection is difficult for people of all abilities with higher speed vehicular traffic, but especially for people with disabilities, seniors, children, and people using mobility aids.
- » Pedestrian ramps sometimes do not allow people to enter into an intersection in the direction of their travel (as in the example above), which makes it more difficult to cross.
- » Wide, multi-lane roadways provide longer distances for travel in order to cross, increasing the vulnerability of pedestrians.
- » Travel speeds of vehicles and lack of gaps in traffic pose as barriers for pedestrians looking to cross roadways such as this.



Example of improved pedestrian curb ramp installed in both directions of pedestrian travel at an intersection (image: City of San Francisco)

Protected pedestrian refuge island shortens the distance that pedestrians are exposed to vehicles while crossing an intersection (Photo: AARP)



HAWK Signal (High Intensity Activated Crosswalk) shown in combination with continental-style crosswalk markings (image: Mary Carpenter Transportation)



Example of a grade-separated crossing in Woodbury MN (image: HKGI)



BICYCLE AND PEDESTRIAN CONSIDERATIONS AT WIDE ROADWAY CROSSINGS OR ADDRESSING TRAIL GAPS:

- » Consider working with local municipality to install wider pedestrian ramps at key trail connections.
- » Continue to install pedestrian refuge islands at key trail connections.
- » Consider installing curb extensions where space permits. Note that curb extensions aren't recommended if they impede roadway travel lanes or shoulder widths.
- » Consider installation of a HAWK signal (High-Intensity Activated Crosswalk) at a mid-block location in combination with other enhanced pedestrian facilities. Pedestrians are not likely to travel farther than 1/4 mile out of their way to reach a safer crossing location, which should be taken into consideration.
- » Consider installation of trail along both sides of roadway, with connection to a safer crossing point.
- » Consider a partnership with the adjacent municipality to install a grade separated crossing, such as a bike/ped tunnel or a pedestrian bridge. Note that both tunnels and bridges have significant funding and space requirements.

RESOURCES:

- » AASHTO Guide for the Development of Bicycle Facilities
- » MnDOT Best Practices and Guidance in At-Grade Trail Crossing Treatments
- » MnDOT Bicycle Facility Design Manual

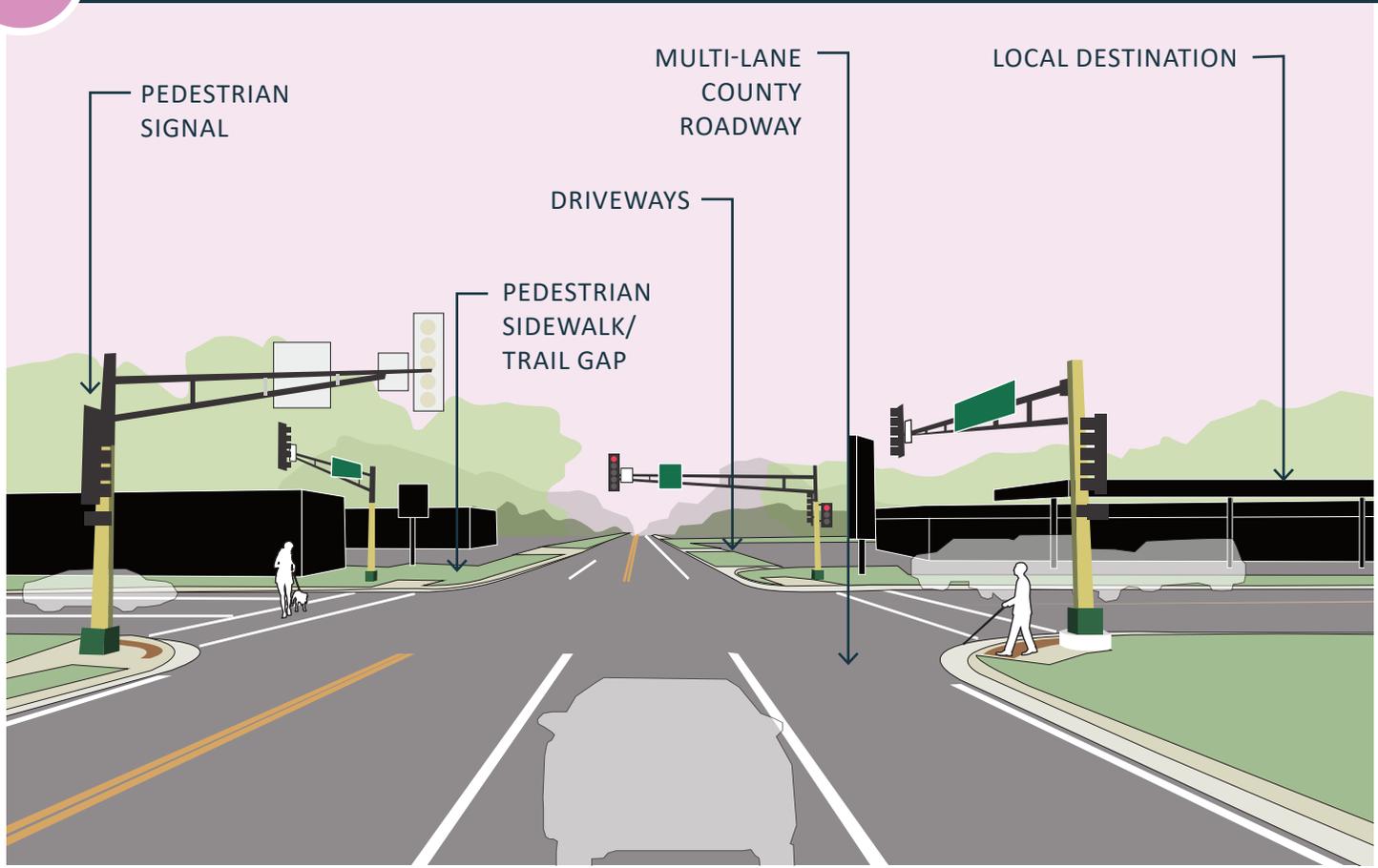


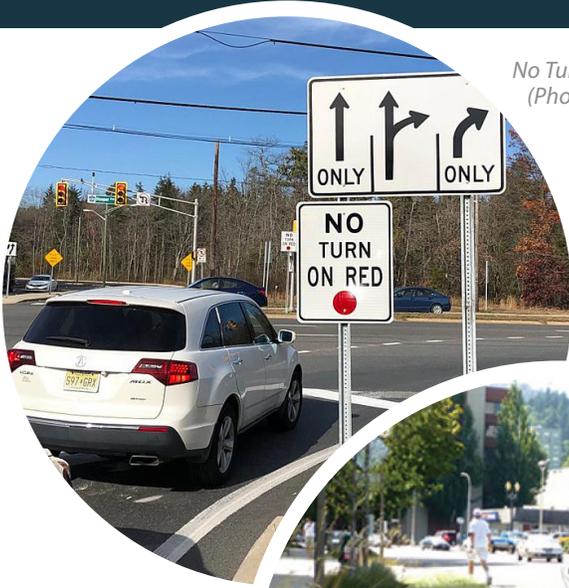
Figure 3.8 Illustration of an example signalized intersection

SIGNALIZED INTERSECTION:

- » The Washington County bicycle and pedestrian network primarily exists in alignment with the county roadway network.
- » Sidewalk connections exist in a few locations throughout the county, primarily in commercial areas.
- » Pedestrian curb ramps, lighting, crosswalk markings, signage, and pedestrian crossing signals are all types of facilities found at signalized intersections that influence the perception of safety and comfort.
- » Gaps in the local and county trail network, even on just one of four legs of an intersection, can create a significant barrier for continuous pedestrian or bicycle travel.

SAFETY CONCERNS:

- » Crosswalk markings are sometimes degraded beyond visibility for both drivers and pedestrians.
- » Gaps in the trail and sidewalk network create barriers to people with disabilities, seniors, children, and people who use mobility aids.
- » Pedestrian ramps and landing areas are sometimes installed around roadway signals and other vertical elements, leaving narrow widths for pedestrians to navigate around.
- » Vehicles making both right and left turns are potential threats to pedestrians and bicyclists using crosswalks.
- » Pedestrians will likely use boulevard areas to access commercial and community destinations, crossing driveways and parking lots where their presence may not be visible or anticipated by drivers.



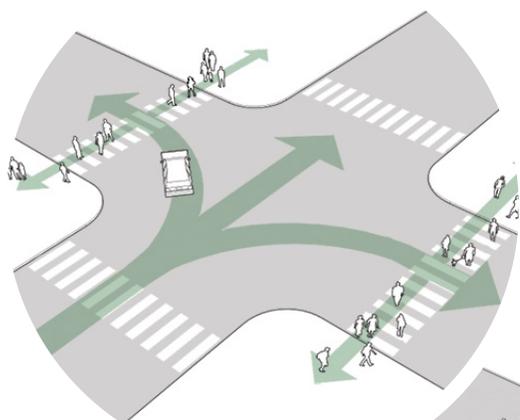
No Turn on Red sign
(Photo: The Hawk)



Curb extension with integrated stormwater feature
(Photo: NACTO)

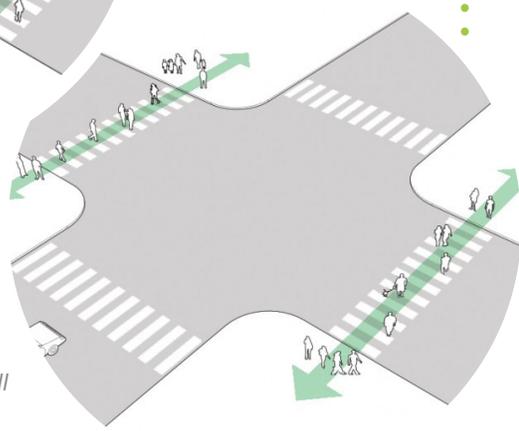
BICYCLE AND PEDESTRIAN CONSIDERATIONS AT SIGNALIZED INTERSECTIONS:

- » Continue to work with local municipalities to perform ADA retrofits and/or signal replacement with improved pedestrian ramps.
- » Continue to install continental or Seattle-style crosswalk markings at all trail and sidewalk crossings, as well as forward stop bar markings.
- » Consider implementing NO TURN ON RED at intersections where warranted.
- » Continue to consider installation of pedestrian refuge islands where warranted.
- » Curb extensions have been considered, if space permits (without obstructing a bikeable shoulder).
- » Consider filling gaps in sidewalk and trail connections throughout corridor.
- » Consider leading pedestrian intervals or all-way stop timing at signalized intersections to allow pedestrians more time to cross the roadways, where applicable. Note that pedestrian wait times can be longer with variations in signal timing.



Typical signal timing exposes pedestrians in crosswalks to vehicles making right and left-hand turns (Image: NACTO)

Leading pedestrian interval is signal timing that gives pedestrians a head start on crossing without vehicles entering the intersection. All-way stop timing allows pedestrians to cross in all directions for a longer period of time, with vehicles stopped in all directions (Image: NACTO)



RESOURCES:

- » NACTO Urban Bikeway Design Guide
- » Washington County ADA Transition Plan
- » MnDOT Best Practices and Guidance in At-Grade Trail Crossing Treatments
- » MnDOT Bicycle Facility Design Manual

PEDESTRIAN AND BICYCLE FACILITY DESIGN

GENERAL DESIGN GUIDANCE

The following statements are intended to provide guidance on general design of bicycle and pedestrian improvements throughout the county:

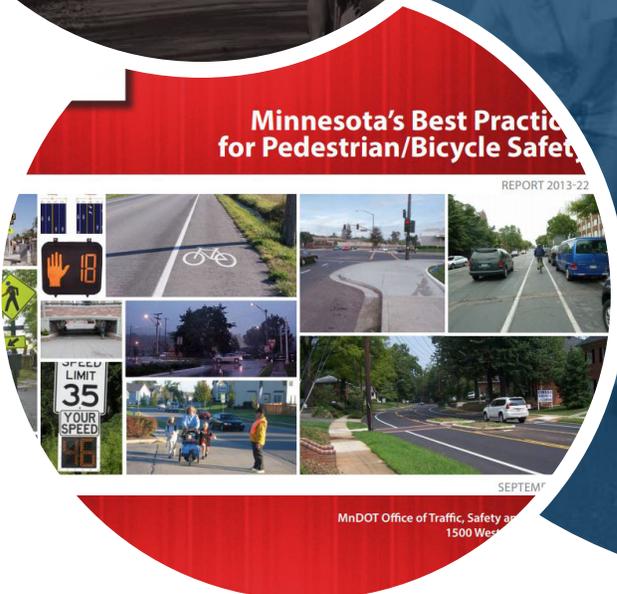
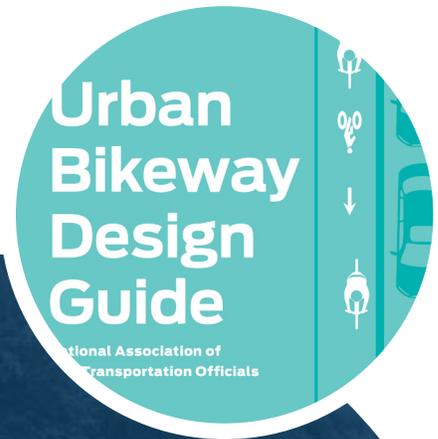
- » The design and implementation of county pedestrian and bicycle facilities should continue to recognize the community character (e.g. rural, suburban or urban) and design features will respond to local features such as natural resources, aesthetics, and gateways.
- » Elements will be incorporated into planning and design efforts to encourage:
 - *Comfortable corridors and places to walk and bike to,*
 - *Safe and well-landscaped routes that inter-connect the community, and*
 - *Healthy and active lifestyles.*
- » Continental-style crosswalk markings should continue to be installed and maintained at county roadway intersections. The county has explored other style crosswalk markings, such as the “Seattle-style” marking, which reduces marking degradation and allows for better visibility with the same amount of material. This style and others will continue to be installed on a case-by-case basis to best suit the context.
- » The county road and public right-of-way network should connect various public realm amenities for a range of modes (walking, biking, driving, etc.) to support travel to and from destinations such as schools, parks/open space, restaurants and other businesses.
- » Per the 2015 ADA Transition Plan approved by the county, new facilities for pedestrians will meet accessibility standards. The county will also continue to actively upgrade existing pedestrian facilities to meet these standards as well.
- » When determining which bicycle and pedestrian facilities to potentially install along roadways and at intersections, the comfort and safety of all roadway users should be taken into account. Pedestrian and bicycle facilities often provide a necessary physical separation between motorized and non-motorized roadway users, which benefits both.

DESIGN GUIDANCE ON SPECIFIC FACILITIES

The following resources provide specific guidance on paved trails and paved shoulders. This guidance has combined standards as listed in the following:

- » *2020 MnDOT Bicycle Facility Manual*
- » National Association for City Transportation Officials (NACTO) guides, such as the *Urban Street Design Guide* and the *Urban Bikeway Design Guide*
- » *Small Town and Rural Multimodal Networks (2016, US DOT)*
- » *Minnesota's Best Practices for Pedestrian/Bicycle Safety (2013)*
- » *State Aid Manual (2015, MnDOT)*
- » *MnDOT Facility Design Manual*

Guidance for County State Aid Highways (CSAH) is generally provided through the most current *MnDOT Bicycle Facility Manual*.



mn DEPARTMENT OF TRANSPORTATION

TRAIL (OR SIDEPATH) DESIGN

In Washington County, nearly all constructed trails could also be referred to as sidepaths, as they typically align with existing roadways. For simplicity, the term trail is used throughout this plan to mean a paved, separated shared-use facility to be used by non-motorized vehicles and pedestrians. This facility type is intended to serve a wide variety of comfort levels for both biking and walking.

Typical design features of trails in Washington County include:

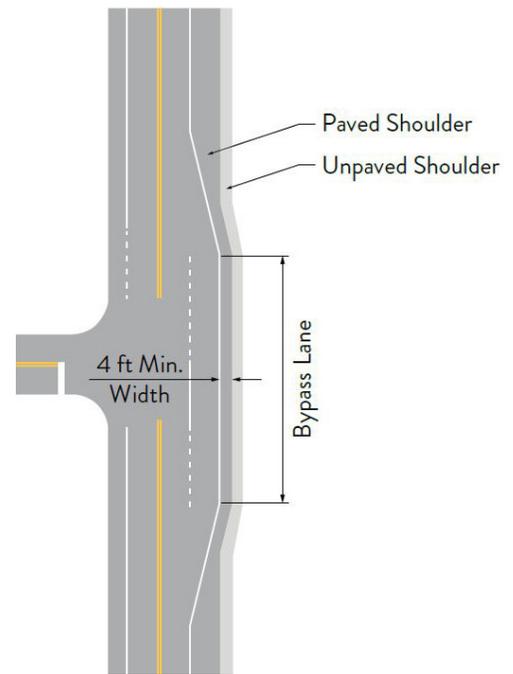
- » Bituminous (asphalt) surfacing
- » Aggregate base
- » 10' width preferred, with 8' width at areas of site constraint and 12'+ in areas of heavy use
- » 2-5' fall zone (turf or gravel) on both sides of the paved trail with no vertical obstructions within 2' of either side of the trail.
- » 2-5% running slope wherever possible, with a 1-2% cross slope
- » Pavement markings to separate bicyclists from pedestrians or designate direction of travel to be implemented only where trail use is heavy and warranted
- » Generally, more separation width between the edge of the roadway and the trail is preferred, with 10' minimum buffer as a guide where feasible. In practice, the county generally matches the boulevard width to the trail width (e.g. construction of a 10' boulevard adjacent to a 10' trail). Trail and boulevard widths are determined to fit within site constraints.
- » Future trail layout and determination of roadway side placement should consider County ROW width, drainage ditches, utilities, existing trees, topography, driveway conflicts, bridge crossings, and other site-specific environmental constraints that impact pedestrian and bicyclist safety and comfort and project costs.



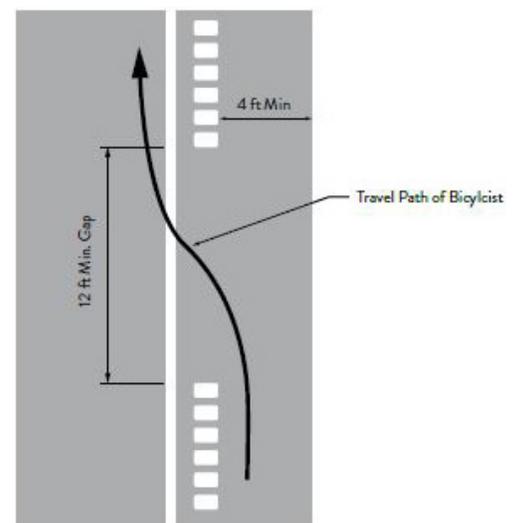
PAVED SHOULDER DESIGN

Paved shoulders alongside Washington County roadways have been considered as part of the bicycle and pedestrian network if they are at least 6 feet in width and are continuously paved with either bituminous (asphalt) or concrete surface to the edge of the roadway. Bicyclists who are comfortable riding alongside and in the same direction as adjacent vehicle traffic are generally the users of these facilities, although pedestrians do use paved shoulders for walking (typically moving in the opposite direction of adjacent vehicle traffic). All Washington County roadways will continue to remain available for pedestrian and bicycle use, with the following design guidelines for future facility construction and improvement:

- » Bituminous (asphalt) paved surface, continuous in width
- » A single, continuous stripe separates vehicle traffic from shoulder use. Rumble strips or striped buffers are also potential treatments to further separate drivers and bicyclists or pedestrians.
- » Although 6' is considered a minimum today for this type of facility, future roadways to be used as part of the County's paved shoulder network should strive for a 8' width (minimum) in urban areas and a 10' width in rural areas to accommodate for future changes in roadway volumes or speeds. These widths are guided by State Aid Standards. In most cases, paved shoulders will be widened to meet county and state standards as part of roadway reconstruction projects.
- » It is expected that shoulders along the County's paved shoulder network will meet minimum width and design guidelines for both sides of the roadway.
- » Potential warning and regulatory signs that may be applicable to Washington County paved shoulder network include:
 - *W11-1 Bicycle Warning Sign with SHARE THE ROAD plaque (W16-1P)*
 - *W8-25 SHOULDER ENDS*
 - *R4-4 RIGHT TURN LANE YIELD TO BIKES*
- » Where a right turn lane terminates the paved shoulder, consider installation of shared lane markings where bicyclists and vehicles share the roadway.
- » At bypass lanes, consider a 4' minimum (6'+ preferred) paved shoulder for bicyclists to continue.



Paved shoulder with bypass lane guidance, as shown in the MnDOT Bicycle Facilities Design Manual (2020)



Rumble strip design guidance, as shown in the MnDOT Bicycle Facilities Design Manual (2020)

CHOOSING FUTURE FACILITIES

This plan is intended to serve as a tool for future decision-making regarding improvements to the bicycle and pedestrian network in Washington County. The following table provides guidance to understand specific facility types that are recommended to be used in combination with common intersection types found in Washington County.

Table 3.1 lists facilities for safety strategies that are potential considerations for intersection types commonly found in Washington County. The table also cites state and national references for locating guidance on specific design for facility and intersection combinations. The table is intended to be used as reference for exploring multiple options for future comparison of language and design. The guides listed are current as of 2020; it should be noted that this list is not exhaustive, but intended to serve as a starting point.

The references are keyed below (click on text to link directly to reference documents):

- 1 - FHWA Safe Transportation for Every Pedestrian (STEP)
- 2 - FHWA Proven Safety Countermeasures
- 3 - AASHTO Guide for the Development of Bicycle Facilities
- 4 - NACTO Urban Street Design Guide
- 5 - NACTO Urban Bikeway Design Guide
- 6 - MnDOT Best Practices and Guidance in At-Grade Trail Crossing Treatments
- 7 - MnDOT Best Practices for Pedestrian/Bicycle Safety
- 8 - MnDOT Bicycle Facility Design Manual

It should be noted that guidance for County State Aid Highways (CSAH) is generally provided through the most current *MnDOT Bicycle Facility Manual (2020)* for pedestrian and bicycle facilities, through the State Aid Manual (2015), and through the MnDOT Facility Design Guide.

Guides are updated periodically; the list above and included in the table reflect guidance current as of 2020.

Table 3.1 Reference Guide to Pedestrian and Bicycle Crossing Facilities at Intersection Types

SAFETY STRATEGIES		INTERSECTION TYPE					
		Roundabouts	Signalized Intersections	Four-way Stop Control	Two-way Stop Control	Trail Crossing at Mid-block	Highway Crossing
SIGNING / STRIPING	High Visibility Crosswalk Markings	1	1,4,6,7,8	1,4,6,7,8	1,4,6,7,8	1,3,4,6,8	1,4,6,7,8
	Crosswalk Warning Signs	1	1,6,8	1,4,6,8	1,6,8	1,3,6,8	1,6,8
	Advance Stop Bar Marking					1,3,4,5,6,7,8	1,6,7,8
	Stop or Yield Signs for Bicycles					3,5,6,8	
CROSSING AID	Rectangular Rapid Flashing Beacon (RRFB)	1,5			1,5,6,7,8	1,4,5,6,7,8	
	Overhead Pedestrian Hybrid Beacon (PHB/HAWK)				2,5,6,7,8	1,2,3,5,6,8	1,2,4,6,7,8
GEOMETRY	Slip Ramp	3,8					
	Curb Extensions (Bump Outs)		1,4,6,7	1,4,6,7	1,4,6,7	1,4,6,7	
	Pedestrian Refuge Island		5,6,8	5,6,8	5,6,8	1,2,3,5,6,8	1,2,6,8
	Trail Crossing Pushed Back from Intersection	6			6,8		
	Road Diet					1,2,3,7	
SIGNALIZED INTERSECTION	Protected Only Left and Right Turn Phases		4,8				
	Signal Timing Adjustments		3,8				
	Bicycle Actuated Signals		3,5,8				
	Leading Pedestrian Interval		2,3,4,5,8				
	No Right Turn on Red		4,8				
GRADE SEPARATION	Trail Overpass or Underpass					3,7,8	3,7,8

ACTIVE LIVING RECOMMENDATIONS

Today, the benefits of increasing physical activity and promoting healthy lifestyle choices for people of all ages in our communities is an identified priority. Access to a safe, convenient, and enjoyable network for walking and biking plays a significant role in providing opportunities for people to engage in healthy lifestyles.

Active living is a method to prioritize the integration of physical activity and healthy eating into daily routines. Age, physical ability and proximity to parks and trails influence opportunities for making active living a reality for residents.

In addition to creating a plan for investing in the future bicycle and pedestrian network, primarily in the form of trails and paved shoulders, this plan identifies other non-infrastructure recommendations for promoting and achieving an environment conducive to active living for all Washington County residents.

RECOMMENDATIONS

1. DEVELOP A COHESIVE AND CONSISTENT WAYFINDING AND SIGNAGE PLAN

This wayfinding plan should coordinate or be integrated with Washington County Parks. Providing clear and consistent communication throughout the county-wide network will promote use of trails and can also build identity and pride for the network. The wayfinding and signage plan process can also integrate a community engagement initiative to develop trail names, and to identify potential landmarks, loop routes, connections with other regional/state/local trail networks, or other points of interest to be noted in directional signage.

2. DEVELOP AND MAINTAIN AN UPDATED NETWORK ROUTE MAP

A county-wide route map, with popular county destinations, landmarks, and existing segments of the bicycle and pedestrian network is an essential way to promote active living. This map should be kept up-to-date and posted visibly through county communications such as the county website, as well as posted at county parks and at regional trailheads. The map should consider accessibility by readers who have visual impairments, and may need to be provided in other languages.



Example of trail wayfinding (Photo: E3)

3. DEVELOP SAFETY AND EDUCATION PROGRAMS FOR PEDESTRIANS AND BICYCLISTS

Providing pedestrian and bicyclist safety and education programs can help potential bicyclists and pedestrians understand how to engage in active living safely and comfortably. This is especially true for residents in more rural areas, who may think that biking and walking are activities reserved for urbanites. These programs can be initiated through Washington County SHIP (Statewide Health Improvement Partnership) or through Washington County Public Safety, Sheriff's Office or Parks. Education or information can also be extended to include programs for drivers, to better understand how to share the roadway with bicyclists and pedestrians. Group bicycle rides or hikes, lead by professionals trained through Bicycle Alliance of Minnesota are one way of providing education in a group setting.

The Minnesota Bicycling Handbook is an excellent resource for understanding the rules of the road and becoming familiar with safe riding techniques. Link to resource:

<https://www.bikemn.org/education/minnesota-bicycling-handbook>

MnDOT's Walk! Bike! Fun! curriculum is a toolkit for creating walking and biking education for children, adults, and seniors. Link to resource: <https://www.bikemn.org/education/walk-bike-fun>

4. BECOME DESIGNATED AS A BICYCLE FRIENDLY COMMUNITY

The Bicycle Friendly Community Program is administered through The League of American Bicyclists. This is an incentive program where communities apply to and become designated at different levels of achievement for accomplishing community goals related to providing high quality bicycle facilities and access to educational and encouragement activities. Becoming designated and working actively with the League of American Bicyclists opens the door to sharing best practices and connecting to technical resources for building and improving the county-wide system. Link to resource:

<https://www.bikeleague.org/>

5. EVALUATE PLAN PROGRESS

This plan, once approved by the county, should be revisited periodically to take inventory of progress made towards filling network gaps, addressing safety improvements, and increasing biking and walking activity in the county. Evaluation could include the following:

- » Taking inventory of completed projects and updating map files
- » Completing trail counts or intercept surveys along routes
- » Convening across county departments to evaluate progress



MNDOT PORTABLE COUNTER BORROWING PROGRAM

MnDOT provides freely available and easy to install portable counters that can be used to collect bicycle and pedestrian count data without concern for weather, climate or daylight. Equipment and instructive toolkits are available to cities, counties, and active transportation advocacy organizations for short-term lending. Counts can be used as a tool for understanding use of current trail networks, and lay the groundwork for future planning and prioritization efforts.

» To learn about this program, visit www.dot.state.mn.us/bike-ped-counting/borrow.html

