



# Comprehensive Bike Plan For Kenosha County 2025 Appendices

July 2013

**PREPARED BY:**

Alta Planning + Design  
Portland, OR / Madison, WI  
(503) 230-9862



**WISCONSIN  
BIKE FED**



## Appendix A: Best Practices Review of Vision, Goals and Objectives

### Best Practices Review of Vision, Goals and Objectives

A collection of goals and objectives from the bicycle plans of comparable counties around the country is listed in the following table.

City	Goals, Objectives
Jefferson County, WI	<p>Goals/Objectives</p> <p>Develop a well-connected trail system that links a variety of facilities together into a cohesive transportation system.</p> <p>Increase the utilization, availability, and demand for funding to improve bicycle facilities.</p> <p>Design roads to be compatible with surrounding uses and be bicycle and transit friendly.</p> <p>Reduce the number and severity of vehicular crashes with particular emphasis on reducing vehicle-bicycle conflicts and crashes.</p> <p>Supplement facilities improvements with adequate education, encouragement, and enforcement programs.</p> <p>Enhance intergovernmental cooperation and coordination for improving multimodal transportation.</p> <p>Develop shared-use transportation standards to include in development review processes used by local communities when reviewing new developments.</p> <p>Enhance the livability of Jefferson County by improving transportation variety throughout the region.</p> <p>Increase the numbers of commuters who live within urbanized areas that bicycle to work.</p> <p>Continue to monitor progress toward implementing this plan and increasing mode share for non-motorized transportation.</p>
Contra Costa County, CA	<p>Expand, improve and maintain facilities for bicycling</p> <p>Encourage more people to bicycle</p> <p>Support local efforts to encourage bicycling</p> <p>Improve safety for bicyclists</p> <p>Maximize funding sources for implementation</p> <p>Plan for the needs of bicyclists</p>
Clark County, WA	<p>Implement the Bicycle and Pedestrian Master Plan to expand travel opportunities for transportation and recreation.</p> <p>Identify a countywide network of bicycle facilities that augments local networks identified by each city.</p> <p>Provide secure short and long-term bicycle parking in employment and commercial areas, in multifamily housing, at schools, and at transit facilities, including covered and/or attended parking.</p> <p>Increase the number of bicycle transit.</p> <p>Develop and improve trails within parks.</p> <p>Facilitate coordination and cooperation among local jurisdictions in</p>

City	Goals, Objectives
	<p>development of the bikeways.</p> <p>Encourage use of alternative types of transportation, particularly those that reduce mobile emissions (bicycle, walking, carpools, and public transit) by implementing Transportation Demand Management Strategies aimed at reducing the number of drive alone trips.</p> <p>Promote bicycle safety and increased bicycling through education, encouragement and enforcement activities.</p> <p>Maintain and improve the quality, operation, and integrity of bikeway network facilities.</p> <p>Work to fund construction of the bicycle improvements in this Plan and maximize the amount of local, state, and federal funding for bikeway facilities that can be received by agencies in Clark County.</p> <p>Increase development practices that are supportive of cycling.</p> <p>Improve bicycle access to nutritious food.</p>

## Wisconsin, County and City Vision, Goals, and Objectives

A collection of goals and objectives from the Wisconsin DOT bicycle plan and the Kenosha County Comprehensive Plan are listed in the following table. In the Wisconsin bicycle planning document, objectives are designed to support the overall plan goals, though they are not structured around individual goal statements. Instead, they are structured around the four-E's of transportation safety: engineering (and planning), education, enforcement and encouragement.

Plan, Vision	Goals, Objectives
<p>Wisconsin State Bicycle Transportation Plan 2020 (1998)</p> <p>“To establish bicycling as a viable, convenient and safe transportation choice throughout Wisconsin.”</p>	<p>Goals</p> <p>Increase levels of bicycling throughout Wisconsin, doubling the number of trips made by bicycles by the year 2010.</p> <p>Reduce crashes involving bicyclists and motor vehicles by at least 10% by the year 2020.</p> <p>Objectives</p> <p>Objective 1 - Plan and design new and improved transportation facilities to accommodate bicyclists and encourage their use.</p> <p>Objective 2 - Expand and improve a statewide network of safe and convenient routes for bicycle transportation and touring, including safe and convenient access to and through the state's urban areas.</p> <p>Objective 3 - Provide consistent safety messages and training to all roadway users by expanding the range of education activities through driver licensing and training, bicycle safety education, increasing understanding of traffic laws, and provision of public service information.</p> <p>Objective 4 - Improve the enforcement of laws to prevent dangerous and illegal behavior by motorists and bicyclists.</p> <p>Objective 5 - Encourage more trips by bicycles by promoting the acceptance and usefulness of this transportation mode.</p>
<p>A Multi-Jurisdictional Comprehensive Plan for Kenosha County: 2035</p>	<p>Goals:</p> <p>Provide for bicycle and pedestrian facilities in Kenosha County that safely and efficiently serve the anticipated land use development pattern set forth on Map 65 (Kenosha County Land Use Plan Map: 2035).</p> <p>Provide options for bicycle and pedestrian travel as an alternative to personal vehicle travel.</p>

## APPENDIX A: BEST PRACTICES REVIEW OF VISION, GOALS AND OBJECTIVES

Plan, Vision	Goals, Objectives
	<p>Objectives:</p> <ul style="list-style-type: none"> <li>Expand and enhance alternative modes of transportation.</li> <li>Provide opportunities for walking and bicycling as part of the planning process to provide an alternative to vehicle travel and to promote a healthy lifestyle.</li> <li>Maintain and enhance existing transportation infrastructure to include bicycle and pedestrian facilities consistent with the regional transportation system plan.</li> <li>Encourage development patterns with transportation infrastructure that minimizes environmental impact, relieves congestion, and reduces fuel consumption and air pollution.</li> </ul>
<p>A Vision for Bicycling in Kenosha County, Wisconsin (2010)</p> <p>“In the future, bicycling in Kenosha County will be an accessible, safe, healthy, practical and viable form of transportation and recreation. The bicycle network will provide convenient connections between communities, places of employment, Parks, schools, recreation areas, retail establishments and other popular destinations.”</p>	<p>Priorities:</p> <p>Encouragement:</p> <ul style="list-style-type: none"> <li>Introduce school districts to the Safe Routes to School program.</li> <li>Produce literature about safe cycling and driving and distribute to county residents.</li> <li>Sponsor organized community bike rides.</li> <li>Implement a direct marketing campaign to encourage residents to bike more.</li> <li>Encourage local businesses to pursue the designation of “Bicycle Friendly Business” from the League of American Bicyclists.</li> </ul> <p>Enforcement:</p> <ul style="list-style-type: none"> <li>Encourage local police officers to participate in the Wisconsin Pedestrian &amp; Bicycle Law Enforcement Training offered by the Wisconsin Department of Transportation (WisDOT).</li> <li>Encourage all county police departments to enforce those activities that pose the greatest risks to cyclists.</li> <li>Offer education opportunities in lieu of fines to people on bicycles who violate traffic regulations.</li> </ul> <p>Evaluation:</p> <ul style="list-style-type: none"> <li>Produce a comprehensive Kenosha County Bicycle Plan.</li> <li>Conduct regular bicycle counts at strategic locations around the county to determine ridership levels.</li> </ul> <p>Engineering:</p> <ul style="list-style-type: none"> <li>Provide at least two east-west corridors that provide safe and convenient links across the county.</li> <li>Sign a network of bicycle routes that links the primary population centers of the county as well as major recreation sites, parks, schools, and employment areas.</li> <li>Provide a continuous lakefront bicycle corridor from Illinois to the Racine County border.</li> <li>Reach an agreement with We-Energies/ATC to build bikeways in power line corridors.</li> <li>Provide safe and convenient crossings of the I-94 corridor.</li> <li>Work with surrounding municipalities to create connections to bikeways outside Kenosha County.</li> <li>Encourage local municipalities to adhere to state and federal guidance for the design and construction of all bicycle facilities.</li> </ul>



## Appendix B: Plan and Policy Review

This Appendix describes background plans and policy documents relevant to the Comprehensive Bike Plan for Kenosha County 2025. The text summarizes previous and on-going planning efforts affecting biking in Kenosha County. The summary identifies issues that may impact the findings and ultimate recommendations of this project. The review focuses on plans and studies prepared by the Wisconsin Department of Transportation (WisDOT), as well as relevant information from Kenosha County and its Cities, Towns, and Villages.

The following plans were reviewed for this analysis.

### Statewide Planning Documents

- Administrative Code Trans 75: BIKEWAYS AND SIDEWALKS IN HIGHWAY PROJECTS (2009)
- Wisconsin State Bicycle Transportation Plan 2020 (1998)
- Advisory on Installation of Bicyclist Compatible Rumble Strips (2011)
- Wisconsin Department of Transportation Guide for Path/Street Crossings (2011)
- Developing a Model for Reducing Bicycle/Motor Vehicle Crashes (2006)
- Wisconsin Rural Bicycle Planning Guide (2006)
- Wisconsin Bicycle Planning Guidance (2003)
- Wisconsin Bicycle Facility Design Handbook (2004)
- Wisconsin Guide to Pedestrian Best Practices (2010)

### Regional and County Documents

- 2035 Regional Transportation Plan Map (2010)
- A Vision for Bicycling in Kenosha County, Wisconsin (2010)
- Regional Bicycle and Pedestrian Plan for Southeastern Wisconsin: 2010
- Wisconsin County Bicycle Maps (2009)
- Wisconsin State Trails Network Plan Map (2001)

### City, Town and Village Documents

- City of Kenosha Bicycle and Pedestrian Facilities Implementation Plan (2007)
- Town of Randall and Village of Twin Lakes 2024 Transportation Plan (2005)
- Town of Randall Comprehensive Outdoor Recreation Plan (2008)
- Town of Salem 2020 Outdoor Recreation Plan for the Town of Salem



- Town of Somers Bike/Pedestrian Trails Map
- University of Wisconsin-Parkside Hiking/Biking Trails map
- Village of Paddock Lake Comprehensive Plan (2005)
- Village of Pleasant Prairie 2010 Bicycle and Pedestrian Trails Plan (2010)
- Village of Silver Lake Park and Open Space Plan (2003)

## Statewide Documents

### **Administrative Code Trans 75: BIKEWAYS AND SIDEWALKS IN HIGHWAY PROJECTS (2009)**

Wisconsin's Pedestrian and Bicycle Accommodations law addressing complete streets was codified in 2009 and codified as State statute SS 84.01(35) and later into administrative code as Transportation 75 (Trans-75). The code aims to “ensure that bikeways and pedestrian ways are established in all new highway construction and reconstruction projects funded in whole or in part from state funds of federal funds.” Exceptions to the law include circumstances when:

- Cyclists and pedestrians are prohibited by law from using the highway.
- The cost of establishing a bikeway or pedestrian way is disproportionate to the probable use of the bikeway or pedestrian way (specifically defined as 20 percent of the total project cost); however, the highway project will spend up to 20 percent of the project costs on establishing bicycle and pedestrian facilities.
- A facility would have excessive negative impacts in a constrained environment, defined as:
  - Reduction of a terrace width to less than 3 feet for more than 50 percent of the total project length.
  - Eliminating structures, improvements or landscaping would dramatically reduce the aesthetic or functionality of the area.
  - A loss or degradation of natural resources, historical or archaeological sites.
- There is an absence of need as indicated by sparse population, traffic volumes or other factors, defined as:
  - Sidewalk – May be omitted in an outlying district defined as “territory near or contiguous to a community where within any 1,000 feet along the highway the buildings average more than 200 feet apart.” Sidewalks may also be omitted in an outlying district or rural area unless land use plans indicate significant development within 10 years.
  - Bikeway – Bikeways may be omitted in an outlying district or rural area unless land use plans indicate significant development within 10 years A bikeway may be omitted in an outlying district or rural area that will have less than 750 ADT in the design year and:



- 2-way bicycle traffic volume is or is expected to be less than 25 per day during peak travel days.
- The highway is not identified in any government bike transportation plan.
- The highway does not provide a connection of 1 mile or less between any existing and planned routes.
- The highway does not provide a connection of 1 mile or less between an existing bikeway and the nearest local road.
- Community refuses to accept maintenance responsibility (with the exception of the National Highway System)

### **Wisconsin State Bicycle Transportation Plan 2020 (1998)**

This plan provides guidance on the state-owned and state-supported transportation systems in the state of Wisconsin. Policies are divided into urban and intercity (rural) geographies. Intercity policies will be most relevant to the goals of Kenosha County during this planning process.

#### **Urban:**

- “Bicycle provisions on urban arterial streets (i.e., wide curb lanes, bicycle lanes or paved shoulders) should be made in accordance with Metropolitan Planning Organization (MPO) and community bicycle plans.”
- “On Urban State Trunk Highways, where suitable accommodations for bicyclists now exist, new highway improvements will be planned to continue an acceptable level of service and safety for bicyclists.”
- “WisDOT will cooperate with local jurisdictions to help develop "stand alone" bikeway projects, including bicycle path facilities, when they are consistent with an approved plan and provide important bicycle transportation improvements.”
- “Safe crossings should be maintained or created when bikeways and streets intersect highways. Crossing controls or grade separations should be considered where there are inadequate gaps in traffic for safe bicycle path crossing.”
- “Intersection design should consider the needs of bicyclists. All intersections should be wide enough for safe bicyclist crossing.”

#### **Rural:**

- On all higher-volume rural roadways (generally with motor vehicle volumes exceeding 1,000 per day), paved shoulders should be provided.
- On higher-volume roadways with a moderate number of bicyclists currently using or anticipated to use the roadway, wider paved shoulders should be provided.
- On lower-volume roadways generally no special improvements are necessary to accommodate bicyclists.

- Multi-use paths should be considered when 1) bicyclists cannot be safely accommodated with on-street facilities; or, 2) an opportunity exists to improve the transportation aspects of bicycling by locating a rural bicycle path within an abandoned rail corridor, utility corridor, or river grade.

### **Advisory on Installation of Bicyclist Compatible Rumble Strips (2011)**

The purpose of this advisory is two-fold: 1) to alert highway officials and engineers in Wisconsin of the potential problems and hazards posed to bicyclists when rumble strips are improperly designed and/or constructed and 2) to act as a limited resource for guidance and standards currently available on rumble strips, especially as they pertain to making rumble strips bicycle compatible. This advisory is intended for all non-interstate and non-freeway rural roadways in Wisconsin regardless of ownership of the roadway or source of funding for highway improvements.

“Shoulder rumble strips should not be used for the sole purpose of improving safety for bicyclists; their presence is more likely to create a hazard for bicyclists.”

Transverse strip “Where state or federal funds are being used for the installation, a rumble free shoulder and passage shall be provided as specified above.” “If a paved shoulder is not present, the passage width should be 3 feet from the right edge of the paved roadway. Where state or federal funds are being used for the installation, this 3’ passage shall be provided.”

### **Wisconsin Department of Transportation Guide for Path/Street Crossings (2011)**

This document prepared by WisDOT identifies and clarifies intersection right-of-way rules at the intersection of bicycle multi-use paths with streets and highways. The document differentiates between bicyclists using a crosswalk along a path facility and those using a crosswalk at a traditional intersection. Generally:

- Bicyclists should obey traffic controls as they encounter them on the path, and proceed through crossings in a manner that is consistent with the safe use of the crosswalk by pedestrians.
- Drivers must yield to pedestrians and bicyclists in the crosswalk, and do everything they can to keep from hitting a pedestrian or bicyclists even if they have failed to meet their obligations.

### **Bicycle crash Analysis for Wisconsin Using a Crash Typing Tool (PBCAT) and Geographic Information System (GIS). (2006)**

This document is a WisDOT research project discussing a method and results of evaluating the relationship between road and intersection conditions and incidences of bicycle crashes, to support safety improvements and countermeasure design to be included in future plans and projects. Key findings include:

- Crashes between bicyclists and motorists in the State of Wisconsin continue to decrease in an annual basis
- Four of the top five crash types indicated that the motorist made the critical error that contributed to the crash
- There were far more urban crashes than rural crashes (94% compared 6%),
- The majority of crashes occurred at intersections (66% compared to 34%)
- There was a high frequency of sidewalk/crosswalk-type crashes (28% of all crashes)
- Crash rates were lower on wider roadways for both local roads and state highways
- While urban streets had a much higher crash rate, rural highways had a much higher rate of fatalities

### **Wisconsin Rural Bicycle Planning Guide (2006)**

This document is a reference for rural counties and small communities creating bicycle plans for their communities. It discusses the importance of bicycling as a form of transportation and outlines and describes the bicycle planning process and content requirements. The focus of these guidelines is on the utilitarian and transportation aspects of bicycling and less on recreational uses.

### **Wisconsin Bicycle Planning Guidance (2003)**

This document is a reference for Metropolitan Planning Organizations (MPOs) responsible for planning in urbanized areas of Wisconsin. It discusses the importance of bicycling for transportation and outlines and describes the bicycle planning process and content requirements. The focus of these guidelines is on the utilitarian and transportation aspects of bicycling and less on recreational uses.

### **Wisconsin Bicycle Facility Design Handbook (2004)**

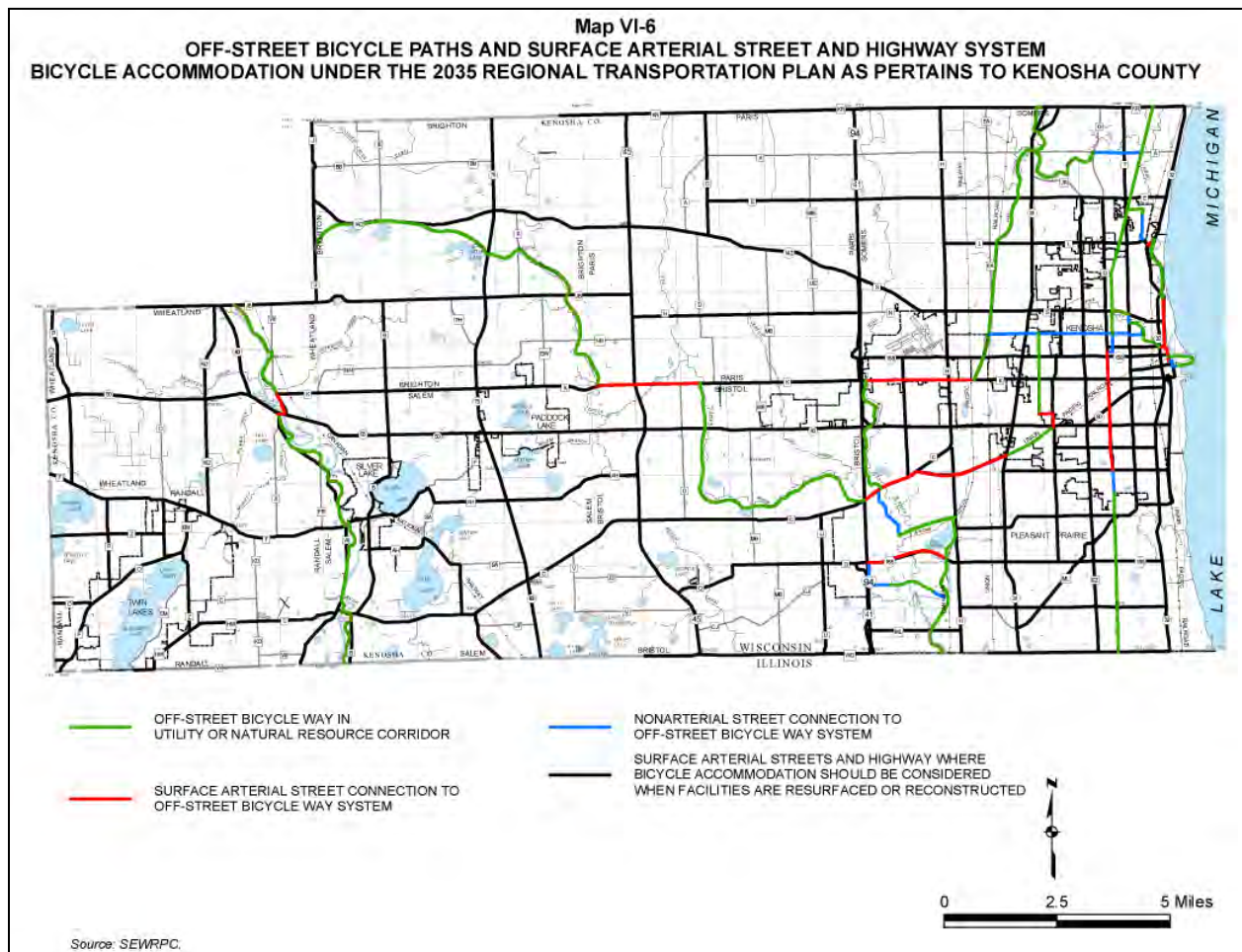
This handbook is the primary source for facility design guidance in the state of Wisconsin. It discusses the operating characteristics and needs of bicyclists, and presents the wide range of design options for enhancing a community's bicycle transportation system. The guide covers basic roadway improvements for shared streets, details for on-street bicycle lanes, and the design of shared-use paths. Shared Lane Markings (SLMs), introduced into the 2009 edition of the FHWA Manual on Uniform Traffic Control Devices and in common use around the country are not included in this guide.

## Regional and County Documents

### 2035 Regional Transportation Plan Map (2010)

The Regional Transportation Plan for Kenosha County identifies regional bicycle accommodation routes. Facilities identified include:

- Off-street bicycle way in utility or natural resource corridor
- Surface arterial street connection to off-street bicycle way system
- Non-arterial street connection to off-street bicycle way system
- Surface arterial streets and highway where bicycle accommodation should be considered when facilities are resurfaced or reconstructed.



Plan map from the 2035 Regional Transportation Plan

### A Multi-Jurisdictional Comprehensive Plan for Kenosha County: 2035

Beyond the routes and facilities identified by the Regional Transportation Plan for Kenosha County (above), the comprehensive plan includes additional Implementation Element with relevant high priority programs and implementation actions:

- Continue the development, enhancement, and management of recreational trail facilities to ensure connectivity of such facilities in Kenosha County including potential water trails, as illustrated in Map 61 and potential area wide recreational bicycle trails, as illustrated in Map 63.
- Prepare and implement City, Village, and Town neighborhood plans, small area plans, and bicycle and pedestrian plans to provide a coordinated system of bicycle and pedestrian trails, collector streets, and local land access streets.
- Develop and implement a detailed bike and pedestrian trail plan for Kenosha County under the guidance of an advisory committee to be formed by Kenosha County. The plan should determine specific locations for bike and pedestrian trails and identify potential links to existing trails in Kenosha County, trails in adjacent counties, and a potential east-west trail in the county.
- Consider including facilities for walking and bicycling during the review and approval of all development projects, including street and highway improvements, to provide an alternative to motor vehicle travel and to promote a healthy lifestyle.
- Encourage the use of the design concept called “Complete Streets.”
- Identify “missing links” or opportunities to provide additional links to connect local bikeways and activity centers to the existing bicycle/pedestrian path network.
- Promote accommodation of bikeways along natural corridors, such as rivers and other waterways.
- Assist local governments in identifying and applying for State and Federal grants for development of bicycle and pedestrian facilities.

### **A Vision for Bicycling in Kenosha County, Wisconsin (2010)**

This plan considers the vision and approach to encouraging bicycling in Kenosha County. The plan discusses the existing suitability and prospects for bicycling within the county, and identifies and summarizes proposed routes and facilities. The plan identifies key priorities for Kenosha County and is described in greater detail in Appendix B: Plan and Policy Review.

Key proposals for bikeway construction and planning include:

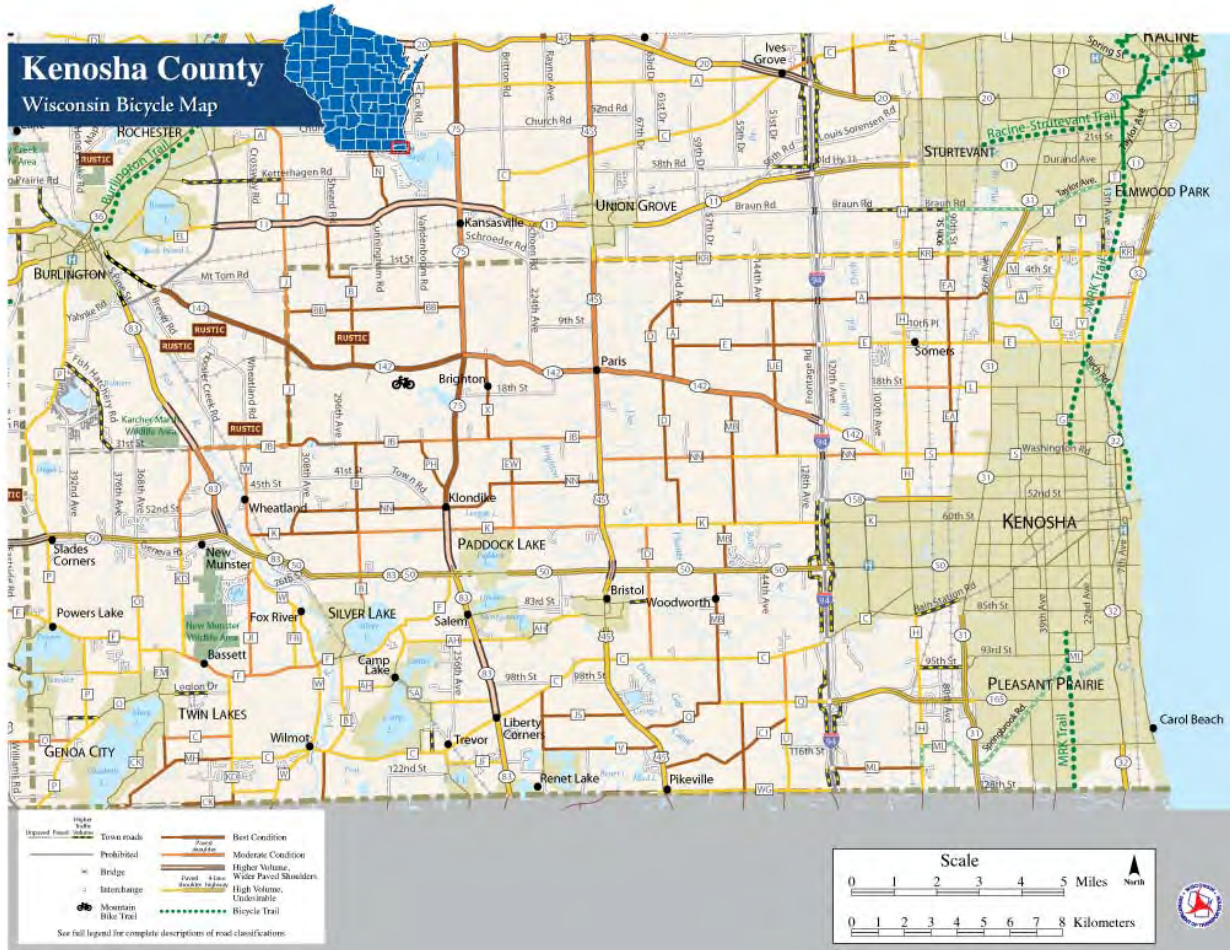
- Shared-use path along Highway K
- Bike lanes to County Highway H
- Off street shared-use path in the southern power line corridor

### **Regional Bicycle and Pedestrian Plan for Southeastern Wisconsin: 2010**

This plan considers bicycle and pedestrian needs for the southeastern Wisconsin region. Identified in an amendment to the plan is an on-street bicycle lane for CTH K between Kenosha and Walworth County line.

## Wisconsin County Bicycle Maps (2009)

These county bike maps provide a bicycling conditions assessment that benefits both cyclists and transportation planners. The conditions for cycling represented on the map are intended for an average adult cyclist with at least some experience operating on higher speed roadways. The methodology for assessing cycling conditions is based on the process described in Appendix A of the Wisconsin Rural Bicycle Planning Guide.

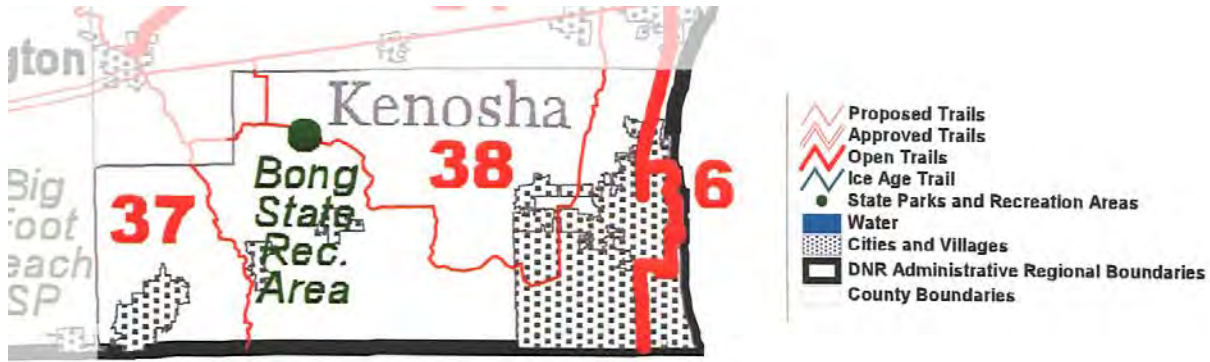


Bicycle Suitability Map created by the Wisconsin Department of Transportation.

## Wisconsin State Trails Network Plan Map (2001)

The Wisconsin State Trails Network Plan identifies trails in the southeast region and Kenosha County. Proposed trails are identified on the map below.





Plan map from the Wisconsin State Trails Network Plan

## City, Town and Village Documents

### City of Kenosha Bicycle and Pedestrian Facilities Implementation Plan (2007)

The Bicycle and Pedestrian Facilities Implementation Plan identifies routes through the city to serve as both commuter routes and as recreational routes.

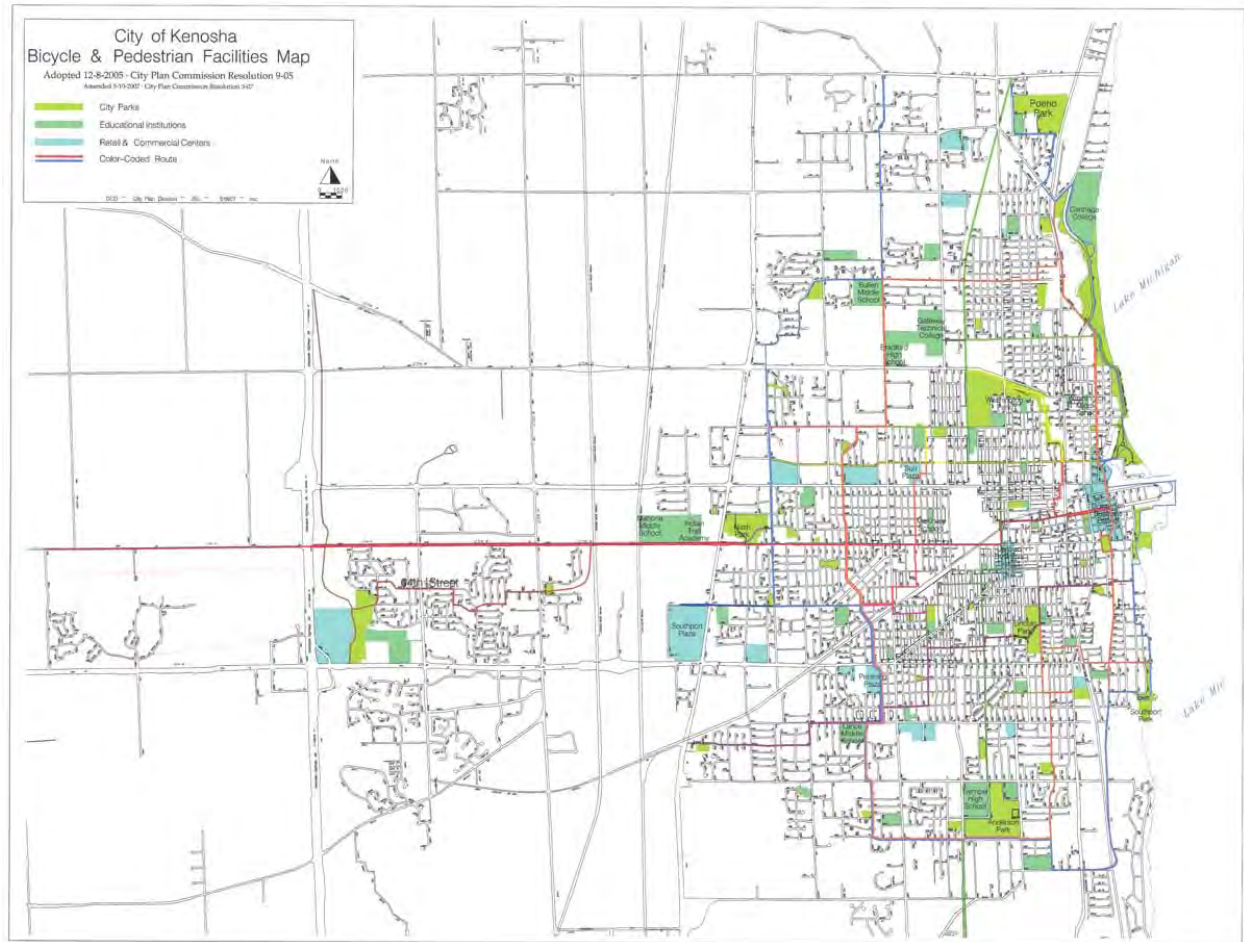
Facilities proposed differ from those in the Wisconsin Bicycle Facility Design Handbook, and include:

- On-Road Segregated Lanes and a Buffer
- On-Road Segregated Lanes with no Buffer
- On-Road Shared Use Signs and Markings
- Off-Road 10 feet wide paved asphalt

A system of color coded planned recreation corridors are identified, to be developed as trails or bicycle routes. Key connections include:

- CTH K
- 39th Ave
- 82nd St
- 30th Ave





Bicycle & Pedestrian Facilities map from the City of Kenosha Bicycle and Pedestrian Facilities Implementation Plan

### **Town of Randall and Village of Twin Lakes 2024 Transportation Plan Map (2005)**

The transportation plan map for the Town of Randall and the Village of Twin Lakes identifies a proposed bicycle and pedestrian path loop connects Randall and Twin Lakes on CTH JI (328th Ave) and CTH D (E Main St). Key access points include CTH F and CTH JI.

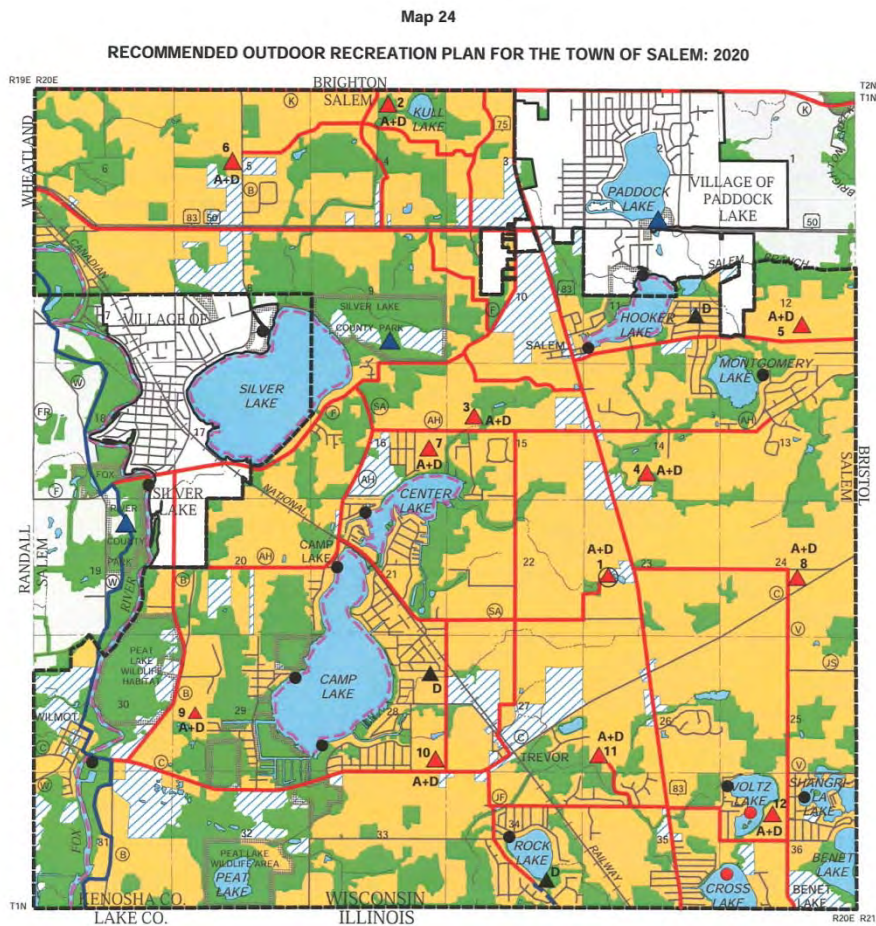
### **Town of Randall Comprehensive Outdoor Recreation Plan (2008)**

A key recommendation related to bicycling in this local town plan is to “Develop new trails in new subdivisions, and as designated on the Transportation Plan.” To provide for safe travel to and from parks and around the community, the plan proposed Linear Parks, either in an on-street right-of-way or independent off-street right-of-way, such as a rail corridor. A key possible future trail is identified in the wildlife area in the northeast corner of the town, which could provide connections to both the Town of Randall and the Village of Twin Lakes. No regionally serving connections were identified.

### **Town of Salem 2020 Outdoor Recreation Plan for the Town of Salem**

The Town of Salem Outdoor Recreation Plan identifies existing and proposed trails through the town. Key multi use trail connections are identified on:

- 84th St
- State Route 83 (Antioch Rd)
- State Route 50 (75th St)
- Rock-Lake Rd
- CTH F (93rd St.)
- County Highway B (Tuttle Rd)

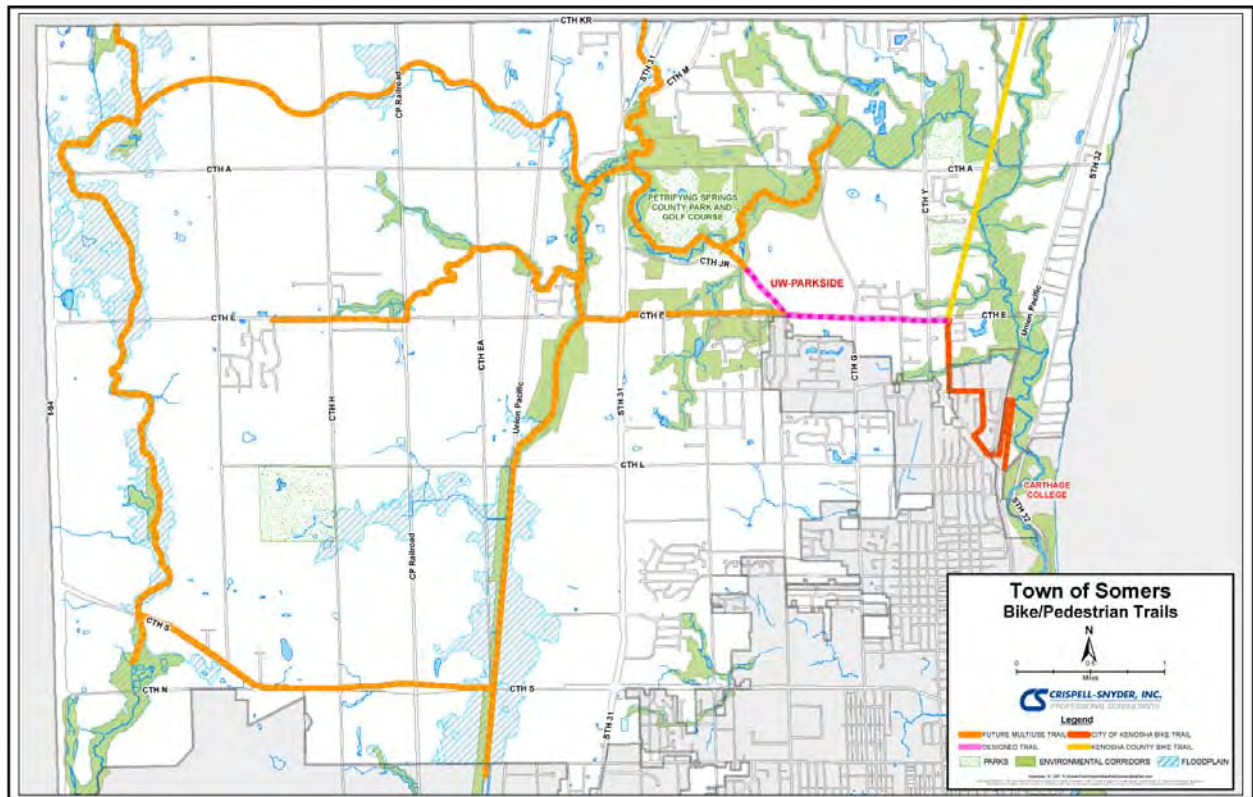


Recommended outdoor recreation plan map for the Town of Salem

### **Town of Somers Bike/Pedestrian Trails Map**

The Town of Somers Bike/Pedestrian Trails Map identifies existing and future trails through the town. Future multi use trail connections are identified on:

- CTH S
- CTH E



Town of Somers Bike/Pedestrian Trails Map

### University of Wisconsin-Parkside Hiking/Biking Trails map

Key access points to campus area trails are identified at CTH JR (Petrifying Springs Rd) and CTH A (7th St).

### Village of Paddock Lake Comprehensive Plan (2005)

The Village of Paddock Lake Comprehensive Plan stresses the importance of bicycle facilities in their compact village because of the short distances between destinations. The plan calls for 2,000 cars per day at 30 mph travel speed as the threshold between a shared roadway bike route and a separated bike lane facility. The plan identifies one existing marked bike lane in the village on 248th St.

The Village of Paddock Lake Comprehensive Plan Map identifies existing and future trails through their town. Future multi use trail connections are identified on:

- CTH K (60th St)
- Off-street path north of the lake, close to CTH EW (232 Ave)



**Village of Pleasant Prairie 2010 Bicycle and Pedestrian Trails Plan (2010)**

This plan considers bicycle and pedestrian systems and facility needs for the Village of Pleasant Prairie. The plan documents existing facilities and village context, and makes recommendations for a future bicycle and pedestrian network. Key proposed bikeway connections with the village include:

- CTH H
- CTH Q
- Kenosha County Bike Trail
- 7<sup>th</sup> Ave
- East and West Frontage Rd along I94

**Village of Silver Lake Park and Open Space Plan (2003)**

This recreation focused plan aims to guide the preservation, acquisition, and development of land for parks, open space and outdoor recreation, including bicycle paths. An open space typology identifies the value of internal “Passive Recreation” facilities such as internal trails, and bicycle access to open spaces of different sizes. The plan recommends approximately one mile of off-street paths and trail segments to link existing and future neighborhoods. The plan recommends an on-street bike route system, with the objective of providing a system of bike routes within a two-minute ride of all village residences.



# Appendix C: Demand and Benefits Model

## Introduction

National transportation surveys, in particular the National Household Travel Survey (NHTS, 2009), have shown that commute trips are only a fraction of total trips an individual takes on a given day. The Demand and Benefits Model uses a market segment approach to estimate the number of non-work, non-school trips so that they can be factored in with commute trips to estimate the total number of bicycling trips that occur in a day. This memorandum describes estimated existing and future bicycle trip making, and identifies the assumptions made in the Kenosha County demand and benefits model.

## Data Used in the Kenosha County Mode

Journey-to-work information collected by the U.S. Census Bureau’s American Communities Survey (ACS) is the foundation of this analysis. Model variables from the ACS include:

- Total population (166,426)
- Employed population (78,252)
- School enrollment (students grade K-12; college students)
- Travel-to-work mode split (see Table 1).

Table 1: Kenosha County Commute Mode Share

	Bicycling	Source
Employed	0.20%	2010 ACS
K-12	0.67%	NHTS 2009
College	0.20%	Assumed same as 2010 ACS “Employed”

The 2009 NHTS provides a substantial national dataset of travel characteristics, particularly for bicycling trips. Data used from this survey to estimate non-work trips include:

- Student mode split, grades K-12
- Ratio of bicycling work trips to non-work, non-social/recreational trips
- Ratio of work trips to social and recreational trips
- Average trip length by trip purpose and mode

NHTS data indicate that for every bicycle work trip, there are more than two utilitarian bicycle trips made. Although these trips cannot be directly attached to a certain group of people (not all utilitarian

bicycling trips are made by people who bicycle to work), reasoned multipliers allow a high percentage of the community’s bicycling activity to be captured in an annual estimate.

The *Safe Routes to School Baseline Data Report* (2010) was used to determine the average distances of school-related bicycling trips.

**Disclaimer**

As with any modeling projection, the accuracy of the result is dependent on the accuracy of the input data and other assumptions. Effort was made to collect the best data possible for input to the model. However, the lack of local data requires the use of national data, which, while valid, creates less regionally-specific outputs. Examples of information that could improve the accuracy of this exercise include detailed results of local Safe Routes to Schools parent and student surveys, a regional household travel survey, and a travel survey of college students.

**Existing Bicycling Trips**

Table 2 shows the results of the model, which estimates that 1,794 bicycle trips occur in Kenosha County each day for transportation purposes. The majority are non-work utilitarian trips, which include medical/dental services, shopping/errands, family or personal business, obligations, meals, and other trips.



Table2: Model Estimate of Current Bicycling Trips

	<b>Bicycling</b>	<b>Source</b>
<b>Work Commute Trips</b>		
Work commuters	156	Employed population multiplied by mode split
Weekday trips	312	Number of commuters multiplied by two for return trips
<b>K-12 School Trips</b>		
K-12 commuters	369	School children population multiplied by mode split
Weekday trips	738	Numbers multiplied by two for return trips
<b>College Commute Trips</b>		
College commuters	50	College population multiplied by mode split
Weekday trips	99	College bicyclists multiplied by two for return trips
<b>Utilitarian Trips</b>		
Daily trips (includes Sat/Sun)	411	Adult trips (sum of work and college) multiplied by ratio of utilitarian work trips (NHTS).
<b>Total Current Daily Trips</b>	<b>1,794</b>	

Trips made for social or recreational purposes are not included in this model since its underlying goal is estimating the transportation benefits of bicycling. However, it is worth noting that NHTS data show that there are approximately 6.5 social and recreational bicycle trips made for every bicycle commute for purely social and recreational purposes that are not accounted for in the model.

## Current Trip Replacement

To estimate the total distance that Kenosha County residents travel to work or school by bicycling, the model isolates different bicycling user groups and applies trip distance information by mode based on the 2009 NHTS. The model values shown in Table 3 show that approximately 481,000 bicycling trips each year replace approximately 367,000 vehicle trips and nearly 723,000 vehicle-miles traveled.

Table 3: Current Bicycling Trip Replacement

	Bicycling	Source
<b>Commute Trips</b>		
Weekday auto trips replaced by bicycle	260	Trips multiplied by the drive-alone trip percentage
Weekday miles reduced	922	Number of vehicle trips reduced multiplied by average bicycle work trip length (NHTS 2009)
<b>School Trips</b>		
Weekday auto trips replaced by bicycle	441	Trips multiplied by drive alone trip percentage
Weekday miles reduced	441	Number of vehicle trips reduced multiplied by average trip length to/from school (SRTS 2010)
<b>College Trips</b>		
Weekday auto trips replaced	83	Trips multiplied by drive alone trip percentage
Weekday miles reduced	123	Number of vehicle trips reduced multiplied by average school/daycare/religious trip length (NHTS 2009) for bicycling modes
<b>Utilitarian Trips</b>		
Daily auto trips replaced by bicycle (includes Sat/Sun)	538	Trips multiplied by drive alone trip percentage
Daily miles reduced (includes Sat/Sun)	1,018	Number of vehicle trips reduced multiplied by average utilitarian trip length (NHTS 2009) for bicycling modes
<b>Yearly Results</b>	<b>Bicycling</b>	<b>Total</b>
Yearly trips by mode	480,626	
Yearly vehicle trips replaced by mode	366,988	
Yearly vehicle miles replaced by mode	722,703	

## Current Benefits

To the extent that bicycling trips replace single-occupancy vehicle trips, they reduce emissions and have tangible economic impacts by reducing traffic congestion, crashes, and maintenance costs. In addition, the reduced need to own and operate a vehicle saves families money. These benefits are shown in Table 4.

Table 4: Benefits of Current Bicycling Trips in Kenosha

	<b>Bicycling</b>	<b>Source</b>
Yearly vehicle miles reduced	722,703	
<b>Air Quality Benefits</b>		
Reduced Hydrocarbons (pounds/year)	2,167	EPA, 2005 <sup>16</sup>
Reduced Particulate Matter (pounds/year)	16	EPA, 2005
Reduced Nitrous Oxides (pounds/year)	1,514	EPA, 2005
Reduced Carbon Monoxide (pounds/year)	19,757	EPA, 2005
Reduced Carbon Dioxide (pounds/year)	587,923	EPA, 2005
<b>Economic Benefits of Air Quality</b>		
Particulate Matter	\$1,352	NHTSA, 2011 <sup>17</sup>
Nitrous Oxides	\$3,027	NHTSA, 2011
Carbon Dioxide	\$10,080	U.S. Government
Traffic Congestion	\$31,799	AAA, 2008 <sup>18</sup>
Vehicle Crashes	\$166,222	AAA, 2008
Roadway Maintenance Costs	\$101,178	Kitamura, R., Zhao, H., and Gubby, A. R., 1989 <sup>19</sup>
<b>Household Transportation Savings</b>		
Reduction in HH transportation spending	\$397,487	IRS operational standard mileage rates for 2010 <sup>20</sup>
<b>Total</b>	<b>\$711,145</b>	

## Future Bicycling Trips

Estimating future benefits requires additional assumptions regarding Kenosha's future population and anticipated commuting patterns in 2025. Future population predictions determined in the county

<sup>16</sup> From EPA report 420-F-05-022 "Emission Facts: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks." 2005.

<sup>17</sup> NHTSA Corporate Average Fuel Economy for MY 2011 Passenger Cars and Light Trucks, Table VIII-5 (<http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.d0b5a45b55bfbe582f57529cdba046a0/>).

<sup>18</sup> "Crashes vs. Congestion – What's the Cost to Society?" <http://www.aaanewsroom.net/Assets/Files/20083591910.CrashesVsCongestionFullReport.pdf>

<sup>19</sup> Kitamura, R., Zhao, H., and Gubby, A. R. (1989). *Development of a Pavement Maintenance Cost Allocation Model*. Institute of Transportation Studies – University of California, Davis ([http://pubs.its.ucdavis.edu/publication\\_detail.php?id=19](http://pubs.its.ucdavis.edu/publication_detail.php?id=19)). \$0.08/mile (1989), adjusted to 2010 dollars using the Bureau of Labor Statistics Inflation Calculator ([http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)).

<sup>20</sup> <http://www.irs.gov/newsroom/article/0,,id=216048,00.html>

COMPREHENSIVE BIKE PLAN FOR KENOSHA COUNTY 2025

comprehensive plan, A Multi-Jurisdictional Comprehensive Plan for Kenosha County: 2035 adjusted to the year 2025 by assuming a linear population growth were used in this model. Table 5 shows the demographics used in the future analysis.

Table 5: Projected 2025 Demographics

	Number	Percent of 2025 Population	Source
Population	183,896	-	A Multi-Jurisdictional Comprehensive Plan for Kenosha County: 2035
Employed population	86,431	47.0%	Based on future population projects and current proportion of the population that is employed.
School population, K-12	60,640	33.0%	Assumes same percent as from ACS 2009 estimate
College student population	27,556	15.0%	Assumes same as 2009 ACS estimate

Table 6 shows projected 2025 bicycling trips for two bicycle mode share scenarios. The first scenario assumes a 0.8 percent bicycle mode share and the second assumes a 1.6 percent bicycle mode share. These numbers were selected based on a comparison of 2009 Journey to Work Commute data for surrounding counties. 0.8% is consistent with the rate of bicycle commuting currently observed in neighboring Walworth County and represents an measureable, yet attainable increase. The high mode share represents a more aspirational increase that is still based in local estimates. For simplicity, these mode shares were assumed to apply for all trip types (commuting, utilitarian, school, etc.).

Table 6: Future (2025) Bicycling and Trips

	Bicycling		Source
	0.8%	1.6%	
Commute Trips			
Work commuters	691	1,383	Employed population multiplied by mode split
Weekday trips	1,383	2,766	Number of commuters multiplied by two for return trips
School Trips			
K-12 commuters	485	970	School children population multiplied by mode split
Weekday trips	970	1,940	Numbers multiplied by two for return trips
College Trips			
College commuters	220	441	College population multiplied by mode split
Weekday trips	441	882	College bicyclists multiplied by two for return trips
Utilitarian Trips			
Daily trips	1,824	3,648	Adult trips (sum of work and college) multiplied by ratio of utilitarian to work trips (NHTS).
Total Future Weekday Trips	5,651	11,301	

The important factor to consider with these future assumptions is not the accuracy of the mode share percentages, but the benefits that would accrue to Kenosha if those numbers are reached. As more cities and counties across the country track changes in bikeway mileage over time and participate in annual bicycle counts, more data will be available to better understand and refine future mode share predictions.

### Future Trip Replacement

The same trip replacement factors used for the existing conditions analysis were applied to the figures in Table 6 in order to generate estimates of bicycling trip replacement for the 2025 scenario. Table 7 shows that a 0.8% bicycle mode share scenario would result in more than 1.6 million annual bicycling trips, which will reduce vehicle trips by more than 1.3 million and vehicle-miles traveled by more than 2.9 million. A 1.6 % bicycle mode share would result in an estimated 3.4 million annual bicycling trips, along with reductions of approximately 2.8 million vehicle trips and nearly 5.6 million vehicle-miles traveled.

### Future Benefits

Table 8 shows the air quality and economic benefits of the future projected bicycling trips in Kenosha. For the 0.8 percent bicycle mode share scenario, annual household transportation savings are estimated to accrue at a rate of \$15 per person. By comparison, a 1.5 percent bicycle mode share would result in an estimated \$32 per person cost savings.

# COMPREHENSIVE BIKE PLAN FOR KENOSHA COUNTY 2025

Table 7: 2025 Bicycling Trip Replacement

	<b>Bicycling</b>		<b>Source</b>
	<b>0.8%</b>	<b>1.6% Share</b>	
<b>Commute Trips</b>			
Weekday auto trips replaced by bicycle	1,611	2,341	Trips multiplied by the drive-alone trip percentage
Weekday miles reduced	4,111	8,288	Number of vehicle trips reduced multiplied by average bicycle work trip length (NHTS 2009)
<b>School Trips</b>			
Weekday auto trips replaced by bicycle	581	1,171	Trips multiplied by drive alone trip percentage
Weekday miles reduced	580	1,170	Number of vehicle trips reduced multiplied by average trip length to/from school (SRTS 2010)
<b>College Trips</b>			
Weekday trips replaced by bicycle	370	746	Trips multiplied by drive alone trip percentage
Weekday miles reduced	548	1,105	Number of vehicle trips reduced multiplied by average school/daycare/religious trip length (NHTS 2009) for bicycling modes
<b>Utilitarian Trips</b>			
Daily auto trips replaced by bicycle (includes Sat/Sun)	2,399	4,836	Trips multiplied by drive alone trip percentage
Daily miles reduced (includes Sat/Sun)	4,541	9,157	Number of vehicle trips reduced multiplied by average utilitarian trip length (NHTS 2009) for bicycling modes
<b>Yearly Results</b>			<b>Total</b>
Yearly trips by mode	1,680,242	3,360,483	
Yearly vehicle trips replaced by mode	1,365,175	2,752,549	
Yearly vehicle miles replaced by mode	2,951,916	5,951,830	

Table 8: Benefits of Future Bicycling Trips in Kenosha County

	Bicycling		Source
	0.8% Share	1.6% Share	
Yearly vehicle miles reduced	2,951,916	5,951,830	
<b>Air Quality Benefits</b>			
Reduced Hydrocarbons (pounds/year)	8,851	17,845	EPA, 2005 <sup>21</sup>
Reduced Particulate Matter (pounds/year)	66,	133	EPA, 2005
Reduced Nitrous Oxides (pounds/year)	6,182	12,465	EPA, 2005
Reduced Carbon Monoxide (pounds/year)	80,697	162,707	EPA, 2005
Reduced Carbon Dioxide (pounds/year)	2,401,400	4,841,848	EPA, 2005
<b>Economic Benefits of Air Quality</b>			
Particulate Matter	\$5,521	\$11,132	NHTSA, 2011 <sup>22</sup>
Nitrous Oxides	\$12,365	\$24,931	NHTSA, 2011
Carbon Dioxide	\$41,173	\$83,015	U.S. Government
<b>Reduced External Costs of Vehicle Travel</b>			
Traffic Congestion	\$129,884	\$261,881	AAA, 2008 <sup>23</sup>
Vehicle Crashes	\$678,941	\$1,368,921	AAA, 2008
Roadway Maintenance Costs	\$413,268	\$833,256	Kitamura, R., Zhao, H., and Gubby, A. R., 1989 <sup>24</sup>
<b>Household Transportation Savings</b>			
Reduction in HH transportation spending	\$1,623,554	\$5,856,507	IRS operational standard mileage rates for 2010 <sup>25</sup>
<b>Total</b>	<b>\$2,928,321</b>	<b>\$5,856,642</b>	

<sup>21</sup> From EPA report 420-F-05-022 "Emission Facts: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks." 2005.

<sup>22</sup> NHTSA Corporate Average Fuel Economy for MY 2011 Passenger Cars and Light Trucks, Table VIII-5 (<http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.d0b5a45b55bfbe582f57529cdba046a0/>).

<sup>23</sup> "Crashes vs. Congestion – What's the Cost to Society?" <http://www.aaanewsroom.net/Assets/Files/20083591910.CrashesVsCongestionFullRe>

<sup>24</sup> Kitamura, R., Zhao, H., and Gubby, A. R. (1989). *Development of a Pavement Maintenance Cost Allocation Model*. Institute of Transportation Studies – University of California, Davis ([http://pubs.its.ucdavis.edu/publication\\_detail.php?id=19](http://pubs.its.ucdavis.edu/publication_detail.php?id=19)). \$0.08/mile (1989), adjusted to 2010 dollars using the Bureau of Labor Statistics Inflation Calculator ([http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)).

<sup>25</sup> <http://www.irs.gov/newsroom/article/0,,id=216048,00.html>



## Difficult-to-Quantify Benefits of Bicycling

Bicycling is a low-cost and effective means of transportation and is non-polluting, energy-efficient, versatile, healthy, and fun. Bicycles offer low-cost mobility to the non-driving public. Bicycling as a means of transportation has been growing in popularity as many communities work to create more balanced transportation systems and individuals seek to be healthier. In addition, more people are willing to bicycle more frequently if better bicycle facilities are provided.<sup>26</sup>

In addition to the tangible economic benefits estimated above, bicycling has many other benefits that are challenging to quantify, but which have been studied by some communities and organizations. The League of American Bicyclists reported that bicycling makes up \$133 billion of the U.S. economy, funding 1.1 million jobs.<sup>27</sup> The League also estimates bicycle-related trips generate another \$47 billion in tourism activity. Many communities have enjoyed a high return on their investment in bicycling. For example, the Outer Banks of North Carolina spent \$6.7 million to improve local bicycle facilities, and reaped the benefit of \$60 million of annual economic activity associated with bicycling.<sup>28</sup> Multiple studies show that bikeable neighborhoods are more livable and attractive, increasing home values<sup>29</sup>, and resulting in increased wealth for individuals and additional property tax revenue.

Bike lanes can improve retail business directly by drawing customers and indirectly by supporting the regional economy. Patrons who bike to local stores have been found to spend more money to visit local businesses than patrons who drive.<sup>30</sup> Other studies show that bikeable communities attract the young creative class,<sup>31</sup> which can help cities and counties gain a competitive edge and diversify economic base. By replacing short car trips, bicycling can help middle-class families defray rising transportation costs. Families that drive less spend 10 percent of their income on transportation, compared to 19 percent for households with heavy car use,<sup>32</sup> freeing additional income for local goods and services.

Bicycling can also improve quality of life. Since bicycling is among the most popular form of recreational activity in the U.S.<sup>33</sup>, when bicycling is available as a daily mode of transportation, substantial health benefits result. The health benefit of bicycling for exercise can reduce the cost of spending on health care

---

<sup>26</sup> Pucher, J., Dill, J. and Handy, S. (2010). *Infrastructure, programs, and policies to increase bicycling: An international review*. Preventative Medicine 50:S106-S125.

<sup>27</sup> Flusche, Darren for the League of American Bicyclists. (2009). *The Economic Benefits of Bicycle Infrastructure Investments*.

<sup>28</sup> N.C. Department of Transportation, Division of Bicycle and Pedestrian Transportation. (). *The Economic Impact of Investments in Bicycle Facilities*. [atfiles.org/files/pdf/NCbikeinvest.pdf](https://files.nc.gov/ncdot/division-of-bicycle-and-pedestrian-transportation/2014-01-21-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000)

<sup>29</sup> Cortright, Joe for CEOs for Cities. (2009). *Walking the Walk: How Walkability Raises Home Values in U.S. Cities*.

<sup>30</sup> The Clean Air Partnership. (2009). *Bike Lanes, On-Street Parking and Business: A Study of Bloor Street in Toronto's Annex Neighborhood*.

<sup>31</sup> Cortright, Joe for CEOs for Cities. (2007). *Portland's Green Dividend*.

<sup>32</sup> Center for Neighborhood Technology. (2005). *Driven to Spend: Pumping Dollars out of Our Households and Communities*.

<sup>33</sup> Almost 80 million people walking and 36 million people bicycling for recreation or exercise nationally, and 27.3 percent of the population over 16 bicycling at least once over the summer. (National Sporting Goods Association survey, 2003)

by as much as \$514 a year, which provides a financial incentive to businesses that provide health coverage to their employees.<sup>34</sup>

Safety concerns are another reason to improve bicycling conditions. Although the incidence of crashes involving bicycles may be low, concerns about safety have historically been the single greatest reason people do not commute by bicycle, as captured in polls as early as 1991.<sup>35</sup> A Safe Routes to School survey in 2004 similarly found that 30 percent of parents consider traffic-related danger to be a barrier to allowing their children to walk or bike to school. Addressing those concerns for bicyclists through physical and program improvements is another major objective of the Comprehensive Bike Plan for Kenosha County 2025. Improving bicyclist safety can also be accomplished by increasing the number of people who bike.

---

<sup>34</sup> Feifei, W., McDona

ld, T., Champagne, L.J., and Edington, D.W. (2004). *Relationship of Body Mass Index and Physical Activity to Health Care Costs Among Employees*. *Journal of Occupational and Environmental Medicine*. 46(5):428-436

<sup>35</sup> Lou Harris Poll (2001)



## Appendix D: Rumble Strips in Wisconsin

### Introduction

Rumble strips are depressed or grooved sections that are cut into the roadway surface to delineate the edge of the travel lane next to a shoulder or centerline (longitudinal) or to alert drivers of an upcoming stop sign at an intersection (transverse). When a vehicle travels over the rumble strip, a rumbling noise and vibration is produced that warns the vehicle operator that they are straying from their travel lane. In recent years, rumble strips have been installed on the centerline of some roadways in other states to warn vehicle operators that they are crossing the centerline of the road. The effectiveness of rumble strips is largely dependent on the presence of a shoulder beyond the strip that allows the vehicle operator room to recover.

Longitudinal rumble strips and stripes (strip with pavement marking) have been shown to be highly effective in improving safety and reducing “run off the road” (ROR) crashes in which a vehicle leaves the roadway, as well as head on collisions in which one vehicle crosses over the centerline. Because of this, the Federal Highway Administration has included rumble strips in their list of proven safety countermeasures, and has strongly encouraged states to implement them, particularly on rural two-lane highways.

### Bicyclists and Rumble Strips

While rumble strips have been shown to increase safety for motorists, they can have an effect on bicycling conditions:

- Rumble strips are difficult to bicycle across and can lead to a crash by bicyclists.
- Rumble strips on the edge of the road tend to be placed in the shoulder, thereby reducing space that bicyclists typically use on rural highways.
- Debris tends to accumulate more rapidly on shoulders with rumble strips present, which creates additional hazards for bicyclists.

In part due to these factors, the Wisconsin Department of Transportation (WisDOT) has had a longstanding informal policy of not installing rumble strips on non-limited access highways. As a practice, WisDOT had not used rumble strips along 2-lane roadways, except transverse rumbles.

### A Change in Policy

For the last five years, 36-40% of Wisconsin fatalities are due to roadway departures, with 90% occurring in rural areas. Based on national research and monitoring of rumbles in other states showing a compelling reduction in crash rates – shoulder rumbles show a reduction in fatal and injury crashes by 29% and center line rumble installations show a reduction in head on and sideswipe by 44%. In early 2012, WisDOT began looking at initiatives to improve safety and reduce the number and severity of roadway departure crashes. As WisDOT makes these improvements, the needs of bicyclists are considered. The design and placement of the rumbles along the outside of the roadway are being done in such a way as to minimize the risks to bicyclists.

## COMPREHENSIVE BIKE PLAN FOR KENOSHA COUNTY 2025

WisDOT evaluated roadway segments with higher speed (50 mph and greater) and a higher frequency of run-off-the-road crashes to receive rumbles. WisDOT also met repeatedly with the Wisconsin Bike Fed and other stakeholders to seek to minimize the impact of rumble strips on bicyclists and other road users. Based on these discussions, criteria for when and how rumble strips would be installed were developed for initiatives in 2012:

- Rumble strips will only be installed along two-lane rural roadway segments with higher speed (50 mph and greater) and a higher frequency of run-off-the-road crashes; and will not install shoulder rumbles on oversize/overweight routes and areas of Amish horse and buggy travel. .
- Edgeline rumble strips would only be installed where at least 3' of paved shoulder is present.
- Geometric changes were made to the typical rumble strip design to reduce the depth and width of the rumbles.
- A 12' gap is placed after every 48' of rumble strip to allow bicyclists to more easily cross over the strip.
- Rumble strips typically will not begin until outside of developed areas to allow cyclists from those communities to make their way to town or county roads that do not have rumble strips.
- Highways that connect popular bicycling routes or trails will be avoided.

Highway segments being improved (resurfaced or reconstructed) in 2012 – 2014 that meet these criteria were identified by the WisDOT regional offices. Edgeline rumble strips will be retrofitted to approximately 40 miles of highway, and centerline rumbles (which have little impact on bicyclists) will be retrofitted to approximately 500 miles of highway. Some segments will not receive rumbles in an effort to balance safety with freight mobility, noise considerations, bicycle accommodations, and Amish horse and buggy travel. WisDOT will also continue work on longer-term policies, resources, education and outreach materials that address the installation and design of rumbles on state highway projects, as well as evaluating the results of this summer's initiatives.

### **Conclusion**

WisDOT has done a good job balancing the safety benefits that rumble strips provide for motorists with the hazards they create for bicyclists. While the expansion of rumble strips on Wisconsin roads is concerning for bicyclists, WisDOT's proposed installations and policies to date will have little impact on Wisconsin bicycling.

## Appendix E: US Bicycle Routes System Brief

### Background

- In 2008 the American Association of State Highway and Transportation Officials (AASHTO) established a [national corridor plan](#) for U.S. Bicycle Routes to facilitate travel between the states over routes which have been identified as being suitable for cycling.
- USBR routes usually use roads and streets suitable for bicycle traveler with separated trails incorporated where appropriate. Facility construction/upgrade is not required but is encouraged over time as roads are maintained and upgraded.
- State DOTs determine road suitability and submit [AASHTO applications](#) for USBR designation.
- State DOTs confirm that all relevant local jurisdictions support the proposed route. Documentation might be letters, resolutions of support or memorandums. It is optional but this documentation may be submitted with the application.
- A well-defined process has been developed for [route implementation](#) and can be reviewed via a web-based training.
- [AASHTO Purpose and Policy Statement on U.S. Bicycle Routes](#) (revised 5-15-09) list the specific requirements for DOTs.
- Extensive reference information is available at [www.adventurecycling.org/usbrs](http://www.adventurecycling.org/usbrs).
- [Environmental, economic, health, and transportation benefits](#) are well-documented.

### Route Implementation Process

- There are three phases of Implementation: Planning, Designation and Promotion.
- There are three methods for implementation: 1) State DOTs manage process from start to finish; 2) State DOTs partner with a non-profit or a volunteer or hire a paid consultant; 3) A committee or group works with the DOT to implement the route.
- State DOT and/or non-profit partners identify a corridor for development
- At least two states must agree on the corridor/cross-over point unless the route connects two existing routes within a state or to Canada or Mexico.
- A specific route (turn by turn listing of roads, streets, & trails) is defined.
- Each local jurisdiction (road or trail “owner”) is contacted to provide feedback on the DRAFT route. The proposed route is modified as required to obtain local jurisdiction support. Experience shows that volunteers are efficient and effective at obtaining that support.
- The state DOT prepares Application to the [AASHTO Special Committee on US Route Numbering \(USRN\)](#) which includes a map and turn by turn route list.

- AASHTO USRN committee reviews applications during AASHTO's spring and annual meetings (May and October) for completeness (documentation) but does not rule on the specific route choices of roads, streets, or trails.
- Routes can be changed/adjusted or deleted through the same AASHTO application process.
- There is an [existing USBR sign](#) (M1-9 in the Manual of Uniform Traffic Control Devices (MUTCD)) and a new (green/white) sign that has received interim approval.

### Economic Drivers

- Numerous studies show significant [economic impact and community benefits](#) from bicycle tourism
- Bicycling economic impact in [Wisconsin](#) approaches \$1B per year.
- Typical bicycle travelers spend [approximately \\$100 per day](#) on multi-day tours.
- Return on investment is high for bicycling facilities. [North Carolina Outer Banks study](#) demonstrated \$6.9 mill investment = annual \$60 million return in tourism generated income)
- Proximity to bicycle facilities means [higher real estate values](#), faster home sales, and more desirable neighborhoods.
- Bicycling infrastructure projects create more jobs than road-only projects. See [PERI study](#).
- US Bicycle Routes utilize existing roads, streets, and trails and are very low cost to implement and maintain.

### Health & Environmental Drivers

- Bicycling has [health benefits](#), reducing heart disease, diabetes, osteoporosis, depression, obesity, arthritis and more.
- The physical environment matters - see "[Increasing Physical Activity Through Community Design: A Guide for Public Health Practitioners](#)"
- Designating and promoting bicycle routes and trails improves safety and promotes physical activity as an element of daily life.
- Designation of bicycle routes [increases mode share and bicycle safety](#).
- Active transportation saves money in the long-term by reducing public health expenditures.
- More people bicycling means [reduced air pollution and less motorized congestion](#).
- Increased bicycling decreases energy consumption and pollution.
- Bicyclist tourism has low impact on public spaces and low cost to implement.
- [Cyclists engage](#) and appreciate the communities and natural environments they encounter.



## Concerns

- Liability issues vary from state to state but generally states do not incur added liability from designating U.S. Bicycle Routes. (See [Transportation Research Board report from April, 2010](#))
- The limited liability of governments for bicycle routes is documented in a study “[Liability Aspects of Bikeway Designation](#)” (also available at: [scholarsbank.uoregon.edu/xmlui/handle/1794/10426](http://scholarsbank.uoregon.edu/xmlui/handle/1794/10426)).
- Some local jurisdictions are concerned about increased bicycle traffic. An increase of 2000 bicycle travelers per year would have significant economic impact on a local community on a USBR but is only 10 additional cyclists per day.
- The target audience for USBRs is long distance bicycle travelers who are experienced road users with experience handling traffic density and speed. In some cases, routes may be chosen that encourage less experienced bicycle travelers. In this case, off-road facilities would be appropriate.
- There is no cost obligation for implementing a USBR other than staff time and promotion (maps).
- Signs not required, but are encouraged. Signs can be funded through the DOT, private-public partnerships, local jurisdictions or other methods. USBR sign placement and USBR markings are subject to the guidance in the MUTCD.
- There are a number of ways a U.S. Bicycle Route can be promoted including maps (paper or electronic), signs, pavement markings, downloadable GPS coordinates, noting routes on existing state and local maps.
- The roads, streets, and trails chosen for a USBR can be adapted easily through the AASHTO Application. Route changes are proposed to AASHTO twice per year, spring and annual meetings (May and October). There is no reason why there would be resistance to any reasonable change request.
- The [choice of roads/trails](#) for a USBR is a trade-off between low-traffic, direct routing, access to services (bike shops, motels, campgrounds), access to points of interest, and scenic roads. The best route for a family weekend bike ride may not be the best route for someone on a multi-day long distance bicycle trip.



## Appendix F: Trail Crossing Improvements

### Introduction

Users of the Kenosha County bikeway network will expect that bikeway crossings of roadways are as comfortable and safe as the bike facility itself. A variety of crossing improvements should be used where appropriate to assist bicyclists at difficult or stressful crossings.

Determining which type of crossing improvement to use for a particular intersection depends on a variety of factors. These include posted travel speed, Average Daily Traffic (ADT), anticipated volumes of bicycle crossing traffic, and site specific configuration and context. Traffic signals may be necessary as part of the construction of a separated bicycle facility, such as a multi-use path, to decrease vehicle or pedestrian conflicts at major crossings.

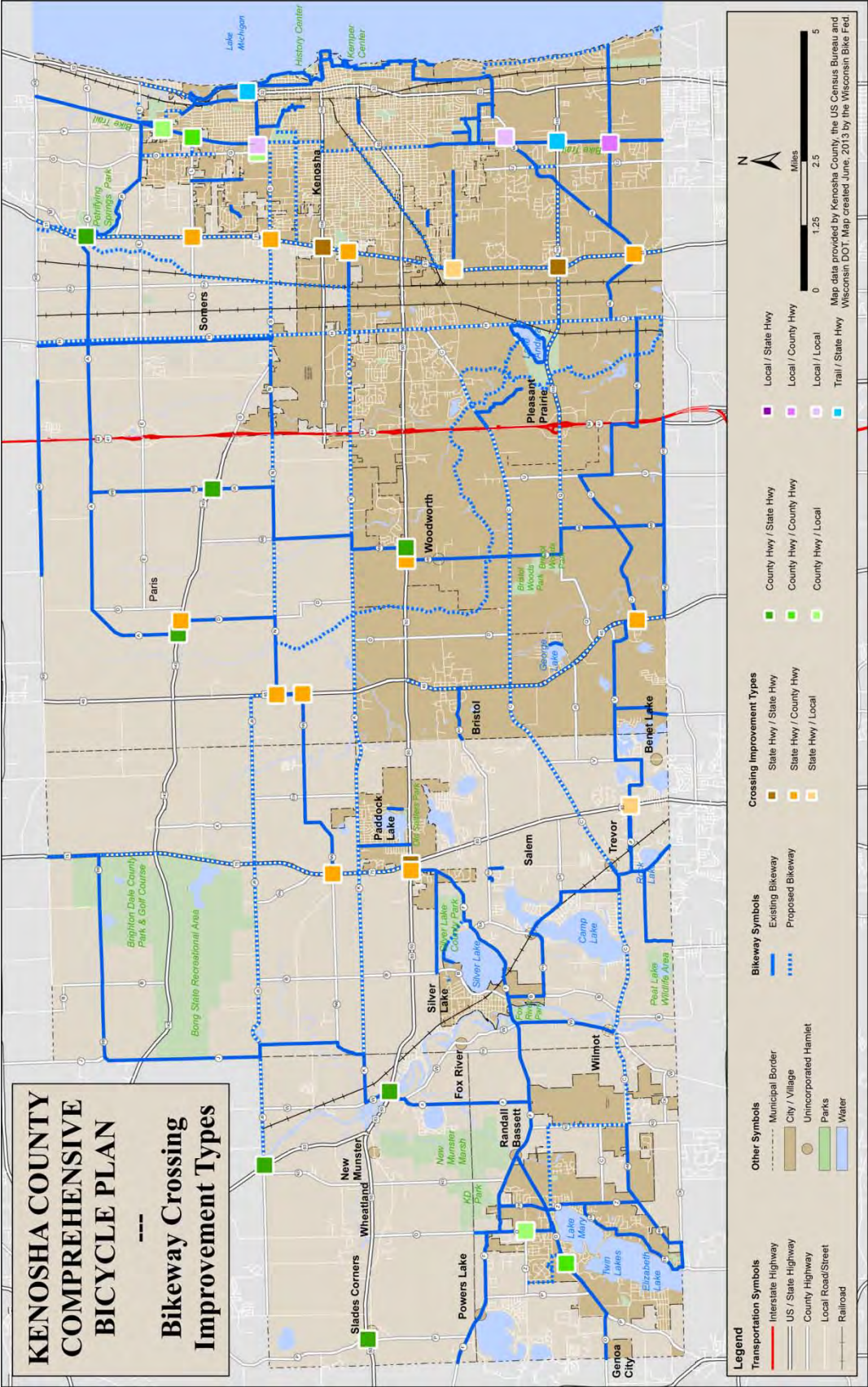
The maps and tables below identify key candidates for crossing improvements along the Kenosha County bikeway network. Each bikeway crossing is classified based on the type of roadway being crossed, and a menu of potential design solutions is identified. It may be appropriate to combine treatments for greater effect. A brief description of each crossing solution is provided, and additional detail for some treatments may be found in Appendix G: Bicycle Design Guidelines.

### Intersection Crossing Types

Map 1 shows the existing and proposed bikeway network in Kenosha County, along with locations identified as candidates for crossing improvements. The intersections identified here are at crossings along the existing bikeway network. Intersections along proposed bikeways are not identified, and should be enhanced as necessary during future implementation and design.

COMPREHENSIVE BIKE PLAN FOR KENOSHA COUNTY 2025

Figure 1: Crossing Locations and Types



## Crossing Locations

Crossing locations are categorized in Table 1 by the type of road the bikeway is on, and the type of road the bikeway is crossing. Street types identified here include US Highway, State Highway, County Highway, Local Road, or Trail. While these roadway designations do not define all of the factors that influence crossing improvement selection, they do imply increasing levels of motor vehicle volumes and speeds. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

**Table 1: Kenosha County Bike Network Crossing Improvement Locations**

Through Route	Cross Street	Crossing Type
CTH O	CTH P	County Highway / County Highway
CTH O	HOLY HILL	County Highway / Local Road
CTH W	STH 50	County Highway / State Highway
STH 75	STH 50	State Highway / State Highway
STH 75	CTH NN	State Highway / County Highway
STH 83	119TH	State Highway / Local Road
USH 45	CTH CJ	State Highway / County Highway
STH 50	CTH MB	State Highway / County Highway
US 45	CTN HH	State Highway / County Highway
US 45	CTH N	State Highway / County Highway
CTH A	STH 142	County Highway / State Highway
STH 142	CTH D	State Highway / County Highway
CTH MB	STH 142	County Highway / State Highway
CTH Y	BIRCH	County Highway / Local Road
CTH L	CTH L	County Highway / County Highway
CTH G	35TH ST	County Highway / Local Road
28TH	35TH ST	Local Road / Local Road
29TH	CTH ML	Local Road / County Highway

Through Route	Cross Street	Crossing Type
CTH MB	STH 50	County Highway / State Highway
STH 165	BIKE TRAIL	State Highway / Trail
29TH	STH 165	Local Road / State Highway
STH 50	CTH F	State Highway / County Highway
CTH A	STH 31	County Highway / State Highway
CTH P	STH 50	County Highway / State Highway
CTH JB	STH 75	County Highway / State Highway
STH 165	STH 31	State Highway / County Highway
STH 31	CTH ML	State Highway / County Highway
STH 31	85TH ST	State Highway / Local Road
STH 31	CTH K	State Highway / County Highway
STH 31	STH 158	State Highway / State Highway
STH 31	CTH S	State Highway / County Highway
STH 31	CTH L	State Highway / County Highway
SHERIDAN ROAD	PIKE BIKE TRAIL	Trail / Local Road



## Potential Crossing Improvements

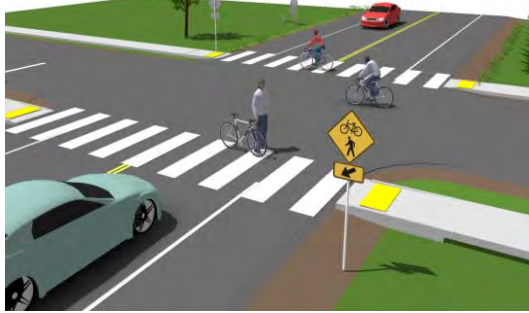
Based on the roadway characteristics, a variety of crossing solutions might be appropriate. Table 2 offers a simple breakdown of appropriate crossing improvements based on the types of intersecting streets. Final selection of a crossing improvement will require additional data and a more detailed analysis than is presented here.

**Table 2: Potential Crossing Improvements**

Through Street Type	Crossing Street Type		
	State Highway	County Highway	Local Road
Shared-Use Path	Median Island Crossing Active Warning Beacon Hybrid Beacon Route Shared-Use Path to Signal Overcrossing Undercrossing	Marked/Signed Crosswalk Median Island Crossing Active Warning Beacon Hybrid Beacon Route Shared-Use Path to Signal Overcrossing Undercrossing	Marked/Signed Crosswalk Median Island Crossing Warning Beacon Hybrid Beacon
State Highway	Dotted Line Extensions Full Signal	Dotted Line Extensions Full Signal	Dotted Line Extensions
County Highway	Dotted Line Extensions Median Island Crossing Active Warning Beacon Hybrid Beacon Full Signal	Dotted Line Extensions Median Island Crossing Active Warning Beacon Hybrid Beacon Full Signal	Dotted Line Extensions
Local Road	Median Island Crossing Active Warning Beacon Hybrid Beacon	Marked/Signed Crosswalk Median Island Crossing Active Warning Beacon Hybrid Beacon	N/A

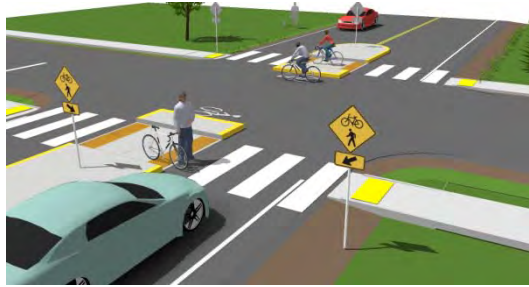
## Crossing Improvement Toolkit

A brief description of the toolkit of crossing improvements is provided below. For a more detailed description of some improvements see Appendix G: Bicycle Design Guidelines.



### Marked/Signed Crosswalk

A marked/signed crossing typically consists of a marked crossing area, signage and other markings to slow or stop traffic. To utilize the crosswalk, bicyclists may either dismount and walk their bicycles as a pedestrian or may cross while riding their bicycle “in a manner which is consistent with the safe use of the crosswalk by pedestrians.”



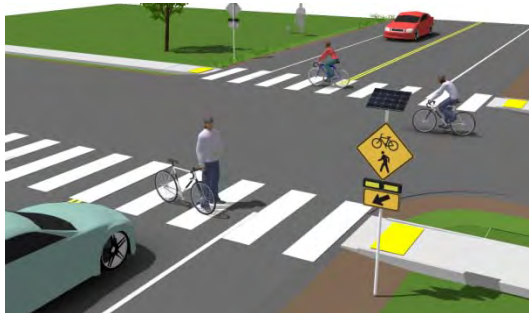
### Median Refuge Island

Median refuge islands are located at the mid-point of a marked path or street crossing and help improve bicyclist safety by allowing bicyclists to cross one direction of traffic at a time. Refuge islands minimize exposure by shortening crossing distance and increasing the number of available gaps for crossing.



### Dotted Line Extensions

Dotted line extensions connect bike lanes through intersections and indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and motor vehicles in the adjacent lane.



### Active Warning Beacon

Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB, shown here).





### Hybrid Beacon

A hybrid beacon consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street. There are no signal indications for motor vehicles on the minor street approaches, which are otherwise controlled by stop signs. Hybrid beacons are used to improve non-motorized crossings of major streets in

locations where side-street volumes do not support installation of a conventional traffic signal.



### Full Signal

The intersection of two higher volume roadways may be fully signalized for automobile traffic. In many cases, bicycle travel through the intersection will be able to take advantage of the traffic signal through minor adjustments to signal timing, and the installation of bicycle-compatible signal detection methods.



### Route Shared-Use Path to Signal

Shared-Use Path crossings within approximately 400 feet of an existing signalized intersection with pedestrian crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. For this restriction to be effective, barriers and signing may be needed to direct path users to the signalized crossing. If no pedestrian crossing exists at the signal, modifications should be made.



### Shared-Use Path Overcrossing

Bicycle/pedestrian overcrossings provide critical non-motorized system links by joining areas separated by barriers such as deep canyons, waterways or major transportation corridors.



### **Shared-Use Path Undercrossing**

Bicycle/pedestrian undercrossings provide critical non-motorized system links by joining areas separated by barriers such as railroads and highway corridors.



## Appendix G: Bicycle Design Guidelines

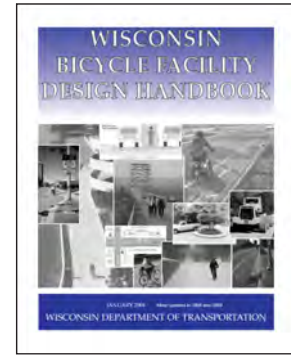
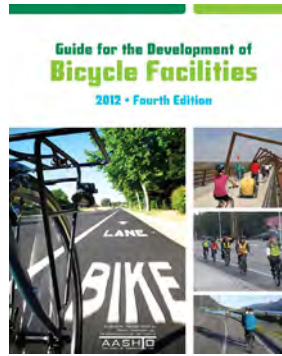
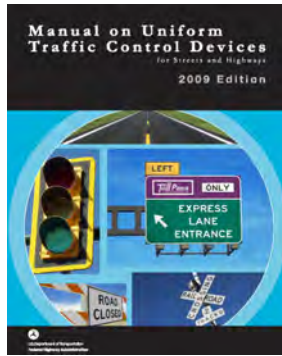
This technical guide is intended to assist Kenosha County in the selection and design of bicycle facilities. The following chapters pull together best practices by facility type from public agencies and municipalities nationwide. Within the design pages, treatments are covered within a single sheet tabular format relaying important design information and discussion, example photos, schematics (if applicable), and existing summary guidance from current or upcoming draft standards. Existing standards are referenced throughout and should be the first source of information when seeking to implement any of the treatments featured here.

### Guiding Principles

The following are guiding principles for these bicycle design guidelines:

- **The bicycling environment should be safe.** All bicycling routes should be physically safe and perceived as safe by all users. Safe means minimal conflicts with external factors, such as noise, vehicular traffic and protruding architectural elements. Safe also means routes are clear and well marked with appropriate pavement markings and directional signage.
- **The bicycle network should be accessible.** Shared use paths, bike routes and crossings should permit the mobility of residents of all ages and abilities. Bicyclists have a range of skill levels, and facilities should be designed with a goal of providing for inexperienced/recreational bicyclists (especially children and seniors) to the greatest extent possible.
- **Bicycle network improvements should be economical.** Bicycle improvements should achieve the maximum benefit for their cost, including initial cost and maintenance cost, as well as a reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.
- **The bicycle network should connect to places people want to go.** The bicycle network should provide continuous direct routes and convenient connections between destinations such as homes, schools, shopping areas, public services, recreational opportunities and transit. A complete network of on-street bicycling facilities should connect seamlessly to existing and proposed multi-use trails to complete recreational and commuting routes.
- **The bicycling environment should be clear and easy to use.** Shared use paths and crossings should allow all people to easily find a direct route to a destination with minimal delays, regardless of whether these persons have mobility, sensory, or cognitive disability impairments. All roads are legal for the use of bicyclists (except freeways, from which bicycles are prohibited unless a separate facility on that right of way is provided). This means that most streets are bicycle facilities and should be designed, marked and maintained accordingly.
- **The bicycling environment should be attractive and enhance community livability.** Good design should integrate with and support the development of complementary uses and should encourage preservation and construction of art, landscaping and other items that add value to communities. These components might include open spaces such as plazas, courtyards and squares, and amenities like street furniture, banners, art, plantings and special paving.
- **Design guidelines are flexible and should be applied using professional judgment.** This document references specific national guidelines for bicycle facility design, as well as a number of design treatments not specifically covered under current guidelines. Statutory and regulatory guidance may change. For this reason, the guidance and recommendations in this document function to complement other resources considered during a design process, and in all cases sound engineering judgment should be used.

## National Standards and Guidelines



The Federal Highway Administration's **Manual on Uniform Traffic Control Devices** (MUTCD) defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is the primary source for guidance on lane striping requirements, signal warrants, and recommended signage and pavement markings.

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities**, updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities. The standards and guidelines presented by AASHTO provide basic information, such as minimum sidewalk widths, bicycle lane dimensions, detailed striping requirements and recommended signage and pavement markings.

The National Association of City Transportation Officials' (NACTO) 2012 **Urban Bikeway Design Guide**<sup>1</sup> is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs. The NACTO Urban Bikeway Design Guide is based on current practices in the best cycling cities in the world. The intent of the guide is to offer substantive guidance for cities seeking to improve bicycle transportation in places where competing demands for the use of the right of way present unique challenges. All of the NACTO Urban Bikeway Design Guide treatments are in use internationally and in many cities around the US.

Meeting the requirements of the Americans with Disabilities Act (ADA) is an important part of any bicycle and pedestrian facility project. The United States Access Board's proposed **Public Rights-of-Way Accessibility Guidelines**<sup>2</sup> (PROWAG) and the **2010 ADA Standards for Accessible Design**<sup>3</sup> (2010 Standards) contain standards and guidance for the construction of accessible facilities. This includes requirements for sidewalk curb ramps, slope requirements, and pedestrian railings along stairs.

Some of these treatments are not directly referenced in the current versions of the AASHTO Guide or the MUTCD, although many of the elements of these treatments are found within these documents. In all cases, engineering judgment is recommended to ensure that the application makes sense for the context of each treatment, given the many complexities of urban streets.

## Local Guidelines

The **Wisconsin Bicycle Facility Design Handbook** is the primary source for facility design guidance in the state of Wisconsin. It discusses the operating characteristics and needs of bicyclists, and presents the wide range of design options for enhancing a community's bicycle transportation system. The guide covers basic roadway improvements for shared streets, details for on-street bicycle lanes, and the design of shared use paths.

The **Trans 75** administrative rule aims to "ensure that bikeways and pedestrian ways are established in all new highway construction and reconstruction projects funded in whole or in part from state funds of federal funds."

1 <http://nacto.org/cities-for-cycling/design-guide/>

2 <http://www.access-board.gov/prowag/>

3 [http://www.ada.gov/2010ADAstandards\\_index.htm](http://www.ada.gov/2010ADAstandards_index.htm)

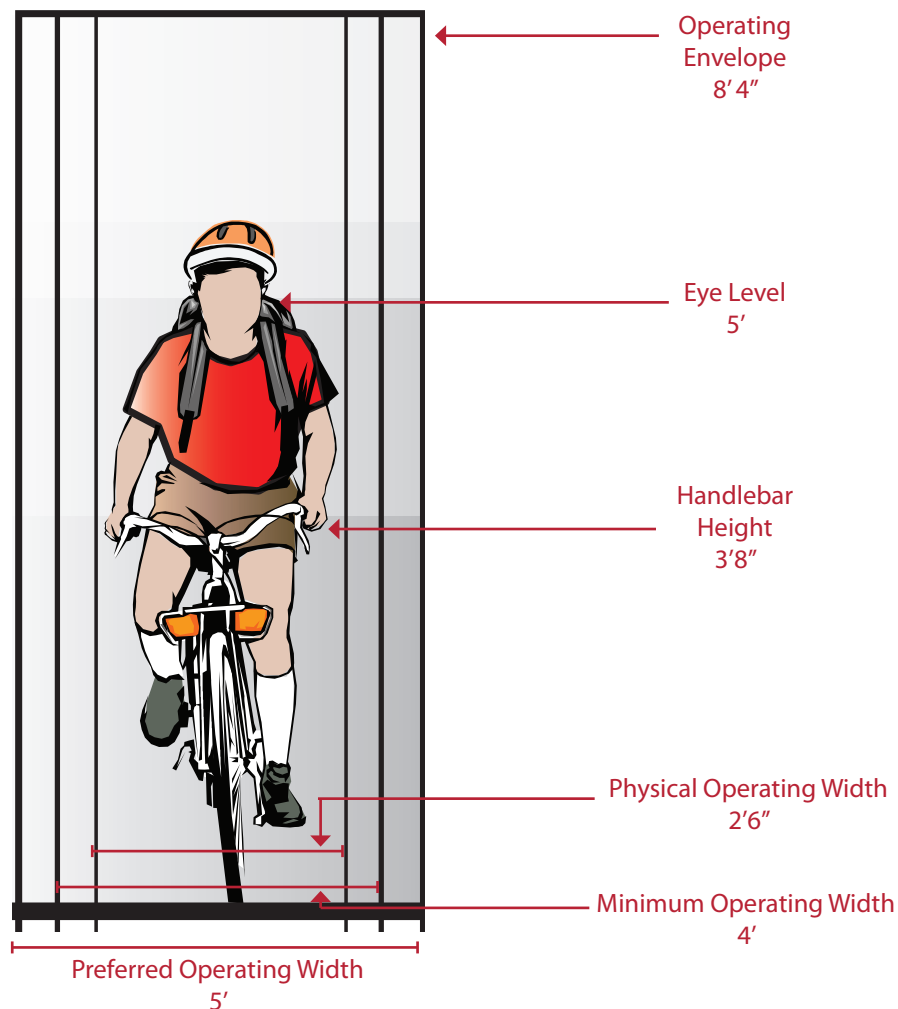
## Design Needs of Bicyclists

The purpose of this section is to provide the facility designer with an understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers. Bicyclists lack the protection from the elements and roadway hazards provided by an automobile's structure and safety features. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

### Bicycle as a Design Vehicle

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on the facility and utilize the appropriate dimensions.

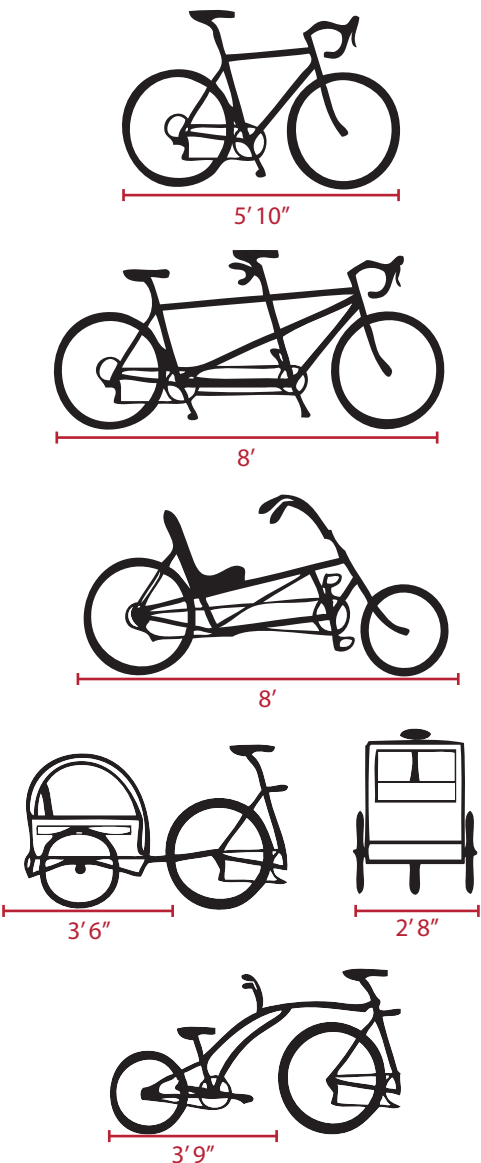
The figure below illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable.



**Standard Bicycle Rider Dimensions**

Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. The figure and table below summarize the typical dimensions for bicycle types.



**Bicycle as Design Vehicle - Typical Dimensions**

Source: AASHTO Guide for the Development of Bicycle Facilities, 3rd Edition \*AASHTO does not provide typical dimensions for tricycles.

**Design Speed Expectations**

The expected speed that different types of bicyclists can maintain under various conditions also influences the design of facilities such as shared use paths. The table to the right provides typical bicyclist speeds for a variety of conditions.

**Bicycle as Design Vehicle - Typical Dimensions**

Bicycle Type	Feature	Typical Dimensions
Upright Adult Bicyclist	Physical width	2 ft 6 in
	Operating width (Minimum)	4 ft
	Operating width (Preferred)	5 ft
	Physical length	5 ft 10 in
	Physical height of handlebars	3 ft 8 in
	Operating height	8 ft 4 in
	Eye height	5 ft
	Vertical clearance to obstructions (tunnel height, lighting, etc)	10 ft
Recumbent Bicyclist	Approximate center of gravity	2 ft 9 in - 3 ft 4 in
	Physical length	8 ft
Tandem Bicyclist	Eye height	3 ft 10 in
	Physical length	8 ft

Bicyclist with child trailer	Physical length	10 ft
	Physical width	2 ft 8 in

**Bicycle as Design Vehicle - Design Speed Expectations**

Bicycle Type	Feature	Typical Speed
Upright Adult Bicyclist	Paved level surfacing	15 mph
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5 -12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

\*Tandem bicycles and bicyclists with trailers have typical speeds equal to or less than upright adult bicyclists.

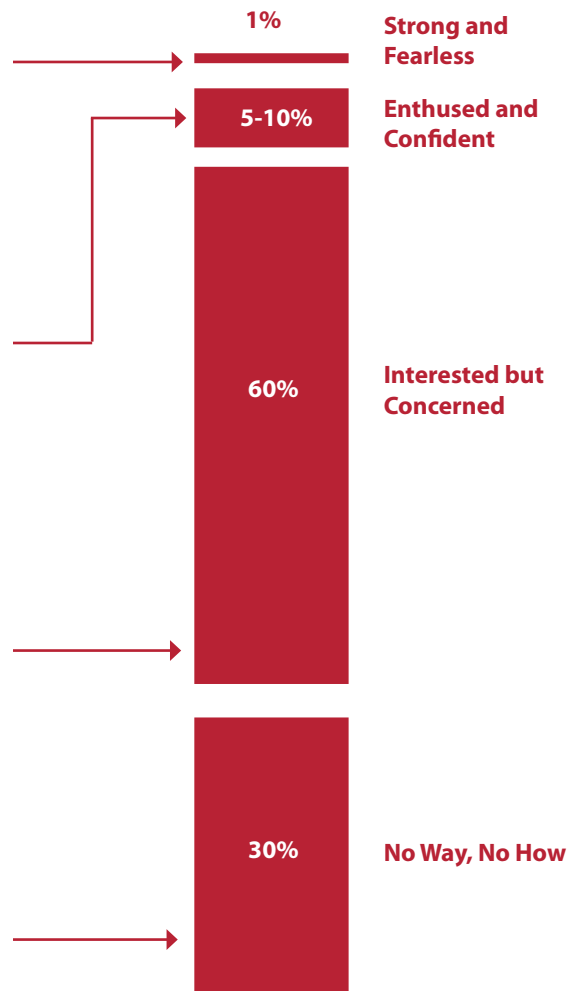


## Types of Bicyclists

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people.

The bicycle planning and engineering professions currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the “design cyclist” as *Advanced, Basic, or Child*<sup>1</sup>. A more detailed understanding of the US population as a whole is illustrated in the figure below. Developed by planners in Portland, OR<sup>2</sup> and supported by data collected nationally since 2005, this classification provides the following alternative categories to address varying attitudes towards bicycling in the US:

- **Strong and Fearless** (approximately 1% of population) – Characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections -- even if shared with vehicles -- over separate bicycle facilities such as shared use paths.
- **Enthusied and Confident** (5-10% of population) - This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.
- **Interested but Concerned** (approximately 60% of population) – This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become “Enthusied & Confident” with encouragement, education and experience.
- **No Way, No How** (approximately 30% of population) – Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become more regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.



Typical Distribution of Bicyclist Types

1 Selecting Roadway Design Treatments to Accommodate Bicycles. (1994). Publication No. FHWA-RD-92-073  
 2 Four Types of Cyclists. (2009). Roger Geller, City of Portland Bureau of Transportation.  
<http://www.portlandonline.com/transportation/index.cfm?&a=237507>

## Types of Bicycle Trips

For purposes of this Plan, bicycle trips are separated into two trip types: recreational and utilitarian. Recreational trips can range from a 50-mile weekend group ride along rural roads to a family outing, and all levels in between. Utilitarian trips include commuter bicyclists, which are a primary focus of State and Federal bicycle funding, as well as bicyclists going to school, shopping or running other errands. Utilitarian cyclists include those who choose to live with one less car, as well as those who have no other alternative transportation due to economic reasons. The table below summarizes general characteristics of recreational and utilitarian bicycle trips.

Characteristics of Recreational and Utilitarian Bicycle Trips

Recreational Trips	Utilitarian Trips
Directness of route not as important as visual interest, shade, protection from wind	Directness of route and connected, continuous facilities more important than visual interest, etc.
Loop trips may be preferred to backtracking	Trips generally travel from residential to shopping or work areas and back
Trips may range from under a mile to over 50 miles	Trips generally are 1-5 miles in length
Short-term bicycle parking should be provided at recreational sites, parks, trailheads and other activity centers	Short-term and long-term bicycle parking should be provided at stores, transit stations, schools, workplaces
Varied topography may be desired, depending on the skill level of the cyclist	Flat topography is desired
May be riding in a group	Often ride alone
May drive with their bicycles to the starting point of a ride	Use bicycle as primary transportation mode for the trip; may transfer to public transportation; may or may not have access to a car for the trip
Trips typically occur on the weekend or on weekdays before morning commute hours or after evening commute hours	Trips typically occur during morning and evening commute hours (commute to school and work). Shopping trips also occur on weekends
Type of facility varies, depending on the skill level of the cyclist	Generally use on-street facilities, may use trails if they provide easier access to destinations than on-street facilities

Recreational bicyclists’ needs vary depending on their skill level. Road bicyclists out for a 100-mile weekend ride may prefer well-maintained roads with wide shoulders and few intersections, and few stop signs or stop lights. Casual bicyclists out for a family trip may prefer a quiet shared use path with adjacent parks, benches, and water fountains.

- Utilitarian bicyclists have needs that are more straightforward. Key commuter needs are summarized below:
- Commuter routes should be direct, continuous, and connected
- Protected intersection crossing locations are needed for safe and efficient bicycle commuting
- Bicycle commuters must have secure places to store their bicycles at their destinations
- Bicycle facilities should be provided on major streets

Not all parts of Kenosha County have easy bicycle access to parks, trails and other recreational opportunities. For the casual recreational rider, this may not be a serious deterrent, since they would be willing and able to drive their bicycle to the trailhead. However, this may not be an option for the experienced recreational rider or the commuter, as they generally would like to use their bicycle for the whole trip. Bicycle-friendly on-street connections between residential areas and the trails and between residential areas and shopping and commute centers would likely increase the prevalence of bicycle commuting, as well as increase the prevalence of recreational riding.

## Bicycle Facility Selection Guidelines

### Facility Classification

#### Description

Consistent with bicycle facility classifications throughout the nation, these Bicycle Facility Design Guidelines identify the following classes of facilities by degree of separation from motor vehicle traffic.

**Shared Roadways** are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.



**Shared Roadways** may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such treatments often are associated with **Bicycle Boulevards**.



**Separated Bikeways**, such as paved shoulders and bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.



**Shared use Paths** are facilities separated from roadways for use by bicyclists and pedestrians.



## Reducing Conflicts

### Sharing The Road

Streets and paths have many potentially competing uses, and it is common for conflicts to arise. Below is a brief list of roadway user conflicts and potential measures to address the problem conditions.

**Bicyclists and Pedestrians on Paths:** On shared use paths bicyclists and pedestrians must mix. At low volumes, this mixing has few problems, but conflicts may increase as user volumes increase. If reduced conflict is a concern, consider providing increased path width, or separate treads for bicyclists and pedestrians.

**Pedestrians in Bike Lanes:** If pedestrians are walking in bike lanes, it is an indication that the provided pedestrian path or sidewalk is inadequate. Sidewalks may not have ADA compliant curb ramps, paths may not connect to local streets, and obstacles or maintenance issues may make the flat, smooth roadway preferable over the pedestrian way. Identify and resolve the issues to ensure safe separation of users.

**Parked Cars in Bike Lanes:** Liberal signing and marking of the bike lane can identify the space for the exclusive use of bicyclists. Additionally, NO PARKING signs may help clarify the proper uses. Enforcement of parking violations is also an effective deterrent to preventing unwanted blocking of the bike lane.

**Bicyclists outside of bike lanes:** There are many reasons a bicyclist may operate outside of a designated bike lane. Common reasons include:

- Avoidance of debris in the bike lane
- To Avoid the door zone of parked cars
- To prepare for a left turn.

Ensure bike lanes are maintained free of debris and snow to promote maximum utility of the lane.

**Bicyclists in Shared Roadways:** Where no separated bikeway is provided, bicyclists are expected to operate in the roadway. In these conditions, Wisconsin law requires that bicyclists operate as far to the right as is safe and reasonable. For similar reasons to riding outside of a bike lane, bicyclists have many reasons to position themselves to occupy the full travel lane.

Provision of shared lane markings and signs, such as Bikes May Use Full Lane may help communicate to all users to expect bicyclists.





## Shared Roadways

On shared roadways, bicyclists and motor vehicles use the same roadway space. These facilities are typically used on roads with low speeds and traffic volumes, however they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Shared roadways employ a large variety of treatments from simple signage and shared lane markings to more complex treatments including directional signage, traffic diverters, chicanes, chokers, and/or other traffic calming devices to reduce vehicle speeds or volumes.



## Shared Roadways

### Signed Shared Roadway

#### Guidance

Lane width varies depending on roadway configuration.

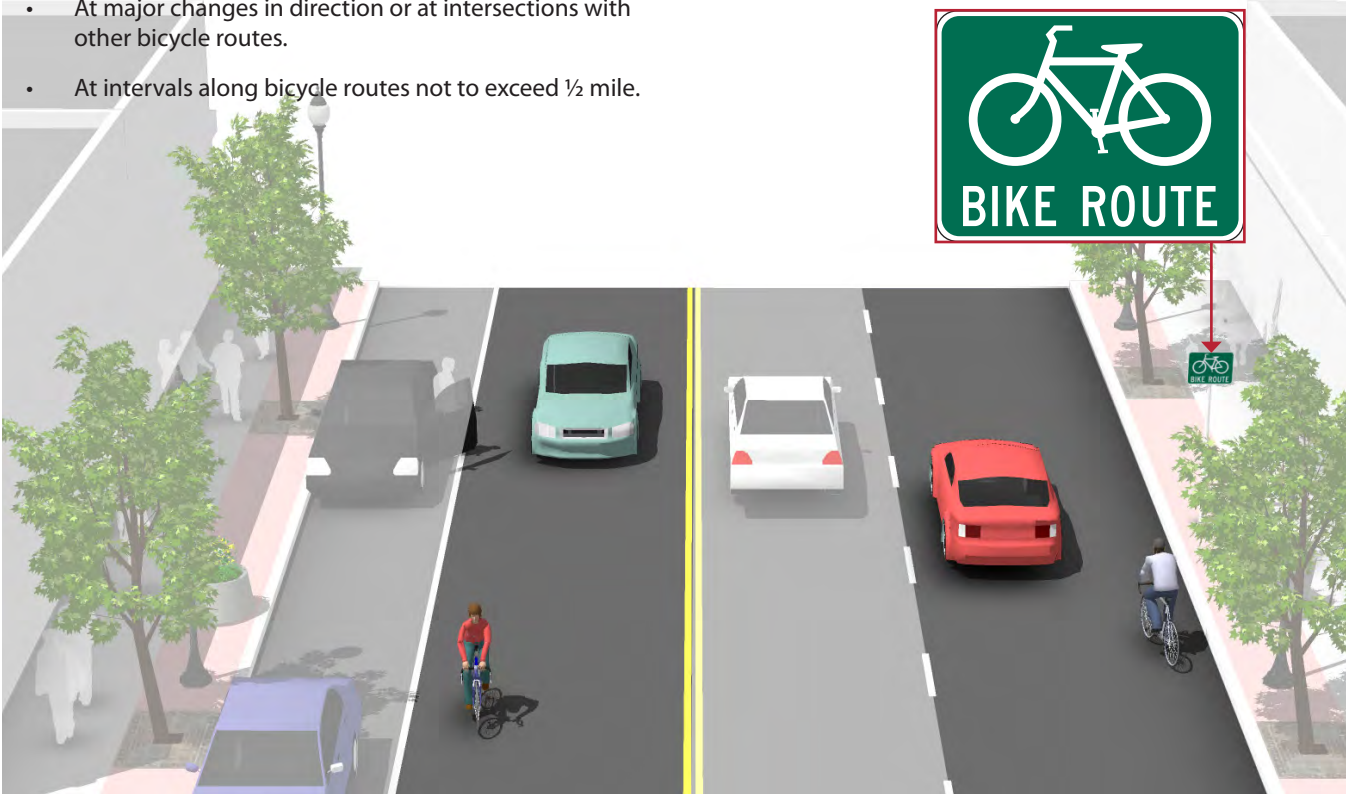
Bicycle Route signage (D11-1) should be applied at intervals frequent enough to keep bicyclists informed of changes in route direction and to remind motorists of the presence of bicyclists. Commonly, this includes placement at:

- Beginning or end of Bicycle Route.
- At major changes in direction or at intersections with other bicycle routes.
- At intervals along bicycle routes not to exceed ½ mile.

#### Description

Signed Shared Roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes, however can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

MUTCD D11-1



#### Discussion

Signed Shared Roadways serve either to provide continuity with other bicycle facilities (usually bike lanes) or to designate preferred routes through high-demand corridors.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.

#### Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs, and will need periodic replacement due to wear.

## Shared Roadways

### Marked Shared Roadway

#### Guidance

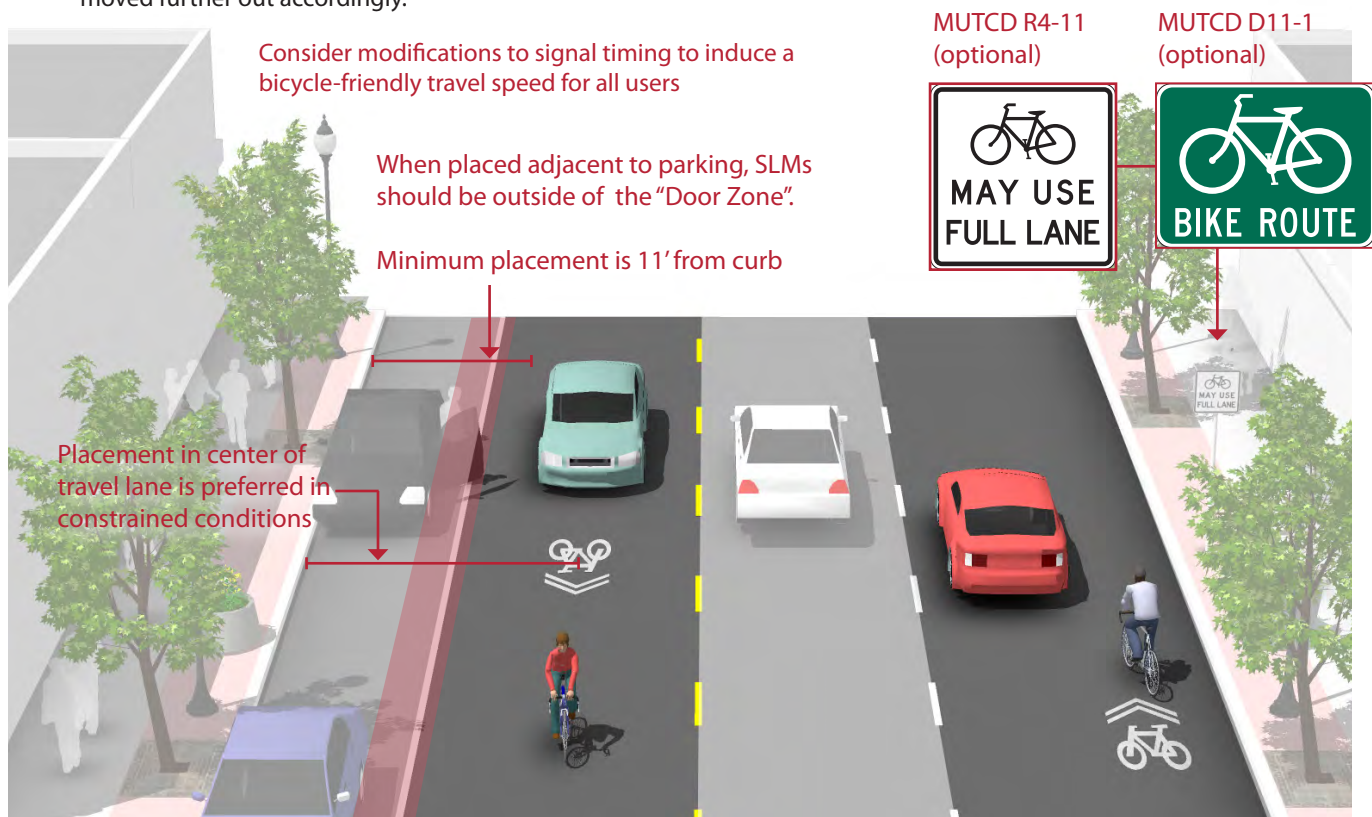
- In constrained conditions, preferred placement is in the center of the travel lane to minimize wear and promote single file travel.
- Minimum placement of SLM marking centerline is 11 feet from edge of curb where on-street parking is present, 4 feet from edge of curb with no parking. If parking lane is wider than 7.5 feet, the SLM should be moved further out accordingly.

#### Description

A marked shared roadway is a general purpose travel lane marked with shared lane markings (SLM) used to encourage bicycle travel and proper positioning within the lane.

In constrained conditions, the SLMs are placed in the middle of the lane to discourage unsafe passing by motor vehicles. On a wide outside lane, the SLMs can be used to promote bicycle travel to the right of motor vehicles.

In all conditions, SLMs should be placed outside of the door zone of parked cars.



#### Discussion

Bike Lanes should be considered on roadways with outside travel lanes wider than 15 feet, or where other lane narrowing or removal strategies may provide adequate road space. SLMs shall not be used on shoulders, in designated Bike Lanes, or to designate Bicycle Detection at signalized intersections. (MUTCD 9C.07).

SLM's may be used within intersections as part of a bike lane corridor to indicate potential conflict areas. See Intersection Crossing Markings in this guide.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices.  
 NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Placing SLMs between vehicle tire tracks will increase the life of the markings and minimize the long-term cost of the treatment.

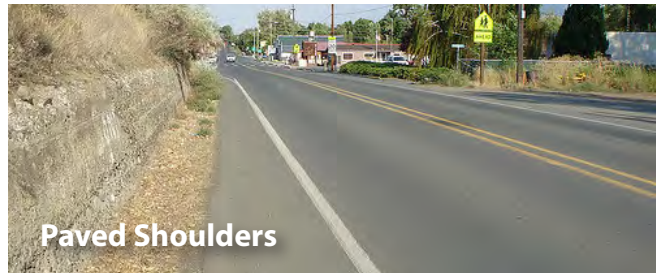


## Separated Bikeways

Designated exclusively for bicycle travel, separated bikeways are segregated from vehicle travel lanes by striping, and can include pavement stencils and other treatments. Separated bikeways are most appropriate on arterial and collector streets where higher traffic volumes and speeds warrant greater separation.

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.



## Separated Bikeways

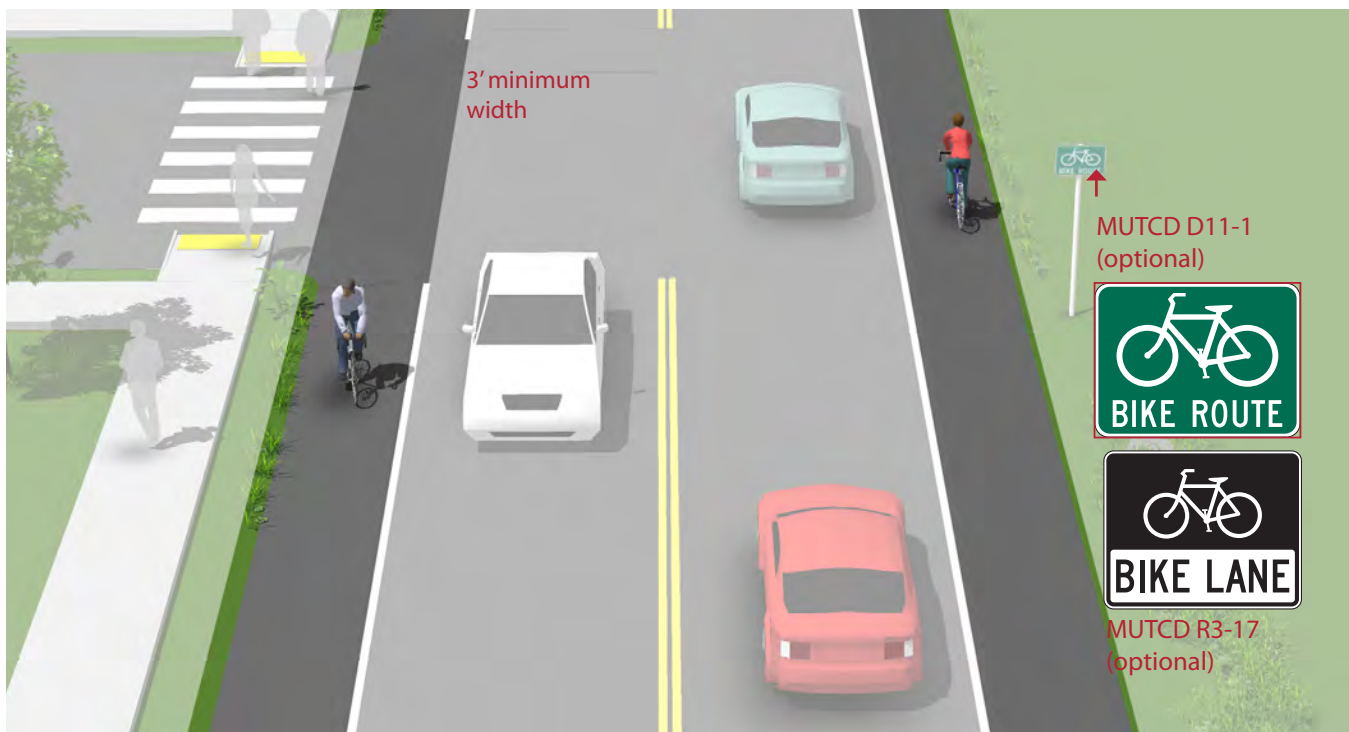
### Paved Shoulders

#### Guidance

- If 5 feet or more is available for bicycle travel, the full bike lane treatment of signs, legends, and an 8" bike lane line should be provided.
- If it is not possible to meet minimum bicycle lane dimensions, a reduced width paved shoulder can still improve conditions for bicyclists on constrained roadways. In these situations, a minimum of 3 feet of operating space should be provided.

#### Description

Typically found in less-dense areas, paved shoulders are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Paved shoulders often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. Paved shoulders should be considered a temporary treatment, with full bike lanes planned for construction when the roadway is widened or completed with curb and gutter. This type of treatment is not typical in urban areas and should only be used where constraints exist.



#### Discussion

A wide outside lane may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Consider configuring as a **marked shared roadway** in these locations.

Where feasible, **roadway widening** should be performed with pavement resurfacing jobs, but not exceeding desirable bike lane widths.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices.  
 WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

#### Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Shoulder bikeways should be cleared of snow through routine snow removal operations.

## Separated Bikeways

### Bicycle Lanes

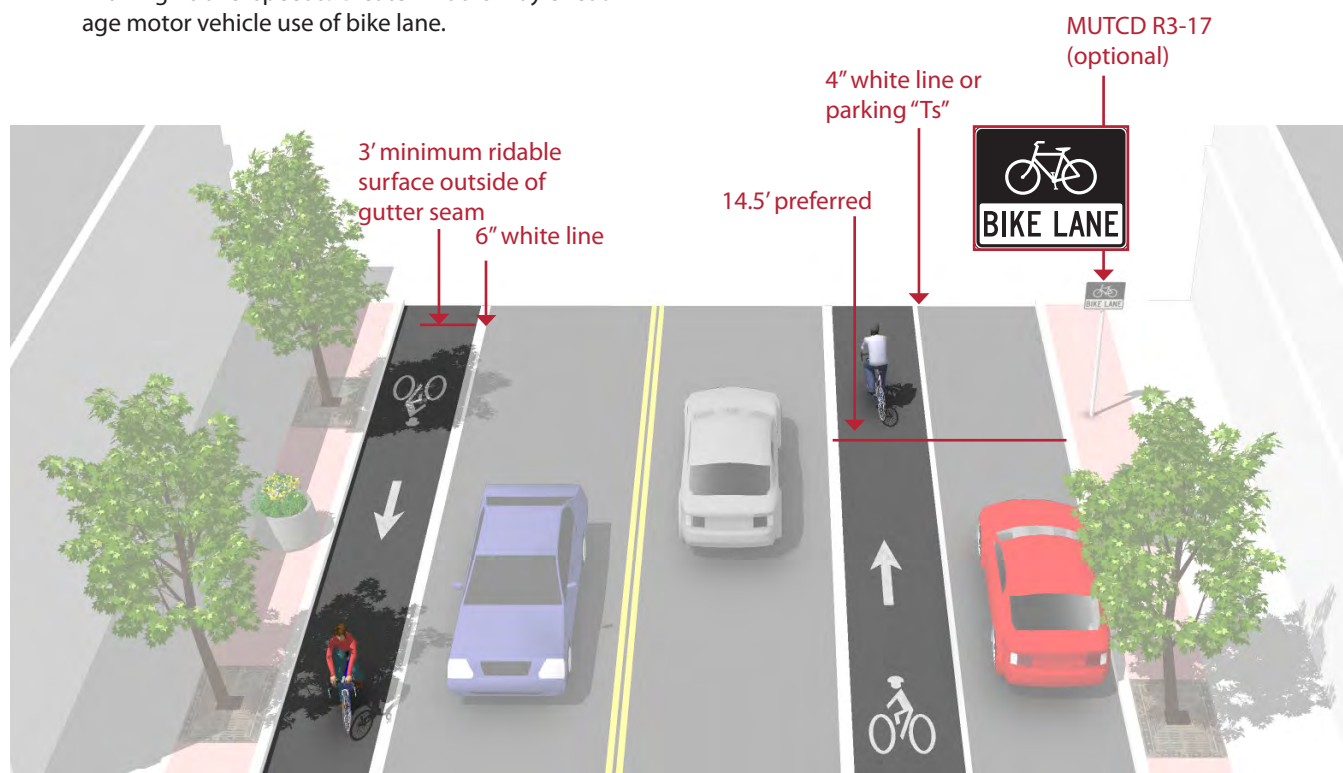
#### Guidance

- 4 foot minimum when no curb and gutter is present.
- 5 foot minimum when adjacent to curb and gutter or 3 feet more than the gutter pan width if the gutter pan is wider than 2 feet.
- 14.5 foot preferred from curb face to edge of bike lane. (12 foot minimum).
- 7 foot maximum width for use adjacent to arterials with high travel speeds. Greater widths may encourage motor vehicle use of bike lane.

#### Description

Bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge or parking lane.

Many bicyclists, particularly less experienced riders, are more comfortable riding on a busy street if it has a striped and signed bikeway than if they are expected to share a lane with vehicles.



#### Discussion

Wider bicycle lanes are desirable in certain situations such as on higher speed arterials (45 mph+) where use of a wider bicycle lane would increase separation between passing vehicles and bicyclists. Appropriate signing and stenciling is important with wide bicycle lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane. Consider **Buffered Bicycle Lanes** when further separation is desired.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices.  
 NACTO. (2012). Urban Bikeway Design Guide.  
 WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

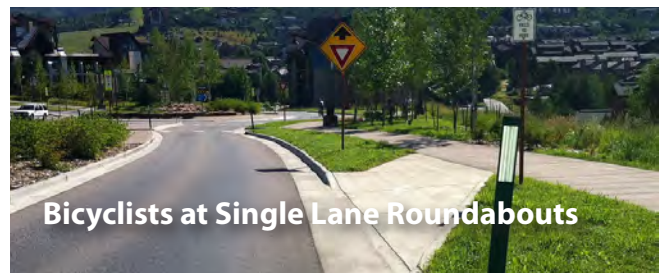
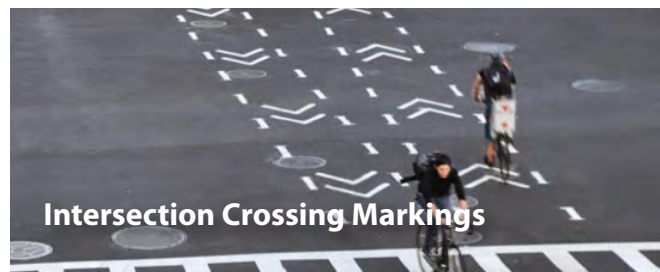
#### Materials and Maintenance

Paint can wear more quickly in high traffic areas or in winter climates. Bicycle lanes should be cleared of snow through routine snow removal operations.

## Separated Bikeways at Intersections

Intersections are junctions at which different modes of transportation meet and facilities overlap. An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes in order to advance traffic flow in a safe and efficient manner. Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals.

The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.





## Separated Bikeways at Intersections

## Bike Lanes at Right Turn Only Lanes

### Description

The appropriate treatment at right-turn lanes is to place the bike lane between the right-turn lane and the right-most through lane or, where right-of-way is insufficient, to use a **shared bike lane/turn lane**.

The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area.

## Guidance

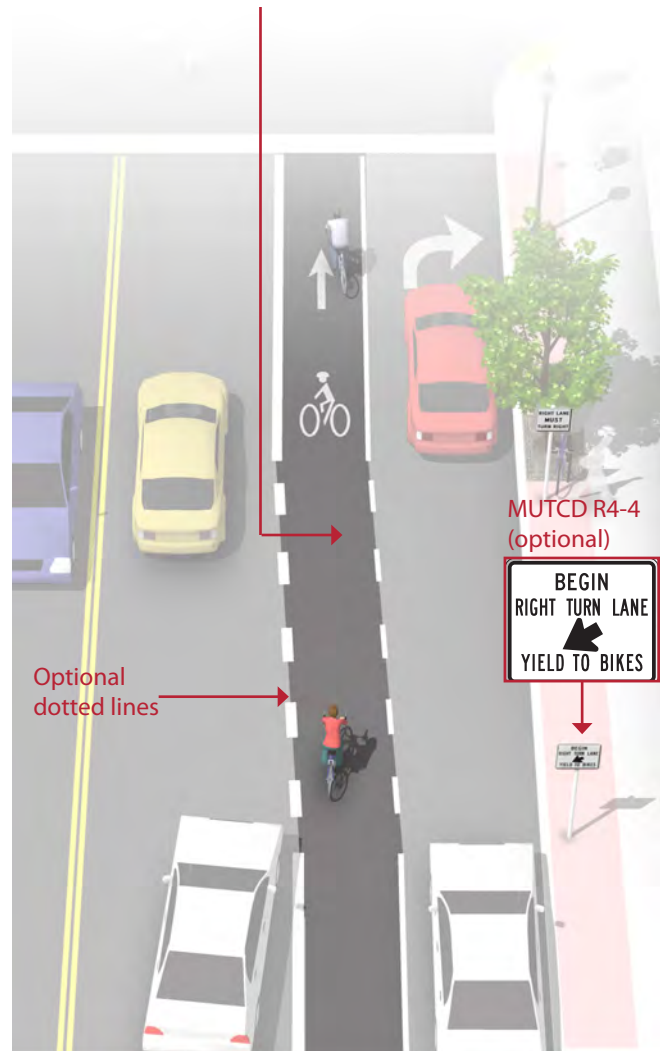
**At auxiliary right turn only lanes (add lane):**

- Continue existing bike lane width; standard width of 5 to 6 feet or 4 feet in constrained locations.
- Use signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using **colored conflict areas** to promote visibility of the mixing zone.

**Where a through lane becomes a right turn only lane (not shown):**

- Do not define a dotted line merging path for bicyclists.
- Drop the bicycle lane in advance of the merge area.
- Use shared lane markings to indicate shared use of the lane in the merging zone.

Colored pavement may be used in the weaving area to increase visibility and awareness of potential conflict



## Discussion

For other potential approaches to providing accommodations for bicyclists at intersections with turn lanes, please see [shared bike lane/turn lane](#), [bicycle signals](#), and [colored bike facilities](#).

## Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
NACTO. (2012). Urban Bikeway Design Guide.  
WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

## Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

## Separated Bikeways at Intersections

### Colored Bike Lanes in Conflict Areas

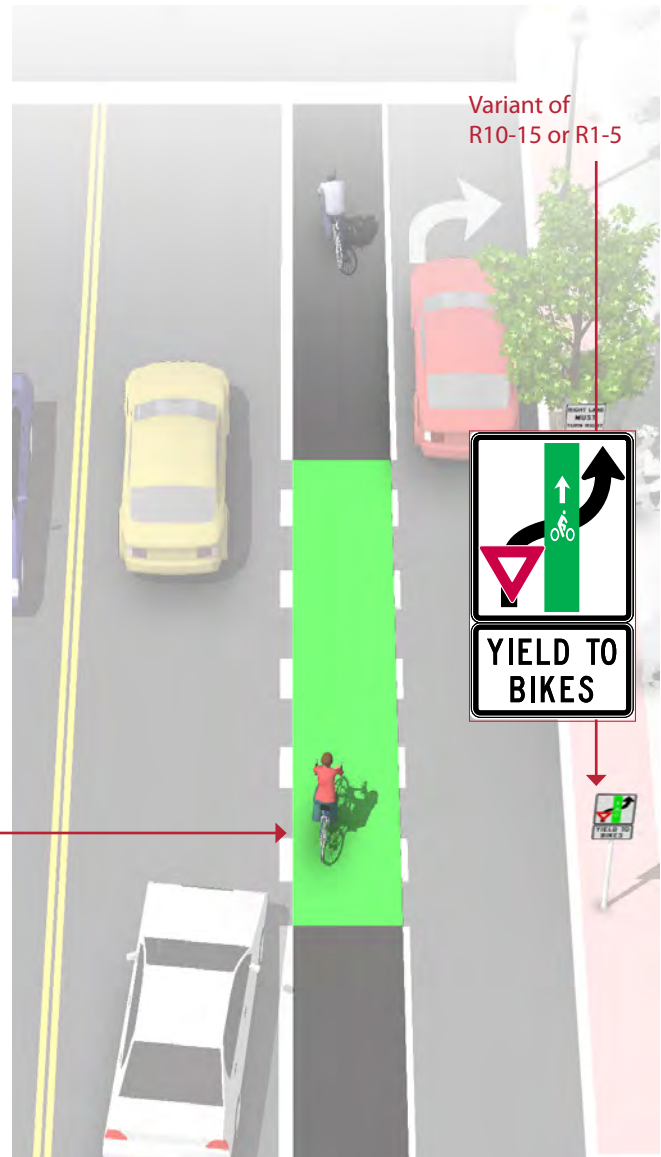
#### Description

Colored pavement within a bicycle lane increases the visibility of the facility and reinforces priority of bicyclists in conflict areas.

#### Guidance

- Green colored pavement was given interim approval by the Federal Highways Administration in March 2011. See interim approval for specific color standards.
- The colored surface should be skid resistant and retro-reflective.
- A “Yield to Bikes” sign should be used at intersections or driveway crossings to reinforce that bicyclists have the right-of-way in colored bike lane areas.

Normal white dotted edge lines should define colored space



#### Discussion

Evaluations performed in Portland, OR, St. Petersburg, FL and Austin, TX found that significantly more motorists yielded to bicyclists and slowed or stopped before entering the conflict area after the application of the colored pavement when compared with an uncolored treatment.

#### Additional References and Guidelines

FHWA. (2011). Interim Approval (IA-14) has been granted. Requests to use green colored pavement need to comply with the provisions of Paragraphs 14 through 22 of Section 1A.10  
NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Because the effectiveness of markings depends entirely on their visibility, maintaining markings should be a high priority.

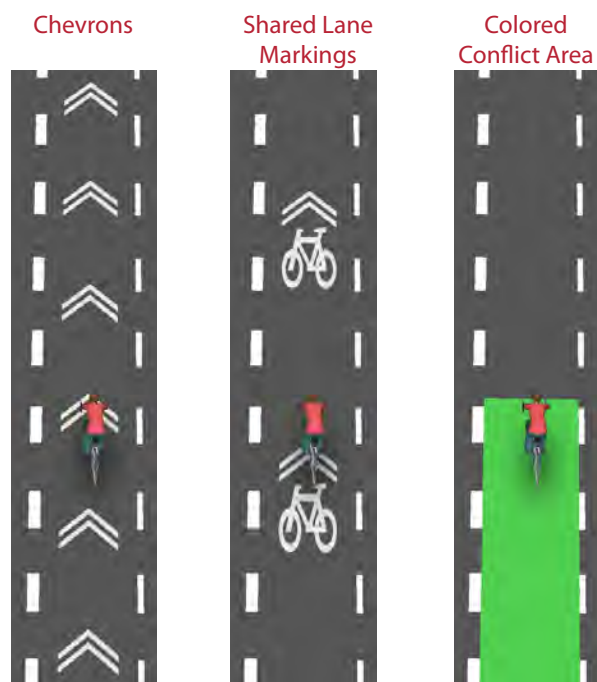
## Separated Bikeways at Intersections

### Intersection Crossing Markings

#### Guidance

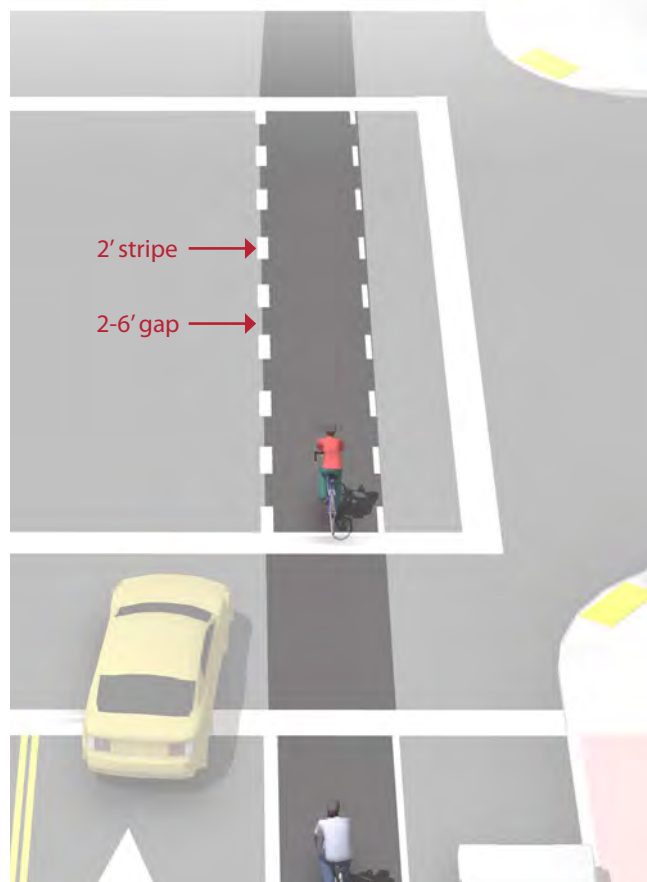
- See MUTCD Section 3B.08: “dotted line extensions”
- Crossing striping shall be at least six inches wide when adjacent to motor vehicle travel lanes. Dotted lines should be two-foot lines spaced two to six feet apart.
- Chevrons, shared lane markings, or **colored bike lanes in conflict areas** may be used to increase visibility within conflict areas or across entire intersections.

#### Optional Design Enhancements:



#### Description

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and either through or turning motor vehicles in the adjacent lane.



#### Discussion

Additional markings such as chevrons, shared lane markings, or **colored bike lanes in conflict areas** are strategies currently in use in the United States and Canada. Cities considering the implementation of markings through intersections should standardize future designs to avoid confusion.

Shared lane markings within intersection crossings indicates to users that motor vehicles and bicycles may conflict or mix.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices. (3A.06)  
 NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Because the effectiveness of marked crossings depends entirely on their visibility, maintaining marked crossings should be a high priority.



## Separated Bikeways at Intersections

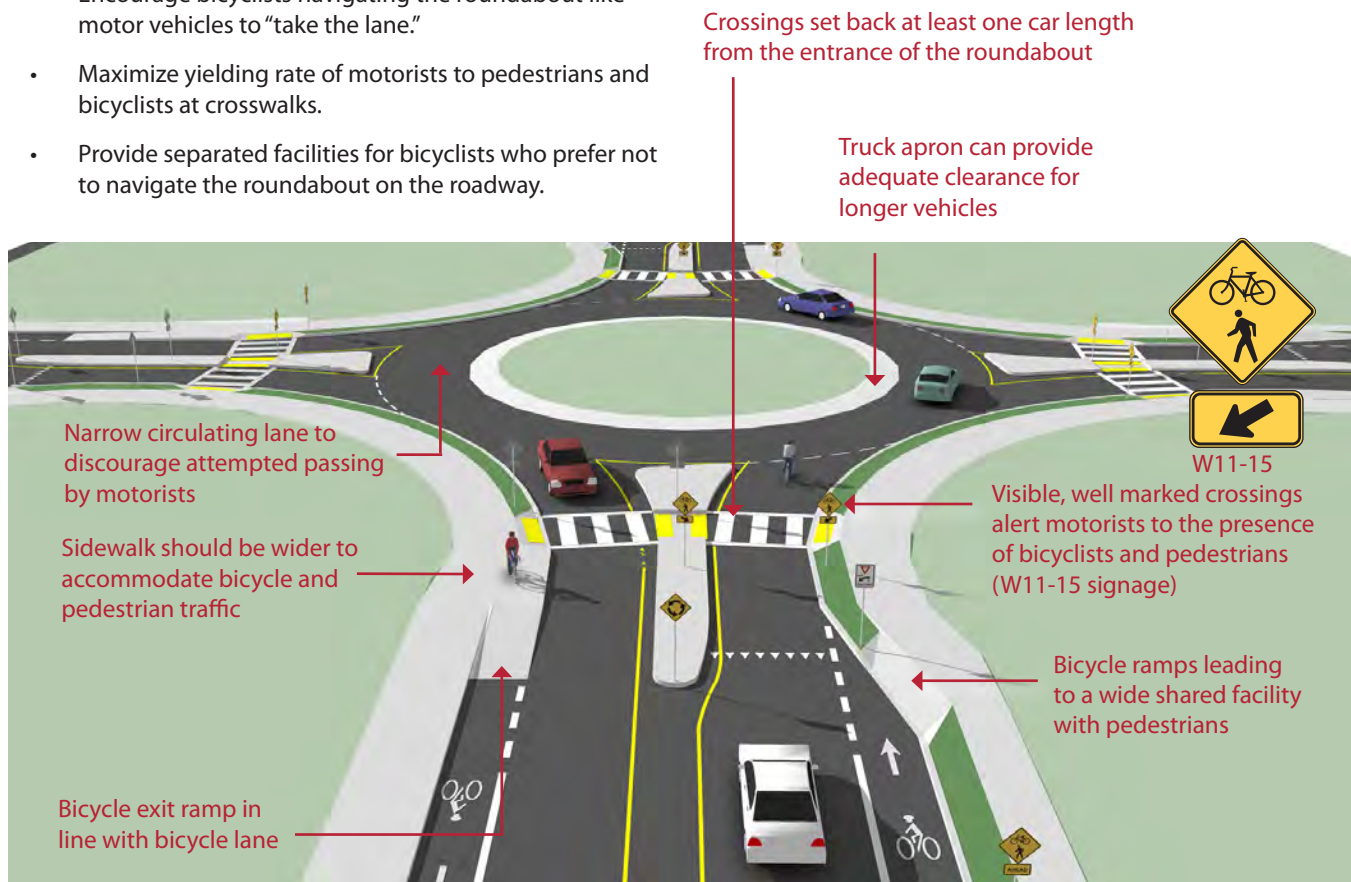
### Bicyclists at Single Lane Roundabouts

#### Guidelines

- 25 mph maximum circulating design speed.
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to “take the lane.”
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.

#### Description

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.



#### Discussion

Research indicates that while single-lane roundabouts may benefit bicyclists and pedestrians by slowing traffic, multi-lane roundabouts may present greater challenges and significantly increase safety problems for these users.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2000). Roundabouts: An Informational Guide  
 TRB. (2010). Roundabouts: An Informational Guide, Second Edition.  
 NCHRP 672

#### Materials and Maintenance

Signage and striping require routine maintenance.

## Separated Bikeways at Intersections

### Bike Lanes at High Speed Interchanges

#### Guidance

##### Entrance Ramps:

Angle the bike lane to increase the approach angle with entering traffic. Position crossing before drivers' attention is focused on the upcoming merge.

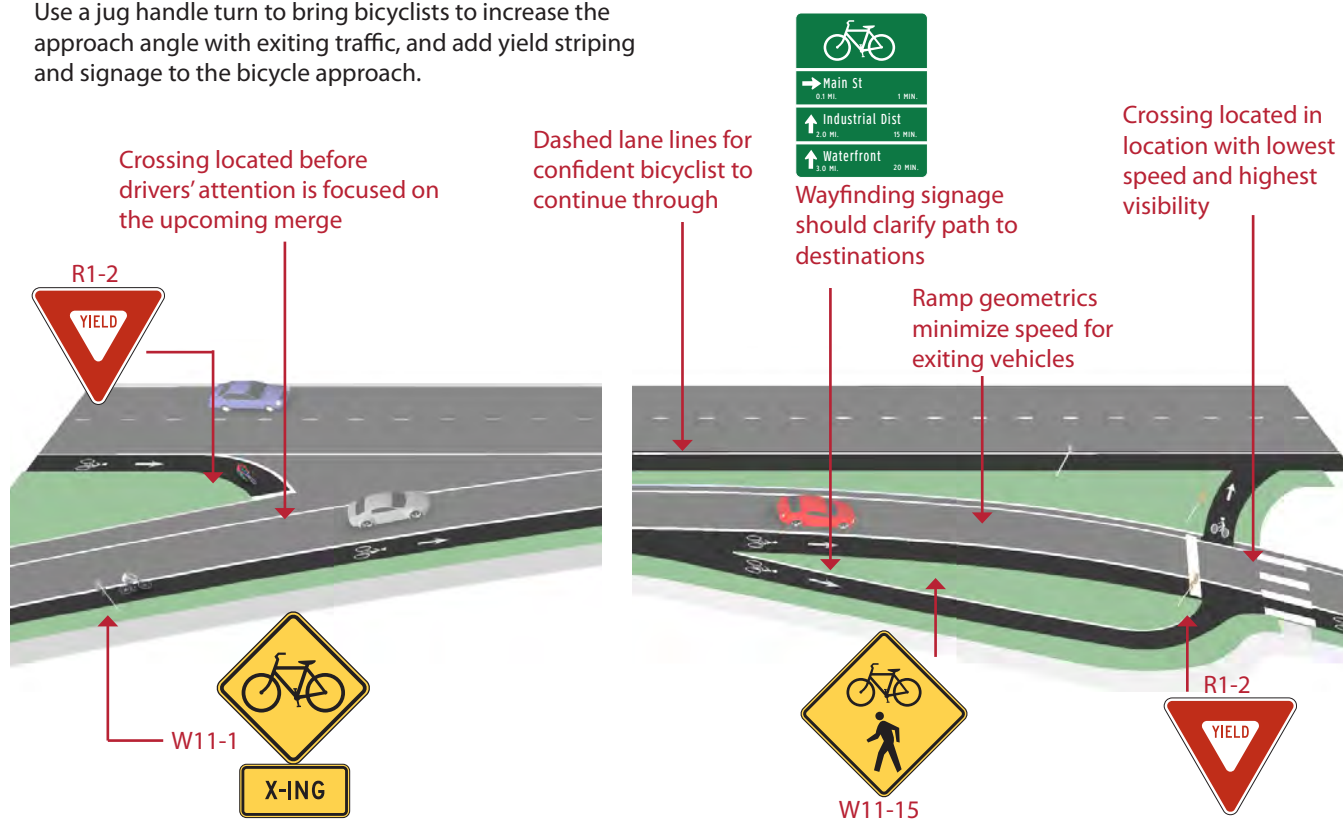
##### Exit Ramps:

Use a jug handle turn to bring bicyclists to increase the approach angle with exiting traffic, and add yield striping and signage to the bicycle approach.

#### Description

Some arterials may contain high speed freeway-style designs such as merge lanes and exit ramps, which can create difficulties for bicyclists. The entrance and exit lanes typically have intrinsic visibility problems because of low approach angles and feature high speed differentials between bicyclists and motor vehicles.

Strategies to improve safety focus on increasing sight distances, creating formal crossings, and minimizing crossing distances.



#### Discussion

While the jug-handle approach is the preferred configuration at exit ramps, provide the option for through bicyclists to perform a vehicular merge and proceed straight through under safe conditions.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
Bicycle and Pedestrian Transportation. Lesson 15: Bicycle Lanes  
WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

#### Materials and Maintenance

Locate crossing markings out of wheel tread when possible to minimize wear and maintenance costs.

## Shared Use Paths

A shared use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles. Path facilities can also include amenities such as lighting, signage, and fencing (where appropriate).

Key features of shared use paths include:

- Frequent access points from the local road network.
- Directional signs to direct users to and from the path.
- A limited number of at-grade crossings with streets or driveways.
- Terminating the path where it is easily accessible to and from the street system.
- Separate treads for pedestrians and bicyclists when heavy use is expected.





## Shared use Paths

### General Design Practices

#### Description

Shared use paths can provide a desirable facility, particularly for recreation, and users of all skill levels preferring separation from traffic. Bicycle paths should generally provide directional travel opportunities not provided by existing roadways.

#### Guidance

##### Width

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users. A separate track (5' minimum) can be provided for pedestrian use.

##### Lateral Clearance

- A 2 foot or greater shoulder on both sides of the path should be provided. An additional foot of lateral clearance (total of 3') is required by the MUTCD for the installation of signage or other furnishings.

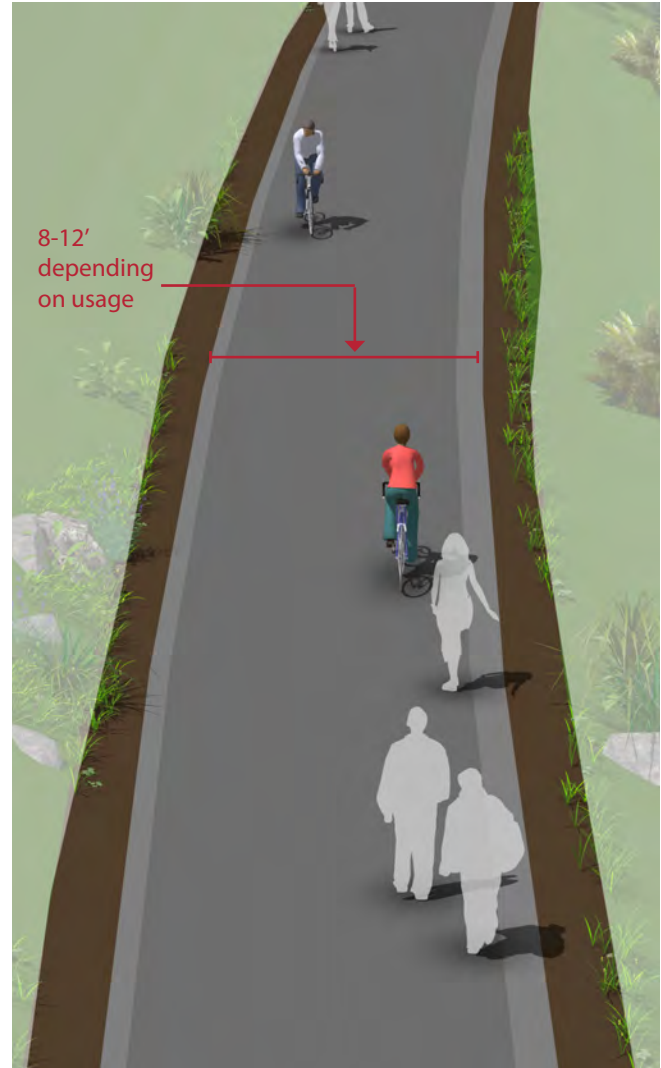
##### Overhead Clearance

- Clearance to overhead obstructions should be 8 feet minimum, with 10 feet recommended.

##### Striping

- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines.
- Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Terminate the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street.



#### Discussion

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of **shared use paths along roadways**. Also known as “sidepaths”, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding when either entering or exiting the path.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices.  
 Flink, C. (1993). Greenways: A Guide To Planning Design And Development.  
 WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

#### Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

## Shared use Paths

### Shared use Paths in River and Utility Corridors

#### Guidance

Shared use paths in utility corridors should meet or exceed **general design practices**. If additional width allows, wider paths, and landscaping are desirable.

#### Access Points

Any access point to the path should be well-defined with appropriate signage designating the pathway as a bicycle facility and prohibiting motor vehicles.

#### Path Closure

Public access to the shared use path may be prohibited during the following events:

- Canal/flood control channel or other utility maintenance activities
- Inclement weather or the prediction of storm conditions

#### Description

Utility and waterway corridors often offer excellent shared use path development and bikeway gap closure opportunities. Utility corridors typically include power line and sewer corridors, while waterway corridors include canals, drainage ditches, rivers, and beaches. These corridors offer excellent transportation and recreation opportunities for bicyclists of all ages and skills.



#### Discussion

Similar to railroads, public access to flood control channels or canals is undesirable by all parties. Hazardous materials, deep water or swift current, steep, slippery slopes, and debris all constitute risks for public access. Appropriate fencing may be required to keep path users within the designated travel way. Creative design of fencing is encouraged to make the path facility feel welcoming to the user.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 FHWA. (2009). Manual on Uniform Traffic Control Devices.  
 Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

#### Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

## Shared use Paths

### Shared use Paths in Abandoned Rail Corridors

#### Guidance

Shared use paths in abandoned rail corridors should meet or exceed **general design practices**. If additional width allows, wider paths, and landscaping are desirable.

In full conversions of abandoned rail corridors, the sub-base, superstructure, drainage, bridges, and crossings are already established. Design becomes a matter of working with the existing infrastructure to meet the needs of a rail-trail.

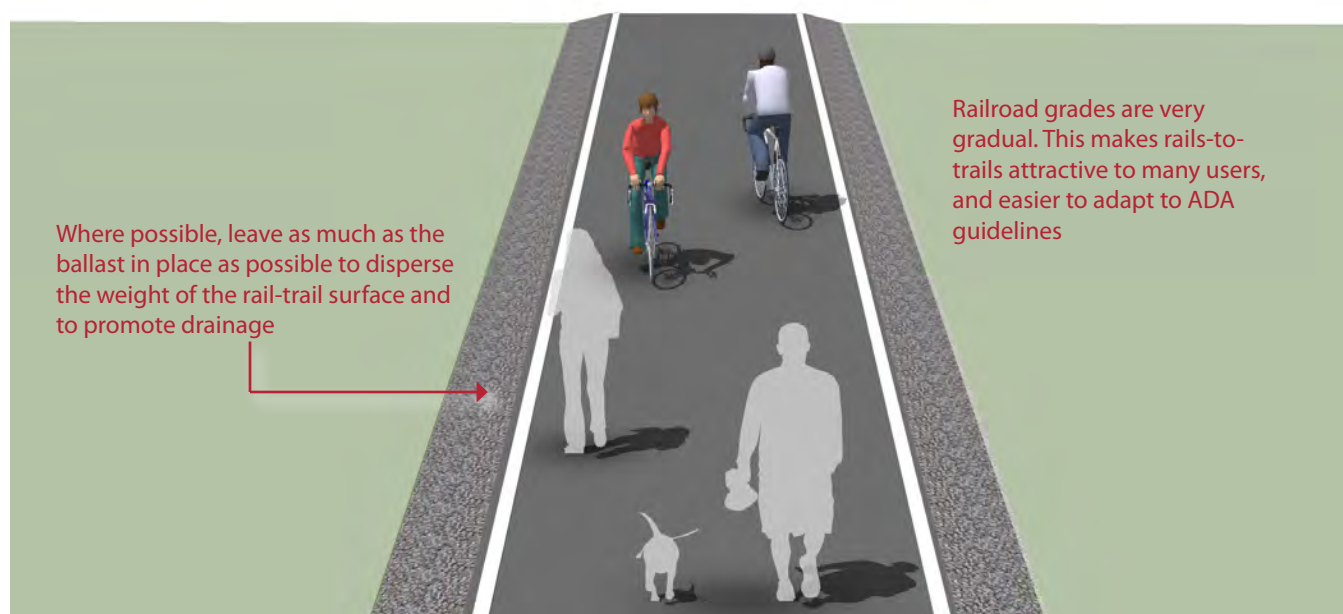
If converting a rail bed adjacent to an active rail line, see **Shared use paths in Existing Active Rail Corridors**.

#### Description

Commonly referred to as Rails-to-Trails or Rail-Trails, these projects convert vacated rail corridors into off-street paths. Rail corridors offer several advantages, including relatively direct routes between major destinations and generally flat terrain.

In some cases, rail owners may rail-bank their corridors as an alternative to a complete abandonment of the line, thus preserving the rail corridor for possible future use.

The railroad may form an agreement with any person, public or private, who would like to use the banked rail line as a trail or linear park until it is again needed for rail use. Municipalities should acquire abandoned rail rights-of-way whenever possible to preserve the opportunity for trail development.



#### Discussion

It is often impractical and costly to add material to existing railroad bed fill slopes. This results in trails that meet minimum path widths, but often lack preferred shoulder and lateral clearance widths.

Rail-to-trails can involve many challenges including the acquisition of the right of way, cleanup and removal of toxic substances, and rehabilitation of tunnels, trestles and culverts. A structural engineer should evaluate existing railroad bridges for structural integrity to ensure they are capable of carrying the appropriate design loads.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
Flink, C. (1993). Greenways: A Guide To Planning Design And Development.

#### Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.



## Shared use Paths

### Shared use Paths in Active Rail Corridors

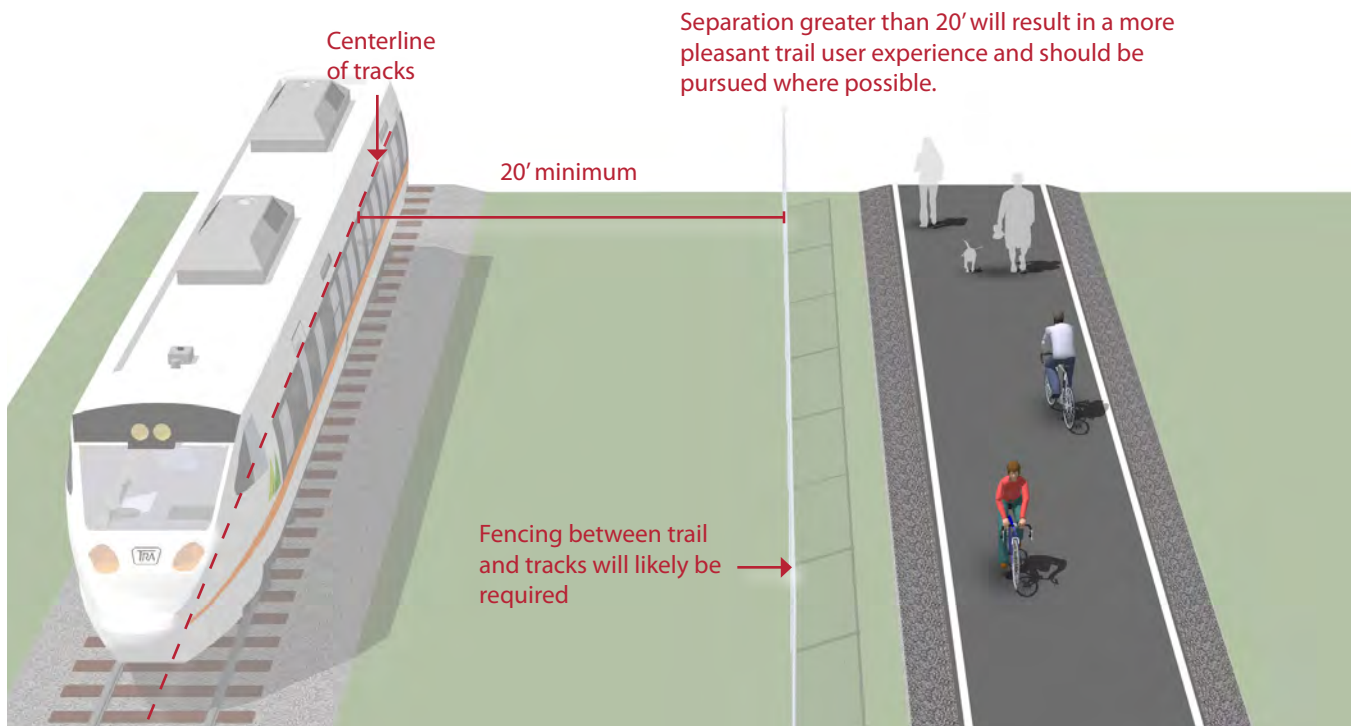
#### Guidance

Shared use paths in utility corridors should meet or exceed **general design standards**. If additional width allows, wider paths, and landscaping are desirable.

If required, fencing should be a minimum of 5 feet in height with higher fencing than usual next to sensitive areas such as switching yards. Setbacks from the active rail line will vary depending on the speed and frequency of trains, and available right-of-way.

#### Description

Rails-with-Trails projects typically consist of paths adjacent to active railroads. It should be noted that some constraints could impact the feasibility of rail-with-trail projects. In some cases, space needs to be preserved for future planned freight, transit or commuter rail service. In other cases, limited right-of-way width, inadequate setbacks, concerns about safety/trespassing, and numerous mid-block crossings may affect a project's feasibility.



#### Discussion

Railroads typically require fencing with all rail-with-trail projects. Concerns with trespassing and security can vary with the amount of train traffic on the adjacent rail line and the setting of the bicycle path, i.e. whether the section of track is in an urban or rural setting.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
FHWA. (2002). Rails-with-Trails: Lessons Learned.

#### Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

## Shared use Paths

### Shared use Paths Along Roadways

#### Description

A shared use path allows for two-way, off-street bicycle use and also may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, along rivers, beaches, and in greenbelts or utility corridors where there are few conflicts with motorized vehicles.

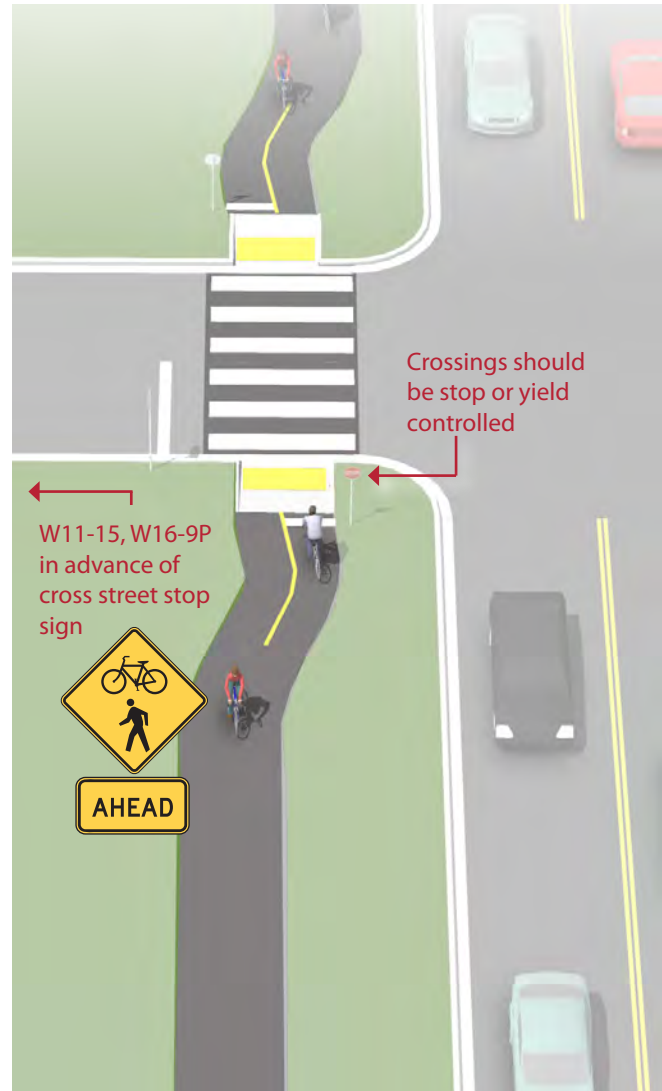
Along roadways, these facilities create a situation where a portion of the bicycle traffic rides against the normal flow of motor vehicle traffic and can result in wrong-way riding where bicyclists enter or leave the path.

The AASHTO Guide for the Development of Bicycle Facilities generally recommends against the development of shared use paths directly adjacent to roadways.

#### Guidance

- 8 feet is the minimum allowed for a two-way bicycle path and is only recommended for low traffic situations.
- 10 feet is recommended in most situations and will be adequate for moderate to heavy use.
- 12 feet is recommended for heavy use situations with high concentrations of multiple users such as joggers, bicyclists, rollerbladers and pedestrians. A separate track (5' minimum) can be provided for pedestrian use.
- Bicycle lanes should be provided as an alternate (more transportation-oriented) facility whenever possible.

Pay special attention to the entrance/exit of the path as bicyclists may continue to travel on the wrong side of the street.



#### Discussion

When designing a bikeway network, the presence of a nearby or parallel path should not be used as a reason to not provide adequate shoulder or bicycle lane width on the roadway, as the on-street bicycle facility will generally be superior to the "sidepath" for experienced bicyclists and those who are cycling for transportation purposes.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
 NACTO. (2012). Urban Bikeway Design Guide. See entry on Raised Cycle Tracks.  
 WisDOT. (2009). Wisconsin Bicycle Facility Design Handbook.

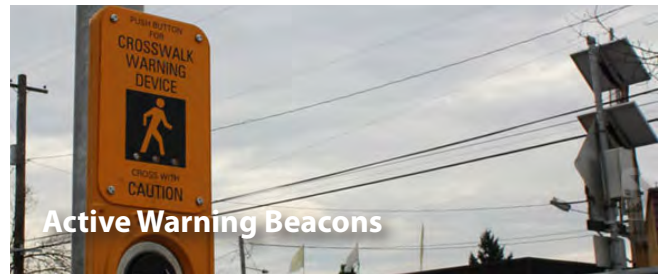
#### Materials and Maintenance

Asphalt is the most common surface for bicycle paths. The use of concrete for paths has proven to be more durable over the long term. Saw cut concrete joints rather than troweled improve the experience of path users.

## Signalization

Signals and beacons facilitate bicyclist crossings of roadways. Flashing amber warning beacons can be utilized at unsignalized intersection crossings. Push buttons, signage, and pavement markings may be used to supplement these facilities for both bicyclists and motorists.

Determining which type of signal or beacon to use for a particular intersection depends on a variety of factors. These include speed limits, Average Daily Traffic (ADT), anticipated bicycle crossing traffic, and the configuration of planned or existing bicycle facilities. Signals may be necessary as part of the construction of a shared use path to decrease vehicle or pedestrian conflicts at major crossings.



## Signalization

### Active Warning Beacons

#### Guidance

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation or, with passive detection, after the pedestrian or bicyclist clears the crosswalk.

#### Description

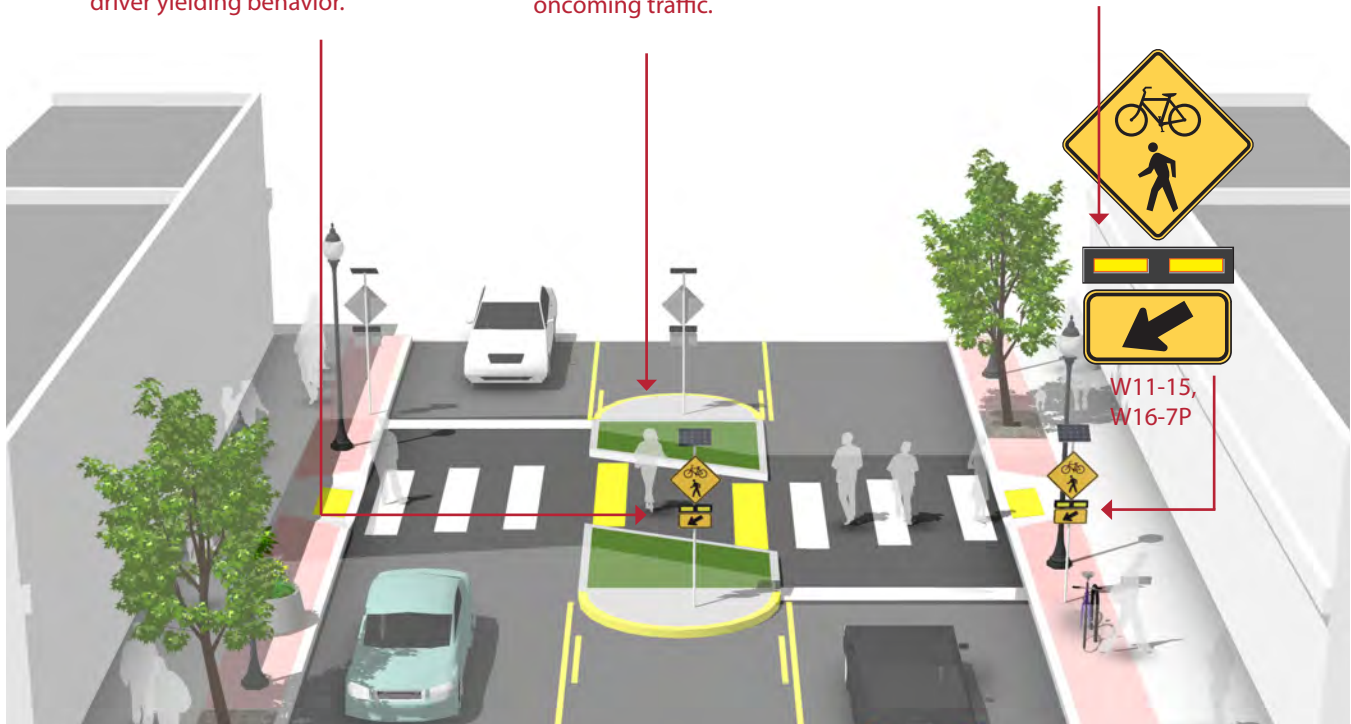
Active warning beacons are user actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

Providing secondary installations of RRFBs on median islands improves driver yielding behavior.

Median refuge islands provide added comfort and should be angled to direct users to face oncoming traffic.

Rectangular Rapid Flash Beacons (RRFB) dramatically increase compliance over conventional warning beacons.



#### Discussion

Rectangular rapid flash beacons have the highest compliance of all the warning beacon enhancement options.

A study of the effectiveness of going from a no-beacon arrangement to a two-beacon RRFB installation increased yielding from 18 percent to 81 percent. A four-beacon arrangement raised compliance to 88 percent. Additional studies over long term installations show little to no decrease in yielding behavior over time.

#### Additional References and Guidelines

NACTO. (2012). Urban Bikeway Design Guide.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
FHWA. (2008). MUTCD - Interim Approval for Optional Use of Rectangular Rapid Flashing Beacons (IA-11)

#### Materials and Maintenance

Depending on power supply, maintenance can be minimal. If solar power is used, RRFBs can run for years without issue.

## Signalization

### Hybrid Beacons

#### Guidance

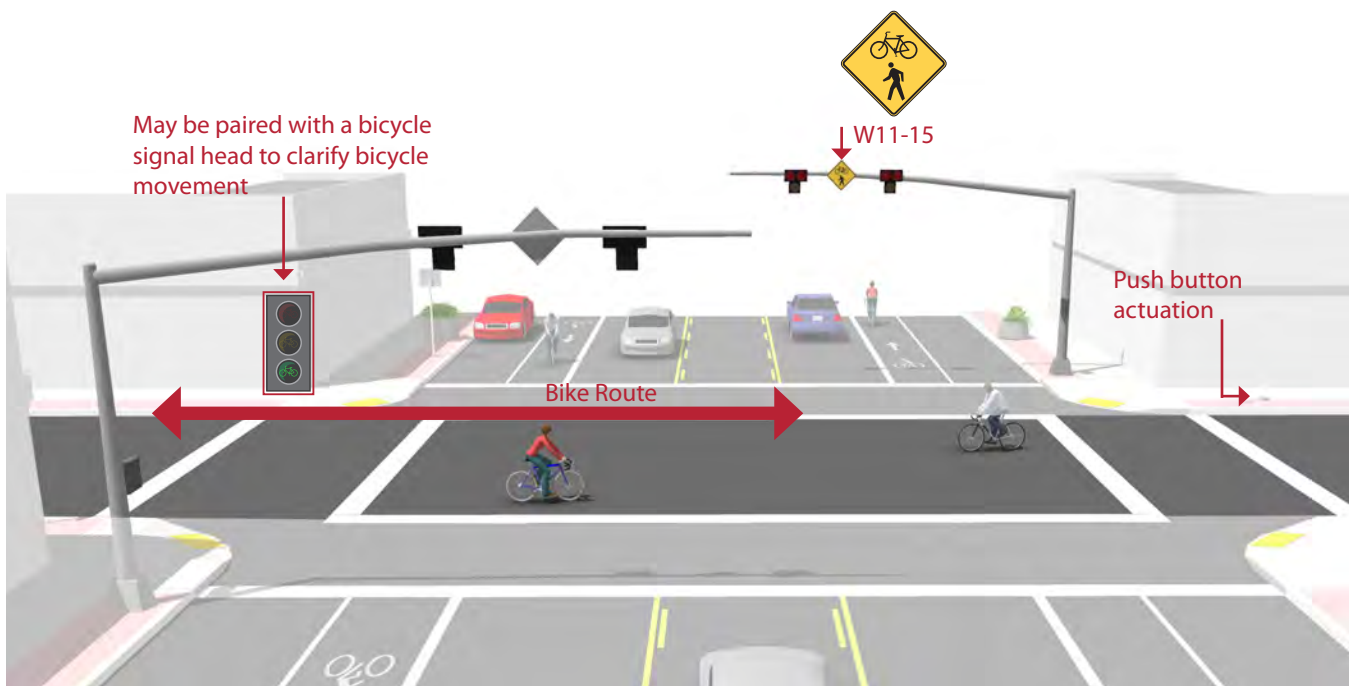
Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable user crossing.

- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

#### Description

A hybrid beacon, also known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or **bicycle signal heads** for the minor street. There are no signal indications for motor vehicles on the minor street approaches.

Hybrid beacons are used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street. Hybrid beacons may also be used at mid-block crossing locations.



#### Discussion

The hybrid beacon can significantly improve the operation of a bicycle route, particularly along **Bicycle Boulevard** corridors. Because of the low traffic volumes on these facilities, intersections with major roadways are often unsignalized, creating difficult and potentially unsafe crossing conditions for bicyclists.

Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

#### Additional References and Guidelines

FHWA. (2009). Manual on Uniform Traffic Control Devices.  
NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Hybrid beacons are subject to the same maintenance needs and requirements as standard traffic signals. Signing and striping need to be maintained to help users understand any unfamiliar traffic control.



## Bikeway Signing

The ability to navigate through a city is informed by landmarks, natural features and other visual cues. Signs throughout the city should indicate to bicyclists:

- Direction of travel
- Location of destinations
- Travel time/distance to those destinations

These signs will increase users' comfort and accessibility to the bicycle systems.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bicycle network
- Helping users identify the best routes to destinations
- Helping to address misperceptions about time and distance
- Helping overcome a "barrier to entry" for people who are not frequent bicyclists (e.g., "interested but concerned" bicyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and travel time to each destination

Bicycle wayfinding signs also visually cue motorists that they are driving along a bicycle route and should use caution. Signs are typically placed at key locations leading to and along bicycle routes, including the intersection of multiple routes. Too many road signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists rather than per vehicle signage standards.





## Wayfinding Signage

### Wayfinding Sign Types

#### Description

A bicycle wayfinding system consists of comprehensive signing and/or pavement markings to guide bicyclists to their destinations along preferred bicycle routes. There are three general types of wayfinding signs:

#### Confirmation Signs

- Indicate to bicyclists that they are on a designated bikeway. Make motorists aware of the bicycle route.
- Can include destinations and distance/time. Do not include arrows.

#### Turn Signs

- Indicate where a bikeway turns from one street onto another street. Can be used with pavement markings.
- Include destinations and arrows.

#### Decisions Signs

- Mark the junction of two or more bikeways.
- Inform bicyclists of the designated bike route to access key destinations.
- Destinations and arrows, distances and travel times are optional but recommended.



#### Localized Designs

A customized alternative design may be used to include pedestrian-oriented travel times, local city logos, and sponsorship branding. Kenosha County has applied custom signs along the existing North Shore Bike Trail. Potential Kenosha County specific branding is shown here.



#### Discussion

There is no standard color for bicycle wayfinding signage. Section 1A.12 of the MUTCD establishes the general meaning for signage colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US, including those in the MUTCD.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

## Wayfinding Signage

### Wayfinding Sign Placement

#### Guidance

Signs are typically placed at decision points along bicycle routes – typically at the intersection of two or more bikeways and at other key locations leading to and along bicycle routes.

#### Decisions Signs

Near-side of intersections in advance of a junction with another bicycle route.

Along a route to indicate a nearby destination.

#### Confirmation Signs

Every ¼ to ½ mile on off-street facilities and every 2 to 3 blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within 150 ft of a turn or decision sign). Should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

#### Turn Signs

Near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.



#### D Decision Sign



#### C Confirmation Sign



#### T Turn Sign



#### Discussion

It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to five miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.  
NACTO. (2012). Urban Bikeway Design Guide.

#### Materials and Maintenance

Maintenance needs for bicycle wayfinding signs are similar to other signs and will need periodic replacement due to wear.

## Wayfinding Signage

### Regulatory Signs

#### Guidance

- Small-sized signs or plaques may be used for bicycle-only traffic applications, such as along shared use paths.
- See the MUTCD 9B for a detailed list of regulatory sign application and guidance.

#### Description

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement and parking. They are usually rectangular or square with a white background and black, white or colored letters.

Regulatory signs with a red background are reserved for STOP, YIELD, DO NOT ENTER or WRONG WAY messages.

Red text indicates a restricted parking conditions, and a circle with a line through it means the activity shown is not allowed.

#### Common Bicycle Oriented Regulatory Signs:



R3-17



R4-11



R7-9



R7-9a



R5-1b



R9-3cP



R9-5



R9-6



R9-7



R10-24



R10-22



R15-8

#### Discussion

Signs for the exclusive use of bicyclists should be located so that other road users are not confused by them.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
FHWA. (2009). Manual on Uniform Traffic Control Devices.

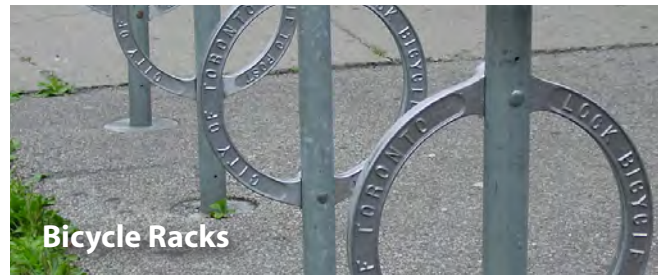
#### Materials and Maintenance

Maintenance needs for bicycle regulatory signs are similar to other signs and will need periodic replacement due to wear.

## Bicycle Support Facilities

### Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.



## Bicycle Support Facilities

### Bicycle Racks

#### Guidance

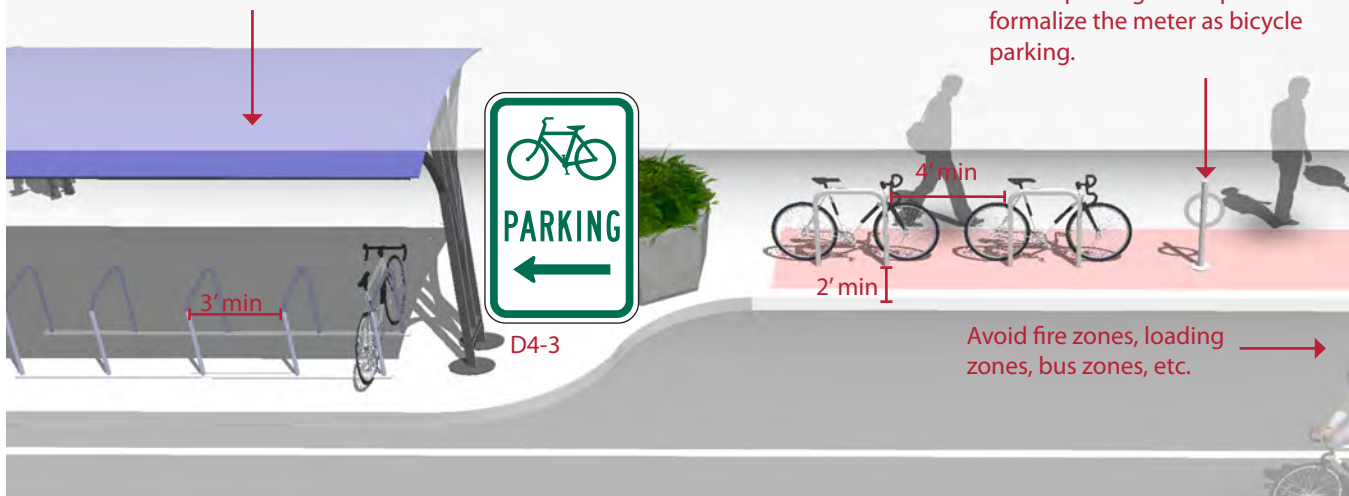
- 2' minimum from the curb face to avoid 'dooring.'
- Close to destinations; 50' maximum distance from main building entrance.
- Minimum clear distance of 6' should be provided between the bicycle rack and the property line.
- Should be highly visible from adjacent bicycle routes and pedestrian traffic.
- Locate racks in areas that cyclists are most likely to travel.

#### Description

Short-term bicycle parking is meant to accommodate visitors, customers, and others expected to depart within two hours. It should have an approved standard rack, appropriate location and placement, and weather protection. The Association for Pedestrian and Bicycle Professionals (APBP) recommends selecting a bicycle rack that:

- Supports the bicycle in at least two places, preventing it from falling over.
- Allows locking of the frame and one or both wheels with a U-lock.
- Is securely anchored to ground.
- Resists cutting, rusting and bending or deformation.

Bicycle shelters consist of bicycle racks grouped together within structures with a roof that provides weather protection.



#### Discussion

Some types of bicycle racks may meet design criteria, but are discouraged except in limited situations. This includes undulating "wave" racks, schoolyard "wheel bender" racks, and spiral racks.

#### Additional References and Guidelines

AASHTO. (2012). Guide for the Development of Bicycle Facilities.  
APBP. (2010). Bicycle Parking Guide 2nd Edition.

#### Materials and Maintenance

Use of proper anchors will prevent vandalism and theft. Racks and anchors should be regularly inspected for damage. Educate snow removal crews to avoid burying racks during winter months.





## Appendix H: Funding Sources

### Moving Ahead for Progress in the Twenty-First Century (MAP-21)

The largest source of federal funding for bicycle and pedestrian projects is the United States Department of Transportation's (US DOT) Federal-Aid Highway Program, which Congress has reauthorized roughly every six years since the passage of the Federal-Aid Road Act of 1916. The latest act, Moving Ahead for Progress in the Twenty-First Century (MAP-21) was enacted in July 2012 as Public Law 112-141. The Act replaces the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), which was valid from August 2005 - June 2012.

MAP-21 authorizes funding for federal surface transportation programs including highways and transit until September 2014. There are a number of programs identified within MAP-21 that are applicable to bicycle and pedestrian projects. These programs are discussed below.

More information: <http://www.fhwa.dot.gov/map21/summaryinfo.cfm>

### Transportation Alternatives (TAP)

Transportation Alternatives (TAP) is a new funding source under MAP-21 that consolidates three former SAFETEA-LU programs: Transportation Enhancements (TE), Safe Routes to School (SRTS), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, shared-use paths, school safety, and rail-trails. TAP funds may also be used for selected education and encouragement programming such as Safe Routes to School. The Wisconsin Department of Transportation (WisDOT) has allocated roughly 2/3rds of TE funds to bicycle and pedestrian projects since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991.

Unless the Governor of a given state chooses to opt out of Recreational Trails Program funds, \$85 million in dedicated funds for recreational trails continues to be provided nationally as a subset of TAP<sup>36</sup>.

Governor Scott Walker chose to opt in, which means that Wisconsin will receive \$2,167,754 in RTP funds per year through FY2014.

Eligible Projects for TAP include:

- **Transportation Alternatives** as defined by Section 1103 (a)(29). This category includes the construction, planning, and design of a range of bicycle and pedestrian infrastructure including “on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990.” Infrastructure projects and systems that provide “Safe Routes for Non-Drivers” is a new eligible activity. For the complete list of eligible activities, visit:

---

<sup>36</sup> See: <http://www.fhwa.dot.gov/map21/funding.cfm>

[http://www.fhwa.dot.gov/environment/transportation\\_enhancements/legislation/map21.cfm](http://www.fhwa.dot.gov/environment/transportation_enhancements/legislation/map21.cfm)

- **Recreational Trails.** TAP funds may be used to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized and motorized uses. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails
- State administrative costs related to this program (limited to seven percent of a State's funds)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds)
- **Safe Routes to School.** Safe Routes to School activities are eligible for the Transportation Alternatives Program. Both infrastructure and non-infrastructure projects are eligible, and the program elements described in SAFETEA-LU are still in effect. The purpose of the Safe Routes to Schools eligibility is to promote safe, healthy alternatives to riding the bus or being driven to school. All projects must be within two miles of primary or middle schools (K-8).

Eligible projects may include:

- *Engineering improvements.* These physical improvements are designed to reduce potential bicycle and pedestrian conflicts with motor vehicles. Eligible improvements include sidewalk improvements, traffic calming/speed reduction, pedestrian and bicycle crossing improvements, on-street bicycle facilities, off-street bicycle and pedestrian facilities, and secure bicycle parking facilities.
- *Education and Encouragement Efforts.* These programs are designed to teach children safe bicycling and walking skills while educating them about the health benefits and environmental impacts. Projects and programs may include creation, distribution and implementation of educational materials; safety based field trips; interactive bicycle/pedestrian safety video games; and promotional events and activities (e.g., assemblies, bicycle rodeos, walking school buses).
- *Enforcement Efforts.* These programs aim to ensure that traffic laws near schools are obeyed. Law enforcement activities apply to cyclists, pedestrians and motor vehicles

alike. Projects may include development of a crossing guard program, enforcement equipment, photo enforcement, and pedestrian targeted enforcement operations.

- **Planning, designing, or constructing roadways within the right-of-way of former Interstate routes or divided highways.** As of mid-December 2012, detailed guidance from the Federal Highway Administration on this new eligible activity was not available.

Average annual funds available through TAP over the life of MAP-21 equal \$814 million nationally, which is based on a two percent set-aside of total MAP-21 authorizations. Projected apportionments for Wisconsin total \$18.7 million for FY 2013 and \$18.9 million for FY 2014. Note that state DOTs may elect to transfer up to fifty percent of TAP funds to other highway programs, so these amounts represent the maximum potential funding.

Kenosha County is eligible to compete for TAP funds through two separate competitive grant programs administered by WisDOT:

- MAP-21 requires WisDOT to allocate a set amount of TAP funding to rural communities in Wisconsin. These funds are distributed through a competitive grant program that is not open to government agencies located in urban areas containing 200,000 or more residents.
- Remaining TAP funds (those monies not re-directed to other highway programs) are disbursed through a separate competitive grant program also administered by WisDOT. Local governments, school districts, tribal governments, and public lands agencies are permitted to compete for these funds.

Interim guidance released by the Federal Highway Administration clarifies that the Transportation Alternatives Program does not establish specific standards or procedures for the competitive grant process, but indicates that the USDOT plans to develop best practices for consideration: “DOT will publish a model Request for Proposal or Notice of Funds Available that States and MPOs may use at their discretion.” For more information, see: <http://www.fhwa.dot.gov/map21/guidance/guidetap.cfm>

As of this writing additional information regarding WisDOT’s plans for administering the grant programs is not available publicly. As WisDOT completes its review of potential programming changes due to MAP-21, further information should become available at:

<http://www.dot.wisconsin.gov/localgov/aid/bike-ped-facilities.htm>

### **Surface Transportation Program (STP)**

The Surface Transportation Program (STP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of bicycle and pedestrian improvements are eligible, including on-street bicycle facilities, off-street trails, sidewalks, crosswalks, bicycle and pedestrian signals, parking, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Unlike most highway projects, STP-funded bicycle and pedestrian facilities may be located on local and

collector roads that are not part of the Federal-aid Highway System. The United States Code Title 23, Chapter 1 defines the Federal-aid Highway system as “a highway eligible for assistance under this chapter other than a highway classified as a local road or rural minor collector.” Fifty percent of each state’s STP funds are suballocated geographically by population; the remaining fifty percent may be spent in any area of the state.

### **Highway Safety Improvement Program (HSIP)**

MAP-21 doubled the amount of funding available through the Highway Safety Improvement Program (HSIP) relative to SAFETEA-LU. HSIP provides \$2.4 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. MAP-21 requires each state to formulate a state safety plan, produced in consultation with non-motorized transportation representatives, in order to receive HSIP funds. Eligible projects will be evaluated on anticipated cost-effectiveness of reducing serious injuries and fatalities.

MAP-21 preserves the Railway-Highway Crossings Program within HSIP but discontinues the High-Risk Rural roads set-aside *unless* safety statistics demonstrate that fatalities are increasing on these roads. Bicycle and pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for non-motorized users in school zones are eligible for these funds. WisDOT estimates that it will receive an average of \$47.1 million annually for this program through the lifetime of MAP-21.<sup>37</sup>

### **Congestion Mitigation/Air Quality Program (CMAQ)**

The Congestion Mitigation/Air Quality Improvement Program (CMAQ) provides funding for projects and programs in air quality non-attainment and maintenance areas for ozone, carbon monoxide, and particulate matter which reduce transportation related emissions. States with no nonattainment areas may use their CMAQ funds for any CMAQ or STP eligible project. These federal dollars can be used to build bicycle and pedestrian facilities that reduce travel by automobile. Purely recreational facilities generally are not eligible.

Between 1993-2011 the CMAQ program provided \$53 million to 78 projects in 11 southeastern counties in Wisconsin non-attainment areas.<sup>38</sup> For current information on designated non-attainment and maintenance zones, including a map of affected counties, please visit the Environmental Protection Agency’s (EPA) website: <http://www.epa.gov/oaqps001/greenbk/mapnmpoll.html>

### **New Freedom Initiative**

MAP-21 continues a formula grant program that provides capital and operating costs to provide transportation services and facility improvements that exceed those required by the Americans with Disabilities Act. Examples of pedestrian/accessibility projects funded in other communities through the New Freedom Initiative include installing Accessible Pedestrian Signals (APS), enhancing transit stops to improve accessibility, and establishing a mobility coordinator position.

---

<sup>37</sup> <http://www.fhwa.dot.gov/map21/funding.cfm>

<sup>38</sup> <http://www.dot.wisconsin.gov/localgov/docs/te-1993-2004.pdf>

More information: <http://www.hhs.gov/newfreedom/>

### **Pilot Transit-Oriented Development Planning**

MAP-21 establishes a new pilot program to promote planning for Transit-Oriented Development. At the time of writing the details of this program are not fully clear, although the bill text states that the Secretary of Transportation may make grants available for the planning of projects that seek to “facilitate multimodal connectivity and accessibility,” and “increase access to transit hubs for pedestrian and bicycle traffic.”

Kenosha County should track federal communications and be prepared to respond proactively to announcements of grant availability.

### **Partnership for Sustainable Communities**

Founded in 2009, the Partnership for Sustainable Communities is a joint project of the EPA, the U.S. Department of Housing and Urban Development (HUD), and USDOT. The partnership aims to “improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide.” The Partnership is based on five Livability Principles, one of which explicitly addresses the need for bicycle and pedestrian infrastructure:

Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation’s dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.

The Partnership is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including both TIGER I and TIGER II grants). Kenosha County should track Partnership communications and be prepared to respond proactively to announcements of new grant programs. Initiatives that speak to multiple livability goals are more likely to score well than initiatives that are narrowly limited in scope to bicycle and pedestrian efforts.

More information: <http://www.sustainablecommunities.gov/grants.html>

### **Community Development Block Grants**

The Community Development Block Grants (CDBG) program provides money for streetscape revitalization, which may be largely comprised of pedestrian improvements. Federal CDBG grantees may use the funds for real property, public facility improvements, and planning. Pedestrian and Bicycle Master Plan projects that enhance accessibility are a good fit for this funding source. CDBG funds could also be used to write an ADA Transition Plan for the county or support design and construction of projects.

More information: [www.hud.gov/cdbg](http://www.hud.gov/cdbg)

## **Community Transformation Grants**

Community Transformation Grants administered through the Center for Disease Control support community-level efforts to reduce chronic diseases such as heart disease, cancer, stroke, and diabetes. Active transportation infrastructure projects and programs that promote healthy lifestyles are a good fit for this program, particularly if the benefits of such improvements accrue to population groups experiencing the greatest burden of chronic disease.

More info: <http://www.cdc.gov/communitytransformation/>

## **Land and Water Conservation Fund**

The Land and Water Conservation Fund (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. Funds can be used for right-of-way acquisition and construction. The program is administered by the Wisconsin Department of Natural Resources as a grant program. Any Pedestrian and Bicycle Master Plan projects located in future parks could benefit from planning and land acquisition funding through the LWCF. Trail corridor acquisition can be funded with LWCF grants as well.

More info: <http://dnr.wi.gov/Aid/LWCF.html> and <http://www.nps.gov/lwcf/>

## **Rivers, Trails, and Conservation Assistance Program**

The Rivers, Trails, and Conservation Assistance Program (RTCA) is a National Parks Service (NPS) program providing technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance—there are no implementation monies available. Projects are prioritized for assistance based on criteria including conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation, and focusing on lasting accomplishments. This program may benefit trail development in Kenosha County indirectly through technical assistance, particularly for community organizations, but should not be considered a future capital funding source.

More info: <http://www.nps.gov/pwro/rtca/who-we-are.htm>

## **Additional Federal Funding**

The landscape of federal funding opportunities for bicycle and pedestrian programs and projects is always changing. A number of Federal agencies, including the Bureau of Land Management, the Department of Health and Human Services, the Department of Energy, and the Environmental Protection Agency have offered grant programs amenable to bicycle and pedestrian planning and implementation, and may do so again in the future. For up-to-date information about grant programs through all federal agencies, see <http://www.grants.gov/>

## **State Funding Sources**

The State of Wisconsin has historically funded bicycle and pedestrian projects above and beyond Federal Transportation Enhancement (TE) dollars through two State grant programs: the Bicycle and Pedestrian



Funding Program (BPFP) and the Surface Transportation Program – Discretionary (STP-D). Funding levels and cycles for both programs has been somewhat sporadic since the early 1990's. In 2002 the Surface Transportation Program – Discretionary (STP-D) was dismantled, but the Bicycle and Pedestrian Funding Program (BPFP) still exists.

### **WisDOT Bicycle and Pedestrian Funding Program (BPFP)**

The most recent funding cycle of the BPFP in 2010 provided more than half a million dollars for bicycle and pedestrian planning and design throughout the state. Funding through the program is competitive – a committee ranks projects and makes funding recommendations to the Wisconsin Department of Transportation Secretary.

All BPFP funds have been awarded through FY 2014. Information on the next BPFP funding cycle will be posted on the WisDOT Bicycle and Pedestrian Facilities Program web page in 2013:

<http://www.dot.wisconsin.gov/localgov/aid/bike-ped-facilities.htm>. Eligibility, schedule and application requirements from the most recent BPFP funding cycle are described below as a reference. Please note that as of January 2013 this program is undergoing review by WisDOT and that future eligibilities, grant cycle schedule, and required elements may change as a result of this process.

#### **Eligibility**

- Funds are available for both planning and construction, including:
  - Planning projects costing \$50,000 or more
  - Construction projects costing \$200,000 or more
- No funding cap, but WisDOT's ability to fund projects over \$1 million is “very limited”, according to the BPFP application guidelines (See: <http://www.dot.wisconsin.gov/localgov/docs/smip-sample.pdf>)
- Statutory language specifically excludes pedestrian-only facilities, such as sidewalks and streetscaping projects
- Local governments with taxing authority and Indian Tribal Nations may apply for funding
- The project must be usable when completed - not staged so that additional money is necessary to make it a useful project

#### **Application Cycle**

- Applications are typically accepted every other year (even numbered years most common)
- Two to three years of funding is made available to projects for the three to four fiscal years following the calendar year in which projects are selected. (For example, in 2010 projects are developed for FY 2011-2014 funding.)
- In the past, WisDOT has reviewed BPFP and Transportation Enhancements (TE) applications simultaneously due to similarities in program objectives and eligibility criteria. WisDOT may choose to coordinate BPFP and Transportation Alternatives (TAP) application in a similar fashion.

### **Required Elements**

- Project Summary and Description
- Sponsor and Contact Information
- Prioritization (if requesting funds for more than one project in an urbanized area)
- Project Costs and Dates
- A realistic estimate of how many people will use the proposed facility on an annual basis
- Project benefits (transportation system improvements, preservation of state historic, environmental and scenic resources, and/or promotion of economic development, tourism, or safety)
- Narrative response to set of detailed questions:
  - Construction projects:
    - Location, length, width, surface materials, connections to existing or planned facilities
    - Relationship to bicycle or pedestrian plan (if applicable)
    - Summary of bicycle and pedestrian plans developed over the past five years
    - Summary of programs in the community designed to encourage walking and bicycling
  - Historic related projects:
    - Documentation from National and/or State Register of Historic Places, locally adopted landmarks ordinance, and/or Wisconsin Historical Society.
    - Description of historic significance
    - Photograph(s) of historic elements
  - Landscaping/streetscape applications
    - Describe how improvements will promote walking and bicycling

A sample BFPF application can be found here: <http://www.dot.state.wi.us/localgov/aid/bike-ped-facilities.htm>

For more information on the history of bicycle and pedestrian funding in Wisconsin, including a list of WisDOT-funded projects from state and federal sources, see:

<http://www.dot.wisconsin.gov/localgov/aid/bike-ped-funding.htm>

### **State Recreation Grant Programs**

The Wisconsin Department of Natural Resources administers several grant programs that may support bicycle and pedestrian facilities that provide a recreational benefit to the state. With the exception of the Recreational Trail Aids program, each of the programs below are part of the Knowles-Nelson Stewardship Program, a fund created by the Wisconsin Legislature in 1989 to “preserve valuable natural

areas and wildlife habitat, protect water quality and fisheries, and expand opportunities for outdoor recreation.”

### **Acquisition & Development of Local Parks**

*Eligibility and Purpose:* Helps to buy land or easements and develop or renovate local park and recreation area facilities for nature-based outdoor recreation purposes including trails. Applicants compete for funds on a regional basis.

### **Friends of State Lands**

*Eligibility and Purpose:* Grants from this program help improve facilities, build new recreation projects, and restore habitat on state properties.

### **Habitat Area**

*Eligibility and Purpose:* Protects and restores important wildlife habitat in Wisconsin in order to expand opportunities for wildlife-based recreation such as hunting, trapping, hiking, bird watching, fishing, nature appreciation and wildlife viewing.

### **Recreational Trail Aids (RTA)**

*Eligibility and Purpose:* Municipal governments and incorporated organizations are eligible to receive reimbursement for development and maintenance of recreational trails and trail-related facilities for both motorized and non-motorized recreational trail uses. Eligible sponsors may be reimbursed for up to 50 percent of the total project costs. This program may be used in conjunction with the state snowmobile or ATV programs and Stewardship development projects.

- Maximum grant amount: \$45,000 (\$200,000 every third calendar year)
- Match requirement: 50 percent
- Contact: Tim Parsons, 608-267-9385
- Deadline: May 1

### **State Trails**

*Eligibility and purpose:* Applications for grants under this subprogram must be for properties identified as part of the State Trail system. It is possible for sponsors to nominate additional trails for state trail designation. The Streambank Protection Program, a sub-program of the State Trails program, protects water quality and fish habitat in Wisconsin by establishing buffers along high-priority waterways.

### **Urban Green Space**

*Eligibility and Purpose:* These grants help buy land or easements in urban areas to preserve the scenic and ecological values of natural open spaces for nature-based outdoor recreation, including non-commercial gardening.

### **Urban Rivers**

*Eligibility and Purpose:* These grants help buy land on rivers flowing through urban or urbanizing areas to preserve or restore the scenic and environmental values of riverways for nature-based outdoor recreation.

For more information see: <http://dnr.wi.gov/Aid/Grants.html#tabx4>

### **Private Foundations**

Private foundations are an increasingly important source of funds for bicycle and pedestrian planning and implementation. For example, planners in Ozaukee County successfully secured a \$10,000 grant from the Bikes Belong Coalition and a \$25,000 grant from the Wisconsin Energy Corporation Foundation to partially fund the Ozaukee Interurban Trail.

To read a case study of the Ozaukee Interurban Trail, visit:

<http://www.bicyclinginfo.org/library/details.cfm?id=4154>

For more information on private foundations, including an extensive list of national foundations visit:

<http://www.foundationcenter.org/>

### **Recommended Next Steps**

In order to realize construction of the greatest portion of the bicycle and pedestrian network, the following actions are recommended:

- Track federal communications and be prepared to respond proactively to announcements of grant availability.
- Identify local funding sources for capital and non-infrastructure bicycle, pedestrian and Safe Routes to School projects.
- Review identified high priority projects against the summary of potential funding sources in Table 1 (below) to find potential complementary matches.
- Work with partners such as health advocacy agencies to develop grant proposals for facility design and construction.
- Work with partners such as health advocacy or safety agencies to identify and apply for support from nontraditional funding sources for capital and non-infrastructure projects.
- Consider identifying a dedicated funding source in the annual county budget (e.g., a dedicated portion of general fund dollars).
- Review the list of currently programmed roadway capital improvements and maintenance projects to identify opportunities for construction of pedestrian and bicycle facilities as an incidental element of these larger ongoing projects.

Table 1: Summary of Potential Funding Sources

		Planning Design and/or Construction			
Funding Program		On-Street Pedestrian Facilities	On-Street Bicycle Facilities	Off-Street Shared-use Paths	Non-Infrastructure Programs
Federal Sources	MAP-21	Transportation Alternatives (TAP)	✓	✓	✓
		Recreational Trails Program (RTP)		✓	
		Safe Routes to School (SRTS)	✓	✓	✓
		Surface Transportation Program (STP)	✓	✓	
		Highway Safety Improvement Program (HSIP)	✓	✓	✓
		Congestion Mitigation/Air Quality (CMAQ)	✓	✓	✓
		New Freedom Initiative	✓	✓	✓
		Pilot Transit-Oriented Development (TOD)			
		Partnership for Sustainable Communities	✓	✓	
		Community Development Block Grants (CDBG)	✓		✓
		Community Transformation Grants (CTG)	✓	✓	✓
		Land and Water Conservation Fund (LWCF)		✓	✓
		Rivers, Trails, and Conservation Assistance (RTCA)		✓	
State Sources	DNR	WisDOT Bicycle and Pedestrian Funding Program (BPPF)	✓	✓	
		Acquisition & Development of Local Parks		✓	
		Friends of State Lands		✓	
		Habitat Area		✓	
		Recreational Trails Aids (RTA)		✓	
		State Trails		✓	
		Urban Green Space		✓	
		Urban Rivers		✓	