

Milwaukee by Bike
City of Milwaukee
2010 Bicycle Master Plan
Plan Only
DRAFT
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Executive Summary



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The City of Milwaukee adopted its first formal bicycle plan in 1993. Bicycle Milwaukee set goals and objectives designed to increase the safety and ease of cycling in the city. Since the adoption of Bicycle Milwaukee, the major recommendations of that plan have been achieved and over 115 miles of bicycle lanes and routes have been implemented throughout the city. Milwaukee has also added bicycle parking throughout the city and added a full time Bicycle and Pedestrian Coordinator to the Department of Public Works staff. These gains led to Milwaukee being named a bronze-level Bicycle Friendly Community by the League of American Bicyclists.

2010 Milwaukee by Bike Master Plan builds on the successes and achievements since Bicycle Milwaukee and the current interest in cycling that has seen Milwaukee's bicycle mode share more than double in the past four years. Despite these successes and the increase in cycling in Milwaukee, it was apparent during the development of this plan that many people are still not comfortable biking in the city, and that many Milwaukee residents would like to cycle more than they currently do.

To address these concerns, Milwaukee by Bike describes a vision for the city in 2010 and a set of overarching goals to achieve this vision:

Vision for Milwaukee 2020

In 2020, Milwaukee's neighborhoods are filled with a noticeable diversity of people riding bicycles on innovative bicycle facilities. Milwaukee is an economically and environmentally healthy world-class city for cycling where people of all ages and abilities have attractive, convenient and safe options to make recreational and utilitarian trips by bicycle.

Overarching Goals for 2020

Increase bicycle use so that five percent of all trips less than five miles are made by bike.

Create a network of bicycle facilities within one quarter (¼) mile of all City residents that is attractive, safe and appropriate for people of all ages and abilities.

Reduce the bicycle crash rate by 50% from current levels.

In order to achieve the vision and overarching goals, Milwaukee by Bike details specific goals focused on facility and support infrastructure improvements;

providing dedicated funding for a Milwaukee Bicycle Program; providing bicycle education and encouragement programs to residents, enforcing laws related to crash reduction and safety issues, and consistently evaluating progress toward these goals. Each goal is supported by objectives designed to achieve that goal and detailed policies to achieve each objective.

Most dramatically, Milwaukee by Bike calls for increasing the city's bicycle network from 116 miles to 295 miles. This increase will include 125 new miles of bike lanes, an expanded bike route system and over 47 miles of bicycle boulevards and paved trails. Bicycle boulevards provide routes for cyclists on traffic-calmed streets while paved trails and paths allow cyclists to ride completely out of traffic; both options will greatly increase the comfort level of most cyclists riding in Milwaukee.

Implementation of the recommendations below will result in increased bicycle ridership, increased accessibility, and increased cyclist safety in Milwaukee by 2020.

Facility Recommendations

The On-Street Bicycle Network

Goal: Expand Milwaukee's bicycle network so all residents live within one quarter mile of a bicycle facility.

Objective 1: Continue Expanding the On-Street Bicycle Network

- Provide equal, and sometimes preferential consideration, to bicyclists and pedestrians in the planning, design, and operation of transportation facilities. Utilize a green transportation hierarchy or complete streets policy that begins the transportation design and planning process with the local land use rather than motor vehicle traffic volumes.
- Implement the bike lane, bike route and bicycle boulevard network detailed in Maps 3 – 7 and Appendix J of this plan.
- Evaluate the bicycle network for new opportunities, missing links and additional needs on an annual basis and add these to the Proposed Bicycle Network Map.

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- Add bicycle facilities to arterial and collector streets as they are reconstructed or resurfaced.

Objective 2: Improve Bicycle Access at Hazard Areas and Across Barriers

- Sign bicycle routes with “Bicycles May Use Full Lane” R4-11 sign and/or add shared lane pavement markings (MUTCD figure 9C-9) on streets needed to connect bicycle lanes or key destinations where bicycle lanes will not fit due to right-of-way constraints.
- Work with the County, DNR, WisDOT and USDOT to create a bikeway connection from Veterans Park to South Shore Park as a part of the Hoan Bridge Project.
- Cover the bicycle portion of any grated bridges with a solid, non-skid material.
- Convert front-in angle parking to parallel parking or back-in angle parking if the number of parking spots must be retained.
- Maintain bicycle access through or around construction areas or areas where bikeways are closed for a significant period of time.

Objective 3: Implement Innovative Facilities to Increase Bicycling Participation

- Establish a bicycle boulevard/quiet-street network that allows residents to participate in lengthy recreational rides on bicycle designated streets.
- Test raised bicycle lanes.
- Test bicycle boxes throughout the city.
- Install shared lane markings throughout the city.
- Use other innovative facilities detailed in Chapter 6 to increase cycling throughout the City.
- Conduct FHWA experiments and lead the nation in implementing and experimenting with new designs for bicycle and roadway facilities.

Objective 4: Provide Connectivity in the Bicycle Network and Link Key Destinations

- Provide a bicycle network that equitably serves all Milwaukee residents.
- Ensure that the bike system connects to and integrates with the transit system and other multimodal options.

- Recommend the provision of secure bicycle parking lockers at transit stations and the airport.
- Work with adjoining municipalities to ensure that bicycle network provides connectivity throughout the region.

Objective 5: Maintain Bicycle Facilities for Safe Use and Operation

- Sweep all bikeways regularly.
- Provide prompt maintenance of potholes and other pavement damage on bikeways.
- Ensure that bicycle lane stripes are repainted before they fade.
- Maintain off-street bikeways to the same or higher level as on-street bikeways.
- Clear snow from off-street bikeways in a timely manner.

The Off-Street Bicycle Network

Goal: Provide a comprehensive network of off-street trails and paths that connect key destinations and provide recreational opportunities for those who prefer to ride away from motor vehicle traffic.

Objective 1: Increase Off-Street Bicycle Facilities and Connections Throughout the City

- Establish a City Trails program as part of the Milwaukee Bicycle Program.
- Implement the recommendations made in the 2006 City of Milwaukee Off-Street Bikeway Study.
- Improve connections to existing trails.
- Increase the number of off-street facilities throughout the city.

Objective 2: Create officially designated places for mountain biking and BMX riding

- Work with local volunteers to design, build and maintain mountain bike trails in the City of Milwaukee.
- Work with local volunteers to design, build and maintain a dirt BMX track.

- Work with local volunteers to design, build and maintain pump tracks (short dirt tracks with berms and rollers that allow riders to practice technical skills) in neighborhoods in the City of Milwaukee.

Support Infrastructure

Goal: Provide the support infrastructure necessary to encourage and support bicycling throughout the City of Milwaukee.

Objective 1: Ensure That the Bicycle Network is Clearly Identified and Easy to Use

- Provide ample bike lane and route signage.
- Provide ample directional and location signage throughout the bicycle network.
- Provide a simple, easy to use on-line mapping tool for bicycle facilities.
- Ensure that free city bicycle maps are available for distribution throughout the city.
- Begin tracking the presence and status of bicycle facilities in the DIME and WISLR roadway data databases.

Objective 2: Provide Ample Bicycle Parking Throughout the City

- Implement the recommendations of the 2007 Milwaukee Bicycle Parking Project Report.
- Produce a flier with acceptable rack guidelines for business owners and developers.
- Fund a program to continue providing bicycle racks to businesses that request them.
- Provide bicycle parking at all City workplaces.
- Fund a program to maintain or replace existing racks that are damaged or rusting.
- Require attended bicycle parking at large events and sporting events.

Program Recommendations

Milwaukee Bicycle Program

Goal: Establish a funded bicycle program within the Department of Public Works.

Objective 1: Fund a Milwaukee Bicycle Program

- Create a dedicated \$450,000 budget to be used to fund bicycle and pedestrian programming in Milwaukee.
- Increase the number of staff dedicated full-time bicycle and pedestrian issues.
- Add a student-intern staff to the bicycle and pedestrian staff similar to the Traffic Engineering section.

Objective 2: Increase Bicycle Access in the Central Business District

- Conduct in-depth, multi-modal study of downtown focused on lane and parking configurations.
- Ensure that the Downtown Master Plan accommodates bicyclists both on the street and in parking and other facilities.

Objective 3: Pilot a Bicycle Sharing Program

- Gather local support for a bike sharing program.
- Research program technology, planning and funding options.
- Plan and procure the system.
- Launch the program.
- Ongoing operations and program enlargement.

Education Programs

Goal: Increase the safety of bicyclists by educating all road users on applicable laws and how to share the road.

Objective 1: Provide Regular Bicycle Education to City Residents

- Provide bicycle and pedestrian education to all students enrolled in a Milwaukee elementary school.
- Provide education to road users and pedestrians through targeted enforcement when new facilities are implemented.

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- Partner with the Bicycle Federation of Wisconsin or other educational organizations to offer regular teen and adult bicycling classes.
- Offer Share the Road education classes in lieu of a fine for first time minor traffic offenses.
- Expand the existing Downtown Ambassadors program to include Bike Ambassadors.
- Require share the road training for all municipal vehicle drivers and work with MCTS to train all transit drivers.

Encouragement Programs

Goal: Increase bicycling in Milwaukee through public and private encouragement events.

Objective 1: Support Cost Effective Encouragement Events, Programs and Organizations

- Support the events and programs of groups promoting bicycling.
- Encourage non-profit retail bike shop and bike education opportunities in underserved communities.
- Offer mini-grant opportunities that support community efforts that encourage bicycling, particularly to infrequent cyclists.

Objective 2: Provide Top-Notch Bicycle Publications and Media Materials

- Update the Milwaukee by Bike promotional study and implement its recommendations.
- Develop a logo for Milwaukee by bike that is used on all city webpages, publications, and media.
- Partner with media outlets for PSAs and other bike-positive stories.
- Update all publications annually.
- Identify and produce new bicycle publications that may be needed.
- Target promotional materials at specific groups or neighborhoods to increase bicycle usage.
- Utilize innovative communication technology such as Facebook, Twitter, Ning and other social networking sites to promote cycling.

Enforcement Programs

Goal: Increase bicyclist safety by better enforcing the rules of the road for all street users.

Objective 1: Ensure That Milwaukee Police Understand Bicycle Issues

- Work with MPD to appoint a police department bicycle liaison.
- Increase the number of Milwaukee police specially trained for bicycle safety enforcement.
- Educate police officers on bicycle safety issues.

Objective 2: Better Enforce Existing Traffic Laws for Both Motorists and Bicyclists.

- Work with MPD to better enforce all traffic violations, particularly failure to yield, speeding and safe passing distance violations.
- Increase enforcement of traffic violations by bicyclists.
- Increase funding and support for the MPD bicycle unit.
- Improve police reporting of all bike crashes and conduct annual crash analysis to determine problem areas that may require infrastructure improvements or enforcement efforts.
- Implement 24-hour speed zones around all parks and schools

Evaluation Programs

Goal: Evaluate bicycle facilities and programs to ensure they are effective.

Objective 1: Gather Robust Data on Bicycle Usage throughout the City

- Conduct semi-annual bicycle counts at locations around the city.
- Install automated bicycle counters around the city such as those from Eco-Counter.
- Include bicycle and pedestrian counts in all manual traffic counts.
- Monitor MCTS's Bikes on Buses counts to determine program usage and heavily used corridors that may need additional bicycle parking and support.

Introduction



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Milwaukee is a good place to get around by bike and it is getting better every year. Much like the rebirth of the city's traditional neighborhoods, bicycling is experiencing a local renaissance and is up almost 300% in the last five years according to Census data. Milwaukee's grid-like street network and diverse neighborhoods are the bones around which can grow a truly great city for cycling. The 2010 Milwaukee by Bike Master Plan was written to help nurture and guide that growth over the next five to ten years.

The main chapters of this plan detail core ideas and recommendations for improving cycling conditions and increasing cycling in Milwaukee. This plan also includes maps of current and proposed facilities within the city. A CD included with this plan includes a series of appendices that document current bicycling conditions in Milwaukee, policies affecting cycling locally, the analysis and process used to create this plan, and more detailed descriptions of specific recommendations. The CD also contains previous planning documents that provide in-depth information on specific topics, including the Bicycle Publicity Plan, the Off-Street Bikeway Study and the Milwaukee Parking Project Report.

Bicycling in Milwaukee Today

Milwaukee has made great strides in cycling since the release of the first bicycling master plan, *Bicycle Milwaukee*, in 1993. The city currently has over 110 miles of on-street bike lanes and bike routes; over three miles of city-owned bike paths or trails also exist. This city-owned network ties into an extensive system of County and State managed paths and trails including the Hank Aaron State Trail and the Oak Leaf Trail. These facilities as well as numerous programs to encourage cycling and educate residents about cycling are detailed in Appendix A: Existing Conditions. Federal, state, county and city policies and laws that impact cycling in Milwaukee are detailed in Appendix B: Policy Inventory and Legal Codes.

To analyze current bicycling conditions in Milwaukee as well as potential future conditions and benefits, a Cycle Zone Analysis was performed by Alta Planning + Design. This analysis divided the city into six zones, each of which was analyzed for bicycling levels and air quality. Advanced modeling was then used to project future bicycling usage in the city as well as the benefits to air quality in the city. A full description of the Cycle

Zones and how they were determined is presented in Appendix C: Cycle Zone Analysis.

Milwaukee has seen rapid growth in cycling in recent years: in 2006 approximately 0.47% of all trips to work were made by bike in the city, a rate that was nearly identical to the national average. By 2008, the city's rate had grown to 1.16% of all trips, a rate that was more than double the national rate. A study conducted for this plan on current bicycle usage in Milwaukee estimated that over 81,000 trips are made by bike each day in the city; by 2030 this number is expected to double to more than 162,000 daily bicycle trips. This study and the assumptions and methodology used to arrive at these figures is detailed in Appendix D: Quantifying Current and Future Demand for Bicycle Facilities. It is important that the city plan for this growth by providing bicycle facilities that are comfortable for all levels of cyclists and is well-connected throughout the city.

There is a general perception among those who do not ride bicycles that cycling on the street is inherently unsafe; this belief keeps many residents from cycling more, or at all. In fact, cycling in Milwaukee is quite safe, and is getting safer every year. As more cyclists have taken to the streets in recent years, the crash rate has consistently fallen. Detailed safety information is presented in Appendix E: Safety Analysis.

Milwaukee is already a great place to ride a bike, but there are improvements that can continue to be made. This plan makes recommendations that build on past gains in cycling and work to make cycling a safe, accessible and environmentally friendly form of transportation and recreation for all Milwaukee residents.



A young family rides home from Golda Meier School

Vision for Milwaukee 2020

In 2020, Milwaukee's neighborhoods are filled with a noticeable diversity of people riding bicycles on innovative bicycle facilities. Milwaukee is an economically and environmentally healthy world-class city for cycling where people of all ages and abilities have attractive, convenient and safe options to make recreational and utilitarian trips by bicycle.

Why invest in bicycling?

Bicycling can lower the cost of congestion

Most people dislike being stuck in traffic, but congestion has greater impacts than increasing the frustration levels of motorists. According to the Texas Transportation Research Institute, annual congestion costs the City of Milwaukee and its businesses about \$300 million collectively and individual travelers \$382 in lost time and productivity. Half of all trips in Milwaukee are three miles or less, a distance that can be easily traveled in less than 20 minutes on a bike, and 28% of all trips are less than one mile. Despite the fact that these trips can be easily made on a bicycle or walking, motor vehicles are used for over 80% of these short trips. Walking or cycling for these very short trips could significantly reduce congestion on Milwaukee streets. The associated reductions in congestion could boost the local economy by tens of millions of dollars in reduced costs to businesses and provide more disposable income and time to residents.

Bicycling can raise the quality of life

Like many other Midwestern industrial leaders of the past, Milwaukee is in the process of reinventing itself to attract new businesses and a creative, talented and well educated workforce. The Wall Street Journal lists Portland, Seattle, Minneapolis and Austin among the top "Youth Magnet Cities" in the country.¹ These are places where young college educated people move for the urban culture and recreational opportunities rather than for a job; they then look for employment after they relocate. It is no coincidence that these popular cities are also among the best cities for cycling in the country.

These "Youth Magnets" have factors other than their status as bicycle friendly cities that help them attract

¹ Dougherty, Conor. "Youth Magnet' Cities Hit Midlife Crisis." The Wall Street Journal. 16 May 2009. <<http://online.wsj.com/article/SB124242099361525009.html>>.



Signed bicycle routes guide cyclists to destinations and preferred routes throughout the City

workers: climate, economy, good transit, arts and culture are also commonalities. But it is clear that bicycles seem to be at least an indicator of vibrant and economically healthy cities.

Bicycling can improve the health of residents

That these same economically healthy, bicycle friendly cities have lower health care costs is no accident. Cycling is a great way to build physical activity into a person's daily routine and is a prescription for health. Recently, the Milwaukee Metropolitan Association of Commerce released a "Blueprint for Progress" that emphasizes personal lifestyle changes to decrease local healthcare costs to businesses.

According to an article by Tim Sheehy of the MMAC, "When 20% of the population accounts for 75% of health care spending that can be impacted by lifestyle choices, wellness and prevention are the place to start."² Not everyone is going to bike to work or the store, but many car trips can be replaced by a bike trip. In fact, almost half of all trips made by car in Milwaukee could be replaced with a 20 minute or shorter bike trip. More people will ride bicycles for exercise if they have attractive and convenient places to ride in their own neighborhood. Creating an attractive and convenient bicycle network is part of becoming a "Well City."

² Sheehy, Tim. "Benchmarking Milwaukee's Economic Progress." Milwaukee Biz Blog. BizTimes.com. 17 Nov. 2009. <<http://www.biztimes.com/blogs/milwaukee-biz-blog/2009/11/13/benchmarking-milwaukees-economic-progress>>.

Bicycling can improve local air quality

The Environmental Protection Agency recently proposed stricter national ozone standards and the Wisconsin State Legislature is proposing a climate change bill with additional air quality standards. Milwaukee is already classified as a non-attainment area for ozone and will be further out of compliance when standards are tightened. Striving for better air quality is not just about meeting EPA or state requirements. Increased air quality provides health benefits to residents and reduces the region's contribution to climate change. Milwaukee residents can take personal responsibility to improve local air quality by replacing short motor vehicle trips with cycling and walking. Even the modest gains proposed in this plan would result in reductions in over 16 million tons of ozone causing pollutants annually (see Appendix F: Existing and Potential Future Air Quality Benefits by Cycle Zone).

If bicycling is so great, why don't more Milwaukee residents do it?

According to a survey done for this plan by the University of Wisconsin-Milwaukee, 49% of Milwaukee residents have bikes and most residents would like to bike more. That survey also indicated that many of these people do not think it is safe to ride bicycles mixed with motor vehicles. Despite this perception that cycling is not safe, crash analysis shows that bicycling



Students leaning to ride safely at a Bike Camp. Children and youths may have significantly different needs as cyclists than an adult daily bicycle commuter.

is inherently safe in Milwaukee. The city's bicycle crash rate has decreased 75% in the last five years alone. This plan includes recommendations to spread the word on how safe cycling really is in Milwaukee. The same UWM survey showed that more people would ride more often if they had a bike trail closer to their homes. Although there is not room for separated bike paths in every neighborhood, this plan recommends innovative bicycle facilities that will appeal to people who prefer not to mix with heavy traffic.

The Needs of Different Types of Cyclists

Throughout the public information gathering process, it became clear that there is a broad spectrum of Milwaukee residents who ride bicycles for many different reasons. Cyclists span a wider age range than motorists, have vastly different experience and comfort levels, and have different reasons for riding a bike. This next section briefly explores the needs of different types of cyclists, the spectrum of experience and interest levels of cyclists, and the differing needs of cyclists depending on the purpose of their trip.

Bicyclist Needs

The goals and objectives proposed in this plan were written to answer the wide range of needs discovered in the public input process. The purpose of reviewing the needs of bicyclists is twofold: it is instrumental when planning a system that must serve different skill levels and different trip types and it is useful when attempting to quantify future usage and benefits to justify expenditures of resources. According to the 2002 National Survey of Pedestrian and Bicycling Attitudes and Behaviors, approximately 57 million people, 27.3% of the population age 16 or older, rode a bicycle at least once during the summer of 2002. About half of all the survey respondents over the age of 16 reported being "very" or "somewhat" satisfied about how their communities are designed with regard to bicycle safety. This indicates that there is a large reservoir of potential bicyclists who do not ride (or would ride more often) simply because they do not feel comfortable using the existing street system.

While the majority of Americans own bicycles, most of these people are recreational riders who ride relatively infrequently. Schoolchildren between the ages of about 6 and 14 typically make up a large percentage of

bicycle riders, often riding to school, parks or other local destinations. The serious adult road bicyclist makes up a small, but important, segment of bikeways users, along with serious off-road mountain bicyclists, who enjoy riding on trails and dirt roads. The single biggest adult group of bicyclists is the intermittent recreational rider who generally prefers to ride on pathways or quiet side streets.

Milwaukee's bicycle spectrum

Milwaukeeans' feelings about bicycling vary widely. The range begins with those people not interested in bicycling for any reason and goes to those who ride every day in any traffic no matter the weather. Most people fall somewhere in between those extremes and the routes they choose to ride may vary from one trip to the next. Many children younger than 10 have not developed the cognitive skills necessary to estimate gaps in traffic and speeds of approaching vehicles, while youths under age 16 may be unfamiliar with operating a vehicle on roads and the related laws, yet they ride regularly to visit friends or for recreation. There are also adults who know how to ride a bike and understand the rules of the road, but only ride on trails on weekends or have not ridden since childhood. These people are interested in cycling more, but are uneasy mixing with motorized traffic. Experienced cyclists include commuters, long-distance road cyclists, racers and those who use their bicycle as a primary means of transportation in any



Participants wait for the start of a group ride on the Hank Aaron State Trail

weather. These people generally feel comfortable riding on streets and with traffic, but sometimes prefer to ride on a quiet side street or an off-street trail.

Milwaukee has done a good job creating bike lanes for more experienced cyclists. At the same time, the local trail systems provide options for people who are more timid about riding with traffic or want to ride recreationally. However, as noted earlier, the majority of people fall in between these two extremes. This majority is interested in bicycling, but often worried about mixing with motor vehicles. These needs and concerns must be addressed. In order to get more people replacing their short car trips with bicycle trips, Milwaukee must create a bikeway network beyond bike lanes and recreational trails. The city must build bike facilities that this interested but concerned majority feels are attractive, convenient and safe.

Recreational versus utilitarian trips

Utilitarian bicycle trips are an important focus of this bicycle plan, but no more so than recreational trips. Bicycling remains a wonderfully healthy and popular form of recreation in Milwaukee. Tens of thousands of people participate annually in charity rides like Milwaukee's famous Miller Lite Ride for the Arts, the Tour de Cure, the Trek 100 Ride for Hope and others. These rides are often family summer rituals and raise millions of dollars for charities every year.

Just as popular are casual rides by individuals, families and groups of friends on local off-street trails. Automated and manual counts show Milwaukee's Oak Leaf Trail attracts hundreds of thousands of riders per month from March through November. The Milwaukee area is also blessed with mountain bike trails that offer an urban escape few other large cities can match.

Racing is another important component of recreational cycling. Milwaukeeans participate in the full range of bicycle racing from weekend warriors to professionals. The Milwaukee area can boast about world-class road racing, track racing, BMX, mountain biking, triathlons, alleycats and even bike polo.

Milwaukee's reputation as a bicycle friendly community with great recreational bicycling opportunities draws tourists from across the country and around the world. The Department of Public Works gets hundreds of request for bicycle maps from tourists and racers planning trips to Milwaukee each year.

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

Utilitarian bicyclists have needs that are more straightforward. They require bike lanes or wider curb lanes along all arterials and collectors, loop detectors at signalized intersections and adequate maintenance of the pavement. At destination points, commuters require adequate long-term bicycle storage and benefit from showers or changing facilities while shoppers require conveniently located short-term bicycle parking.

Table 1: Characteristics of Recreational and Utilitarian Trips

Recreational Trips	Utilitarian Trips
Directness of route not as important as visual interest, shade and protection from wind	Directness of route more important than visual interest
Loop trips may be preferred to backtracking	Trips generally travel from residential to shopping or work areas and back
Trips may range from short to over 50 miles	Trips generally are 1-5 miles in length
Short-term bicycle parking should be provided at parks, trailheads and other recreational sites	Short-term and long-term bicycle parking should be provided at stores, transit stations, schools and workplaces
May be riding in a group	Often ride alone
May drive with their bicycles to the start of a ride	Use bicycle as primary transportation mode for the trip
Trips typically occur on the weekend or weekday afternoons	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 cyclist	Generally use on-street facilities, may use pathways if they provide easier access to destinations than on-street facilities

Conclusion

Milwaukee is a safe place to bicycle with numerous paths, bike lanes and bike routes. The city has seen strong growth in cycling in recent years, particularly after adding a basic network of bicycle lanes. However, many potential cyclists are not aware of these trends, and some who are may not be comfortable riding under existing conditions. This plan proposes new and expanded bicycle facilities and support facilities; education, encouragement and enforcement programs for cycling; and evaluation programs to monitor cycling in the city. Implementation of these recommendations will set Milwaukee on the path to become a world-class city for bicycling while increasing participation in cycling and the safety of those on bikes.

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Goals and Objectives



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For any plan and planning process to be successful, the public must be involved and vested in its development and goal setting process. This update of the 1993 Milwaukee Bike Plan began in April 2008 and there were numerous opportunities for the public to voice their concerns about biking in Milwaukee. This chapter provides a brief description of the public input during the planning process and then outlines the plan's goals and objectives, the general strategy proposed to reach those goals, and how the City can meet the needs of the broad spectrum of people who ride bicycles in Milwaukee.

Public Participation

There were numerous opportunities for public input on this plan throughout the multi-year planning process. These opportunities included small group meetings and presentations, two large public surveys, an open house, and a standing steering committee.

Steering Committee

A Bike Plan Update Steering Committee was formed to guide the planning process and offer regular input on the plan. The Steering Committee was comprised of city staff representing the Department of Public Works (DPW), the Department of City Development (DCD), the Office of Sustainability and the Common Council. Additional members were drawn from local bicycle clubs, bicycle businesses and interested citizens.

The Steering Committee met approximately once every two months from April 2008 to March 2010 to receive updates and offer input on the planning process.

Open House

An open house was held November 13, 2008, to present bicycle facilities to the public at large and to collect comments on bicycling in Milwaukee. Planning staff prepared large-scale maps that showed existing bicycle facilities in the city and allowed citizens to comment on deficiencies in the bicycle network. Planning staff also prepared informational materials on bicycle facilities not in use in Milwaukee including bicycle boulevards, bike boxes and raised bicycle lanes to demonstrate the types of facilities that could be recommended in the final plan. The open house had 71 registered attendees who offered wide ranging comments on biking in the city and their visions of what the plan, and the city, could be.



Attendees at the open house had an opportunity to view maps and diagrams of potential facility improvements.

Charette

A charette was held May 27, 2009, to continue gathering input on the programs, policies, goals and objectives of the bike plan. Attendees were encouraged to circulate through a series of stations staffed by planning staff and trained volunteers. Stations were designed to educate visitors on the element up for discussion and to record the visitors' opinions and feedback on either a survey or a map.

The charette had 22 registered attendees representing the Boys and Girls Club, Milwaukee County Transit System, Metro Wisconsin Off-Road Bicycle Association, the Bicycle Federation of Wisconsin, the Departments of Public Works and City Development, the Common Council, the Cream City Bike Club, the National Parks Service, Milwaukee County Parks and others.

Public Presentations

In addition to the open house and the charette, presentations were given to a number of groups with strong interest in the Bike Plan. These presentations included:

- The Wheel and Sprocket Bike Expo, April 2009

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- The Cream City Bicycle Club, April 2009
- The Cambridge Woods Neighborhood Association, May 2009
- The Bay View Bicycle Club, August 2009

The presentations outlined the goals of the Bike Plan as well as facilities and other proposals that may be included in the plan. The meetings allowed comments and suggestions from participants and an opportunity to voice concerns about biking in Milwaukee.

Survey and Electronic Input

Throughout the planning process public input was solicited by electronic means including email, the internet and telephone. This allowed for broader participation from those who could not attend the public hearings or were not aware of them, and allowed for random selection of participants in the case of the phone survey.

In August 2008, the Department of Public Works and the Wisconsin Bicycle Federation sponsored the Milwaukee Survey of Bicyclist Attitudes and Behaviors. The survey was carried out over the phone by the Institute for Survey and Policy Research at the University of Wisconsin-Milwaukee and it gauged bicycling usage and the attitudes toward cycling within Milwaukee. The survey results are summarized in Appendix G: Current Usage and User Needs Assessment; the survey methodology is provided in Appendix H and recommendations for improving the survey should it be conducted again are offered in Appendix I.



Attendees at the open house looking at a description of planned and proposed bicycle facilities.

An online survey was available from March 20 until October 26, 2008. The survey was open to anyone with internet access and had 689 participants. The online survey was wider ranging than the Milwaukee Survey of Bicyclist Attitudes and Behaviors and allowed respondents to offer more detailed responses to open-ended questions. Results of the survey are summarized in Appendix G.

A select group of citizens were emailed directly by the Milwaukee Bicycle and Pedestrian Coordinator for comments regarding barriers to cycling in the city. The responses received ranged from specific physical barriers, such as pinch points under bridges or particularly high traffic corridors, to policy or social barriers such as personal safety concerns or lack of facilities. These comments were taken into consideration when developing specific plan recommendations.

Summary of Comments

Comments received through the various forms of public input were wide ranging and included praise and support for what the city has already done and suggestions for improvements that the city should make. Specific themes repeatedly emerged throughout all of the public forums:

Many residents, particularly older and younger ones and those with children, do not feel safe cycling on streets with even moderate levels of motor vehicle traffic.

Strong support exists for continuing to expand the bicycle lane network, and even stronger support exists for increasing the number of off-street paths and trails.

Although often unfamiliar with the idea of bicycle boulevards, residents are supportive of them once the benefits of reduced motor vehicle traffic and reduced vehicle speeds are explained.

Residents want to ride their bikes more, but barriers including perceptions of the safety of cycling in the city and the lack of access to nearby bicycle facilities prevent them from doing so.

Detailed results of surveys conducted for this plan are included in Appendix G.

Overarching Goals for 2020

Increase bicycle use so that five percent of all trips less than five miles are made by bike.

Create a network of bicycle facilities within one quarter (¼) mile of all City residents that is attractive, safe and appropriate for people of all ages and abilities.

Reduce the bicycle crash rate by 50% from current levels.

Achieving the Goals: Goals, Objectives and Policies

The 2010 Milwaukee Bike Plan begins with the idea that urban streets are for moving people and goods, not vehicles. Traffic engineering should start with the question of how an urban street can best serve the needs of the local land uses.

This policy builds on the existing foundations of local, regional, state and federal community sensitive design policies that are supportive of making cycling a regular fixture of communities throughout Wisconsin. These existing policies include a state mandate to double the number of bicycle trips by 2010, while reducing the number of crashes and a regional mandate to reduce barriers to bicycle travel, as well as existing local policies recognizing bicyclists as rightful users of the roadways. Further support for the inclusion and consideration of cyclists on all roadways comes from the State's passage of a 2009 "Complete Streets" policy.

The following chapters provide specific goals supported by objectives and policies designed to achieve those goals. The majority of the policies include specific performance measures as well as references to other

cities that have implemented best practices related to each policy. These examples from other cities across the United States are included as tangible measures that planners, decision makers and advocates can use to evaluate Milwaukee's progress toward becoming a world-class cycling city. These goals and objectives are found primarily in Chapters 3 and 4.

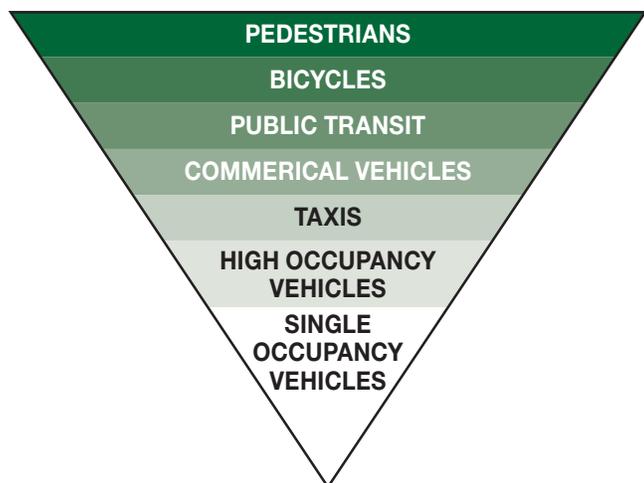
Addressing the Five Es

The goals of this plan take a "Five Es" approach to improving conditions for bicycling in Milwaukee. When any traffic issue is examined, The Five Es must be considered: Engineering, Education, Encouragement, Enforcement and Evaluation. It is not enough to simply paint bike lanes and build trails. In order to gain the full benefit of bicycle facilities, the City needs to encourage cycling and promote new facilities. People need to be educated about safe bicycling techniques and the laws related to cycling just as they are educated about the laws related to motor vehicles and pedestrians. Those laws then need to be enforced. Finally, bicycle use should be evaluated just as the City evaluates roads by counting cars, trucks and crashes. Although Milwaukee has made big strides with small but significant investments in engineering and the construction of bicycle facilities, very little has been invested in the other Es. In order to become a world-class cycling city, all of the Es must be addressed.

Engineering: Build an attractive, convenient and safe bikeways network

The City now has approximately 116 miles of traditional bicycle facilities such as bike trails, lanes and routes. Six years ago, the City of Milwaukee painted 35 miles of bike lanes on city streets, increasing the miles of bike lanes in Milwaukee almost 400%. Suddenly, after years of no growth in cycling, Census data showed dramatic increases in the number of people commuting to work by bike. This supports the idea that "if you build it they will come."

It is important to note that this growth in cycling was stimulated by an improved, yet still very incomplete bike lane network. A person driving a car can expect to find a complete 450 mile network of paved major roads to any destination in the City. But a person on a bicycle only has 51 miles of bike lanes and there are major gaps in that network. Even with the City's plans to paint an additional 125 miles of bike lanes in coming years, the



Goals and Objectives

majority of major streets in Milwaukee will still not have bicycle accommodations.

Since most utilitarian trips by bike or motor vehicle have destinations on major streets, a core recommendation of this plan is for Milwaukee to build on past success and continue adding bike lanes on major roads when they are resurfaced or reconstructed, the most economical time to do so. In this way the gaps in Milwaukee's bikeway network on major streets will gradually be filled in over time.

Bike lanes on major streets are the skeleton around which all great cycling cities are built, but bike lanes alone are not enough. During the public meetings to create this plan people repeatedly expressed their desire for bicycle facilities away from busy streets and traffic. Even a few experienced cyclists said they did not find bike lanes on arterial streets pleasant to use. Furthermore, parents asked for safe places to ride with their children. In most cases people asked for more off-street trails.

These comments mirror recent studies in other cities. There is a wide range of people who ride bikes, and only about 5% to 10% of them are comfortable riding in bike lanes on arterial streets. The majority of people who ride bikes prefer to be further segregated from cars. But in an older urban city like Milwaukee, there simply is not room to provide trails everywhere.

However, Milwaukee does have a vast 900 mile grid of residential side streets that should be ideal for cycling. This network of local streets can serve to get children to their friends' houses and to neighborhood parks. Quiet tree-lined residential streets with slow moving cars also make for enjoyable recreational rides for people of all ages and cycling abilities. Unfortunately, the majority of people still complain that traffic moves too fast on their streets and they do not feel safe letting their children ride bikes on them.

In order to accommodate this majority of cyclists and make bicycling attractive to the full range of people who ride bikes, this plan proposes some "non-traditional" bicycle facilities. This includes 40 miles of bicycle boulevards on traffic calmed side streets and pilot studies of raised bike lanes and cycletracks. These new-to-Milwaukee facilities have proven popular and effective at promoting cycling in other cities where they have been implemented.

The implementation of all these facilities will result in a



Water Street has a buffered bike lane that separates cyclist from motor vehicles.

bicycle network of close to 300 miles. This network will put 72% of Milwaukee's total geographic area within $\frac{1}{4}$ mile of an on-street bicycle facility. Additional long-term bike parking will enhance transit connections and increase users' ability to use bicycles for the "last mile" of their trip.

The overarching bikeway network development goals of this plan include:

- Continue expansion of the bikeway network to improve bicycle access and safety and promote connectivity of key destinations.
- Provide bicycle lanes or other accommodations on almost every major street.
- Provide a supporting network of bikeways on quiet side streets such as signed bike routes and bicycle boulevards.
- Expanded city trails network.
- Use innovative facilities and context sensitive solutions to add bikeways to the street network.
- Develop maintenance standards that will maximize the performance and safety of the existing network.

Education: Teach people how to bicycle safely and the rules of the road

Little formal education exists to teach people how to bicycle safely and to educate them about bicycle facilities they may not have encountered before. Education programs and materials should be available to Milwaukee residents to address these issues. The Bicycle Federation of Wisconsin, in cooperation with Milwaukee Public Schools and the Milwaukee Police Department created an excellent safe routes to school curriculum. But that program only reaches a few thousand students each year. If possible, the City could partner with Milwaukee Public Schools to expand that program to reach all MPS students and more of the growing private school population in Milwaukee.

Programs should also be available to teens and adults to teach them how to ride safely. Brochures and marketing campaigns can educate cyclists and motorists about how to use specific facilities and the rights and responsibilities of all road users.

Encouragement: Put a positive spin on getting around Milwaukee by Bike

Implementing a SmartTrips style social marketing program to promote cycling has proven to increase bicycle use for transportation by 8% to 10% among the target audience in other cities. These programs go after the low hanging fruit of people interested in cycling more but unsure of how to get started.

Milwaukee is a safe place to ride a bike, but not enough people perceive it that way. The city should establish a clear brand identity for its bicycling program that promotes Milwaukee as a fun and safe place to ride a bike. Highlights of marketing program recommendations include:



- Establish a clear brand identity; several logo suggestions are provided for consideration.
- Use social networking technology to reach a broader audience and provide residents with up-to-date information on bicycling conditions and events.
- Provide quality bicycle-related publications to Milwaukee residents.
- Use traditional media outlets as suggested in the Milwaukee Bicycle Publicity Plan

Enforcement: Enforce violations of current laws that most threaten bicyclist safety

Expanding police bicycle patrol units is a proven cost effective method of policing that has the side benefit of improving police enforcement of laws relating to cycling. These officers not only improve neighborhood policing, but their expertise in cycling yields increased and improved enforcement of violations by motorists and cyclists alike.

Each year the Milwaukee Police Department gets about \$4,000 in funding from the Wisconsin Dept. of Transportation Bureau of Transportation Safety to be used for strategic enforcement efforts targeting motorists and cyclists who violate laws relative to cycling. These efforts have proven to be very effective and should be expanded with more funds from WisDOT BOTS.

Milwaukee would benefit from more special training offered on a volunteer basis to police department staff. One or two bicycle enforcement training sessions should be offered each year. The officers who successfully complete that training should be eligible for overtime on strategic bicycle enforcement campaigns.

Evaluation: Measure bicycling in Milwaukee

In order to understand how engineering, education, encouragement and enforcement efforts are impacting cycling in the city, it is critical that the City of Milwaukee regularly evaluate different aspects of cycling. This includes regularly counting cyclists to monitor changes in participation levels and ensuring consistent crash reporting to monitor the safety of cycling in the city. These regular evaluation efforts should feed back into ongoing engineering, education, encouragement and enforcement efforts to improve their effectiveness.

Funding: Bicyclists are a cheap date

Compared to facilities for motor vehicles, spending on bicycle infrastructure provides a lot of bang for the buck. The total cost of implementing the on-street facilities in this plan is estimated at \$6.9 million in 2010 dollars. Another \$2 million is needed for off-street paths and connections to those paths. Routine maintenance, education programs, marketing campaigns, enforcement efforts and other programs also have costs. As a comparison, in 2009 alone, the City of Milwaukee budgeted a little more than \$74 million for streets, alleys, sidewalks and bridges. To date, the total investment in bicycle infrastructure in the City of Milwaukee is about \$9.8 million dollars including grant monies. This plan recommends that Milwaukee set aside \$450,000 annually for bicycle specific projects and maintenance, in the same way Milwaukee budgets for Major Streets, Local Roads and other transportation programs. These funds will be used to match grants when needed, to construct new bicycle facilities, to print the bike map, for encouragement and education programs, and to maintain existing bicycle infrastructure.

Dedicated funding sources for a City bicycle program are increasingly common around the country. A few examples are listed below for comparison purposes:

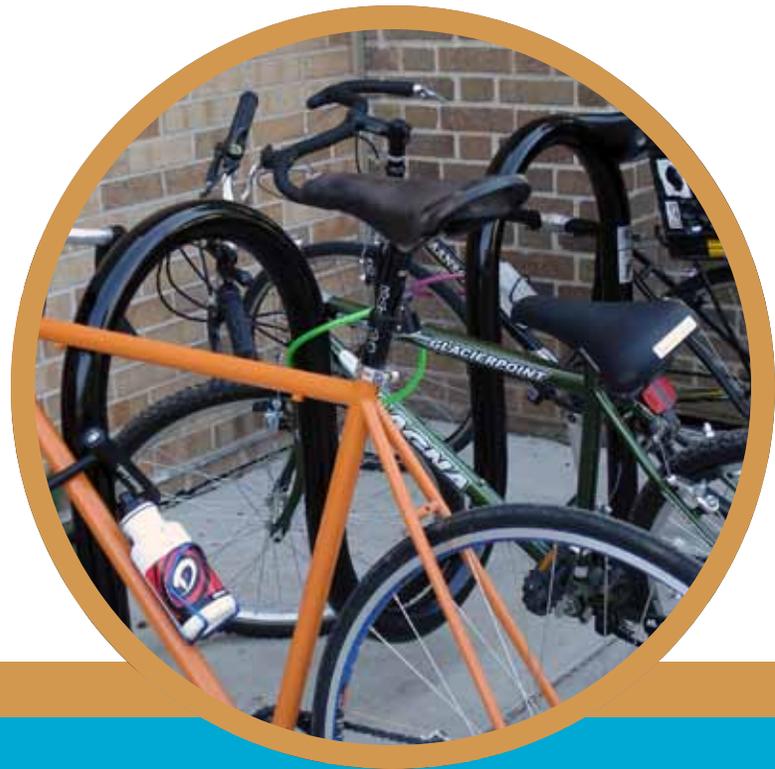
- Seattle, WA (pop. 582,174): \$23.3 million annually
- Boulder, CO (pop. 293,161): \$4.5 million annually (2003 budget)
- Minneapolis, MN (pop. 377,342): \$4 million annually
- Scottsdale, AZ (pop. 244,000): \$9.8 million annually
- Bloomington, IN (pop. 70,000): \$550,000 annually

Keep Rolling Forward

This plan lays out aggressive goals, objectives and policies for improving bicycling in Milwaukee through education, engineering, enforcement, encouragement and evaluation. As these goals are achieved, it is critical that the city continue to evaluate the state of cycling in the city, add new goals and targets as they are appropriate, and continue to plan aggressively for cycling. Because numerous variables impact transportation planning, this plan should be updated every five years. Consistently updating Milwaukee by Bike will ensure that the city is utilizing the current best practices from around the world and will allow for a simpler, less expensive and less time consuming process than this complete rewrite of the 1993 plan.

Building on the city's assets and investments made to date will ensure that cycling conditions continue to improve to the point that Milwaukee truly becomes a world-class cycling city. Implementation of this plan's recommendations will make cycling a more attractive, practical and enjoyable form of recreation and transportation for a wider range of City residents.

Facility Recommendations



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This chapter provides bikeway network facility recommendations for the City of Milwaukee. These recommendations are divided into sections: the On-Street Bicycle Network, the Off-Street Bicycle Network and Support Infrastructure. Each section is guided by an overarching goal, which is supported by specific objectives and policies to achieve each goal. Whenever possible, performance measures, best practices from around the country and departmental responsibility have been included with each policy. The Department of Public Works (DPW) is assumed to be responsible for all policies unless other departments are listed. Detailed facility design guidance is provided in the appendices.

As detailed in Appendix A, the City of Milwaukee has approximately 116 miles of existing bike lanes and routes; these facilities place approximately 45% of the city’s area within ¼ mile of a designated bikeway (see Maps 1 and 2). This plan proposes an additional 125 miles of bike lanes, nearly ten miles of signed bike routes, recently federally approved “shared-lane pavement markings” and nearly 40 miles of bicycle boulevards. Additionally, pilot studies of raised bicycle lanes and cycletracks are recommended. The implementation of these facilities will result in a bicycle network of just less than 300 miles. This network will put 72.1% of



Milwaukee’s bike lane network has increased substantially in the last ten years

Milwaukee’s total area within ¼ mile of a designated on-street bicycle facility (see Maps 3 and 4).

Many of the proposed facilities, particularly many of the bicycle lanes, have already undergone preliminary feasibility analysis and are ready to implement. However, many of the proposed facilities will need additional feasibility studies to determine the actual level of improvement. The proposed raised bike lanes on Bay Street and the three viaducts over the Menomonee Valley will be the first raised bike lanes in Wisconsin and should be implemented as a pilot study to monitor their effectiveness and maintenance issues that may arise.

Table 2 shows the miles of existing and proposed bicycle facilities in Milwaukee. Maps 1 – 8 at the back of this plan display the existing and proposed bicycle facilities in Milwaukee. Detailed descriptions and cost estimates of the proposed facilities are provided in Appendix J while detailed design guidance is provided in Chapter 4.

Table 2: Miles of Existing and Proposed Bicycle Facilities

	Existing	Proposed	Total
Bike Lanes	51.28	125.36	176.64
Raised Bike Lanes	0.00	3.41	3.41
Bike Routes	65.26	9.53	74.79
Bike Boulevards	0.00	40.61	40.61
Paved Trails	3.10	6.80	9.90
Total	116.54	178.91	295.45

The On-Street Bicycle Network

Goal

Expand Milwaukee’s bicycle network so all residents live within one quarter mile of a bicycle facility.

Route Selection Criteria

The proposed bicycle facilities were selected to form an attractive, convenient and well-connected network that meets the transportation and recreation needs of Milwaukee residents. Factors considered during the assessment of proposed facilities include bicycle trip generators, traffic volumes and roadway geometries. Citizen feedback as provided through the public participation process, the future demand estimates in Appendix D, and the safety analysis presented in

Facility Recommendations

Appendix E also factored in to route selection. Political realities, including willingness to remove vehicle travel and parking lanes to create space for bicycle facilities, also factored into route selection.

Network Coverage and Connectivity

The proposed system is designed to provide bicycle facilities within close proximity to the majority of Milwaukee residences and places of employment. The network is primarily comprised of bike lanes, but also includes a network of bicycle boulevards, signed bike routes, bike routes with shared lane pavement markings and raised bike lanes.

The proposed system provides a well-connected network of bicycle facilities and will allow users to access residential areas, parks, schools, employment centers, retail areas and other popular destinations. The bicycle boulevard network was specifically designed to connect parks and other areas popular with children and families and to provide low traffic corridors in areas lacking off-street paths. Additionally, the proposed system provides numerous connections to adjacent municipalities.



Milwaukee's award winning 6th Street Bridge includes bike lanes with anti-slip plates

Attractive

Adding new bike lanes have proven to be successful in getting many more Milwaukee cyclists riding for transportation. Bike lanes on major streets remain the foundation of the on-street bikeway network since getting to nearly all destinations involves traveling on a major street, even if only for a block or two. The proposed system in this plan includes additional bike lanes on arterial streets, but also recommends alternate facilities like bike boulevards, raised bike lanes and shared lane pavement markings. These facilities will be attractive transportation options to a wider audience of people interested in riding bicycles. The recommended bikeway system also seeks to increase the number of crossings of major barriers, including rivers and freeways.

Detailed Route Descriptions

Maps 3 – 8 display the proposed network and are included at the back of this plan. Appendix J provides detailed project descriptions and includes facility lengths and individual project cost opinions.

Objective 1: Continue Expanding the On-Street Bicycle Network

Supporting Policies

- 1.1 Provide equal, and sometime preferential consideration, to bicyclists and pedestrians in the planning, design, and operation of transportation facilities. Utilize a green transportation hierarchy or complete streets policy that begins the transportation design and planning process with the local land use rather than motor vehicle traffic volumes.
 - 1.1.1 Performance Measure: Adopt complete streets policy in 2010.
 - 1.1.2 Best Practices: Portland, OR
- 1.2 Implement the bike lane, bike route and bicycle boulevard network detailed in Maps 3 – 7 and Appendix J of this plan.
 - 1.2.1 Performance Measures: Stripe half of all proposed bicycle lanes by the end of 2010, and all proposed lanes by the end of 2011. Sign all bicycle routes by the end of 2011. Implement at least two segments of bicycle boulevard per year (see 3.1 in this section).
 - 1.2.2 Best Practices: Chicago, IL; Portland, OR
- 1.3 Evaluate the bicycle network for new opportunities, missing links and additional needs on an annual basis and add these to the Proposed Bicycle Network Map.
 - 1.3.1 Performance Measures: Update the Proposed Bicycle Network Map annually.
 - 1.3.2 Best Practices: New York City, NY
- 1.4 Add bicycle facilities to arterial and collector streets as they are reconstructed or resurfaced.
 - 1.4.1 Performance Measures: Accommodate bicycles on all newly reconstructed arterials and collectors.
 - 1.4.2 Best Practices: Portland, OR

Discussion

Bicycle accommodations should be included as a routine part of all transportation projects (1.1). To achieve this, Milwaukee should adopt a “complete streets” policy such as the one detailed in Appendix K. In addition to including bicycle facilities in all transportation planning, this plan specifically calls for the addition of 125 miles of new bicycle lanes, nearly ten miles of bicycle routes and nearly 40 miles of bicycle boulevards to the city’s bicycle network (1.2).

The city’s street network should be regularly evaluated for new and additional opportunities for bicycle facilities, particularly in underserved areas or in areas with missing links between existing facilities (1.3). In particular, the city should evaluate all arterial and collector streets that carry 2,000 or more vehicles per day for the ability to add bicycle lanes. If bicycle lanes are not feasible on specific streets, alternate bicycle treatments should be considered, including shared-lane markings or bicycle route signage. Every effort should be made to accommodate cyclists on reconstructed arterials and collector streets (1.3).

In addition to bicycle facilities such as bike lanes and shared lanes, designated bike routes should be used within Milwaukee to provide continuity between other bicycle facilities (1.4). Bike routes can provide direct routes to popular destinations that are not well served by other facilities or can parallel major roadways that may not be safe or comfortable for bicycle travel.



Milwaukee has a number of buffered bicycle lanes that separate cyclists further from traffic than standard bike lanes

Objective 2: Improve Bicycle Access at Hazard Areas and Across Barriers

Supporting Policies

- 2.1 Sign bicycle routes with “Bicycles May Use Full Lane” R4-11 sign and/or add shared lane pavement markings (MUTCD figure 9C-9) on streets needed to connect bicycle lanes or key destinations where bicycle lanes will not fit due to right-of-way constraints.
 - 2.1.1 Performance Measures: Install R4-11 signs and/or shared lane markings at ten locations by the end of 2011.
 - 2.1.2 Best Practices: Chicago, IL
- 2.2 Work with the County, DNR, WisDOT and USDOT to create a bikeway connection from Veterans Park to South Shore Park as a part of the Hoan Bridge Project.
 - 2.2.1 Performance Measures: Inclusion of a bikeway on any future reconstructed or rebuilt bridge.
 - 2.2.2 Best Practices: Milwaukee, WI (Marsupial Bridge); Austin, TX (Mo-Pac Expressway); Charleston, SC (Cooper River Bridge)
- 2.3 Cover the bicycle portion of any grated bridges with a solid, non-skid material.
 - 2.3.1 Performance Measures: Cover the bicycle lane portion of all grated bridges by the end of 2014.
 - 2.3.2 Best Practices: Chicago, IL
- 2.4 Convert front-in angle parking to parallel parking or back-in angle parking if the number of parking spots must be retained.
 - 2.4.1 Performance Measures: Convert half of all front-in angle parking in the downtown area to back-in or parallel parking by the end of 2011, and convert the remaining parking spaces by the end of 2012.
 - 2.4.2 Best Practices: Seattle, WA; Portland, OR; Wilmington, DE; Washington, D.C.; Indianapolis, IN
- 2.5 Maintain bicycle access through or around construction areas or areas where bikeways are closed for a significant period of time.
 - 2.5.1 Performance Measures: Require all street or building projects that obstruct a bikeway to provide an alternate route by the end of 2011.

Discussion

Milwaukee has numerous freeways, rivers and narrow right-of-ways that present hazards or barriers to cyclists. Many bridges or underpasses crossing these barriers do not allow comfortable access to bicyclists and are a major impediment to increased cycling in the city. Signage should be added to narrow areas alerting both cyclists and motorists to the right of cyclists to use the full travel lane (2.1).

Bridges are particularly problematic for cyclists. The lack of bicycle access on the Hoan Bridge and across the harbor is commonly cited as the greatest physical barrier to cycling in Milwaukee; the City should work to ensure that bicycle access is included on the bridge in the future (2.2). The city should also ensure that lift bridges with metal grate decks have a smooth, nonskid surface in the bicycle lane to reduce hazards (2.3).

Motor vehicles pulling in and out of on-street parking areas often conflict with bicyclists. Angle parking is particularly dangerous, as motorists are often forced to back blindly out of the parking space. Parallel and back-in angle parking provide better visibility when pulling into and out of parking places. Front-in angle parking should be converted to back-in angle parking or parallel parking, which can also provide room to add bicycle lanes to a street (2.4).

When construction projects encroach into the street, it is critical that bicycle access is maintained or that clear, convenient detours for cyclists are provided so that cyclists are no more inconvenienced than drivers (2.5).



It is important to maintain bike access through construction zones, particularly on busy streets

Objective 3: Implement Innovative Facilities to Increase Bicycling Participation

Supporting Policies

- 3.1 Establish a bicycle boulevard/quiet-street network that allows residents to participate in lengthy recreational rides on bicycle designated streets.
 - 3.1.1 Performance Measures: Designate and implement four bicycle boulevards throughout the city by the end of 2011. Continue adding Bicycle Boulevards at a rate of at least two per year.
 - 3.1.2 Best Practices: Portland, OR; Berkeley, CA
- 3.2 Test raised bicycle lanes.
 - 3.2.1 Performance Measures: Pilot at least one section of raised lane in 2011. If successful, continue to implement around the city.
 - 3.2.2 Best Practices: New York, NY; Eugene, OR
- 3.3 Test bicycle boxes throughout the city.
 - 3.3.1 Performance Measures: Implement bicycle boxes at five intersections in 2010. If successful, continue to implement around the city.
 - 3.3.2 Best Practices: Portland, OR; Berkeley, CA; New York, NY
- 3.4 Install shared lane markings throughout the city.
 - 3.4.1 Performance Measures: Implement shared lanes on at least five miles of city streets by the end of 2010. Continue adding shared lanes at a similar rate in future years.
 - 3.4.2 Best Practices: Chicago, IL
- 3.5 Use other innovative facilities detailed in Chapter 6 to increase cycling throughout the City.
 - 3.5.1 Performance Measures: Test at least one non-standard facility/treatment in 2011 and one in 2012.
 - 3.5.2 Best Practices: Portland, OR; New York, NY
- 3.6 Conduct FHWA experiments and lead the nation in implementing and experimenting with new designs for bicycle and roadway facilities.
 - 3.6.1 Performance Measures: Conduct at least one FHWA approved experiment with bicycle facilities by 2012.
 - 3.6.2 Best Practices: New York, NY, Portland, OR

Discussion

Cyclists have a wide range of comfort levels when it comes to riding with traffic: some are confident riding in heavy traffic, while others, particularly novice cyclists or those with children, are very uncomfortable with even moderate levels of traffic. Innovative facilities can offer more timid cyclists, or those who do not cycle at all due to traffic concerns, an environment that is more comfortable and provides fewer interactions with traffic.

Bicycle boulevards offer bicyclists a low-traffic network that connects neighborhoods, parks, schools, trails and other destinations (3.1). These streets benefit local residents who experience lower traffic levels and speeds on their streets. Bicycle boulevards are ideal for areas with few opportunities for trails or bike lanes or to connect areas with lots of children including parks and schools.

Chapter 6 details facilities and non-standard design treatments designed to be more attractive and comfortable for novice and less traffic tolerant bicyclists (3.2 – 3.5). The opportunity to use these innovative facilities should be closely examined when implementing new bicycle facilities, particularly in areas of high conflict between bicycles and motor vehicles. Where appropriate, Milwaukee should implement innovative facilities that may make bicycle travel attractive and more convenient, conduct studies to determine the success of those facilities, and report the results to FHWA (3.6).



Bike boxes provide additional safe space at stoplights and help reduce the incidence of “right hook” conflicts.

Objective 4: Provide Connectivity in the Bicycle Network and Link Key Destinations

Supporting Policies

- 4.1 Provide a bicycle network that equitably serves all Milwaukee residents.
 - 4.1.1 Performance Measures: Provide a bikeway within 0.25 miles of all Milwaukee residents by the end of 2015.
 - 4.1.2 Best Practices: Minneapolis, MN
- 4.2 Ensure that the bike system connects to and integrates with the transit system and other multimodal options.
 - 4.2.1 Performance Measures: Provide bikeways directly serving the airport, the Intermodal Station, and large park-and-ride lots by the end of 2011.
 - 4.2.2 Best Practices: Reagan National Airport (Arlington, VA / Washington DC); Portland International Airport (Portland, OR)
 - 4.2.3 Responsible Department: DPW, MCTS, Milwaukee County Airport Authority
- 4.3 Recommend the provision of secure bicycle parking lockers at transit stations and the airport.
 - 4.3.1 Performance Measures: Recommend the installation of secure bicycle parking by the end of 2010.
 - 4.3.2 Best Practices: Victoria International Airport (British Columbia); Caltrain Commuter Rail Stations
 - 4.3.3 Responsible Department: DPW, MCTS, Milwaukee County Airport Authority
- 4.4 Work with adjoining municipalities to ensure that bicycle network provides connectivity throughout the region.
 - 4.4.1 Best Practices: Minneapolis - St. Paul, MN region

Discussion

Bicycling is a low-cost form of transportation and it is critical that bicycle facilities exist in lower income neighborhoods and neighborhoods with lower rates of car ownership. Additionally, the bicycle network must be equitably distributed throughout the City and provide clear, safe and convenient routes exist to key destinations including schools, cultural centers, employment areas and recreation centers (4.1).

The bicycle network should also connect to Milwaukee County Transit System (MCTS) facilities and stops, as well as the intermodal bus and train station, the airport and park-and-ride lots (4.2). Bicycles greatly expand the reach of transit and other forms of transportation: users can easily bike to or from a bus or train that can then take them across the city or across the state.

However, for bicycles to be a part of multimodal trips, bicyclists must be confident that secure parking exists when they move to their next mode. Bicycle lockers or other secure facilities should be installed at the airport, the intermodal station and park-and-ride lots where bicyclists may need to secure their bicycles for multiple days (4.3).

The bicycle network must also connect to neighboring communities. Bicyclist travel does not end at the City's borders, and the City should work with neighboring municipalities to ensure that facilities connect throughout the region (4.4).



A cyclist loads their bike onto a MCTS bus

Objective 5: Maintain Bicycle Facilities for Safe Use and Operation

Supporting Policies

- 5.1 Sweep all bikeways regularly.
 - 5.1.1 Performance Measures: Sweep priority bikeways weekly and all bikeways at least once every two weeks.
 - 5.1.2 Best Practices: Austin, TX
- 5.2 Provide prompt maintenance of potholes and other pavement damage on bikeways.
 - 5.2.1 Performance Measures: Manually inspect the bicycle network three to four times per year and issue work orders to address maintenance issues. Respond to user complaints within 48 hours.
 - 5.2.2 Best Practices: San Francisco, CA; Austin, TX
- 5.3 Ensure that bicycle lane stripes are repainted before they fade.
 - 5.3.1 Performance Measures: Repaint all bike lane lines annually or more frequently if needed.
- 5.4 Maintain off-street bikeways to the same or higher level as on-street bikeways.
 - 5.4.1 Performance Measures: Sweep all trails on a regular basis; perform maintenance as needed.
 - 5.4.2 Best Practices: Madison, WI
- 5.5 Clear snow from off-street bikeways in a timely manner.
 - 5.5.1 Performance Measures: Plow primary off-street bikeways that the city maintains concurrent with the plowing of nearby streets.
 - 5.5.2 Best Practices: Madison, WI

Discussion

Bicycles are more susceptible to damage than motor vehicles. To provide a safe bicycle network, bicycle facilities must be maintained to the highest level possible.

Bicycle tires are easily damaged by glass or other debris, while sticks, wet leaves, other debris and damaged pavement can pose a crash hazard to bicyclists. Frequent street sweeping and prompt attention to road damage are both necessary to provide a safe bicycle network (5.1 – 5.2).

Bicycle lane lines provide important separation between bicycles and motor vehicles on the road and it is critical that these lines are highly visible. Bicycle lane lines should be repainted annually or as needed (5.3). It is preferable to repaint bike lane lines as soon as snow clears in the spring, so they are fresh for the most heavily used time of year.

It is important to maintain off-street bicycle paths to the same level as on-street facilities (5.4). Because off-street paths and trails do not have vehicles traveling on them, they often need more frequent sweeping than streets to help clear leaves and other debris. Additionally, snow must be cleared from paths immediately after snowfall for the paths to serve as legitimate year-round bicycle transportation facilities (5.5).



Bike lane stripes need to be regularly repainted before they fade

The Off-Street Bicycle Network

Goal

Provide a comprehensive network of off-street trails and paths that connect key destinations and provide recreational opportunities for those who prefer to ride away from motor vehicle traffic.

Off-Street Trails and Connections

In addition to the on-street facilities, this plan recommends continued implementation of the off-street trails recommended in the Off-Street Bikeway Study. In particular, the city should prioritize construction of the South Side Powerline Trail where it runs through the City or along its borders, and should work with adjoining municipalities to ensure the trail is completed through the entire corridor. The North Milwaukee Line should also be prioritized as it provides off-street access to an area of the City with no other off-street facilities. These two trails were not the top priorities described in the Off-Street Bikeway Study; these projects should now be prioritized due to progress on the South Side Powerline Trail by adjoining municipalities and much needed connections in the area of the North Milwaukee Line. Additionally, some projects prioritized in the Off-Street Bikeway Study have had obstacles arise that will keep them from moving forward for the foreseeable future.



The Oak Leaf Trail provides access to scenic park areas in the middle of Milwaukee

Off-street facilities are very popular, but can be difficult to access particularly if they are not at street level. The city should formalize all existing “desire paths” to trails as called for in the Off-Street Bikeway Study. Additionally, the city should construct more connections to existing off-street trails that are grade-separated from the street network, such as the Eastside Trail. This plan calls for adding at least four access ramps to existing grade-separated trails within the city to improve access to the trails.

Table 3: Proposed and Existing City Owned Off-Street Bikeways

Bikeway	Status	Approximate Length (miles)
Riverwest Linear Park	Existing	0.7
KK River Bike Trail	Existing	2.4
South Side Powerline Trail	Proposed	4.2 (9.1 total length)
North Milwaukee Line	Proposed	2.6



The Oak Leaf Trail also links many parks and recreation areas outside the City of Milwaukee

Objective 1: Increase Off-Street Bicycle Facilities and Connections Throughout the City

Supporting Policies

- 1.1 Establish a City Trails program as part of the Milwaukee Bicycle Program.
 - 1.1.1 Performance Measures: Produce a report on the feasibility of a City Trails program including departmental oversight and responsibility by the end of 2011.
 - 1.1.2 Best Practices: Madison, WI; Boulder, CO
- 1.2 Implement the recommendations made in the 2006 City of Milwaukee Off-Street Bikeway Study.
 - 1.2.1 Performance Measures: Implement the Southside Powerline Trail and North Milwaukee line by the end of 2013. Continue implementing trails and recommendations made in the plan.
 - 1.2.2 Best Practices: Boulder, CO
- 1.3 Improve connections to existing trails.
 - 1.3.1 Performance Measures: Formalize existing desire lines to grade-separated trails; add at least four access ramps to grade-separated trails.
 - 1.3.2 Best Practices: Madison, WI
 - 1.3.3 Responsible Department: DPW, Milwaukee County Parks, Wisconsin DNR, National Park Service
- 1.4 Increase the number of off-street facilities throughout the city.
 - 1.4.1 Performance Measures: In cooperation with the County and DNR, add at least five miles of off-street facilities each year for the next five years.
 - 1.4.2 Best Practices: Boulder, CO; Minneapolis, MN
- 1.4.3 Responsible Department: DPW, Milwaukee County Parks, Wisconsin DNR

Discussion

Bicycle trails are extremely popular in Milwaukee. Bicycle counts on portions of the Oak Leaf Trail indicate that hundreds of thousands of cyclists make use of the trail every year. At every meeting regarding the development of this plan there was nearly unanimous agreement that the City should expand the existing trail network.

However, nearly all off-street trails and paths in the City are owned and maintained by Milwaukee County or the Wisconsin Department of Natural Resources. The City should study establishing its own trail program to implement and maintain off-street trails that are not a part of the County or State system (1.1).

The 2006 City of Milwaukee Off-Street Bikeway Study proposed off-street connections and trails that can provide bicycle access around or across major barriers in the city. Implementing the recommendations in the plan will greatly expand bicycle access throughout the city while also creating off-street facilities that are comfortable for bicyclists of all ages and skill levels to use (1.2 – 1.3).

In addition to studying implementing its own trail system, the City should actively work with the County and DNR to expand the off-street network throughout the city (1.4). This effort should focus on crossing major barriers as well as providing continuous corridors that run north-south and east-west through the city.



An informal "desire path" linking to an off-street trail

Objective 2: Create Officially Designated Places for Mountain Biking and BMX Riding

Supporting Policies

- 2.1 Work with local volunteers to design, build and maintain mountain bike trails in the City of Milwaukee.
 - 2.1.1 Performance Measures: Designate at least five miles of official mountain bike trails by 2011. Continue to expand network at a similar rate in future years.
 - 2.1.2 Best Practices: Milwaukee County Parks Department.
- 2.2 Work with local volunteers to design, build and maintain a dirt BMX track.
 - 2.2.1 Performance Measures: Build one American Bicycle Association sanctioned BMX track in the city by 2012.
 - 2.2.2 Best Practices: Boulder, CO
- 2.3 Work with local volunteers to design, build and maintain pump tracks (short dirt tracks with berms and rollers that allow riders to practice technical skills) in neighborhoods in the City of Milwaukee.
 - 2.3.1 Performance Measures: Build one pump track in the city by 2011.
 - 2.3.2 Best Practices: Seattle, WA

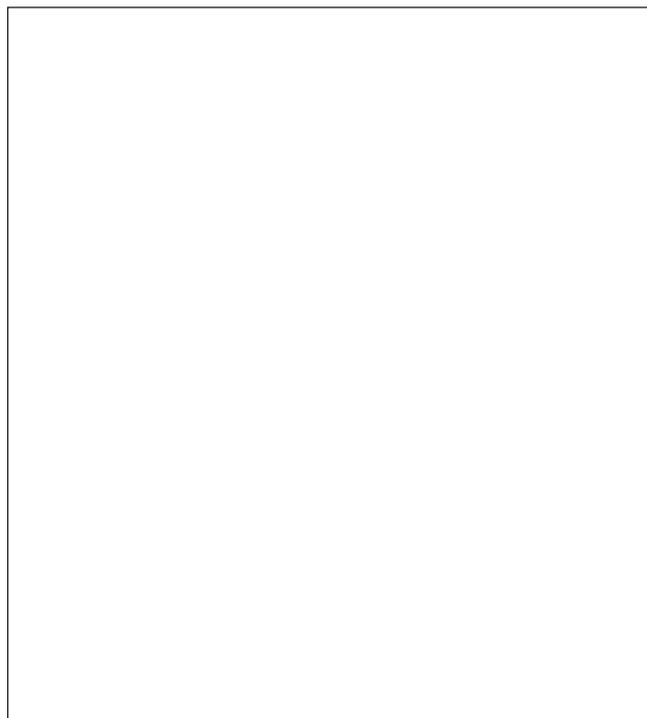
Discussion

Mountain biking and BMX are very popular recreational activities and sports. Yet because there are no legally designated trails or tracks for mountain bikers and BMX riders to use, they build their own illegal trails and tracks where they find open land.

There are now more than 50 miles of illegal single track trails along the Milwaukee and Menomonee Rivers, railroad tracks and through the Milwaukee lakefront parks. Many of these trails have been used by cyclists and hikers for 50 years or more. Most of them have now been mapped using GIS technology. Because these trails and tracks are built by users, there are often conflicts and some of the trails are on private property.

To address the need for such trails, the local communities of mountain bike and BMX riders have organized and worked with the County Parks Department, private land owners and other surrounding communities to designate official trails. These riders have been trained in the design, construction and maintenance of such trails so they are built in a sustainable way.

This plan recommends the City of Milwaukee work with interested volunteers to facilitate the designation, construction and regular maintenance of mountain bike trails, a BMX track and several small pump tracks in the city (2.1 – 2.3).



BMX racing at the ABA track in Franklin

Support Infrastructure

Goal

Provide the support infrastructure necessary to encourage and support bicycling throughout the City of Milwaukee.

A Robust Support System

For cycling to be a viable form of transportation, a system of support facilities must be in place in addition to bicycle infrastructure such as bike lanes and shared-use paths. Providing informational signage, including directions and distances to popular destinations, clearly marked bike routes and maps of the bicycle network can help cyclists easily get to their destination. Once at their destination, cyclists must be certain that there will be secure places to lock their bikes. Providing this support infrastructure ensures that bicycles can serve as a viable form of recreation and transportation in Milwaukee.



Beans & Barley Deli and Market on North Avenue offers convenient bicycle parking for patrons.

Facility Recommendations

Objective 1: Ensure That the Bicycle Network is Clearly Identified and Easy to Use

Supporting Policies

- 1.1 Provide ample bike lane and route signage.
 - 1.1.1 Performance Measures: Sign all bicycle lanes and routes to MUTCD and WisDOT standards by the end of 2011.
 - 1.1.2 Best Practices: Chicago, IL
- 1.2 Provide ample directional and location signage throughout the bicycle network.
 - 1.2.1 Performance Measures: Provide network signage at 20 key points around the city by the end of 2011. Provide directional signage on all major bicycle lanes and routes by the end of 2011.
 - 1.2.2 Best Practices: Berkeley, CA; Chicago, IL
- 1.3 Provide a simple, easy to use on-line mapping tool for bicycle facilities.
 - 1.3.1 Performance Measures: Provide an online bicycle map and routing system by the end of 2011.
 - 1.3.2 Best Practices: Broward County, FL (<http://maps.fiu.edu/mpobike/index.html>)
- 1.4 Ensure that free city bicycle maps are available for distribution throughout the city.
 - 1.4.1 Performance Measures: Print enough maps annually to meet demand and distribute to local bike shops and other areas for distribution.
 - 1.4.2 Best Practices: Madison, WI
- 1.5 Begin tracking the presence and status of bicycle facilities in the DIME and WISLR roadway data databases.
 - 1.5.1 Performance Measures: Add bikeway categories and coding to the DIME system in 2010 and begin tracking status immediately. Request that WisDOT add bikeway categories to WISLR in 2010.
 - 1.5.2 Responsible Department: DPW, WisDOT

Discussion

Signage for bicycle lanes, routes and boulevards indicate to both bicyclists and motorists that bicycles belong on the street (1.1). Additionally, signage should allow bicyclists to quickly and clearly identify where they are within the bicycle network, the direction to popular destinations, and the distance to and how long it will take them to get there (1.2). Directional signage is particularly important for new bicyclists and visitors to Milwaukee who may not be familiar with the bicycle network.

Signage should clearly indicate trail heads, trail connections, trail routes and destinations. It may be valuable to work with County to name specific sections of the Oak Leaf Trail to ease identification. Signage should follow the requirements described in the MUTCD and the WisDOT FDM.

Residents have become accustomed to easily accessing maps and directions online. The City should provide an interactive, easy to use online mapping system that builds on existing GIS data (1.3). Additionally, the City should make this data accessible via mobile phones, either through a mobile web page or applications dedicated to specific mobile platforms. The City should also ensure that print maps are widely available throughout the city (1.4)

Tracking the presence and status of bikeways in the DIME and WISLR roadway databases will allow the city and other agencies to better map, plan and maintain the network (1.5).



On- and off-street bicycle facilities and trail connections should be well signed

Objective 2: Provide Ample Bicycle Parking Throughout the City

Supporting Policies

- 2.1 Implement the recommendations of the 2007 Milwaukee Bicycle Parking Project Report.
 - 2.1.1 Performance Measures: Install racks to achieve a rate of one rack for every 250 residents by the end of 2012.
 - 2.1.2 Best practices: Portland, OR
- 2.2 Produce a flier with acceptable rack guidelines for business owners and developers.
 - 2.2.1 Performance Measures: Produce an information flier with bicycle parking and rack guidelines and require its inclusion with all relevant building permits.
 - 2.2.2 Best Practices: Cambridge, MA
- 2.3 Fund a program to continue providing bicycle racks to businesses that request them.
 - 2.3.1 Performance Measures: Ensure that 100% or requests can be met every year.
 - 2.3.2 Best Practices: Cambridge, MA
- 2.4 Provide bicycle parking at all City workplaces.
 - 2.4.1 Performance Measures: Provide a minimum of one bicycle rack for every ten employees at all City employment centers by the end of 2010. Provide bicycle lockers or secure indoor bike parking at the City's three largest employment centers by the end of 2011.
 - 2.4.2 Best Practices: Portland, OR
- 2.5 Fund a program to maintain or replace existing racks that are damaged or rusting.
 - 2.5.1 Performance Measures: Establish a program to regularly inspect all racks in the public right of way and repair or replace damaged ones.
- 2.6 Require attended bicycle parking at large events and sporting events.
 - 2.6.1 Performance Measures: Require events requesting a street closure with expected attendance of over 2,000 people to offer attended bicycle parking for attendees.
 - 2.6.2 Best Practices: San Francisco, CA

Discussion

For bicycling to be a viable transportation option, there must be plentiful secure bicycle parking throughout the city. The 2007 Milwaukee Bicycle Parking Project Report found that Milwaukee provides approximately one bicycle rack for every 298 residents, a rate that compares poorly with peer cities. The City should continue to implement the recommendations of the 2007 report (2.1)

The Association of Pedestrian and Bicycle Professionals publishes model Bicycle Parking Guidelines that address acceptable size, type, material, placement and maintenance of bike racks and can be tailored to Milwaukee. The City should produce a brief flier summarizing acceptable rack types and placement that should be included with all permits for construction of new commercial, industrial, office and multi-family housing (2.2).

The City can increase bicycle parking by continuing its program of furnishing bicycle racks to all businesses requesting them for installation in the public right of way (2.3). The City should also lead by example by providing bicycle lockers or indoor bicycle rooms at all municipal employment locations with over ten employees (2.4).

Many existing racks in the city are damaged or rusting, but there is no regular maintenance program to repair or replace them. As part of the Bicycle Program, the City should regularly assess the condition of all racks in the public right of way and repair or replace those that are damaged or rusting (2.5).

The city should require attended bicycle parking (valet parking) at large public events both to promote cycling and to reduce motor vehicle congestion at such events (2.6). The City of San Francisco has had success with their mandatory bike valet parking ordinance.



Bicycle parking quickly fills up at popular destinations.

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Program Recommendations



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Milwaukee Bicycle Program

Goal

Establish a funded bicycle program within the Department of Public Works.

Bicycling is affordable transportation

Bicycling is an affordable form of transportation. It is affordable for users who can purchase new or used bicycles for a fraction of the cost of a motor vehicle. It is also affordable for the city as a well-connected bicycle network will cost only a fraction of what the city currently spends on transportation each year. Bicycle improvements in Milwaukee have historically been funded on a piecemeal basis, with most of the funding coming from state and federal transportation grants. For Milwaukee to support bicycling as a viable means of transportation a dedicated source of funding must be created just as one is for motor vehicle transportation. A relatively modest investment in cycling will provide matching funds for state and federal grant money, staff to oversee the program, and the ability to become a world-class city for cycling.



Milwaukee cyclists don't let rain, snow and other adverse weather keep them off their bikes.

Program Recommendations

Objective 1: Fund a Milwaukee Bicycle Program

Supporting Policies

- 1.1 Create a dedicated \$450,000 budget to be used to fund bicycle and pedestrian programming in Milwaukee.
 - 1.1.1 Strategy: Funding will be used for local match on federal grants.
 - 1.1.2 Strategy: Funding will be used for maintenance of bicycle lanes.
 - 1.1.3 Strategy: Budget will be used for capital expenditures on new bicycle facilities.
 - 1.1.4 Strategy: Budget will be used for a SmartTrips style targeted marketing program.
 - 1.1.5 Strategy: Budget will be used for printed materials such as bicycle maps.
 - 1.1.6 Strategy: Budget will be used to fund bicycle and pedestrian safety education programs.
 - 1.1.7 Performance Measures: A budget category for bicycling by the end of 2011.
 - 1.1.8 Best Practices: Seattle, WA; Scottsdale, AZ
- 1.2 Increase the number of staff dedicated full-time bicycle and pedestrian issues.
 - 1.2.1 Performance Measures: Add one FTE staff member by the end of 2013.
 - 1.2.2 Best Practices: Portland, OR; Chicago, IL
- 1.3 Add a student-intern staff to the bicycle and pedestrian staff similar to the Traffic Engineering section.
 - 1.3.1 Performance Measures: Weekly intern hours should equal at least one FTE. Begin intern program in time for the beginning of the 2011 school year.
 - 1.3.2 Best Practices: Chicago, IL

Discussion

Milwaukee has invested \$9.8 million in bicycle facilities, all without a segregated budget for cycling. The city's piece-meal investments in bicycle facilities have been successful to this point. However, to truly become a world-class city for cycling, bicycle planning and investment must be done on a long-term basis as it is for every other city department. Building infrastructure and creating programs that nurture and support cycling takes years, and those programs and infrastructure cannot be accomplished if future funding is unknown. In order to better plan for these investments and to maintain Milwaukee's existing and growing bicycle facilities, a dedicated funding source must be created (1.1).

Currently Milwaukee has one employee responsible for bicycle and pedestrian issues. That same employee has additional duties related to streetscaping and traffic calming. To increase bicycling in Milwaukee and to be recognized as one of the world's best cities to bike in, the City needs to increase the staff dedicated to these issues (1.2). This plan recommends the City dedicate additional staff for bicycle and pedestrian issues.

In addition to adding full-time staff, the city should add dedicated high school and college student interns to the program. Internships can focus on marketing, planning, GIS, engineering and public relations (1.3).



Building cycling infrastructure requires long-term funding and knowledge about future budgets.

Objective 2: Increase Bicycle Access in the Central Business District

Supporting Policies

- 2.1 Conduct in-depth, multi-modal study of downtown focused on lane and parking configurations.
 - 2.1.1 Performance Measures: Complete a multimodal study that includes lane and parking configuration recommendations by the end of 2011.
- 2.2 Ensure that the Downtown Master Plan accommodates bicyclists both on the street and in parking and other facilities.
 - 2.2.1 Performance Measures: Inclusion of bicycle specific goals in the Downtown Master Plan that align with the goals of this plan.
 - 2.2.2 Responsible Department: Department of City Development

Discussion

Milwaukee's downtown has high levels of bicycle, pedestrian, private motor vehicle and bus usage. These users often come into conflict due to the design of transportation and pedestrian facilities. An in-depth multi-modal study should determine how these different modes of transportation can operate more safely and efficiently together (2.1). The study should make special note of bicycle and motor vehicle parking in the downtown area and conflicts between bicycles and motor vehicle parking. The study should have a goal of more consistent parking and lane patterns that take into account the contiguous land use and bicycle access.

The Downtown Master Plan will guide development in the downtown area for the next ten years. It is imperative that the plan provide for bicycle lanes, ample bicycle parking and other accommodations so that bicycles are an attractive and efficient means of getting around downtown. The recommendations of this plan should be integrated into the Downtown Master Plan (2.2).



Downtown Milwaukee has large numbers of cyclists. Downtown planning efforts should focus on the safe and efficient accommodation of cyclists, motorists and pedestrians.

Objective 3: Pilot a Bicycle Sharing Program

Supporting Policies

- 3.1 Gather local support for a bike sharing program.
 - 3.1.1 Performance Measures: Identify key stakeholders, including UWM, major employers, non-profits, other major education centers and major institutions; hold several public meetings.
 - 3.1.2 Best Practices: Arlington, VA; Boston, MA; Philadelphia, PA
- 3.2 Research program technology, planning and funding options.
 - 3.2.1 Performance Measures: Issue a Request for Information, perform a feasibility study, or perform research in-house, depending on resources and timeline.
 - 3.2.2 Best Practices: New York, NY; Philadelphia, PA; Broward County, FL; Santa Clara County, CA; Boston, MA; Minneapolis, MN
- 3.3 Plan and procure the system.
 - 3.3.1 Performance Measures: Issue a Request for Proposals or sole source for equipment and management. Involve stakeholders. View contractor as a partner to evaluate station locations, branding/marketing and system size.
 - 3.3.2 Best Practices: Boston, MA; Melbourne, Australia; Arlington VA
- 3.4 Launch the program.
 - 3.4.1 Performance measures: Perform pre-launch membership sales, employer/institution special membership; gain free PR to maximize initial membership
 - 3.4.2 Best Practices: Montreal, Quebec
- 3.5 Ongoing operations and program enlargement.
 - 3.5.1 Performance Measures: Strong bicycle maintenance and bike distribution to ensure good user experience, continued grassroots efforts with stakeholders and non-profits to ensure local 'ownership' of the system as well as continued desired growth in density and reach
 - 3.5.2 Best Practices: Montreal, Quebec; Paris, France; Lyon, France

Discussion

Bicycle sharing is a form of public transportation that is gaining momentum globally to help cities become greener, quieter and healthier places to live. It is a unique opportunity to convert non-bicyclists to cycling and to increase the visibility of bicycles.

There is currently only one large-scale bicycle share system in operation in North America, in Montreal, Quebec, Canada. However, the success of these systems in Europe has spurred strong interest in the United States. Currently, Arlington, VA, Boston, MA, Minneapolis, MN, Denver, CO and Miami, FL are planning to launch bicycle sharing systems in 2010.

One key to successful bicycle sharing systems is density. Stations should be located frequently so as to always be convenient, and there should be more bicycle docks located at major transportation hubs, employment centers, entertainment areas and large institutions. With downtown Milwaukee covering an area of approximately 1.5 square miles, a system consisting of approximately 500 bicycles and 40 stations would be appropriate. A well designed pilot program of 100 bikes in a small area is a potential mechanism to gain momentum for a larger program.

Funding for the initial capital outlay is the key planning step. Options include federal transportation funds, local funds, private sponsors and advertising.



Bike sharing programs can help travelers complete the “last mile” of a transit trip and provide convenient accessibility within a city.

Education Programs

Goal

Increase the safety of bicyclists by educating all road users on applicable laws and how to share the road.

Share the Road

Educating motorists and bicyclists to share the road will establish safer, more inviting streets for bicycling. Many cyclists, motorists and pedestrians are not aware of their legal responsibilities on the street, as well as their responsibilities toward other users of the streets. This commonly results in motorists who do not respect the rights of cyclists and pedestrians as well as cyclists who do not operate their bike in a legal manner. Increasing education for all street users will result in a safer transportation system.



Bike camps offered to Milwaukee students are popular and fun ways to teach youths about safe cycling.

Objective 1: Provide Regular Bicycle Education to City Residents

Supporting Policies

- 1.1 Provide bicycle and pedestrian education to all students enrolled in a Milwaukee elementary school.
 - 1.1.1 Performance Measures: Provide bicycle education in 25% of all Milwaukee elementary schools by 2012, 50% by 2014, and 100% 2016.
 - 1.1.2 Best Practices: Marin County, CA
- 1.2 Provide education to road users and pedestrians through targeted enforcement when new facilities are implemented.
 - 1.2.1 Performance Measures: Conduct at least one targeted education program annually related to new bicycle facilities.
 - 1.2.2 Best Practices: Portland, OR
- 1.3 Partner with the Bicycle Federation of Wisconsin or other educational organizations to offer regular teen and adult bicycling classes.
 - 1.3.1 Performance Measures: Ensure that adult and teen bicycle education classes are offered regularly beginning in 2011.
 - 1.3.2 Best Practices: League of American Bicyclists
- 1.4 Offer Share the Road education classes in lieu of a fine for first time minor traffic offenses.
 - 1.4.1 Performance Measures: If approved by the court system, offer deterrence classes beginning in 2011 to first time traffic offenders.
 - 1.4.2 Best Practices: Legacy Health Courses
 - 1.4.3 Responsible Department: Milwaukee Municipal Court; MPD
- 1.5 Expand the existing Downtown Ambassadors program to include Bike Ambassadors.
 - 1.5.1 Performance measures: Implement a Bicycle Ambassadors program by June 2011.
 - 1.5.2 Best Practices: Chicago, IL
- 1.6 Require share the road training for all municipal vehicle drivers and work with MCTS to train all transit drivers.
 - 1.6.1 Performance Measures: Ensure that all municipal vehicle drivers have received training by the end of 2012. Although bicycles are legal vehicles on the road, very few individuals receive formal bicycle education. This often results in poor awareness of the rules of the road as they apply to bicycles, as well as poor bicycle handling skills, particularly among youths. Bicycle education should be offered in many different forms to different segments of the population. Specific program recommendations are found in Appendix L.

Discussion

Bicycle and pedestrian education should be offered to all Milwaukee students, ideally between fourth and sixth grade, through the Safe Routes to School (SRTS) program (1.1). Federal funding is available on a competitive basis for SRTS programs as well as other bicycle education programs and opportunities for federal funds should be pursued whenever possible.

When new facilities such as bike boxes, bike boulevards or raised bike lanes are implemented, targeted education campaigns should be conducted to educate motorists and cyclists to the use and benefits of the new facility (1.2). This can be accomplished through advertising and PSAs, or by distributing flyers to cyclists and motorists near the facilities.

Teenagers and adults are also often lacking in bicycle knowledge and skills and should have educational opportunities made available to them (1.3). The League of American Bicyclists' Smart Cycling program and other educational programs teach safe bicycling and other techniques and can be offered through partner agencies.

Some jurisdictions offer driver education courses in lieu of a for minor traffic offences. The city should offer a Share the Road course that increases awareness of bicycle and pedestrian issues (1.4).

Bicycle Ambassadors educate bicyclists, pedestrians and motorists on the rules of the road and bicycle and pedestrian safety. The existing Downtown Ambassadors program should be expanded to include Bike Ambassadors who can assist and educate cyclists throughout the city (1.5).

City vehicles and MCTS buses make up a large share of the large vehicles on city streets. All drivers of these vehicles should be required to attend share the road bicycle education courses as a part of their ongoing training (1.6).

Encouragement Programs

Goal

Increase bicycling in Milwaukee through public and private encouragement events.

Encouraging Cycling Throughout the City

Chapter 2 of this plan describes the spectrum of bicyclists in Milwaukee, from those who will never consider biking to those who ride in any and all conditions and weather. In between those two extremes is a large group of residents who are open to cycling, but need a bit of encouragement. Formal encouragement programs, including programs to help residents purchase bicycles, organized rides and media that educates and encourages can go a long way toward increasing the level of cycling in Milwaukee.



Participants in a 24-hour race through Milwaukee neighborhoods pose for a group photo at the finish. Events like this encourage more cycling in the city.

Program Recommendations

Objective 1: Support Cost Effective Encouragement Events, Programs and Organizations

Supporting Policies

- 1.1 Support the events and programs of groups promoting bicycling.
 - 1.1.1 Performance Measure: Publicize significant local bicycle events, programs and non-profit group in appropriate city Web sites and publications, beginning in 2010.
 - 1.1.2 Responsible Department: DPW, DPH, DCD, Office of Environmental Sustainability (OES)
- 1.2 Encourage non-profit retail bike shop and bike education opportunities in underserved communities.
 - 1.2.1 Performance Measures: When the city has opportunities to do so, they will provide assistance to groups that wish to facilitate bike programs.
 - 1.2.2 Best Practices: Milwaukee Bicycle Collective; Dreambikes, Madison, WI; Community Cycling Center, Portland, OR; Blackstone Cycle Works, Chicago, IL; BICAS, Tucson, AZ; Freeride, Pittsburgh, PA
 - 1.2.3 Responsible Departments: DPW, DCD
- 1.3 Offer mini-grant opportunities that support community efforts that encourage bicycling, particularly to infrequent cyclists.
 - 1.3.1 Performance Measures: Use a portion of the Milwaukee by Bike program budget to offer mini-grants to applicants.
 - 1.3.2 Responsible Departments: DCD, DPW, OES

Discussion

Many people are interested in cycling more often but need encouragement to actually begin riding. For some, access to a bicycle or parts is paramount; others need training in how to ride safely; others may want to find a group to ride with. Although bicycles can provide a low-cost form of transportation, many individuals cannot afford to purchase one for themselves or for their children. To increase transportation options, improve accessibility, and improve public health, the city should promote programs and organizations that work to make bicycles available to anyone desiring one (1.1).

Although Milwaukee has numerous bicycle shops, the majority of the city does not have access to local shops. This makes it difficult for residents to purchase bicycles and necessary accessories as well as have maintenance performed. Small shops, non-profits and “Do It Yourself” shops can provide access to inexpensive used bicycles, parts and services in areas without access to these services currently. Additionally, non-profit groups can provide the encouragement, training and resources needed to get more Milwaukee residents on bikes. Supporting non-profit groups is a cost-effective way to reach people interested in bicycling who may need some encouragement (1.2).

Mini-grants offered by the city can fund community efforts to encourage cycling. These grants should be made available to neighborhood groups and others on a competitive basis to increase cycling in targeted areas (1.3).



Students learning to repair bikes at the Bicycle Federation's North Division Shop.

Objective 2: Provide Top-Notch Bicycle Publications and Media Materials

Supporting Policies

- 2.1 Update the Milwaukee by Bike promotional study and implement its recommendations.
 - 2.1.1 Performance Measures: Produce a new Milwaukee by Bike promotional guide by the end of 2011.
- 2.2 Develop a logo for Milwaukee by bike that is used on all city webpages, publications, and media.
 - 2.2.1 Performance Measures: Produce a logo by the end of June 2010.
- 2.3 Partner with media outlets for PSAs and other bike-positive stories.
 - 2.3.1 Performance Measures: Create and run at least one print and one video PSA by 2011; target at least one positive cycling story in local media per month.
- 2.4 Update all publications annually.
 - 2.4.1 Performance Measures: Ensure that all bicycle publications, including maps and brochures, are updated annually.
- 2.5 Identify and produce new bicycle publications that may be needed.
 - 2.5.1 Performance Measures: Create fliers or other media to educate users about bike boxes, bicycle parking, commuting by bike, and other topic areas. Print all media in English and Spanish.
 - 2.5.2 Best Practices: Pittsburgh, PA; Chicago, IL
- 2.6 Target promotional materials at specific groups or neighborhoods to increase bicycle usage.
 - 2.6.1 Performance Measures: Implement a funded SmartTrips targeted marketing campaign as part of the Bicycle Program by the end of 2011.
 - 2.6.2 Best Practices: St. Paul, MN
- 2.7 Utilize innovative communication technology such as Facebook, Twitter, Ning and other social networking sites to promote cycling.
 - 2.7.1 Performance measure: Establish and regularly update a Milwaukee by Bike Facebook and Twitter account in 2010.

Discussion

The 2002 Milwaukee by Bike promotional study outlined ways for the City to actively promote and encourage bicycling. The conclusions and recommendations of the study are still valid, but large shifts have occurred in media and promotion. Chapter 5 provides brief branding and promotional recommendations, but the city should update the Milwaukee by Bike Study as a formal guide that outlines media strategies to encourage bicycling in Milwaukee (2.1 – 2.3).

The city bicycle map and other bicycle safety and educational fliers should be updated annually (2.4). These materials should be widely available throughout the city in both English and Spanish and should be provided on the City's bicycling webpage.

New facilities, such as shared-lane markings and bicycle boxes can be confusing for both cyclists and motorists. As new facilities are implemented, educational materials should be produced that can be distributed to the public, particularly during enforcement activities by the Milwaukee Police Department (2.5).

Targeted marketing materials, sometimes called the SmartTrips program, can have a great impact on increasing bicycle mode share. Such a program should be undertaken in partnership with other City or County agencies to encourage bicycling (2.6).

Social networking sites have gained widespread usage, particularly with younger residents. By utilizing such sites, the City can update residents on infrastructure projects, encouragement activities, and other bicycle related news and events (2.7). These sites can also publicize stolen bicycles that have been registered with the city.



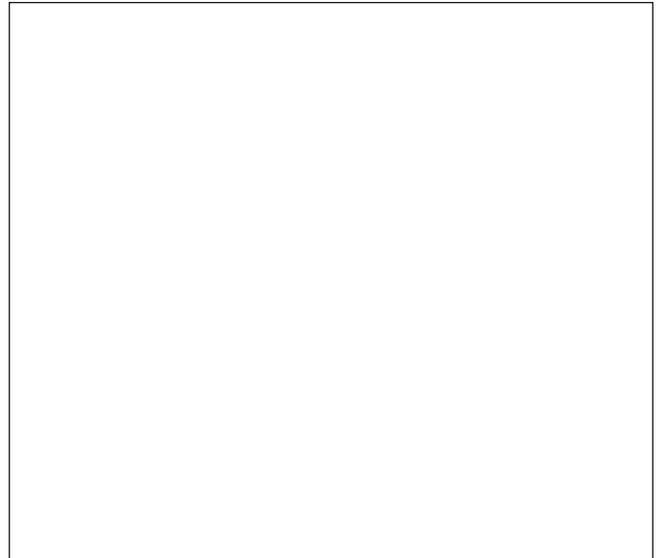
Enforcement Programs

Goal

Increase bicyclist safety by better enforcing the rules of the road for all street users.

Applying the Law to all Road Users

When users of the roadway follow the “rules of the road,” Milwaukee’s transportation system is safe and efficient – it is when users break the law that this system begins to break down. Both motor vehicle drivers and cyclists are guilty of violating regulations designed for safety. However, when a crash occurs between a motor vehicle and a cyclist, the cyclist always comes out on the losing end. It is important that the rules of the road are enforced for all road users, cyclists, motorists and pedestrians. This enforcement effort should focus on those infractions that most imperil cyclists and pedestrians including speeding, right-of-way violations and dangerous passing.



Need photo and caption

Objective 1: Ensure That Milwaukee Police Understand Bicycle Issues

Supporting Policies

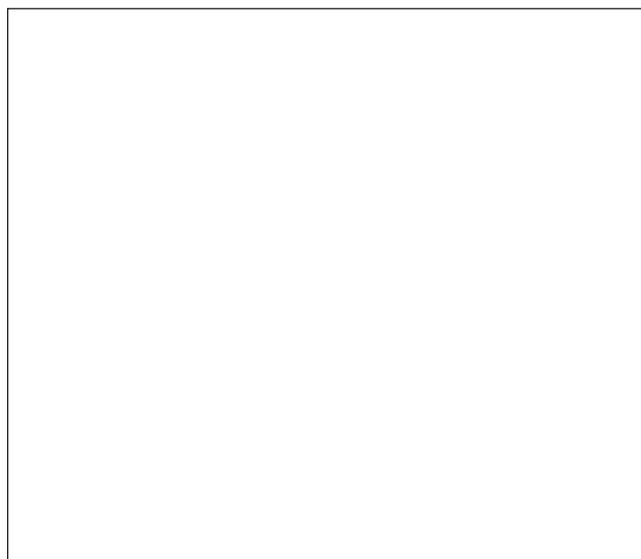
- 1.1 Work with MPD to appoint a police department bicycle liaison.
 - 1.1.1 Performance Measures: Appoint a police department bicycle liaison by the end of 2010.
 - 1.1.2 Best Practices: Portland, OR
 - 1.1.3 Responsible Department: DPW, MPD
- 1.2 Increase the number of Milwaukee police specially trained for bicycle safety enforcement.
 - 1.2.1 Performance Measures: Provide 2 – 3 bicycle law enforcement training sessions annually. Programs such as WisDOT's Enforcement for Bicycle Safety cover appropriate issues and count toward Wisconsin Department of Justice training.
 - 1.2.2 Best Practices: Portland, OR
 - 1.2.3 Responsible Department: MPD
- 1.3 Educate police officers on bicycle safety issues.
 - 1.3.1 Performance Measures: Offer Wisconsin Pedestrian & Bicycle Law Enforcement Training Course on a biennial basis as part of regular required police officer training.
 - 1.3.2 Responsible Department: MPD

Discussion

Personal safety is one of the top concerns of cyclists and one of the top reasons many people report for not bicycling. Safety issues can partially be addressed through more aggressive education and through better enforcement of existing traffic laws.

A formal police department bicycle liaison should focus on bicycle issues within the department (1.1). The liaison should have a permanent position on the Milwaukee Bicycle and Pedestrian Task Force. Additionally, the liaison can focus on increasing police awareness of the behaviors by both motorists and bicyclists that create the greatest risks of a crash. Proper education can increase police awareness of bicycle safety issues while also counting for mandatory on-going training.

For police officers to properly enforce traffic laws relating to bicycles, they must be aware of the activities by motorists and cyclists that pose the greatest risk to cyclists. Regular bicycle related training for all Milwaukee police will help increase their understanding of dangerous activities and allow them to better enforce existing laws while also educating residents on safe behaviors (1.2 - 1.3).



Enforcement is an important component of teaching safe cycling behavior

Objective 2: Better Enforce Existing Traffic Laws for Both Motorists and Bicyclists

Supporting Policies

- 2.1 Work with MPD to better enforce all traffic violations, particularly failure to yield, speeding and safe passing distance violations.
 - 2.1.1 Responsible Department: DPW, MPD
- 2.2 Increase enforcement of traffic violations by bicyclists.
 - 2.2.1 Performance Measures: Double the amount of targeted bicycle law enforcement by 2015.
 - 2.2.2 Best Practices: Madison, WI
 - 2.2.3 Responsible Department: DPW, MPD
- 2.3 Increase funding and support for the MPD bicycle unit.
 - 2.3.1 Performance Measures: Expand the number of police officers in the bicycle unit from 60 to 100 by the end of 2012. Include funding for new police bicycles every year as well as for special clothing and equipment required by bicycle unit.
 - 2.3.2 Best Practices: San Antonio, TX
 - 2.3.3 Responsible Department: DPW, MPD
- 2.4 Improve police reporting of all bike crashes and conduct annual crash analysis to determine problem areas that may require infrastructure improvements or enforcement efforts.
 - 2.4.1 Performance Measures: Annual crash analysis published beginning in 2012.
 - 2.4.2 Responsible Department: DPW, MPD
- 2.5 Implement 24-hour speed zones around all parks and schools
 - 2.5.1 Performance Measures: Request permission from WisDOT to implement 15 mph speed zones by the end of 2011. If approved, begin implementing such zones in 2012.
 - 2.5.2 Best Practices: State of Arizona

Discussion

The Milwaukee Police Department (MPD) should better enforce existing traffic laws, particularly those that pose the greatest risks to cyclists and pedestrians (2.1 – 2.2). These include failure to yield by drivers and cyclists, speeding and close passing by drivers, dangerous riding by cyclists and cycling at night without reflectors or lights. Enforcement in these areas should focus on education, rather than issuing citations, at least for first-time offenders.

The Milwaukee Police Department currently receives \$4,000 annually for targeted bicycle enforcement through WisDOT Bureau of Transportation Safety grants. These grants pay police officers who volunteer to work overtime for bicycle law enforcement in areas of high bicycle traffic. This funding should be increased to allow for additional target enforcement (2.3).

The Milwaukee Police Department bicycle unit is a valuable resource: its members are more accessible to the public than officers in cars, can easily patrol areas not accessible by cars, can respond quickly in crowded or heavy traffic conditions, and the unit provides positive public relations for the department. Expanding funding for the bicycle unit can strengthen the police department at minimal cost (2.3).

Bicycle crashes are widely underreported, particularly when no motor vehicle is involved. This makes it difficult to analyze problem intersections or other areas that may need attention to increase safety. To properly report crashes involving bikes, police must be trained in the risk factors in bicycle crashes and the department must require reporting of crashes even with no injuries and little property damage (2.4).

Children are particularly vulnerable to crashes with motor vehicles as pedestrians and bicyclists because their skills are not fully refined at judging vehicle speeds and distances. Implementing 24-hour speed zones (15 mph) within a two-block radius of all parks and schools will reinforce to motorists the need to be particularly cautious in these areas (2.5).

Evaluation Programs

Goal

Evaluate bicycle facilities and programs to ensure they are effective.

Ensuring needs are being met

It is important that the City evaluate the effectiveness of bicycle facilities and programs, just as it does with other transportation programs. Evaluation should ensure that facilities achieve the goals they were intended to achieve and that they are doing so in a cost effective manner.



Volunteers count cyclists to monitor changes in the level of cycling in the city.

Program Recommendations

Objective 1: Gather Robust Data on Bicycle Usage throughout the City

Supporting Policies

- 1.1 Conduct semi-annual bicycle counts at locations around the city.
 - 1.1.1 Performance Measures: Conduct city-wide bicycle counts during the two national count periods every year.
 - 1.1.2 Best Practices: Portland, OR; Minneapolis, MN
- 1.2 Install automated bicycle counters around the city such as those from Eco-Counter.
 - 1.2.1 Performance Measures: Install four automated counters by the end of 2011.
 - 1.2.2 Best Practices: Vancouver, BC; Montreal, QC
- 1.3 Include bicycle and pedestrian counts in all manual traffic counts.
 - 1.3.1 Performance Measures: Require the inclusion of bicycles and pedestrians in all manual traffic counts by the end of 2010.
- 1.4 Monitor MCTS's Bikes on Buses counts to determine program usage and heavily used corridors that may need additional bicycle parking and support.
 - 1.4.1 Performance Measures: Annually determine the five bus routes with the heaviest bike rack usage and ensure that adequate bicycle facilities and parking exists in those corridors.

Discussion

It is critical that the City of Milwaukee know how many bicyclists are on its streets and where those bicyclists are. Regular bicycle counts at specific locations can provide a more accurate picture of bicycle usage within the city than data provided by the Census Bureau. The city should conduct counts at the same time each year and at many of the same locations so that changes in ridership can be assessed (1.1).

Bicycle counts only provide a snapshot of bicycle usage on a single day. Automated bicycle counters (in-ground loops, video or infrared) can provide data 24 hours a day, year-round (1.2). This data provides a better picture of bicycle usage, regardless of weather conditions or time of day. Locations for counters should be carefully chosen to focus on popular bicycle corridors.

Manual traffic counts are regularly conducted during the planning stages of road projects. Bicycle and pedestrian counts should be included in these counts so as to gather better data on bicycle and pedestrian usage at different locations around the city (1.3).

The Milwaukee County Transit System's bicycle counts can provide the city with useful data regarding bicycle usage on specific bus routes. This data can be used to focus planning for bicycle parking and other facilities (1.4).



Monitoring MCTS Bikes on Buses program can provide information about usage and major bike corridors

Marketing Recommendations



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To increase the visibility of Milwaukee's bicycle efforts, the city should create a unique brand identity that is clearly associated with the program. While efforts of this have been undertaken in the past, they have been largely unsuccessful. Branding the City's bicycle program requires a review of past efforts, adoption of an identifiable logo and color scheme, reworking of the city's bicycling webpage and social networking efforts, and consistent use of templates for all bicycle-related publications.

In 2002, the Bicycle Federation of Wisconsin conducted a branding study for the City of Milwaukee. The Milwaukee by Bike Bicycle Publicity Plan outlined a series of strategies to promote cycling awareness in Milwaukee and increase ridership. While many of the plan's recommendations were accomplished, the campaign failed to create a clear "brand" for the city's bicycling efforts.

Brand Identity

The City of Milwaukee must create a unique and consistent brand identity for all bicycle-related materials. This identity should include:

- A simple, easily identifiable logo. The logo should be clearly identifiable at all sizes, from a logo on a business card to a logo on a large banner used at an event.
- A consistent color scheme that is used on all bicycle-related materials. Colors chosen should complement the logo and should be easily identified with the City's bicycle program.
- A consistent typeface that is used on all bicycle-related materials. All printed materials should use a uniform set of typefaces that are easy to read at all sizes.
- Consistent templates for printed materials. The city should provide printed materials to promote bicycling, including education campaigns and encouragement events. These materials should use consistent templates integrating the logo, colors and typefaces for a unique brand identity.

By creating a unique brand identity, the city can increase the visibility of its bicycle marketing materials.

Logo Recommendations

The City should develop a simple, easily identifiable logo for the bicycle program. Although a logo was developed with the original Milwaukee by Bike publicity plan, it was never put into widespread use. A few new sample logos are provided below.



Webpage Recommendations

The official City of Milwaukee bicycle webpage (<http://www.city.milwaukee.gov/BiketoWork1989.htm>) provides plentiful information about bicycling in Milwaukee, but could use refreshing and reorganization to increase usability. Many of the recommendations that follow are based upon best practices from around the county, particularly the City of Chicago's Bicycle Program (<http://www.chicagobikes.org>).

General Recommendations

The Milwaukee by Bike webpage uses the City of Milwaukee general webpage template. While this limits the design of the page, it is possible to control some aspects of the template. In particular, the Milwaukee by Bike webpage should utilize the color scheme and logo identified above throughout the site to reinforce the brand identity of Milwaukee by Bike.

Content

Much of the information presented on the current Milwaukee by Bike page is of interest only to those interested in bicycle-related planning and policy making. However, the majority of users visiting the site simply want to find a bike route map or learn how to properly lock their bike. Detailed information about bicycle policy and planning should be provided on the site, but it can be deemphasized and moved deeper within the site.

The Milwaukee by Bike webpage should present useful information about bicycling in Milwaukee. This includes route mapping information, events, safety tips, bicycle locking instructions, sharing the road instructions, bikes on transit and other common information. The information should be displayed largely in graphical format, with basic text. All information should be available in Spanish as well as English.

More detailed information about bicycling in Milwaukee should also be included on the webpage, but it should be deemphasized. This should include information about the city's bicycle staff, bicycle planning work, the Bicycle and Pedestrian Steering Committee and other updates.

Recommended Pages, Subpages and Links

- **Bike Maps:** Downloadable, printable maps, as well as on-line mapping and routing, such as that provided by Ride the City (<http://www.ridethecity.com>).
- **Bike Events:** Information about City-sponsored events.
- **Bike Parking and Locking:** Brief descriptions about safely locking a bicycle.
- **Bike Facilities:** Brief descriptions about bike lanes and routes, as well as more detailed descriptions about innovative facilities such as bicycle boxes, raised bike lanes, and sharrows; should be primarily graphics with minimal descriptive text.
- **Bike Trails:** Description about proper trail use and etiquette as well as links to information about the Oak Leaf Trail and the Hank Aaron State Trail.
- **Share the Road:** Information about proper lane positioning, avoiding the door zone and communicating (signaling) to other road users.
- **Bikes on Transit:** Information about using the racks on MCTS buses as well as bike parking near major transit stops.



The annual Santa Rampage gets cyclists out for winter riding

- **Bike Links:** Links to external websites, particularly the Milwaukee by Bike Ning (social networking) site; should include links to local shops, bicycle clubs and other popular bicycling sites.
- **Bike Planning & Laws:** Information about Milwaukee's bicycle planning staff and operations, the Bicycle and Pedestrian Task Force and local and state bicycle laws.

As on the Milwaukee home page, additional graphical links should be included on the right side of every page (as on the City of Milwaukee front page). These should include:

- **Report a Problem:** Link to a form to report a bicycle-facility issue in the City of Milwaukee; information from the form should immediately be sent to the appropriate Department of Public Works manager to address the issue; see the City of Madison's Bikeways Concerns form: <https://www.cityofmadison.com/reportaproblem/bikeway.cfm>
- **Request a Bicycle Rack:** Link to a form to request installation of a bicycle rack by the City; information on the form should immediately be sent to the appropriate Department of Public Works manager to fulfill the request.
- **Milwaukee by Bike Social Networking:** Link to the city's existing Ning page: <http://milwaukeebybike.ning.com/>
- **Follow Us on Facebook:** Link to a Milwaukee by Bike Facebook page maintained by city staff.



The Bike Fed's Shea Schachameyer riding a fish bike at the Cooper School parade

- **Follow Us on Twitter:** Link to a Milwaukee by Bike Twitter page maintained by city staff.

It is critical that requests from the first two links are promptly responded to by city staff. Issues reported on the "Report a Problem" page should be immediately forwarded to the appropriate maintenance department for investigation and resolution. Maintenance issues on bikeways that pose a safety hazard should have a temporary solution in place within 48 hours and a permanent solution within five working days whenever possible. City staff should follow up on requests for bicycle racks within five business days with the goal of fulfilling a request within two weeks if racks are available.

Social Networking Recommendations

The city should maintain a presence on social networking sites to promote cycling and cycling events in and around the city. This is already occurring with the Ning site (<http://milwaukeebybike.ning.com>) maintained by the Bicycle and Pedestrian Coordinator. This site allows registered users to post information on events and happenings, stolen bikes and other bicycle related news. While a useful site, most residents are not familiar with Ning.com and the city should establish a presence on Facebook and Twitter, both of which are very popular, particularly with mobile users. However, the Ning site should continue to be maintained as it allows functionality not found on Facebook and Twitter, particularly the forums that allow user-to-user communication about bicycle and non-bicycle related events.

Facebook is useful to highlight bicycle-specific events whether or not the City is a sponsor of the events, local and regional news stories related to bicycling, and traffic detours or construction that may impact bicyclists. Facebook also allows users to post related stories and events.

Twitter is a resource that is useful for frequently communicating hazard or construction updates to users, as well as information about bicycling events. By allowing a number of approved users from different parts of the City to post updates to the account, the City can quickly spread information about cycling conditions on popular commuting and recreational routes.

It is critical that all social networking sites are updated multiple times a week to maintain user interest and promote the utility of the site to users. The sites must also be monitored by city staff for inappropriate posting

Marketing Recommendations

or spam, particularly in any forums. This frequent updating and monitoring requires dedicated staff time that should not be expected to be carried out by the Bicycle and Pedestrian Coordinator. Internships for students studying web development, marketing and communications or media relations could be offered to help maintain the city's social networking presence up to date and useful for users.

Pamphlet Recommendations

The City should regularly distribute bicycle-related materials to users. These should include pamphlets about the City's bicycle rack request program, safety information including proper use of helmets, bicycle parking and locking, bike lanes, commuting and other information. The City should use a single unified template and color scheme for them, as well as the new Milwaukee by Bike logo. Pamphlets should be widely available throughout the city at bike shops, parks, city buildings and other locations.

Pamphlets should be either 8.5 inches by 5.5 inches (half of a letter size sheet) or postcard size (4.25 by 5.5) on a card stock with full color printing on both sides of the piece. All pieces should be made available in English and Spanish, and the City should regularly evaluate the need for other languages.



Mayor Barrett cycling in to work

Recommended pamphlets include:

- Bicycle facilities
 - Bike lanes
 - Shared lanes
 - Raised lanes
 - Bicycle boxes
 - Bicycle boulevards
 - Other new facilities as they are implemented
- Share the Road
- Share the Trail
- Avoiding the door zone
- Commuting
- Shopping
- Bikes on transit
- Bicycle parking and locking
- Request a bike rack (should direct all users to the city's webpage)

All printed materials should include the Milwaukee by Bike logo, the webpage address, and Facebook and Twitter links. Best practices include materials produced by Bike Pittsburgh (<http://bike-pgh.org/>).

Bike Facility Design Options



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This chapter details bicycle facility design options for the City of Milwaukee. The facilities detailed here build upon current state and federal design guidelines, as well as non-traditional design treatments that may not be found in current guidance. The City of Milwaukee Bicycle Lane Design Guide, the Wisconsin Facilities Development Manual (FDM) and Bicycle Facility Design Handbook, and the Federal Highway Administration's Manual on Uniform Traffic Control Devices should all be consulted before implementing new facilities.

This chapter includes:

- Current Milwaukee design treatments that require updates to meet current best practices or reflect the most current research.
- Treatments that are included in the Wisconsin Bicycle Facility Design Handbook but not included in the City's Bike Lane Design Guide.
- Treatments that are currently in use or under study in other parts of the country but are not included in the Wisconsin Bicycle Facility Design Handbook. These innovative or experimental treatments should be included as supplemental design guidelines for future study and application.

Recommended updates are discussed in the first section of this chapter, while the second section provides updates or new guidance for treatments that fall into the first or second category. The final section of this chapter contains design guidance for treatments that fall into the third category.

Current Milwaukee Design Treatments

Treatments currently included in the City of Milwaukee standard design guidelines are consistent with the federal standards contained in the FHWA's Manual on Uniform Traffic Control Devices and anticipated updates to American Association of State and Highway Transportation Officials (AASHTO)'s Guide for the Development of Bicycle Facilities. These facilities have been updated to ensure that they conform to standards contained in editions of the MUTCD and Guide for the Development of Bicycle Facilities.

Bike Route Striping/Shared Lane Marking

The City's Bike Lane Design Guide contains a standard pavement marking symbol to be painted on bike routes. The design closely resembles that of a Shared Lane Marking or "sharrow" that provides visual clues for cyclists about where they should travel within the roadway to avoid the doors of parked vehicles. This treatment design should follow guidance included in the 2009 MUTCD design guidelines and renamed to 'Shared Lane Markings' for consistency with other bikeway design standards.

Current Wisconsin Design Treatments

These treatments are identified in Wisconsin state guidelines (the FDM the Wisconsin Bicycle Facility Design Handbook) but not in the City's guidelines (e.g., shared use paths). It is recommended that the City follow the state of Wisconsin's guidance in these situations. It should be noted that Wisconsin state guidelines will be updated to conform to standards contained in the 2009 FHWA Manual on Uniform Traffic Control Devices and anticipated updates to American Association of State and Highway Transportation Officials (AASHTO)'s Guide for the Development of Bicycle Facilities.³

Shared Use Paths

In the absence of city-wide design guidelines for shared use pathways, Milwaukee should adopt Wisconsin state guidelines. The current state guidelines provide information on:

- Suggested pathway dimensions
- Sidewalk bikeways
- Design considerations (e.g., design speed, pavement structure and sight distance)
- Intersection design (e.g., path-roadway crossings)
- Lighting
- Signing and marking
- Overpasses and underpasses
- Design of pathways next to roadways
- Interactions of bicycles and other shared use pathway users (e.g., pedestrians, horses and motor vehicles)

³ Anticipated to occur in 2010.

Detailed Design Guidance for On-Street Facilities

State guidelines contain supplemental guidance for on-street facilities; the City should consider this guidance in design of all future on-street facilities. This information covers details of:

- Railroad crossings
- Wide outside lanes
- Paved Shoulders
- Bridges and interchanges
- Pavement quality
- Drainage grates and utility covers
- Intersection design
- Traffic calming
- Bicycles and traffic signals (i.e., bicycle detection, signal loop markings, signal timing and programmed signal heads)
- Left turn bicycle lanes
- Intersections with right-turn lanes

Contra-Flow Bicycle Lane on One-Way Street

Contra-flow bicycle lanes enable bicyclists to ride in the opposite direction of vehicle traffic on one-way streets. Pilot project status and other case studies should be reviewed to determine the status of this design treatment. Several US cities have existing contra-flow bike lanes⁴.

Shared Bicycle/Right-Turn Lane

Places a standard width bicycle lane within a standard right-turn lane. A dashed line delineates space for motorist and bicyclist ensuring proper positioning for bicyclists at intersections⁵.

⁴ Treatment included in state guidelines but not in the MUTCD.

⁵ Treatment included in state guidelines but not in the MUTCD.

Supplemental and Nonstandard Design Treatments

These treatments are not currently found in the City standards, may not be included in the MUTCD and are sometimes considered 'non-standard'. These treatments are recommended for consideration and possible use by the city. Many of these treatments cover specific situations intended to create safer travel conditions for cyclists, pedestrians and motorists alike. Nonstandard treatments can be used when standard bicycle facility treatments do not fit the context of the existing built environment (e.g., narrow rights-of-way or off-angled intersections).

Wide Bicycle Lane Next to On-Street Parallel Parking

Wide bicycle lanes increase the safety of the facility. An update to lane width would be necessary to meet with current best practices.

Bicycle Lane Next to On-Street Diagonal Parking

This treatment improves line-of-sight between motorists and bicyclists, increasing safety for all users. The treatment requires the use of reverse (back-in) diagonal parking that requires motorists to back in to parking spaces.

Bicycle Boulevard

Bicycle boulevards create on-street travel conditions for cyclists that do not wish to ride in bicycle lanes or may not feel comfortable on streets with more motor vehicle traffic. Bicycle boulevards are ideal for streets with relatively low traffic volumes and posted speeds that enable cyclists and motorists to share the same travel lanes.

Bicycle Only Left Turn Pocket

Creates a buffered space in the median accessible only to bicyclists allowing for safe left turning movements.

Bicycle Lanes at Double Right-Turn Intersections

Location of the bike lane prevents motorists in the outside turn lane from turning into bicyclists traveling forward through the intersection.

Colored Bicycle Lanes In Conflict Areas

Colored bicycle lanes alert motorists to approaching conflict areas and help guide bicyclists through difficult transitions.

Bicycle Lanes at Interchanges

Where bicyclists and motorists merge together it may be necessary to provide increased visibility through coloring and/or striping techniques and signage.

Colored Bicycle Lanes

A contrasting color for sections of bicycle lane helps to better delineate space for bicyclists on the roadway.

Bicycle Box – Single Lane - No Vehicle Right Turns

A bicycle box is an extension of the bike lane located at the head of an intersection that can reduce the risk of “right hook” conflicts between motorists and bicyclists by making cyclists more visible to motor vehicles. Motorists are stopped behind an advanced stop bar and restricted from making right turns on red. Bicyclists are able to move to the front of the queue and are the first to move on green.

Bicycle Box – Multi Lane - No Vehicle Right Turns

The same as above, however, this treatment works best to allow bicyclists to make either right or left turn movements ahead of traffic.

Bicycle Box – Multi-Lane - Right Turns Allowed

In some cases bicycle access in unnecessary or restricted and a right-turn only lane for motorists may be provided that does not interfere with bicyclists.

Raised Bicycle Lanes

Raised bicycle lanes have several benefits: they provide a visual and tactile reminder to drivers, provide an element of separation between fast moving traffic and the bike lane, and they have lower maintenance costs due to reduced travel wear.

Cycle Tracks

A cycle track is a hybrid type bicycle facility that combines the experience of a separated path with the on-street infrastructure of a conventional bicycle lane. They provide space that is intended to be exclusively or primarily for bicycles, and is separated from vehicle travel lanes, parking lanes and sidewalks by pavement markings or coloring, bollards, curbs/medians or a combination of these elements.⁶

Detailed Design Treatments

The remainder of this chapter details the design treatments outlined above. Each section provides a summary and discussion of the design treatment as well as photographs or illustrations of the treatment; some treatments provide best practices related to the treatment as well as municipalities where the treatment has been used.

Illustrations and photographs provided in this section are information and should not be treated as engineering diagrams. Specific projects should be evaluated on a case-by-case basis for the appropriateness of the proposed treatment and the design modifications that may be necessary.

⁶ Wisconsin Bike Facility Design Guidelines state that bike lanes should never be placed between parked cars and the curb due to the increased difficulty of turning maneuvers and increased potential of conflicts at driveways and intersections. New cycle track design guidelines create a facility similar to a bike lane placed between a parking lane and travel lane. Following updated guidelines and carefully considering where installation of this type of facility is appropriate can reduce conflicts and increase safety of all parties sharing the right-of-way.

Bike Facility Design Options

Shoulder Bikeways

Design Summary

Typically found in rural areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway.

Discussion

In some cases, the opportunity to develop a full standard bike lane on a street where it is desirable may be many years away. It is possible to stripe the shoulder in lieu of bike lanes if the area is 50% of the desirable bike lane width and the outside lane width can be reduced to the AASHTO minimum. If the available bike lane width is 2/3 of the desirable bike lane width, the full bike lane treatment of signs, legends, and an 8" bike lane line would be provided. Where feasible, extra width should be provided with pavement resurfacing jobs, but not exceeding desirable bike lane widths.

Wide Outside Lanes

A wide outside lane (13'-15') may be sufficient accommodation for bicyclists on streets with insufficient width for bike lanes.



Shoulder bikeways are appropriate along wide rural roads where vehicles can avoid passing close to bicyclists

Bike Lanes

Design Summary

Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and also include pavement stencils. Bike lanes are most appropriate on arterial and collector streets, where higher traffic volumes and speeds warrant greater separation.

Discussion

Most commuter bicyclists would argue that on-street facilities are the safest and most functional facilities for bicycle transportation. Bicyclists have stated their preference for marked on-street bike lanes in numerous national surveys. The fact is that many bicyclists – particularly less experienced riders – are far more comfortable riding on a busy street if it has a striped and signed bike lane. Part of the goal of this Plan is to encourage new riders, and providing marked facilities such as bike lanes is one way of helping to persuade residents to give bicycling a try.

If properly designed, bike lanes can increase safety and promote proper riding. For this reason, bike lanes are desirable for bicycle commute routes along major roadways. Bike lanes help to define the road space for bicyclists and motorists, reduce the chance that motorists will stray into the cyclists' path, discourage bicyclists from riding on the sidewalk, and remind motorists that cyclists have a right to the road. One key consideration in designing bike lanes in an urban setting is to ensure that bike lanes and adjacent parking lanes have sufficient width so that cyclists have enough room to avoid a suddenly opened vehicle door.

Additional Guidance

The AASHTO Guide for the Development of Bicycle Facilities guidance notes that “longitudinal pavement markings should be used to define bicycle lanes.” The guideline states that “if used, the bicycle lane symbol marking shall be placed immediately after an intersection and other locations as needed. The bicycle lane symbol marking shall be white. If the word or symbol pavement markings are used, Bicycle Lane signs shall also be used, but the signs need not be adjacent to every symbol to avoid overuse of the signs.”

The following pages describe guidelines for implementing bike lanes on streets with on-street parking (both parallel and diagonal) and without parking. Additional sheets highlight particular considerations for bike lanes, including conflicts with right-turning motorists, left-turning bicycle movements, bike lanes at intersections, and innovative techniques for improving bike lane visibility (including colored bike lanes and bike boxes). The following sections discuss a variety of methodologies for retrofitting bike lanes to existing roadways.



Bike lanes with signage on a popular commuting and recreational route in California



Bike lane pavement markings in Portland, OR provide character to the roadway

Bike Facility Design Options

Bike Lane Configurations

Bike Lane Adjacent to On-Street Parallel Parking

Design Summary

Bike Lane Width:

- 5' recommended
- 7' maximum (may encourage vehicle loading in bike lane)

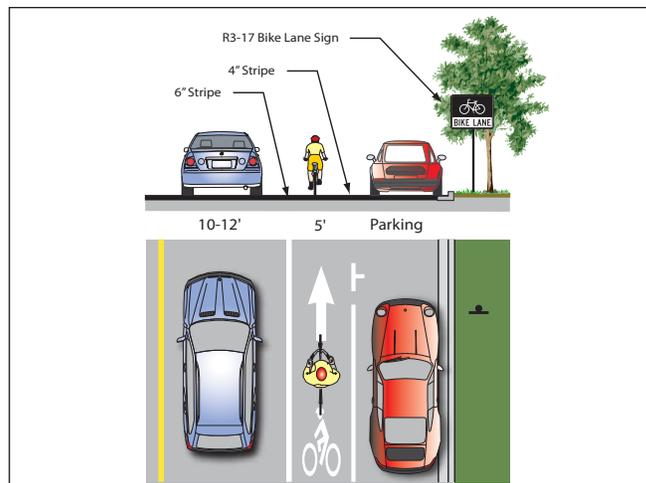
Discussion

Bike lanes adjacent to on-street parallel parking are common in the United States and can be dangerous for bicyclists if not designed properly. Crashes caused by a suddenly opened vehicle door are a common hazard for bicyclists using this type of facility. Wide bike lanes may encourage the cyclist to ride farther to the right (door zone) to maximize distance from passing traffic. Wide bike lanes may also cause confusion with unloading vehicles in busy areas where parking is typically full. Some alternatives include:

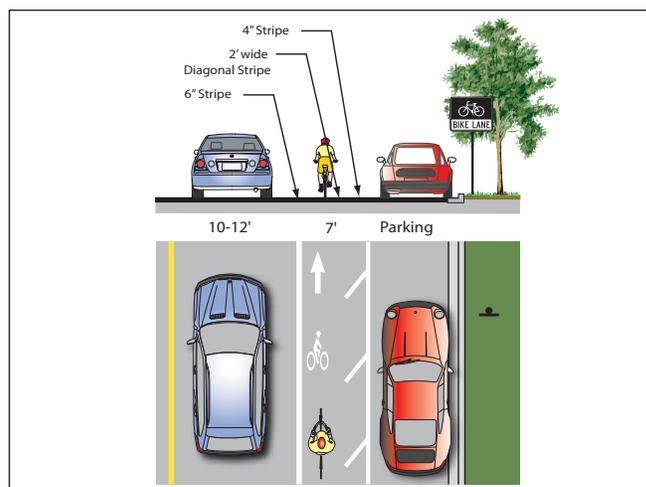
- Installing parking "T's" and smaller bike lane stencils placed to the left (see graphic at top right).
- Using diagonal stripes to encourage cyclists to ride on the left side of the bike lane (shown middle right; this treatment is not standard and should be studied before use)
- Provide a buffer zone (preferred design; shown lower right) Bicyclists traveling in the center of the bike lane will be less likely to encounter open car doors. Motorists have space to stand outside the bike lane when loading and unloading

AASHTO Guide for the Development of Bicycle Facilities provides additional guidance for bike lanes adjacent to on-street parking:

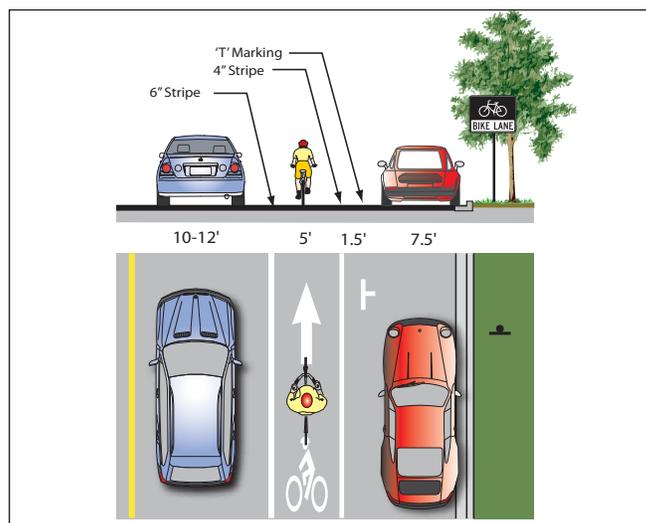
- "If parking is permitted, the bike lane should be placed between the parking area and the travel lane and have a minimum width of 5'. Where parking is permitted but a parking stripe or stalls are not utilized, the shared area should be a minimum of 11' without a curb face and 12' adjacent to a curb face. If the parking volume is substantial or turnover is high, an additional 1'- 2' of width is desirable."



Minimum Design



Maximum Width



Preferred Design (if space is available)

Bike Lane Configurations

Bike Lane Without On-Street Parking

Design Summary

Bike Lane Width:

- 4' minimum when no gutter is present (rural road sections)
- 5' minimum when adjacent to curb and gutter

Recommended Width:

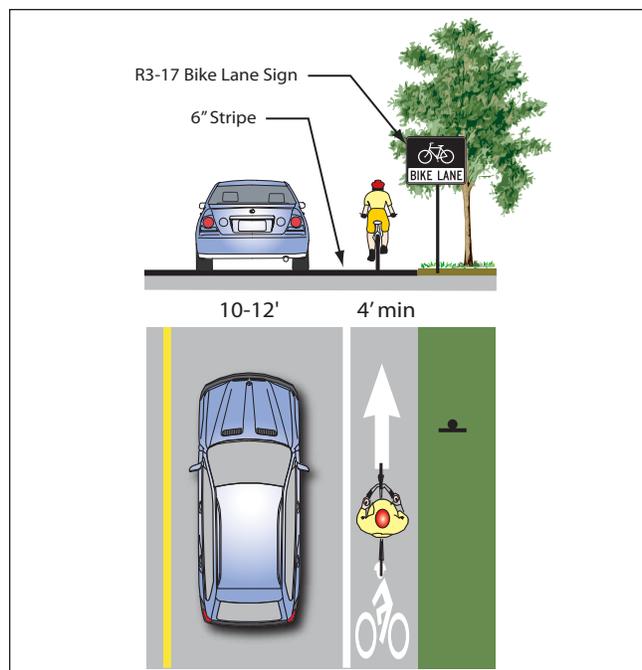
- 6' where right-of-way allows

Maximum Width:

- 8' Adjacent to arterials with high travel speeds (45 mph+)

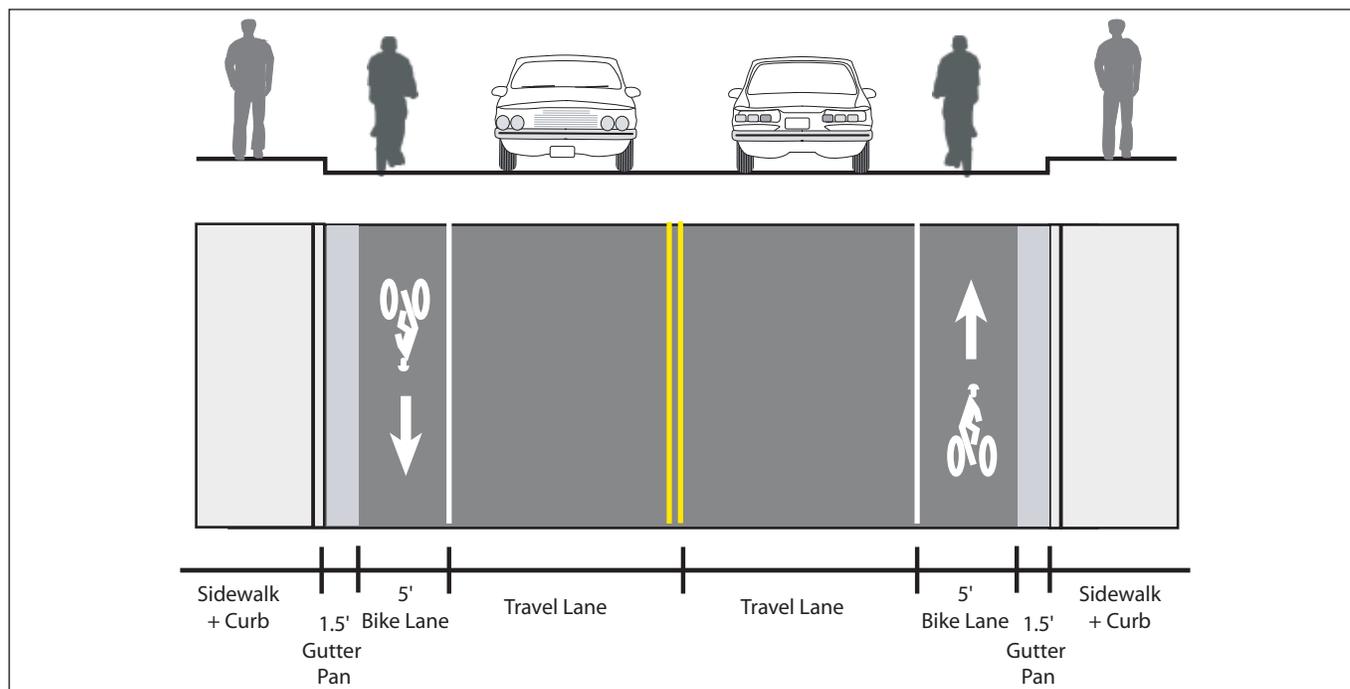
Discussion

Wider bike lanes are desirable in certain circumstances such as on higher speed arterials (45 mph+) where a wider bike lane can increase separation between passing vehicles and cyclists. Wide bike lanes are also appropriate in areas with high bicycle use. A bike lane width of 6 to 8 feet makes it possible for bicyclists to ride side-by-side or pass each other without leaving the bike lane, increasing the capacity of the lane. Appropriate signing and stenciling is important with wide bike lanes to ensure motorists do not mistake the lane for a vehicle lane or parking lane.



Recommended Design

Recommended Design



Two Lane Cross-Section with No Parking (Bike lanes may be 4' in width under constrained circumstances)

Bike Facility Design Options

Bike Lanes at Intersections

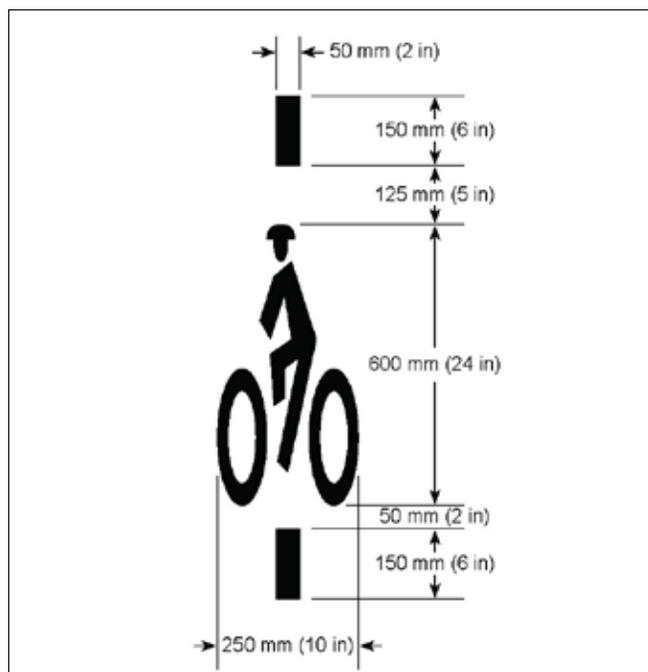
Loop Detectors

Design Summary

Facilitate bicycle through-movement at signalized intersections.

Discussion

Changing how intersections operate also can help make them more “friendly” to bicyclists. Improved signal timings for bicyclists, bicycle-activated loop detectors and camera detection make it easier and safer for cyclists to cross intersections. Bicycle-activated loop detectors are installed within the roadway to allow the presence of a bicycle to trigger a change in the traffic signal. This allows the cyclist to stay within the lane of travel and avoid maneuvering to the side of the road to trigger a push button. One purpose of bicycle loops is to give cyclists extra green time before the light turns yellow to make it through the light. Current and future loops that are sensitive enough to detect bicycles should have pavement markings to instruct cyclists how to trip them.



Recommended Design

Bike Boxes

Design Summary

Bike Box Dimensions:

14' deep to allow for bicycle positioning.

Signage:

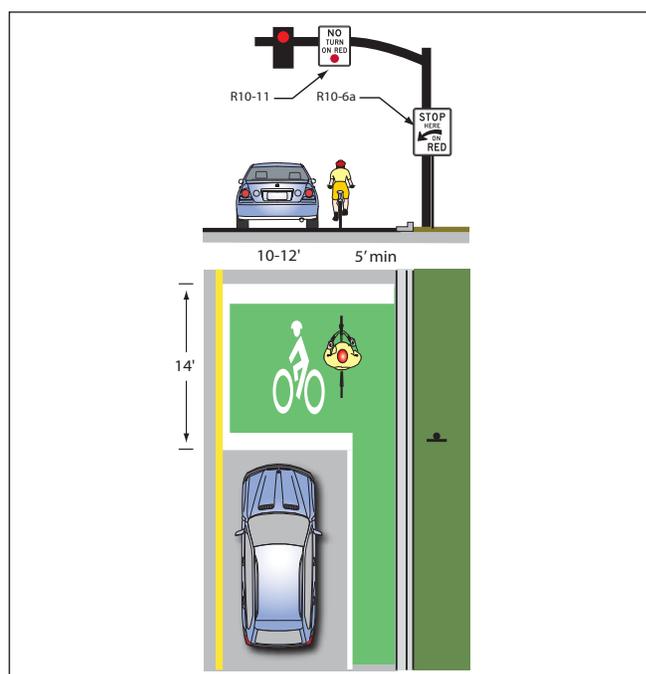
Appropriate signage as recommended by the MUTCD applies. Signage should be present to prohibit ‘right-turn on red’ and to indicate where the motorist must stop.

Discussion

A bike box is generally a right angle extension of a bike lane at the head of a signalized intersection. The bike box allows bicyclists to move to the front of the traffic, queue on a red light and proceed first when that signal turns green. Motor vehicles must stop behind the white stop line at the rear of the bike box.

Bike boxes can be combined with dashed lines through the intersection for green light situations to remind right-turning motorists to be aware of bicyclists traveling straight, similar to the colored bike lane treatment described earlier. Bike boxes can be installed with striping only or with colored treatments to increase visibility.

Bike boxes should be located at signalized intersections only, and right turns on red should be prohibited. On roadways with one travel lane in each direction, the bike box also facilitates left turning movements for cyclists.



Recommended Design

Bike Lanes With Right-Turn Pockets

Design Summary

Bike Lane Width:

- Bike lane should be at least 4' wide (5' preferred)

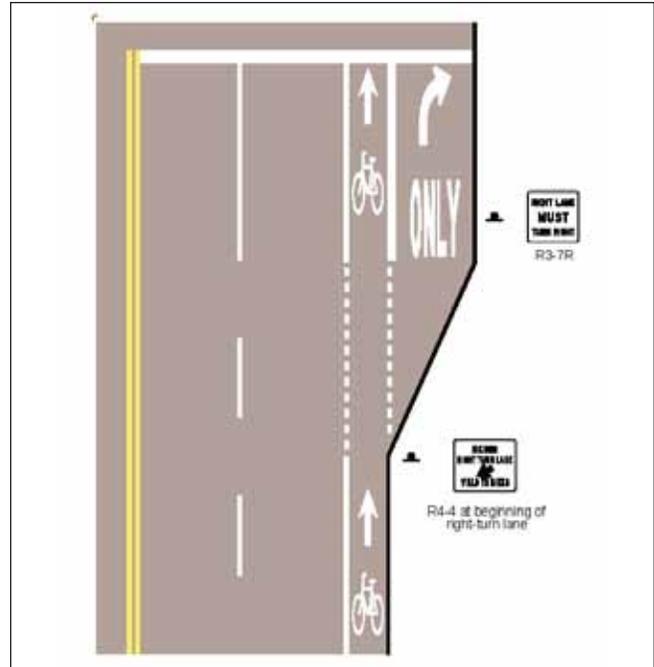
Discussion

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 drop the bike lane entirely approaching the right-turn lane. The design (right) illustrates a bike lane pocket, with signage indicating that motorists should yield to bicyclists through the conflict area. While the dashed lines in this area are currently an optional treatment, it is recommended that they be an integral part of any intersection with this treatment in Milwaukee.

Dropping the bike lane is not recommended, and should only be done when a bike lane cannot be accommodated at the intersection.



Continuing a bike lane straight while providing a right-turn pocket reduces bicycle/motor vehicle conflicts



Recommended Design

Bike Facility Design Options

Retrofitting Existing Streets with Bike Lanes

Design Summary

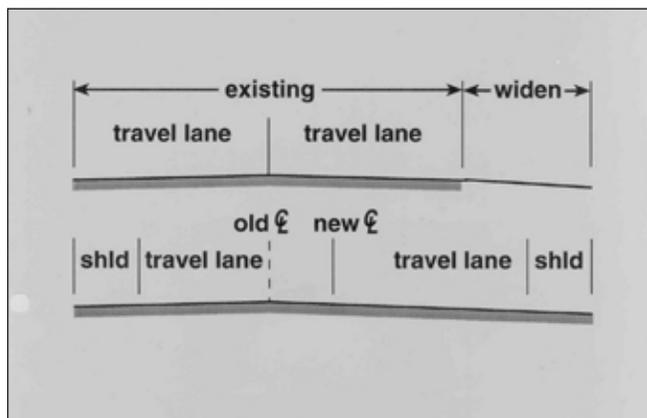
This section describes several strategies for retrofitting bike lanes to existing streets. Treatments include:

- Roadway widening
- Lane narrowing
- Lane reconfiguration
- Parking reduction

Although largely intended for major streets, these measures may be appropriate on some lower-order streets where bike lanes would best accommodate cyclists.

Discussion

Most major streets in Milwaukee are characterized by conditions for which dedicated bike lanes are appropriate to accommodate safe and comfortable riding (e.g., high vehicle speeds and/or volumes). Although opportunities to add bike lanes through roadway widening may exist in some locations, most major streets in Milwaukee pose physical and other constraints requiring street retrofit measures within existing curb-to-curb widths. As a result, many of the recommended measures effectively reallocate existing street width through striping modifications to accommodate dedicated bike lanes.



Design guidance for widening roadway shoulders to accommodate bicycles

Retrofitting Existing Streets with Bike Lanes - Roadway Widening

Design Summary

Bike Lane Width:

- 6' preferred
- 4' minimum (see bike lane guidance)

Discussion

Bike lanes could be accommodated on several streets with excess right-of-way through shoulder widening. Although street widening incurs higher expenses compared with re-striping projects, bike lanes could be added to streets currently lacking curbs, gutters and sidewalks without the high costs of major infrastructure reconstruction.

As a long-term measure, the City of Milwaukee should find opportunities to add bike lanes to other major streets where they are needed. Opportunities include adding bike lanes as streets and bridges are widened for additional auto capacity or as property development necessitates street reconstruction.

Guidance for this treatment comes from the AASHTO Guide for the Development of Bicycle Facilities.



Roadway widening is preferred on roads lacking curbs, gutters and sidewalks

Retrofitting Existing Streets with Bike Lanes - Lane Narrowing (Road Diet 1)

Design Summary

Vehicle Lane Widths:

- Before: 12'-15'; after: 10'-11'

Bike Lane Width:

- See bike lane design guidance

Discussion

Also called a 'Road Diet', lane narrowing utilizes roadway space that exceeds minimum standards to create the needed space to provide bike lanes. Many Milwaukee roadways have existing lanes that are wider than those prescribed in local and national roadway design standards. Most standards allow for the use of 11-foot and sometimes ten-foot-wide travel lanes to create space for bike lanes.

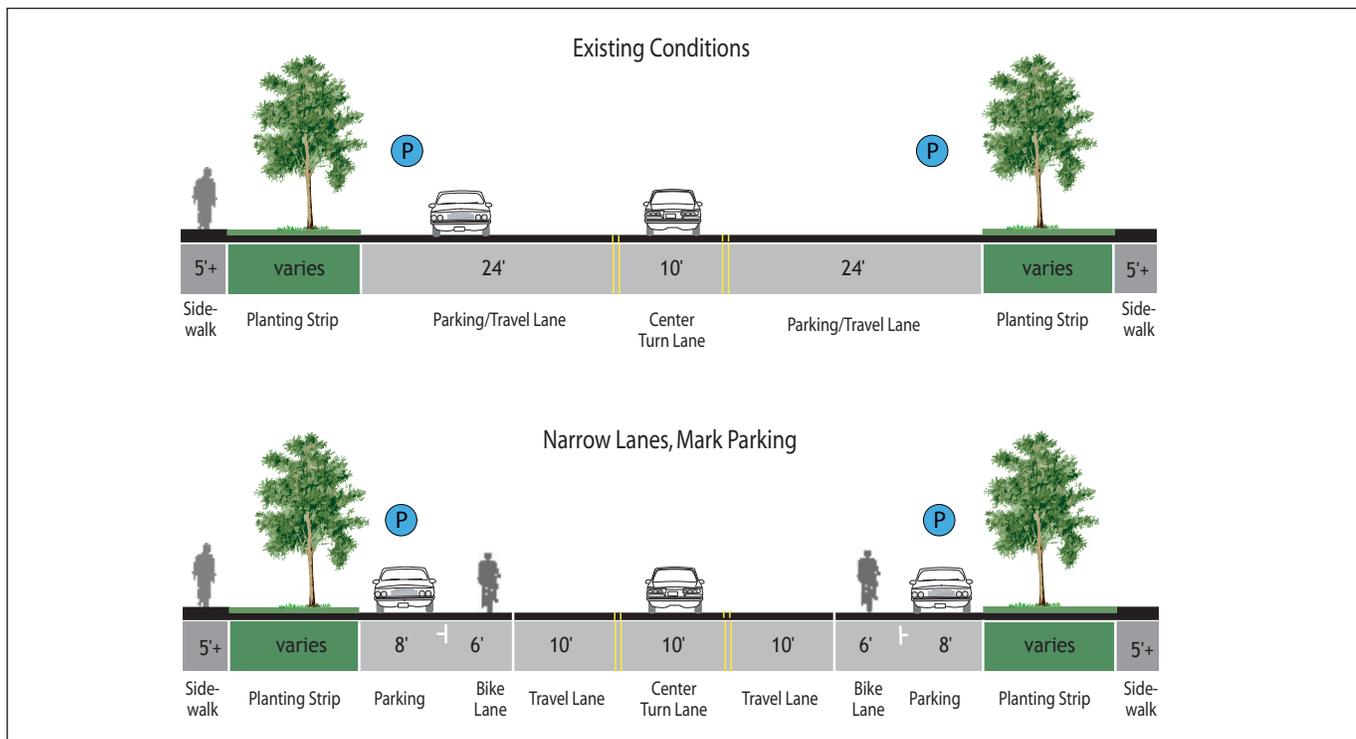
Special consideration should be given to the amount of heavy vehicle traffic and horizontal curvature before the decision is made to narrow travel lanes. Center turn lanes can also be narrowed in some situations to free up pavement space for bike lanes.

Design Example



This street previously had 13' lanes, which were narrowed to accommodate bike lanes without removing a lane

Recommended Design



Example of vehicle travel lane narrowing to accommodate bike lanes

Bike Facility Design Options

Retrofitting Existing Streets with Bike Lanes - Lane Reconfiguration (Road Diet 2)

Design Summary

Vehicle Lane Widths:

- Width depends on project. No narrowing may be needed if a lane is removed.

Bike Lane Width:

- See bike lane design guidance

Discussion

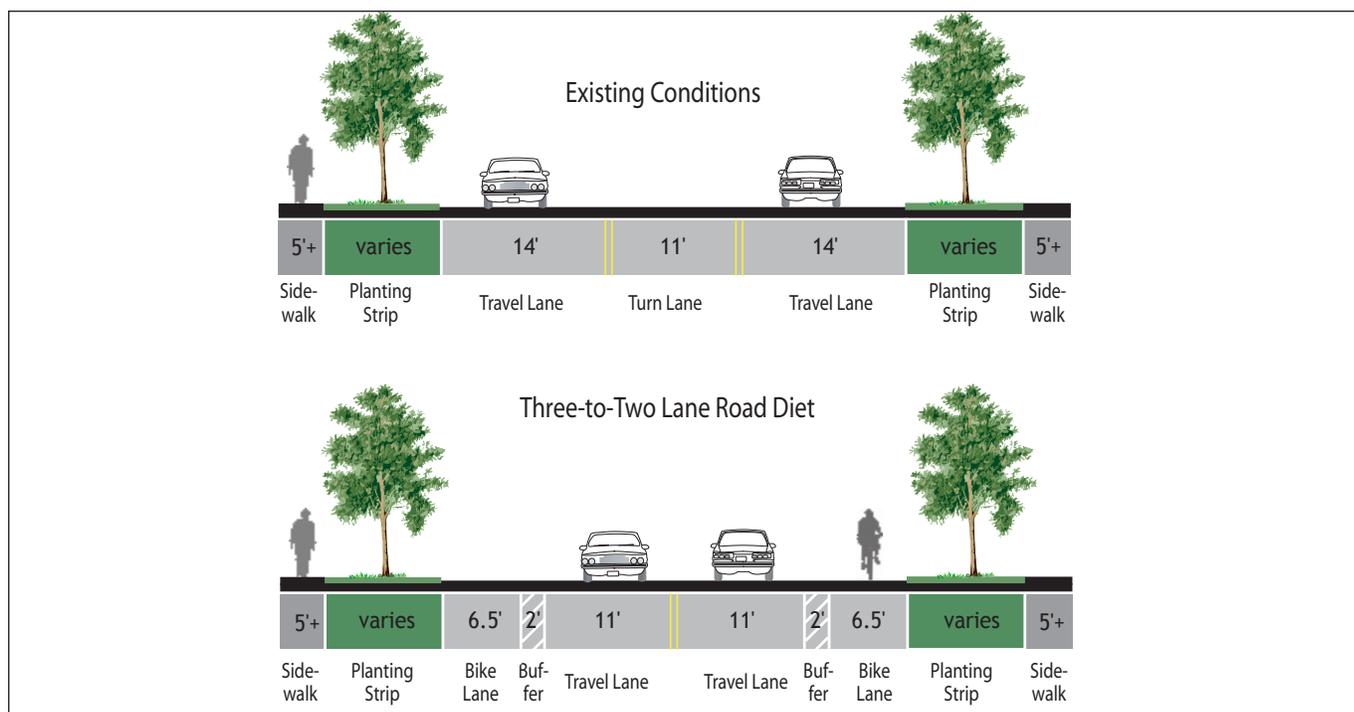
The removal of a single travel lane will generally provide sufficient space for bike lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for bike lane retrofit projects. Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations exist. For instance, a four-lane street (with two travel lanes in each direction) could be modified to include one travel lane in each direction, a center turn lane and bike lanes. Prior to implementing this measure, a traffic analysis should identify impacts.

Recommended Design



This road was re-stripped to convert four vehicle travel lanes into three travel lanes with bike lanes. The center lane can also be configured as individual left turn lanes or a median.

Design Example



Example of vehicle travel lane narrowing to accommodate bike lanes

Retrofitting Existing Streets with Bike Lanes - Parking Reduction (Road Diet 3)

Design Summary

Vehicle Lane Widths:

Width depends on project. No narrowing may be needed depending on the width of the parking lane to be removed.

Bike Lane Width:

See bike lane design guidance.

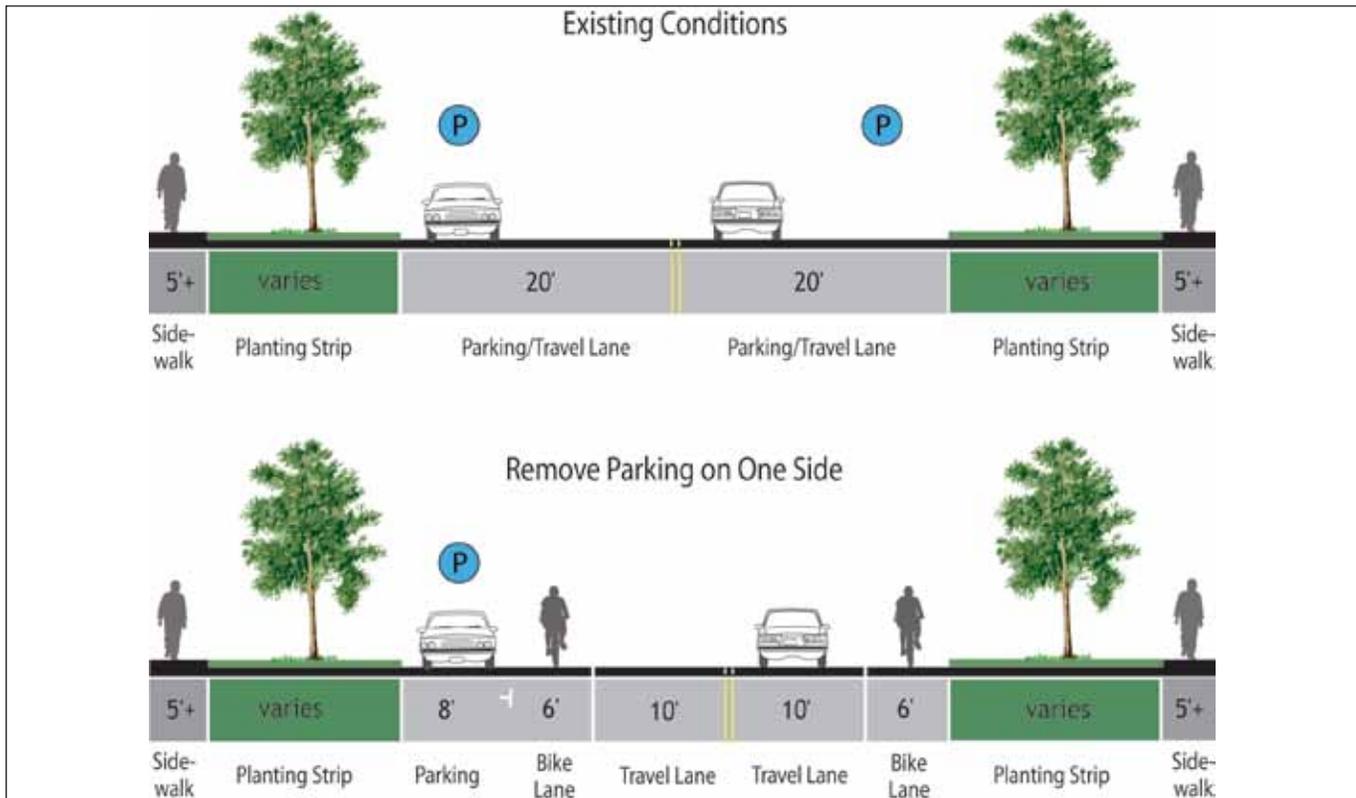
Discussion

Bike lanes could replace one or more on-street parking lanes on streets where excess parking exists and/or the importance of bike lanes outweighs parking needs. For instance, parking may be needed on only one side of a street (as shown below and at right). Eliminating or reducing on-street parking also improves sight distance for cyclists in bike lanes and for motorists on approaching side streets and driveways. Prior to reallocating on-street parking for other uses, a parking study should be performed to gauge demand.



Some streets may not require parking on both sides

Recommended Design



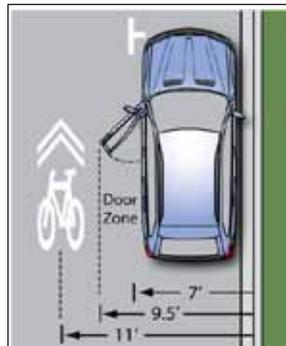
Example of parking removal to accommodate bike lanes

Bike Facility Design Options

Shared Lane Markings

Design Summary

Shared-lane markings (also known as “sharrows”) are high-visibility pavement markings that help position bicyclists within the travel lane. These markings are often used on streets where dedicated bike lanes are desirable but are not possible due to physical or other constraints. Sharrows are placed strategically in the travel lane to alert motorists of bicycle traffic, while also encouraging cyclists to ride at an appropriate distance from the “door zone” of adjacent parked cars. Placed in a linear pattern along a corridor (typically every 100-200 feet), sharrows also encourage cyclists to ride in a straight line so their movements are predictable to motorists. These pavement markings have been successfully used in many small and large communities throughout the U.S. Shared-lane markings made of thermoplastic tend to last longer than traditional paint.

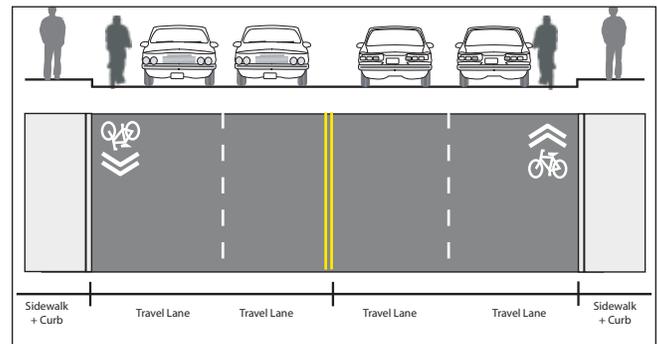


Shared lane marking placement guidance with on-street parking



Shared lane markings can be used on minor and major roadways

Recommended Design



Recommended Shared Lane Markings

Door Zone Width:

The width of the door zone is generally assumed to be 2.5' from the edge of the parking lane.

Recommended Placement:

- At least 11' from face of curb (or shoulder edge) on streets with on-street parking
- At least 4' from face of curb (or shoulder edge) on streets without on-street parking

Discussion

The 2009 MUTCD notes that sharrows should not be placed on roadways with a speed limit over 35 MPH, and that, when used, the marking should be placed after an intersection and spaced at intervals no greater than 250' thereafter. Placing shared lane markings between vehicle tire tracks will increase the life of the markings.

Shared Roadways/Bicycle Boulevards

Design Summary

Shared roadways are low-volume streets where motorists and bicyclists share the same space. Treatments for shared roadways fall within five “application levels” based on their level of physical intensity, with Level 1 representing the least physically-intensive treatments that could be implemented at relatively low cost. Identifying appropriate application levels for individual shared roadways provides a starting point for selecting appropriate site-specific improvements.

Discussion

Traffic calming and other treatments along the corridor reduce vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more-comfortable environment for all users. Shared roadways incorporate treatments to facilitate safe and convenient crossings where bicyclists must traverse major streets. They work best in well-connected street grids where riders can follow reasonably direct and logical routes and when higher-order parallel streets exist to serve thru vehicle traffic.

Additional Guidance

Shared roadways serve a variety of purposes:

- Parallel major streets lacking dedicated bicycle facilities: Higher-order streets such as arterials and major collectors typically include major bicyclist destinations (e.g., commercial and employment areas and other activity centers). However, these corridors often lack bike lanes or other dedicated facilities thereby creating an uncomfortable, unattractive and potentially unsafe riding environment. Shared roadways serve as alternate parallel facilities allowing cyclists to avoid major streets for longer trip segments.
- Parallel major streets with bicycle facilities that are uncomfortable for some users: Some users may not feel comfortable using bike lanes on major streets for various reasons, including high traffic volumes and vehicle speeds, conflicts with motorists entering and leaving driveways, and/or conflicts with buses occupying the bike lane while loading and unloading passengers. Children and less-experienced riders might find these environments especially challenging. Shared roadways provide alternate route choices for bicyclists uncomfortable using the major street network. It should be noted however that bike lanes on major streets provide important access to key land uses, and the major street network often provides the most direct routes between major destinations. For these reasons, shared roadways should complement a bike lane network and not serve as a substitute.



Shared roadways are low-speed streets that provide a comfortable and pleasant experience for cyclists

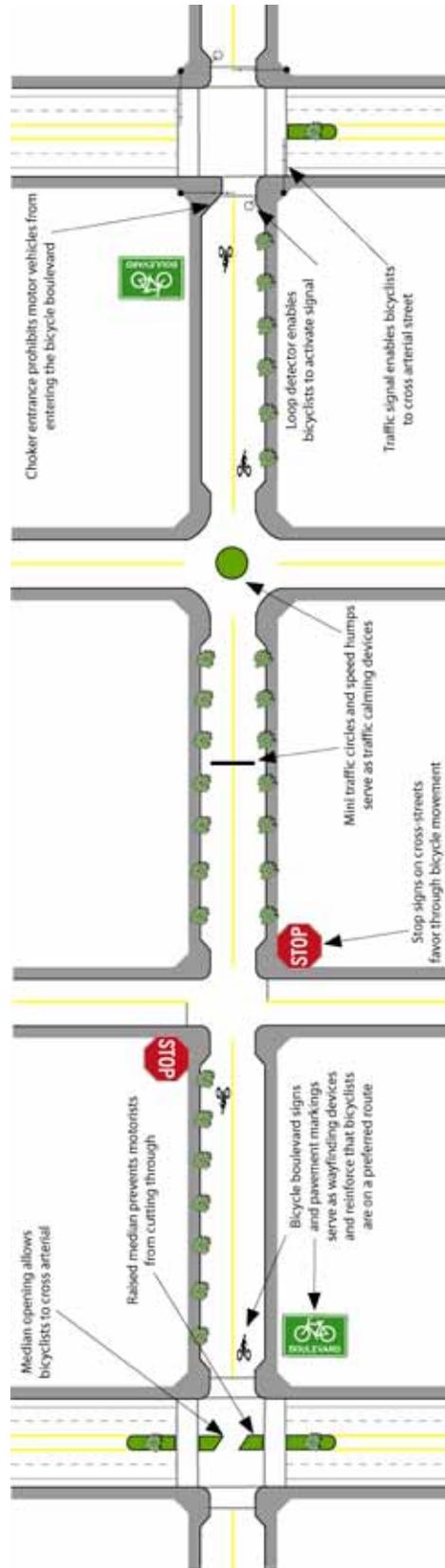
- Ease of implementation on most local streets: Shared roadways incorporate cost-effective and less physically-intrusive treatments than bike lanes and cycle tracks. Most streets could be provided relatively inexpensive treatments like new signage, pavement markings, striping and signal improvements to facilitate bicyclists’ mobility and safety. Other potential treatments include curb extensions, medians, and other features that can be implemented at reasonable cost and are compatible with emergency vehicle accessibility.
- Benefits beyond an improved bicycling environment: Residents living on shared roadways benefit from reduced vehicle speeds and thru traffic, creating a safer and more attractive environment. Pedestrians can also benefit from boulevard treatments (e.g., by improving the crossing environment where boulevards meet major streets).
- Shared roadways can employ a variety of treatments from simple signage to traffic calming and/or pavement stenciling. The level of treatment depends on several factors, discussed on the following pages.

Sample Shared Roadway/Bicycle Boulevard Treatments

It should be noted that corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications, as necessary. It should also be noted that some applications may be appropriate on some streets while inappropriate on others. In other words, it may not be appropriate or necessary to implement all “Level 2” applications on a Level 2 street. Furthermore, several treatments could fall within multiple categories as they achieve multiple goals. To identify and develop specific treatments for each bicycle boulevard, the City of Milwaukee should involve the bicycling community and neighborhood groups. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.

Bike Facility Design Options

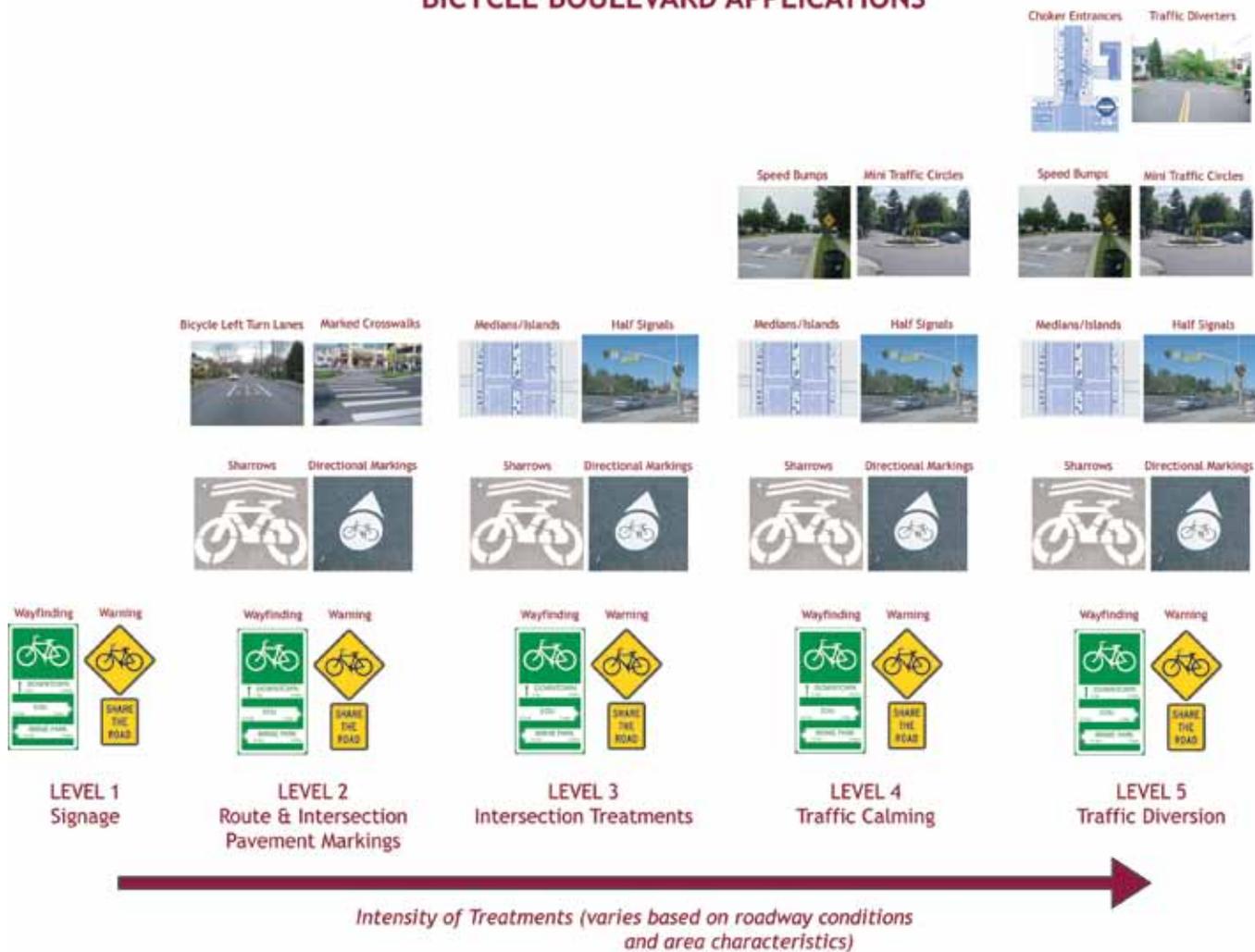
Additional Guidance



Sample Shared Roadway/Bicycle Boulevard Treatments

Additional Guidance

BICYCLE BOULEVARD APPLICATIONS



It should be noted that corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications, as necessary. It should also be noted that some applications may be appropriate on some streets while inappropriate on others. In other words, it may not be appropriate or necessary to implement all "Level 2" applications on a Level 2 street. Furthermore, several treatments could fall within multiple categories as they achieve multiple goals. To identify and develop specific treatments for each bicycle boulevard, the City of Milwaukee should involve the bicycling community and neighborhood groups. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.

Bike Facility Design Options

Level 1: Shared Roadway/Bicycle Boulevard Signing

Design Summary

Signage is a cost-effective, yet highly-visible treatment that can improve the riding environment on a bicycle boulevard network.

Wayfinding Signs

Wayfinding signs are typically placed at key locations leading to and along bicycle boulevards, including where multiple routes intersect and at key bicyclist “decision points.” Wayfinding signs displaying destinations, distances and “riding time” can dispel common misperceptions about time and distance while increasing users’ comfort and accessibility to the boulevard network.



Wayfinding signs help bicyclists stay on designated bicycle routes

Wayfinding signs also visually cue motorists that they are driving along a bicycle route and should correspondingly use caution. Note that too many signs tend to clutter the right-of-way, and it is recommended that these signs be posted at a level most visible to bicyclists and pedestrians, rather than per vehicle signage standards.

Signs should comply with MUTCD approved standards contained in contained in Section 9B.2 of the 2009 document.

Suggested placement guidelines are found in the AASHTO Bike guide include placing signs every 500 M along routes, at all turns and at major signalized intersections.

Warning signs

Warning signs advising motorists to “share the road” and “watch for bicyclists” may also improve bicycling conditions on a bicycle boulevard network. These signs are especially useful near major bicycle trip generators such as schools, parks and other activity centers. Warning signs should also be placed on major streets approaching bicycle boulevards to alert motorists of bicyclist crossings.

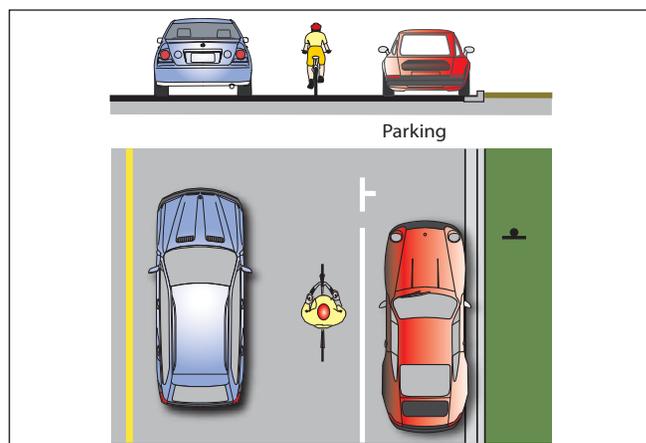


‘Share the Road’ signage can remind both bicyclists and motorists to watch for other vehicles

Level 2: Shared Roadway/Bicycle Boulevard Pavement Markings

On-Street Parking Delineation

Delineating on-street parking spaces with paint or other materials clearly indicates where a vehicle should be parked, and can discourage motorists from parking their vehicles too far into the adjacent travel lane. This helps cyclists by maintaining a wide enough space to safely share a travel lane with moving vehicles while minimizing the need to swerve farther into the travel lane to maneuver around parked cars. In addition to benefiting cyclists, delineated parking spaces also promote the efficient use of on-street parking by maximizing the number of spaces in high-demand areas.



On-Street Parking Delineation

Bicycle Boulevard/ Directional Pavement Markings

Directional pavement markings (also known as “bicycle boulevard markings”) lead cyclists along a Boulevard and reinforce that they are on a designated route. Markings can take a variety of forms.

When a bicycle boulevard follows several streets (with multiple turns at intersections), additional markings accompanied by directional arrows are provided to guide cyclists through turns and other complex routing areas. Directional pavement markings also visually cue motorists that they are traveling along a bicycle route and should exercise caution.



Bicycle boulevard directional marking

Level 3: Shared Roadway/Bicycle Boulevard Intersection Treatments

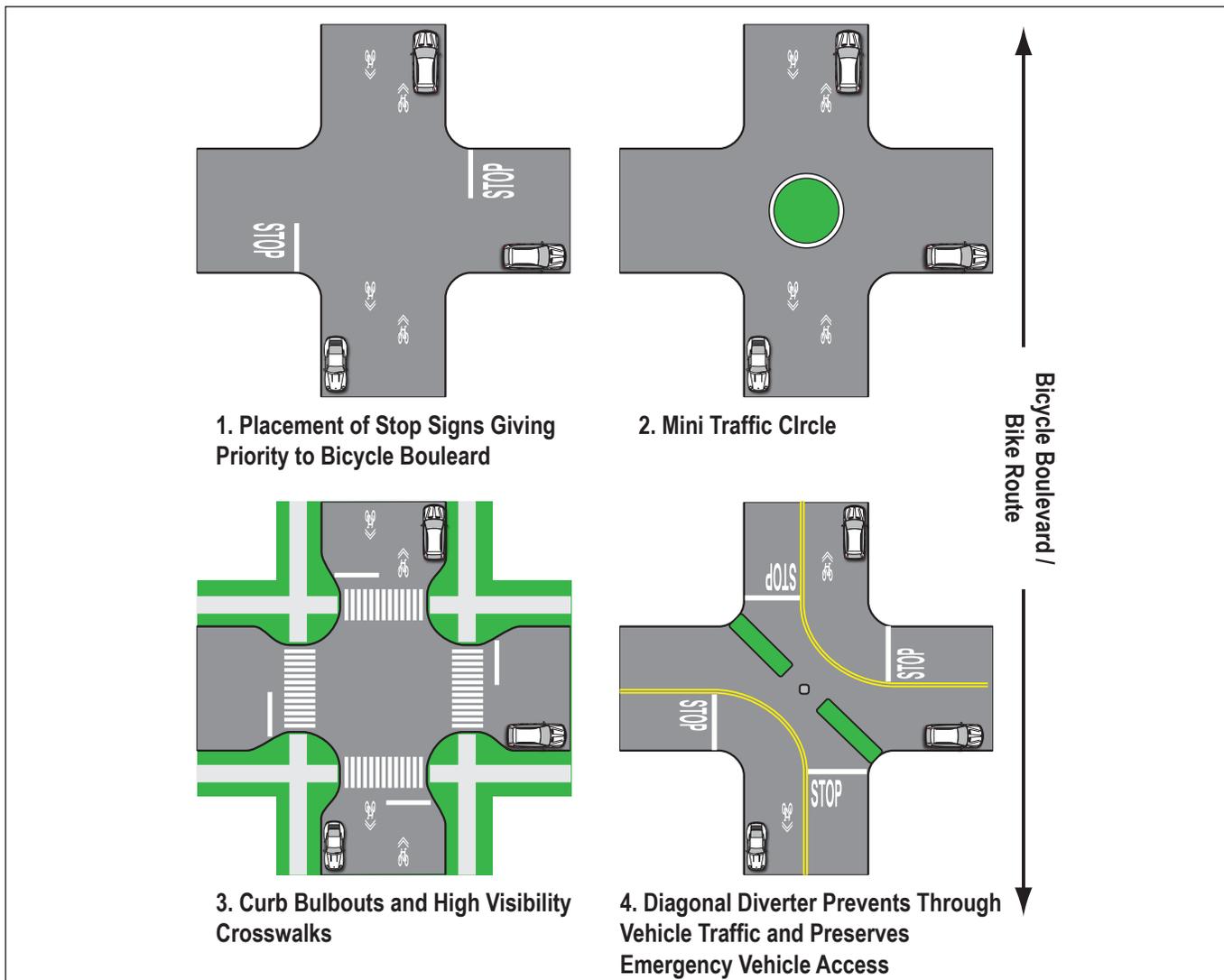
Design Summary

Intersection treatments represent a critical component of Bicycle Boulevards. Intersection traffic controls favoring thru bicycle movement on the boulevard facilitate continuous and convenient bicycle travel. Intersection treatments also provide convenient and safe crossings where boulevards intersect major roads. The following sections discuss various intersection improvement tools.

Guidance from: Berkley Bicycle Boulevard Design Tools and Guidelines, available at: webserver.ci.berkeley.ca.us/uploaded-Files/Public_Works/Level_3_-_General/ch4_.pdf



Intersection treatments are critical to bicyclists' safety on bicycle boulevards



Levels of bicycle boulevard intersection treatments

Bike Facility Design Options

Stop Sign on Cross-Street

The installation of a stop sign on cross streets along the bicycle boulevard maximizes thru bicycle connectivity and momentum and forces motorists crossing the facility to stop and proceed when safe.

This treatment should be used judiciously. It can be combined with traffic-calming efforts to prevent excessive vehicle speeds on the bicycle boulevard,

Stop signs are a relatively inexpensive treatment that is quite effective at minimizing bicycle and cross-vehicle conflicts. However, placing stop signs at all intersections along bicycle boulevards may be unwarranted as a traffic control device.



Stop signs effectively minimize conflicts

Neighborhood Traffic Circle

Typically neighborhood traffic circles are implemented where the bicycle boulevard intersects a local street or even a collector if ADT is less than 2,000. Stop signs may be added on the cross streets if necessary, otherwise all traffic yields. Signage and striping treatments should be implemented based on expected traffic volumes.



Mini traffic circles require that both bicyclists and motorists slow down and watch for conflicts

For example, the circle itself may be appropriate for local intersections with very low ADT, while increased signage and splitter striping may be appropriate experiencing higher traffic volumes. Neighborhood traffic circles can be landscaped for added visual impact and traffic calming effect. This treatment should be designed with adequate curb radii for emergency vehicle access.

Neighborhood traffic circles are very effective at reducing though bicycle and cross vehicle conflicts and add overall traffic calming in all directions. Mini traffic circles have a moderate cost (approx \$20,000 per intersection).

Curb Bump-Outs and High-Visibility Crosswalks

This treatment is appropriate for bicycle boulevards near activity centers that may generate large amounts of pedestrian activity such as schools or commercial areas. The bulb-outs should only extend across the parking lane and should not obstruct bicyclists' path of travel or the travel lane. This treatment may be combined with a stop sign on the cross street if necessary.



Curb bulb-outs can include street trees

Curb bump-outs and high-visibility crosswalks both calm traffic and also increase the visibility of pedestrians waiting to cross the street. However, they may impact on-street parking.

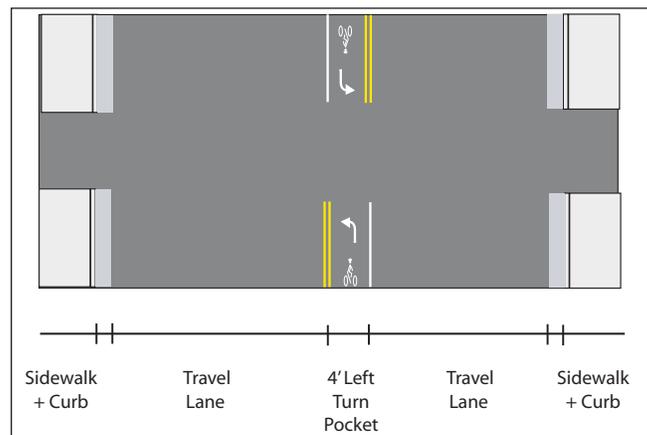
Curb bump-outs and high-visibility crosswalks both calm traffic and also increase the visibility of pedestrians waiting to cross the street. However, they may impact on-street parking.

Bicycle Left-Turn Lane

Bicycle boulevards crossing major streets at offset intersections can incorporate "bicycle left-turn lanes" to facilitate easier bicyclist crossings. Similar to medians/refuge islands, bicycle left-turn lanes allow the crossing to be completed in two phases. A bicyclist on the bicycle boulevard could execute a right-hand turn onto the cross-street, and then wait in a delineated left-turn lane (if necessary to wait for a gap in oncoming traffic). The bike turn pockets should be at least five feet wide, with a total of 11 feet for both turn pockets and center striping.



Example of a bicycle left-turn pocket



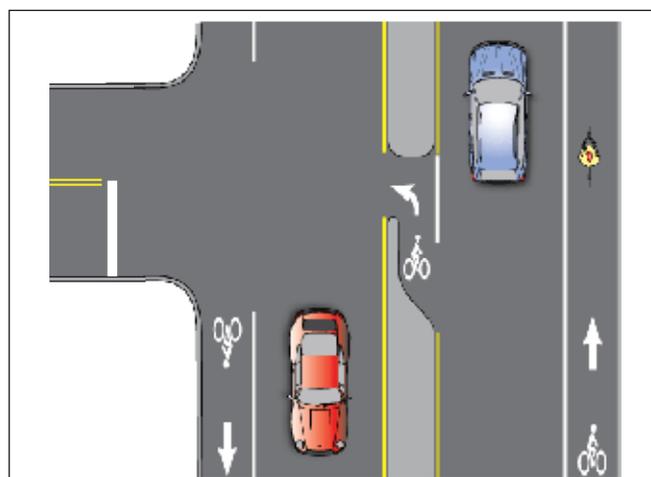
Bicycle Left Turn Pocket

A bike-only left-turn pocket permits bicycle left turn movements while restricting vehicle left turn movements. If the intersection is signal-controlled, the left turn pocket may have a left arrow signal, depending on bicycle and vehicle volumes. Signs should be provided that prohibit motorists from turning, while allowing access to bicyclists.

Bicycle signal heads may also be used at busy or complex intersections. Ideally, the left turn pocket should be protected by a raised curb, but the pocket may also be defined by striping if necessary. Because of the restriction on vehicle left-turning movements, this treatment also acts as traffic diversion.



This bike-only left-turn pocket guides cyclists along a popular bike route



Bicycle Signal Warrant

A bicycle signal may be considered for use only when the volume and collision or volume and geometric warrants have been met:

- 1. **VOLUME.** When $W = B \times V$ and $W > 50,000$ and $B > 50$. Where W is the volume warrant, B is the number of bicycles at the peak hour entering the intersection, and V is the number of vehicles at the peak hour entering the intersection. (same peak hour)



- 2. **COLLISION.** When 2 or more bicycle/vehicle collisions of types susceptible to correction by a bicycle signal have occurred over a 12-month period and the responsible ACHD official determines that a bicycle signal will reduce the number of collisions.
- 3. **GEOMETRIC.** (a) Where a separate bicycle/multi use path intersects a roadway. (b) At other locations to facilitate a bicycle movement that is not permitted for a motor vehicle

This treatment may require experimental status from FHWA.

Half-Signals

In situations where there are few crossable gaps and where vehicles on the major street do not stop for pedestrians and cyclists waiting to cross, “half signals” could be installed to improve the crossing environment. Half signals include pedestrian and bicycle activation buttons and may also include bicycle loop detectors on the bicycle boulevard approach. Many of these models have been used successfully for years overseas, and their use in the U.S. has increased dramatically over the last decade. This treatment may require experimental status from FHWA.



Medians/Refuge Islands

At uncontrolled intersections along bicycle boulevards and major streets, a bicycle crossing island can be provided to allow cyclists to cross one direction of traffic at a time when gaps in traffic allow. The bicycle crossing island should be at least 8' wide (measured perpendicular to the centerline of the major road) to be used as the bike refuge area. Narrower medians can accommodate bikes if the holding area is at an acute angle to the major roadway, which allows stopped cyclists to face oncoming motorists. Railings can also be provided so bicyclists do not have to put their feet down, thus making it quicker to start again. Crossing islands can be placed in the middle of the intersection, thus prohibiting left and thru vehicle movements.



Bike Facility Design Options

Level 4: Shared Roadway/Bicycle Boulevard Traffic Calming

Traffic calming treatments on bicycle boulevards improve the bicycling environment by reducing vehicle speeds to the point where they generally match cyclists' operating speeds, enabling motorists and cyclists to safely co-exist on the same facility. Specific traffic calming treatments are described below.

Chicanes

Chicanes are a series of raised or delineated curb extensions on alternating sides of a street forming an S-shaped curb, which reduce vehicle speeds through narrowed travel lanes (see right). Chicanes can also be achieved by establishing on-street parking on alternate sides of the street. These treatments are most effective on streets with narrower cross-sections.



Mini Traffic Circles

Mini traffic circles are raised or delineated islands placed at intersections, reducing vehicle speeds through tighter turning radii and narrowed vehicle travel lanes (see right). These devices can effectively slow vehicle traffic while facilitating all turning movements at an intersection. Mini traffic circles can also include a paved apron to accommodate the turning radii of larger vehicles, like fire trucks or school buses.



Speed Humps

Shown right, speed humps are rounded raised areas of the pavement requiring approaching motor vehicles to reduce speed. These devices also discourage thru vehicle travel on a street when a parallel route exists.



Level 5: Shared Roadway/Bicycle Boulevard Traffic Diversion

Traffic diversion treatments maintain thru bicycle travel on a street while physically restricting thru vehicle traffic. These treatments direct thru vehicle traffic onto parallel higher-order streets while accommodating bicyclists and local vehicle traffic on the bicycle boulevard. Traffic diversion is most effective when higher-order streets can sufficiently accommodate the diverted traffic associated with these treatments.

Choker Entrances

Choker entrances are intersection curb extensions or raised islands allowing full bicycle passage while restricting vehicle access to and from a bicycle boulevard. When they approach a choker entrance at a cross-street, motorists on the bicycle boulevard must turn onto the cross-street while cyclists may continue forward. These devices can be designed to permit some vehicle turning movements from a cross-street onto the bicycle boulevard while restricting other movements.



Traffic Diverters

Similar to choker entrances, traffic diverters are raised features directing vehicle traffic off the bicycle boulevard while permitting thru travel.

Advantages:

- Provides safe refuge in the median of the major street so that bicyclists only have to cross one direction of traffic at a time; works well with signal-controlled traffic platoons coming from opposite directions
- Provides traffic calming and safety benefits by preventing left turns and/or thru traffic from using the intersection

Disadvantages:

- Potential motor vehicle impacts to major roadways, including lane narrowing, loss of some on-street parking and restricted turning movements
- Crossing island may be difficult to maintain and may collect debris



Bicycle Parking

Design Summary

Bicycle parking can be broadly defined as either short-term or long-term parking:

- Short-term parking: parking meant to accommodate visitors, customers, messengers and others expected to depart within two hours; requires approved standard rack, appropriate location and placement, and weather protection.
- Long-term parking: parking meant to accommodate employees, students, residents, commuters and others expected to park more than two hours. This parking is to be provided in a secure, weather-protected manner and location.

Short-Term Parking

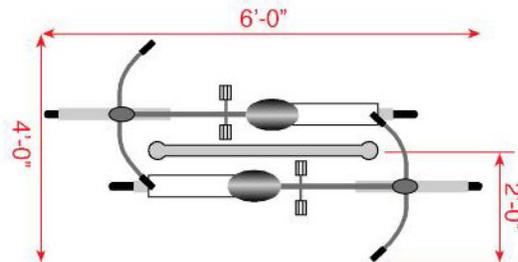
Short-term bicycle parking facilities include racks which permit the locking of the bicycle frame and at least one wheel to the rack, and support the bicycle in a stable position without damage to wheels, frame or components. Short-term bicycle

parking is currently provided at no charge at various locations in Milwaukee. Such facilities should continue to be free, as they provide minimal security, but encourage cycling and promote proper bicycle parking.



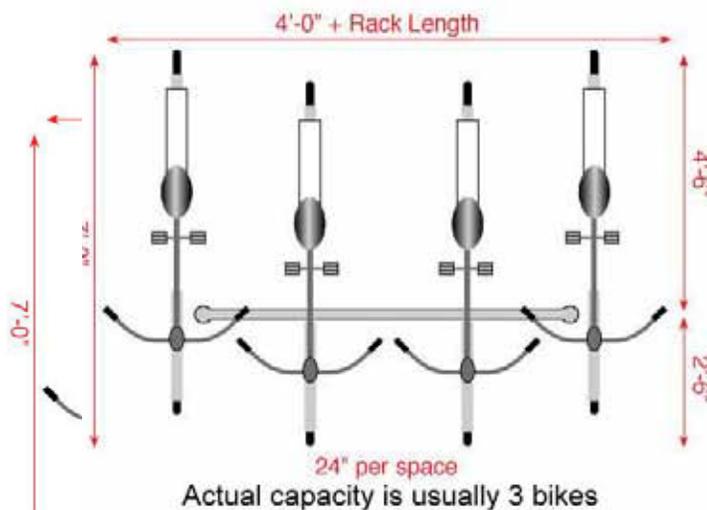
Standard bicycle rack

Hitching Post or Staple Racks



Ribbon, Spiral, or Freestanding Racks

(with access from only one side)



Bike Facility Design Options

Bicycle Rack Placement Guidelines

Design Issue	Recommended Guidance
Minimum Rack Height	To increase visibility to pedestrians, racks should have a minimum height of 33 inches or be indicated or cordoned off by visible markers.
Signing	Where bicycle parking areas are not clearly visible to approaching cyclists, signs at least 12 inches square should direct them to the facility. The sign should include the name, phone number, and location of the person in charge of the facility, where applicable.
Lighting	Lighting of not less than one foot-candle illumination at ground level should be provided in all bicycle parking areas.
Frequency of Racks on Streets	In popular retail areas, two or more racks should be installed on each side of each block. This does not eliminate the inclusion of requests from the public which do not fall in these areas. Areas officially designated or used as bicycle routes may warrant the consideration of more racks.
Location and Access	Access to facilities should be convenient; where access is by sidewalk or walkway, ADA-compliant curb ramps should be provided where appropriate. Parking facilities intended for employees should be located near the employee entrance, and those for customers or visitors near main public entrances. (Convenience should be balanced against the need for security if the employee entrance is not in a well traveled area). Bicycle parking should be clustered in lots not to exceed 16 spaces each. Large expanses of bicycle parking make it easier for thieves to be undetected.
Locations within Buildings	Provide bike racks within 50 feet of the entrance. Where a security guard is present, provide racks behind or within view of a security guard. The location should be outside the normal flow of pedestrian traffic.
Locations near Transit Stops	To prevent bicyclists from locking bikes to bus stop poles - which can create access problems for transit users, particularly those who are disabled - racks should be placed in close proximity to transit stops where there is a demand for short-term bike parking.
Locations within a Campus-Type Setting	Racks are useful in a campus-type setting at locations where the user is likely to spend less than two hours, such as classroom buildings. Racks should be located near the entrance to each building. Where racks are clustered in a single location, they should be surrounded by a fence and watched by an attendant. The attendant can often share this duty with other duties to reduce or eliminate the cost of labor being applied to bike parking duties; a cheaper alternative to an attendant may be to site the fenced bicycle compound in a highly visible location on the campus. For long-term parking needs of employees and students, attendant parking and/or bike lockers are recommended.
Retrofit Program	In established locations, such as schools, employment centers, and shopping centers, the City should conduct bicycle audits to assess bicycle parking availability and access, and add additional bicycle racks where necessary.

On-Street Parking

Where the placement of racks on sidewalks is not possible (e.g., due to narrow sidewalk width, sidewalk obstructions or other issues), bicycle parking can be provided in the street where on-street vehicle parking is allowed. Two possible options for creating parking in the street include clustered racks in a vehicle parking space protected by bollards or curbs, and racks installed on sidewalk curb extensions where adequate sight distance exists. Installing bicycle parking directly in a car parking space incurs only the cost of the racks and bollards or other protective devices.

While on-street bicycle parking may take space away from the automobile parking, additional auto parking spaces can be created by consolidating driveways, moving fire hydrants, or otherwise finding places where it may be possible to permit auto parking where it is currently prohibited. Options for combining bicycle and motorcycle parking also exist.



On-street bicycle parking may be installed at intersection corners or at mid-block locations

Bikeway Maintenance

This section presents guidelines for incorporating bicycle facilities into construction, maintenance and repair activities. The guidelines are presented as a menu of options for maintenance activities, and not strict guidelines.

Street Construction and Repair

Safety of all roadway users should be considered during road construction and repair. Wherever bicycles are allowed, measures should be taken to provide for the continuity of a bicyclist's trip through a work zone area. Only in rare cases should pedestrians and bicyclists be detoured to another street when travel vehicle lanes remain open. The following actions are recommended:

- Bicyclists should not be led into conflicts with work site vehicles, equipment, moving vehicles, open trenches or temporary construction signage.
- Efforts should be made to re-create the bike lane (if one exists) to the left of the construction zone if space exists to do so safely.
- Where there is insufficient space to provide a bike lane adjacent to the construction zone, then a standard wide travel lane should be considered. If steel plating is used, special care should be taken to ensure that bicyclists can traverse the plates safely.
- Contractors performing work for Milwaukee should be made aware of the needs of bicyclists and be properly trained in how to safely route bicyclists through or around work zones.

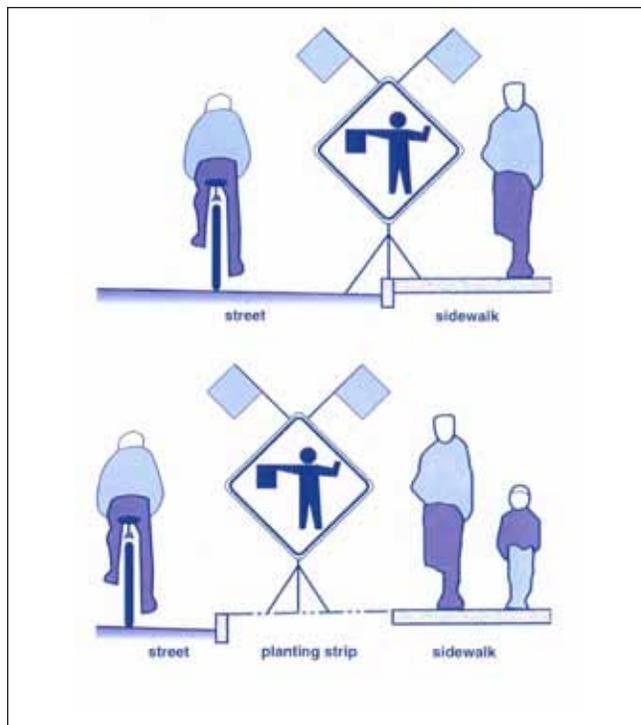
Signage Actions:

Signage related to construction activities should be placed in a location that does not obstruct the path of bicyclists or pedestrians, including bike lanes, wide curb lanes, or sidewalks. In areas where there are grades, signs may be placed at the street-side edge of sidewalks so as not to encroach onto a bike lane.

Detour and closure signage related to bicycle travel may be included on all bikeways where construction activities occur. Signage should also be provided on all other roadways.

The following MUTCD signs should be used:

- W21-4A: Road Work Ahead
- W20-5: Right Lane Closed
- W4-2: Lane Shift, Left Sign
- W11-1: Bicycle Warning Sign
- W16-1: Share The Road



Open Trenches

Plates used to cover trenches are typically not flush with the pavement and have a 1"-2" vertical transition on the edges. This can puncture a hole in a narrow bicycle tire and cause a cyclist to lose control due to the vertical transition. Bicyclists often are left to their own devices to merge with vehicles in the adjacent travel lane.

Although a common practice is to use steel plates during non-construction hours, these plates can be dangerously slippery, particularly when wet.

The City of Milwaukee should consider:

- Ensuring that steel plates do not have a vertical edge greater than ¼" without an asphalt lip
- Using non-skid steel plates with no raised steel bar
- Requiring temporary asphalt (cold mix) around plates to create a smooth transition and hold the plates in place
- Using steel plates only as a temporary measure during construction, not for extended periods

Like all roadways, bicycle facilities require regular maintenance. This includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flat, and installing bicycle-friendly drainage grates. Pavement overlays should be used as a good opportunity to improve bicycle facilities. The following recommendations are provided as a menu of options for Milwaukee to consider as it augments and enhances its maintenance capabilities.

Bike Facility Design Options

Many of the recommendations listed below are already part of Milwaukee's regular maintenance activities.

Recommended Walkway and Bikeway Maintenance Activities

Maintenance Activity	Frequency
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping/blowing	As needed, weekly in Fall
Pavement sealing, potholes	5 - 15 years
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	1 – 3 years
Signage replacement	1 – 3 years
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Sweeping

Bicyclists often avoid shoulders and bike lanes filled with sanding materials, gravel, broken glass and other debris; they will ride in the roadway to avoid these hazards, causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept.

Action items involving sweeping activities include:

- Establish a seasonal sweeping schedule that prioritizes roadways with major bicycle routes
- Sweep walkways and bikeways whenever there is an accumulation of debris on the facility
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders
- Provide extra sweeping in the fall in areas where leaves accumulate

Roadway Surface

Roadway surface is a critical issue for bicyclists' quality. Bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Various materials are used to pave roadways, and some are smoother than others. Compaction is also an important issue after trenches and other construction holes are filled. Uneven settlement after trenching can affect the roadway surface nearest the curb where bicycles travel. Sometimes compaction is not achieved to a satisfactory level, and an uneven pavement surface can result due to settling over the course of days or weeks.

Recommended action items involving maintaining the roadway surface include:

- On all bikeways, use the smallest possible chip for chip sealing bike lanes and shoulders
- Ensure that on new roadway construction, the finished surface on bikeways does not vary more than ¼"
- Maintain a smooth surface of all bikeways
- Maintain pavement so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred

Gutter-to-Pavement Transition

On streets with concrete curbs and gutters, 1'-2' of the curb-side area is typically devoted to the gutter pan, where water collects and drains into catch basins. On many streets, the bikeway is situated near the transition between the gutter pan and the pavement edge. At this location water can erode the transition, creating potholes and a rough surface.

The pavement on many streets is not flush with the gutter, creating a vertical transition between these segments. This area can buckle over time, creating a hazardous environment for bicyclists. Since it is the most likely place for bicyclists to ride, this issue is significant for bike travel.

Action items related to maintaining a smooth gutter-to-pavement transition include:

- Ensure that gutter-to-pavement transitions have no more than a ¼" vertical transition
- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets

Drainage Grates

Drainage grates are typically located in the gutter area near the curb of a roadway. Drainage grates typically have slots through which water drains into the municipal wastewater system. Many grates are designed with linear parallel bars spread wide enough for a tire to become caught so that if a bicycle were to ride on them, the front tire would become caught and fall through the slot. This would cause the cyclist to tumble over the handlebars and sustain potentially injuries.

The City of Milwaukee should consider the following:

- Continue to require all new drainage grates be bicycle-friendly, including grates that have horizontal slats on them so that bicycle tires do not fall through the vertical slats
- Creating a program to inventory all existing drainage grates, and replace hazardous grates as necessary

Pavement Overlays

Pavement overlays represent good opportunities to improve conditions for cyclists if done carefully. A ridge should not be left in the area where cyclists ride (this occurs where an overlay extends part-way into a shoulder bikeway or bike lane). Overlay projects offer opportunities to widen a roadway, or to re-stripe a roadway with bike lanes.

Action items include the following:

- Extend the overlay over the entire roadway surface to avoid leaving an abrupt edge
- If there is adequate shoulder or bike lane width, it may be appropriate to stop at the shoulder or bike lane stripe, provided no abrupt ridge remains
- Ensure that inlet grates, manhole and valve covers are within ¼ inch of the pavement surface
- Pave gravel driveways to property line to prevent gravel from spilling onto shoulders or bike lanes

Signage

Bike lanes, shared shoulders, bicycle boulevards and paths all have different signage types for wayfinding and regulations. Such signage is vulnerable to vandalism or wear, and requires regular maintenance and replacement as needed.

The City of Milwaukee should consider the following:

- Check regulatory and wayfinding signage placed along bikeways for signs of vandalism, graffiti, or normal wear
- Replace signage along bikeways as needed
- Perform a regularly-scheduled check on the status of signage with follow-up as necessary
- Create a maintenance management plan

Landscaping

Bikeways can be rendered inaccessible due to overgrown vegetation. To prevent this, shoulder plants should be trimmed twice a year. Similarly, after a flood or major storm, bikeways should be checked and fallen trees or debris should be removed promptly.

Action items related to landscaping maintenance include:

- Ensure that shoulder plants do not hang into or impede passage along bikeways
- After major damage incidents, remove fallen trees or other debris from bikeways as quickly as possible

Maintenance Management Plan

Bikeway users require accommodation when segments of bikeways are closed or unavailable. Users must be warned of impending bikeway closures and given adequate detour information to bypass the section. Users should be warned through the use of standard signing approaching each affected section including information on alternate routes and dates of closure. Alternate routes should provide a reasonable level of directness and equivalent traffic characteristics.

Action items include:

- Provide fire and police departments with map of system, along with access points to gates/bollards
- Enforce speed limits and other rules of the road
- Enforce all trespassing laws for people attempting to enter adjacent private properties

Bikeway Wayfinding Signage

Design Summary

Costing about \$250 each, wayfinding signs are a relatively cost-effective means for improving the walking and bicycling environment.

Discussion

The ability to navigate through a city is informed by landmarks, natural features and other visual cues. Placing signs throughout the city indicating to bicyclists their direction of travel, location of destinations and the riding time/distance to those destinations will increase users' comfort and accessibility to the bicycle system. 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 and pedestrians, rather than per vehicle signage standards. Sign design standards are found in Section 9.2B of the 2009 MUTCD. Placement guidance from AASHTO suggests placing signs approximately every 500M, as well as at all turns and major signalized intersection. MUTCD provides guidance on sign height, placement and setback. Specific jurisdictional guidance (e.g., county and state) should be consulted to ensure that all relevant standards are met.

Signage can serve both wayfinding and safety purposes including:

- Helping to familiarize users with the bikeway system
- 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 do not bicycle often (e.g., "interested but concerned" cyclists)

A community-wide bicycle wayfinding signage plan would identify:

- Sign locations along existing and planned bicycle routes
- Sign type – what information should be included and design features
- Destinations to be highlighted on each sign – key destinations for bicyclists
- Approximate distance and riding time to each destination



Non-Standard Design Treatments

Standard bicycle facility treatments do not always fit within the context of the existing built environment. Narrow rights-of-way, off angled intersections, and unique roadway geometry may necessitate the use of context sensitive, non-standard treatments. These treatments are recommended for consideration and possible use by the city. Many of these treatments cover specific situations intended to create safer travel conditions for cyclists, pedestrians and motorists alike. Nonstandard treatments can be used when standard bicycle facility treatments do not fit the context of the existing built environment (e.g., narrow rights-of-way or off-angled intersections). See Appendix M for guidance on FHWA experimental status that may be required for these applications.

Wide Bicycle Lane Next to On-Street Parallel Parking

Design Summary

Bicycle Lane Width:

7' maximum (may encourage vehicle loading in bicycle lane)

Discussion

Wide bike lanes can be used in areas with significant amounts of bicycle traffic to increase capacity

Wide bike lanes can increase the safety of the facility

Wide bicycle lanes may encourage the bicyclist to ride farther to the right (door zone) to maximize distance from passing traffic

Wide bicycle lanes may also encourage vehicles to use the bicycle lane as a loading zone in busy areas where on-street parking is typically full

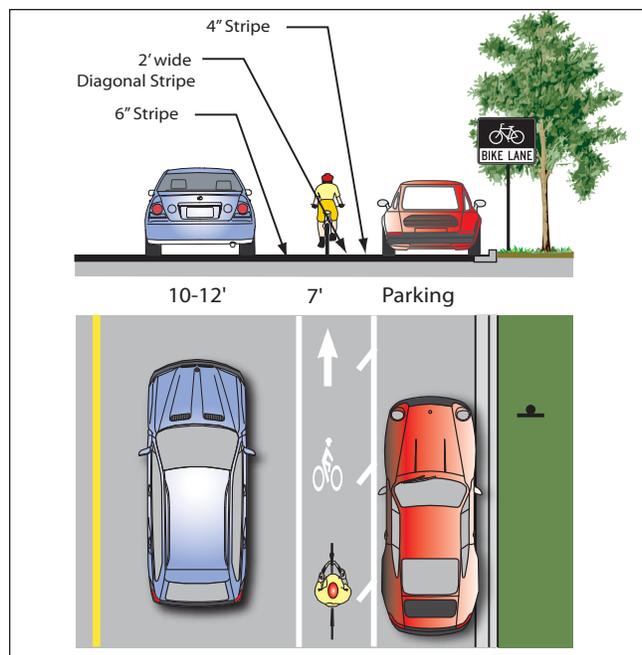
Installing smaller bicycle lane stencils placed to the left of are one way to increase separation

Diagonal stripes can be added to encourage the bicyclist to ride to the left of the bicycle lane to reduce proximity to the door zone

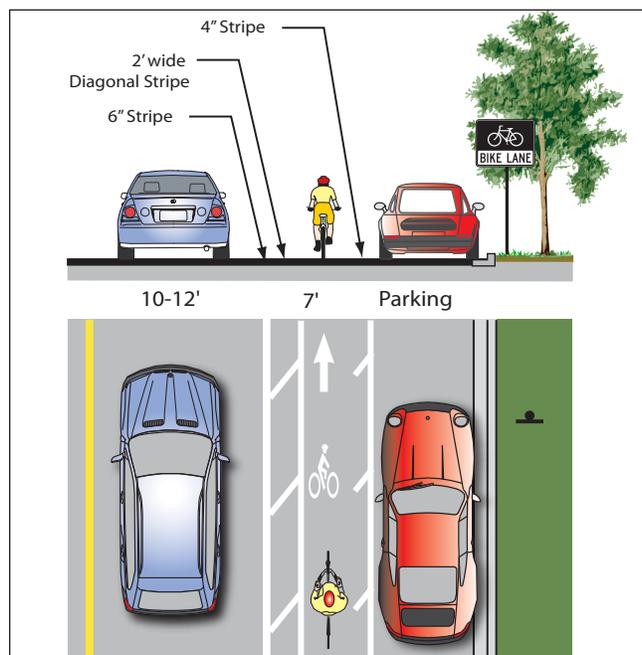
Alternative design 1 places striping between the bicycle and motor vehicle travel lane, visually narrows the vehicle travel lane and creates additional buffer space between slower moving bicycles and faster moving motor vehicles. This design may be problematic on streets with high parking turnover, particularly when cyclist volumes are also high. Motorists will block the bike lane during parking maneuvers and may use the wide bicycle lane as a temporary parking spot while waiting to pull into a legal curbside spot. Safety benefits gained from diagonal striping near parked vehicles (Minimum Design) may be lost. A modified option would add a small diagonal buffer alongside parked cars to encourage cyclists to travel further away from the door zone

Guidance

This treatment is not currently present in any state or federal design standards.



Minimum Design



Alternative Design 1

Bike Facility Design Options

Bicycle Lane Next to On-Street Diagonal Parking

Design Summary

Bicycle Lane Width: 5' minimum

White 4-inch stripe separates bicycle lane from parking bays.

Parking bays are sufficiently long to accommodate most vehicles (vehicles do not block bicycle lane)

Discussion

In certain areas, diagonal parking can be used to increase parking supply

Conventional diagonal parking is not compatible or recommended in conjunction with high levels of bicycle traffic

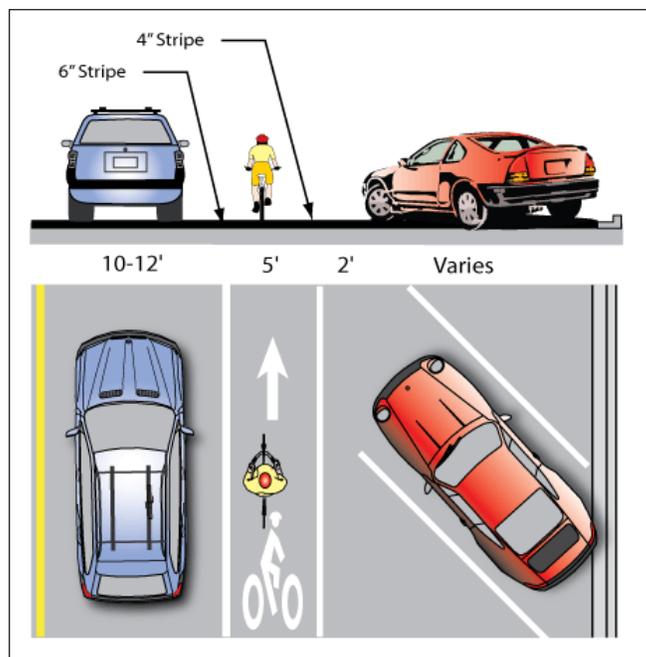
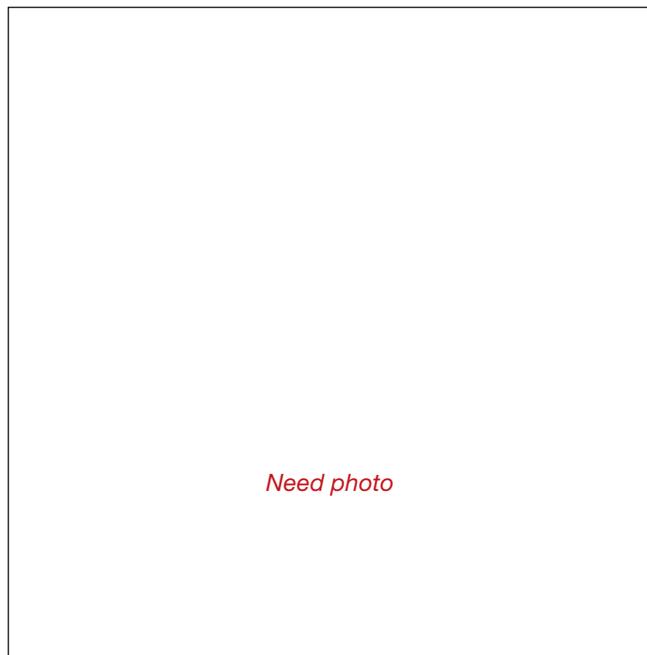
The use of 'back-in diagonal parking' or 'reverse angled parking' is recommended over head-in diagonal parking. This design addresses improves sight distance between drivers and bicyclists and has been shown to reduce parking related crashes

While there may be a learning curve for some drivers, using back-in diagonal parking is typically an easier maneuver than conventional parallel parking

Guidance

This treatment is not currently present in federal design standards but recommended in some states including Oregon.

Design Example



Recommended Design

Bicycle Boulevard

Design Summary

Signed shared bikeways can be implemented at two levels of treatments depending on the roadway characteristics. Higher level (more intensive) treatments fall into the bicycle boulevard category. Bike Boulevards create on-street travel conditions for cyclists that do not wish to ride in bicycle lanes or may not feel comfortable on streets with heavy motor vehicle traffic.

Discussion

Bike boulevards are ideal for streets with relatively low traffic volumes and posted speeds that enable cyclists and motorists to share the same travel lanes.

Treatment Summary

Level 1 – Signage (e.g., wayfinding and warning)

Level 2 – Pavement Markings (e.g., Wayfinding and Warning)

Level 3 – Intersection Treatments (e.g., turned stop signs and curb extensions)

Level 4 – Traffic Calming (e.g., speed humps)

Level 5 – Traffic Diversion (e.g., choker entrances)

Guidance

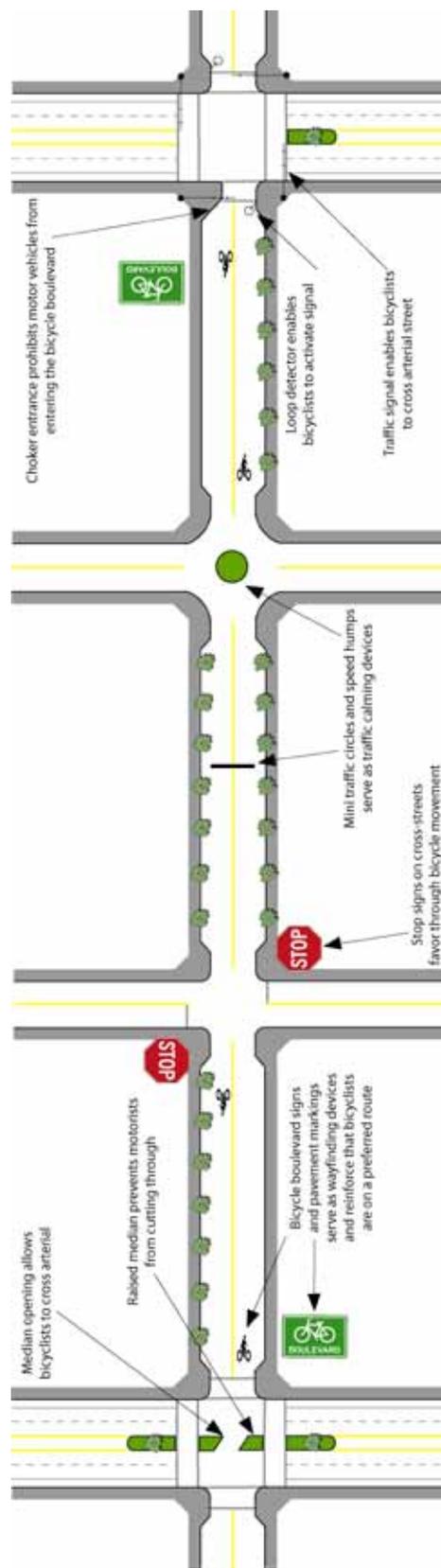
There is no currently adopted federal or state guidance for this treatment though signage and traffic calming (the two key components of Bike Boulevards are discussed in the Wisconsin Bicycle Facility Design Handbook). This treatment will probably not require experimentation permission from FHWA. Treatments are generally site specific.

Previously Implemented in

Portland, OR

Vancouver, B.C.

Berkeley, CA



Bike Facility Design Options

Bicycle Only Left Turn Pocket

Design Summary

Bicycle Lane Width:

Bicycle Lane pocket should be 4' minimum in width, with 5' preferred.

Discussion

A left-turn pocket allows only bicycles to access a bicycle boulevard or designated bikeway

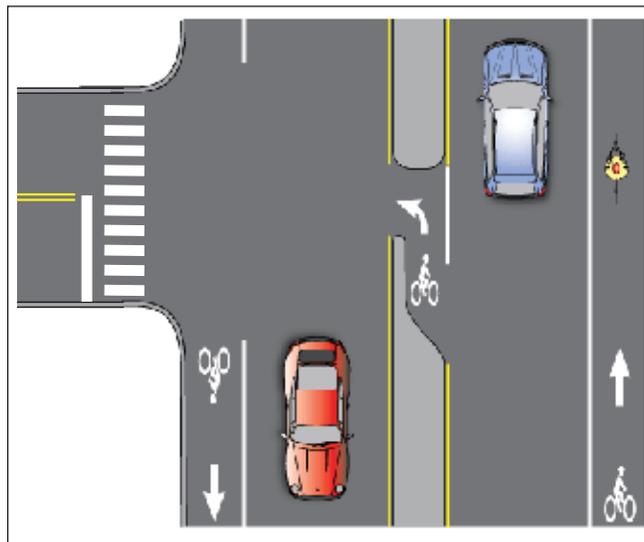
If the intersection is controlled the left-turn pocket may have a left arrow signal

Signs should prohibit motorists from turning, while allowing access to bicyclists

The left turn pocket should be protected by a raised curb, but the pocket may also be defined by striping only if necessary

This treatment is typically applied on lower volume arterials and collectors

Design Example



Recommended Design

Guidance

There is no currently adopted federal or state guidance for this treatment.



Recommended Design

Bicycle Lanes at Double Right-Turn Intersections

Design Summary

Width: Minimum width of 4' with 5' preferred.

Discussion

Option A accomplishes this by providing a bike lane to the left of the outside turn lane. The design positions bicyclists to the outside of a double right-turn lane

Option B uses shared lane markings in the through/right-turn lane properly positioning through bicyclists and reducing conflicts with right turning vehicles

This treatment should only be considered at locations where the right most turn lane is a pocket at the intersection

Under no circumstances should the bicyclist be expected to merge across two lanes of traffic to continue straight though an intersection

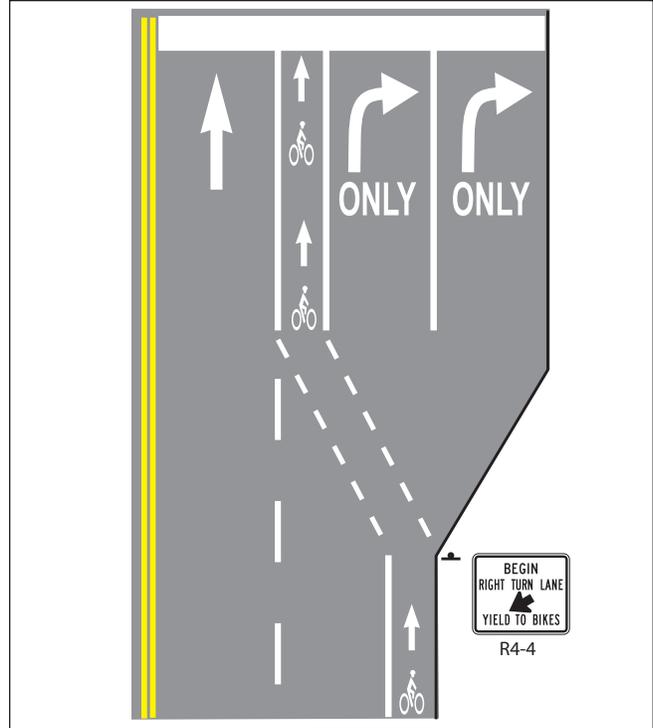
This treatment can be done in both double right-turn lane configurations and in a right/through lane

Double right-turn lanes or an inside through/right combination lane should be avoided on routes with heavy bicycle use

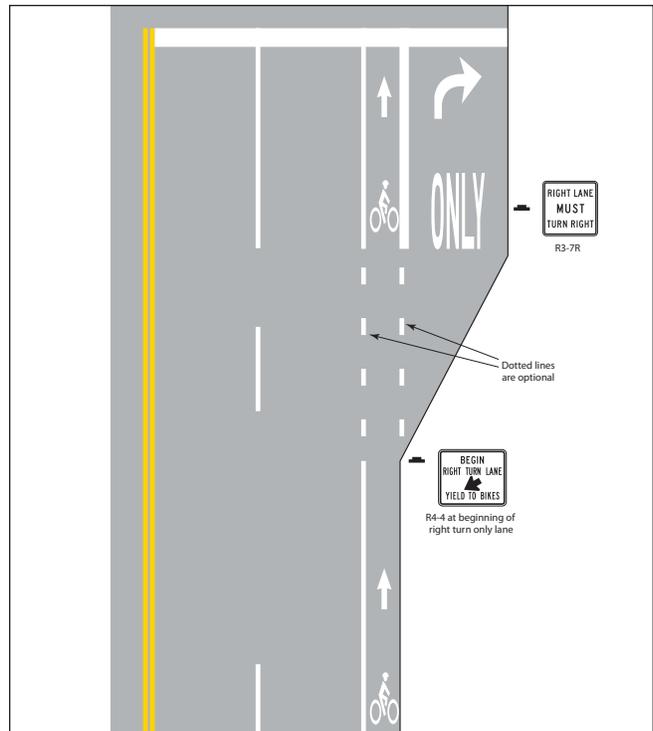
Design Example

Guidance

There is no currently adopted federal or state guidance for this treatment.



Option A 'Bicycle Lane'



Option B 'Shared Lane Marking'

Bike Facility Design Options

Colored Bicycle Lanes in Conflict Areas

Design Summary

Recommended Design

Bicycle lane width: 5' minimum and 7' maximum.

Discussion

Some cities in the United States are successfully using colored bicycle lanes to guide bicyclists through major vehicle/bicycle conflict points

Colored bike lanes help the bicycle lane stand out in merging areas. The City of Portland began using green lanes in 2008, and is the color recommended for use in Milwaukee

Colored bike lanes extend through the entire bicycle/vehicle conflict area

This treatment typically includes signage alerting motorists of approaching conflict point

Studies illustrate more consistent yielding behavior by motorists at these locations

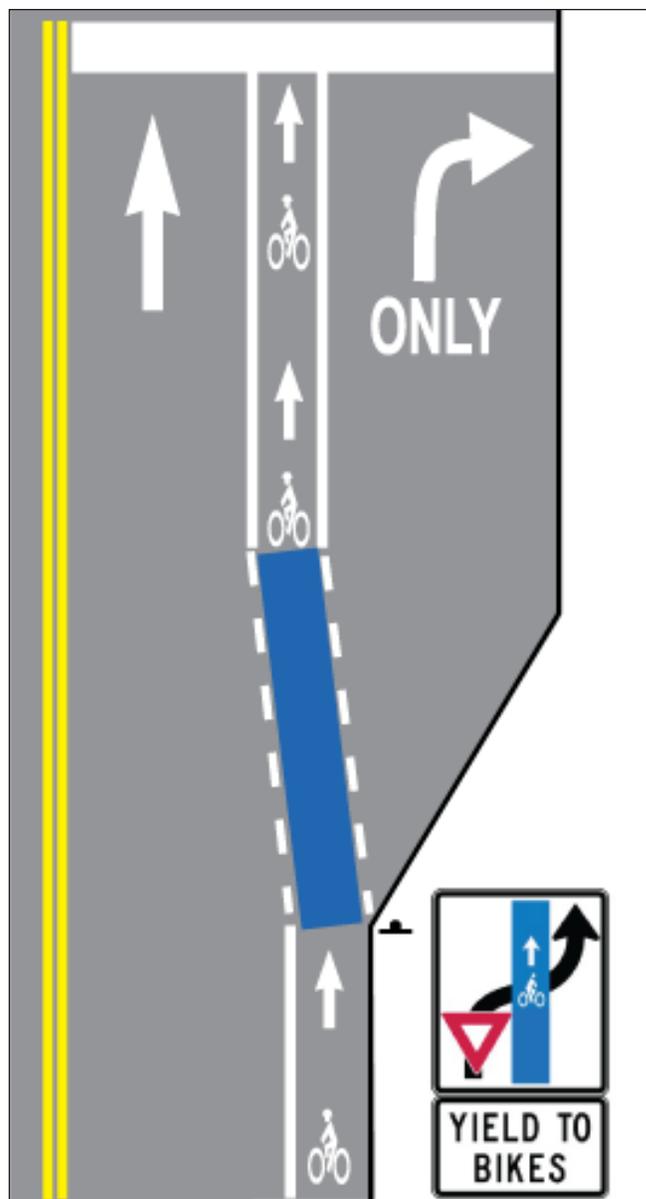
Design Example



Guidance

This treatment is not currently present in any state or federal design standards.

Portland's Blue Bicycle Lanes: <http://www.portlandonline.com/shared/cfm/image.cfm?id=58842>



Recommended Design

Bicycle Lanes at Interchanges

Design Summary

Recommended Design

Bicycle Lane Width: 5' minimum and 7' maximum.

Discussion

Dashed bicycle lane lines with or without colored bicycle lanes may be applied to provide increased visibility for bicycles in the merging area.

The benefits of this treatment are similar to those described in the discussion of colored bike lanes in conflict areas.

Design Example

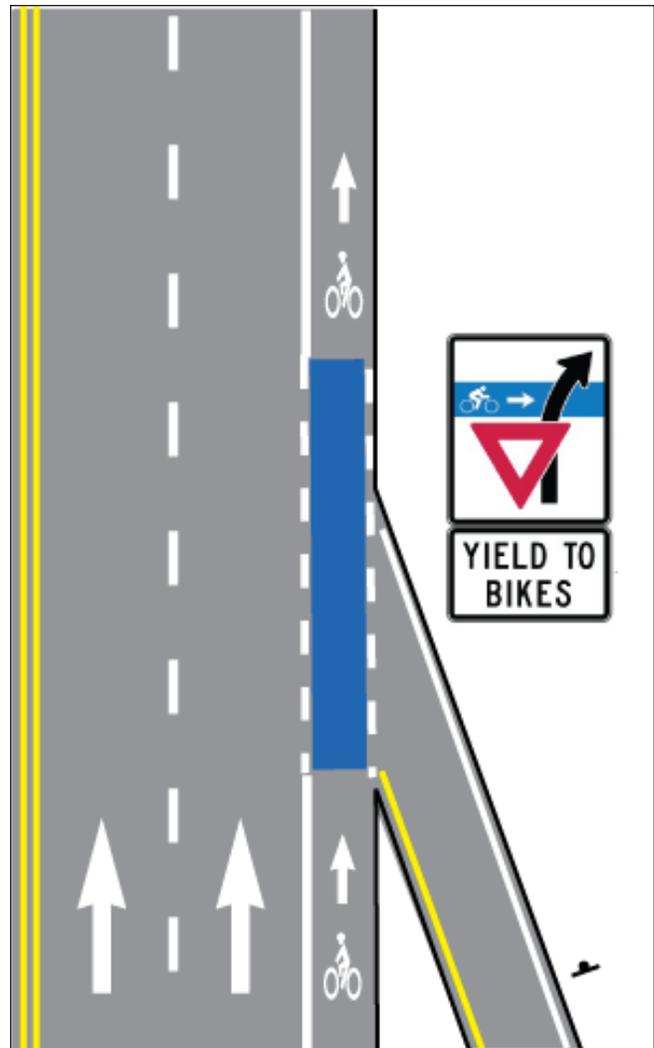


Broadway Bridge at Interstate Avenue in Portland, Oregon. Images provided by Google StreetView and Portland's Blue Bicycle Lanes.

Guidance

This treatment is not currently present in any state or federal design standards.

Portland's Blue Bicycle Lanes: <http://www.portlandonline.com/shared/cfm/image.cfm?id=58842>



Recommended Design

Bike Facility Design Options

Colored Bicycle Lanes

Design Summary

Bicycle Lane Width: 5' minimum and 7' maximum.

Discussion

A contrasting color for the paving of bicycle lanes can be applied to continuous sections of roadways

These situations help to better define road space dedicated to bicyclists and make the roadway appear narrower to drivers resulting in beneficial speed reductions

Colored bicycle lanes require additional cost to install and maintain. Techniques include:

Paint – less durable and can be slippery when wet

Colored pavement – colored medium in pavement during construction – most durable

Colored and textured sheets of acrylic epoxy coating

Design Example

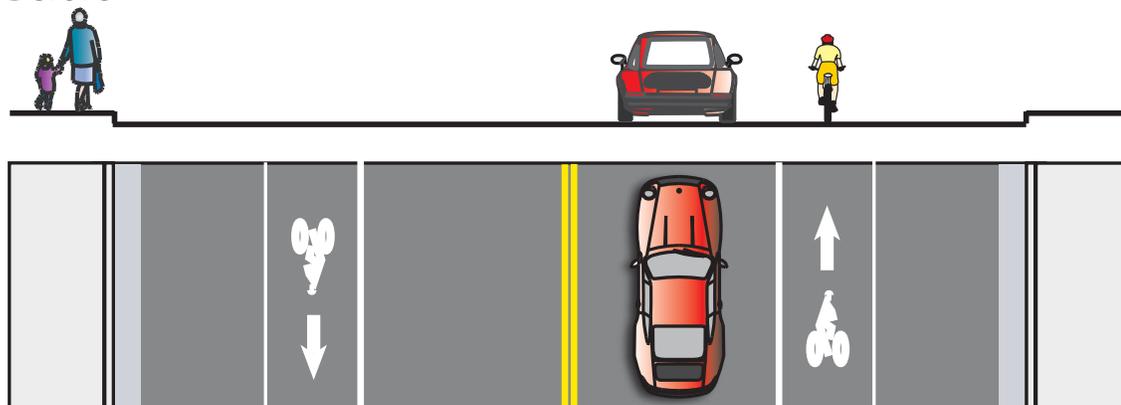


Guidance

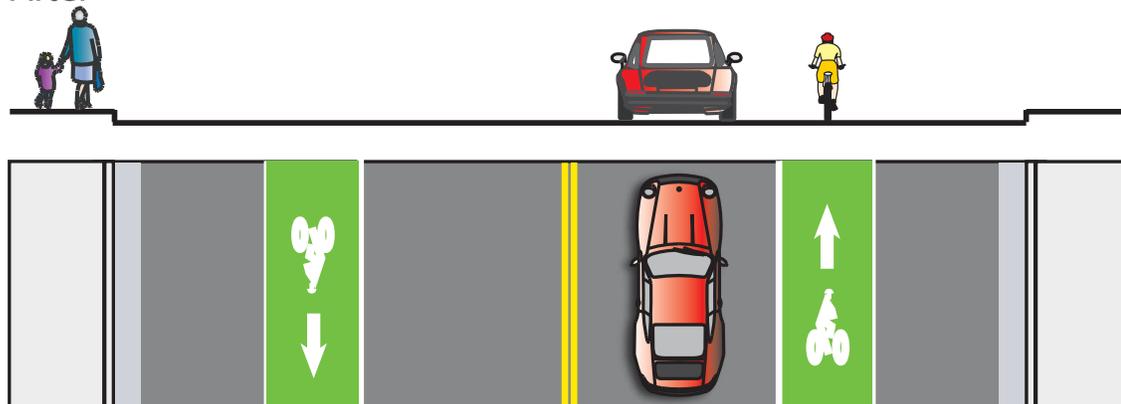
This treatment is not currently present in any state or federal design standards.

Recommended Design

Before



After



Bicycle Box

Design Summary

A bicycle box is a right angle extension to a bicycle lane at the head of a signalized intersection

Bicycle Box Dimensions:

The bicycle box should be 14' deep to allow for bicycle positioning.

Signage:

Appropriate signage as recommended by the MUTCD applies. Signage should be present to prevent 'right-turn on red' (if applicable) and to indicate where the motorist must stop.

Discussion

Bicycle boxes help reduce risk of "right hook" conflicts between motorists and bicyclists

The bicycle box assigns priority to bicyclists, allowing them to get in front of the traffic queue

Signage alerting motorists to stop behind the bicycle box is advised

On a two-lane roadway the bicycle box can also facilitate left turning movements for bicyclists as well as through bicycle traffic

Motor vehicles must stop behind the white stop line at the rear of the bicycle box and may not turn right on red

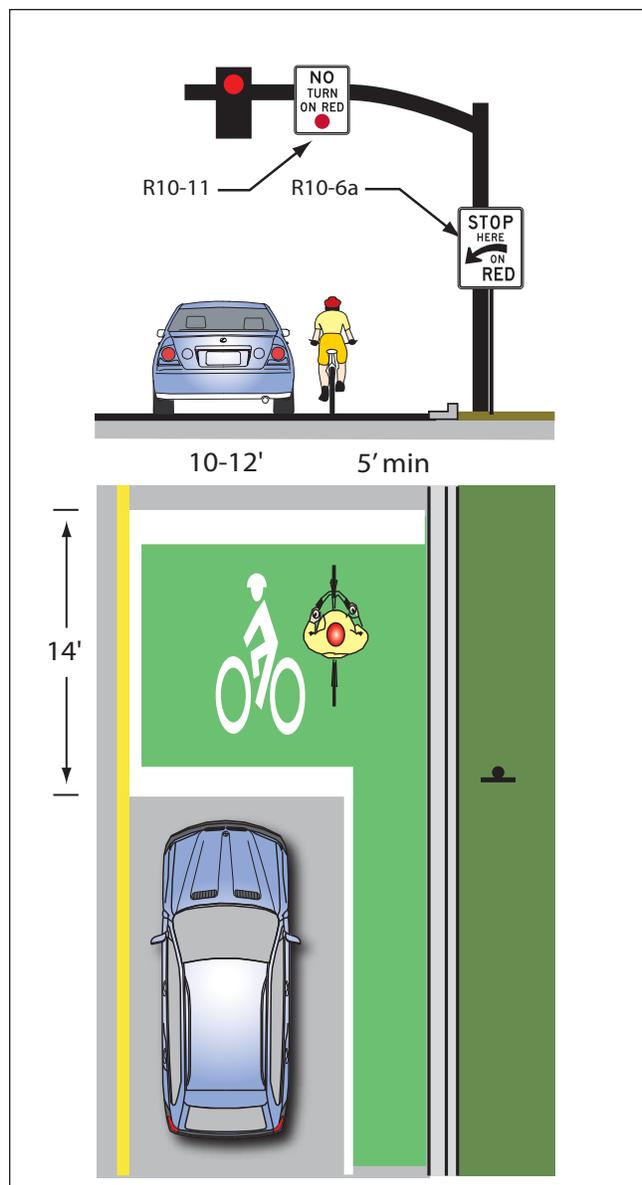
Where bicyclists have no need or have restricted access it may not be necessary to restrict right turns on red.

In these limited cases a vehicle right-turn only lane may be provided to the outside of the bicycle box.

At multi-lane bicycle boxes there can be a safety issue if a bicyclist is using the bicycle box to maneuver for a left turn just as the signal turns green. This would put the cyclist possibly in the path of an approaching vehicle. It is recommended that installations wider than one lane across from the access point to the bicycle box be studied carefully before installation

Guidance

This treatment is not currently present in any state or federal design standards.



Recommended Design

Bike Facility Design Options

Raised Bicycle Lanes

Design Summary

Recommended Design With Parking

Bicycle Lane Width:

5 feet minimum without parking. Bicycle lane should drain to street. Drainage grates should be in travel lane

Mountable Curb Design:

Mountable curb should have a 4:1 or flatter slope and have no lip that could catch bicycle tires

Signage & Striping:

Same as standard bicycle lanes

Discussion

When placed next to parking, bike lane should be a minimum six feet wide and colored to clearly delineate cyclist travel areas from motor vehicle parking

Raised bicycle lanes have a mountable curb separating them from the adjacent travel lanes

Provide an element of physical separation from faster moving vehicle traffic

For drivers, the mountable curb provides a visual and tactile reminder of where the bicycle lane is

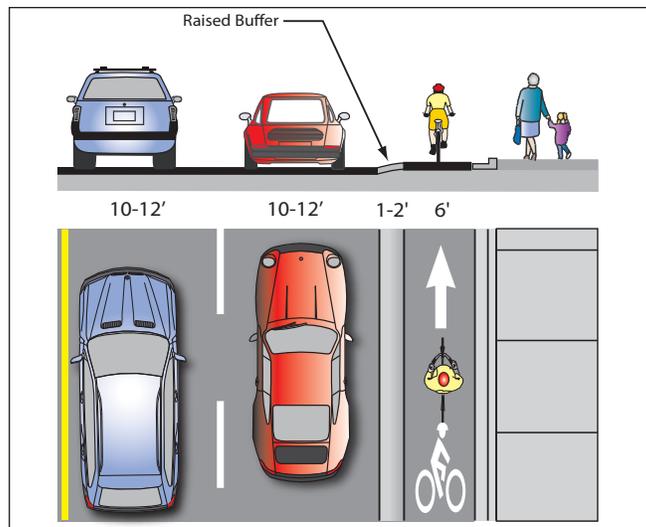
For bicyclists the mountable curb makes it easy to leave the bicycle lane if necessary, such as when passing another bicyclist

Raised bicycle lanes cost more than traditional bicycle lanes and typically require a separate paving operation but maintenance may cost less as the bicycle lane receives no vehicle wear and resists debris accumulation

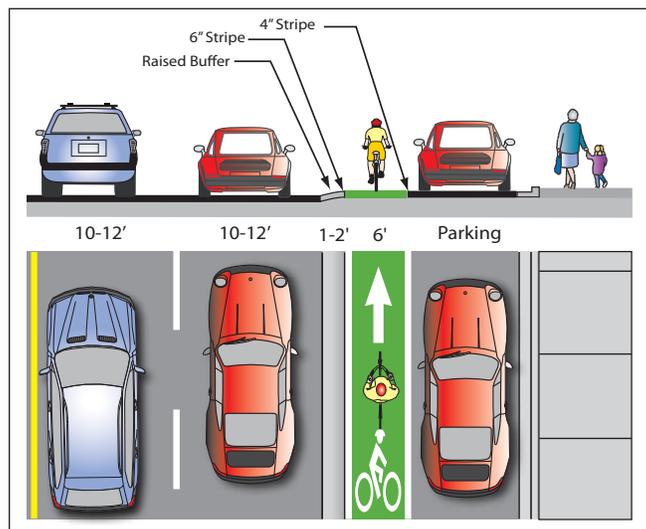
This treatment is less preferable than a cycle track, which eliminates more potential motor vehicle/cyclist conflict points

Guidance

This treatment is not currently present in any state or federal design standards.



Recommended Design Without Parking



Recommended Design With Parking

Cycle Tracks

Design Summary

A cycle track is a hybrid type bicycle facility that combines the experience of a separated path with the on-street infrastructure of a conventional bicycle lane.

Cycle Track Width:

7 feet minimum to allow passing and obstacle avoidance

2 foot buffer between parking and cycle track to reduce door zone conflicts

Discussion

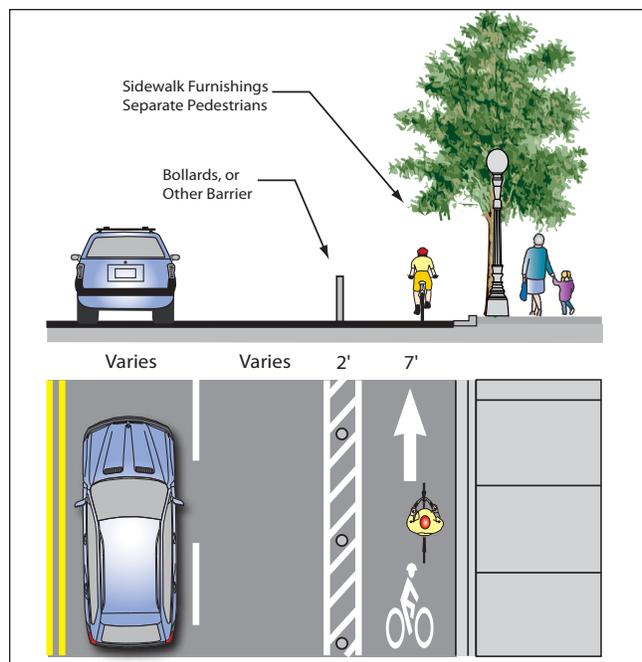
Provide space that is intended to be exclusively or primarily for bicycles, and is separated from vehicle travel lanes, parking lanes and sidewalks by pavement markings or coloring, bollards, curbs/medians or a combination of these elements

Should be one-way facilities, on one or both sides of a street, and are separated from vehicles and pedestrians

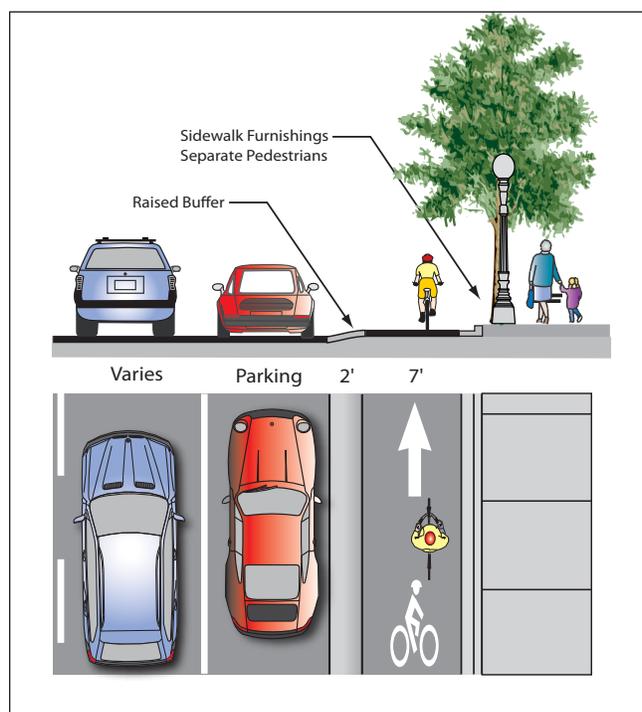
Place along slower speed urban/suburban streets with few driveways or other mid-block access points for vehicles

Careful considerations at intersections must be taken. Right turning motorists conflicting with cycle track users is the most common. For a detailed discussion, see Cycle Tracks: Lessons Learned available at <http://www.altaplanning.com/cycle+tracks.aspx>

Design Example



Recommended Design – No Parking



Recommended Design – On-Street Parking

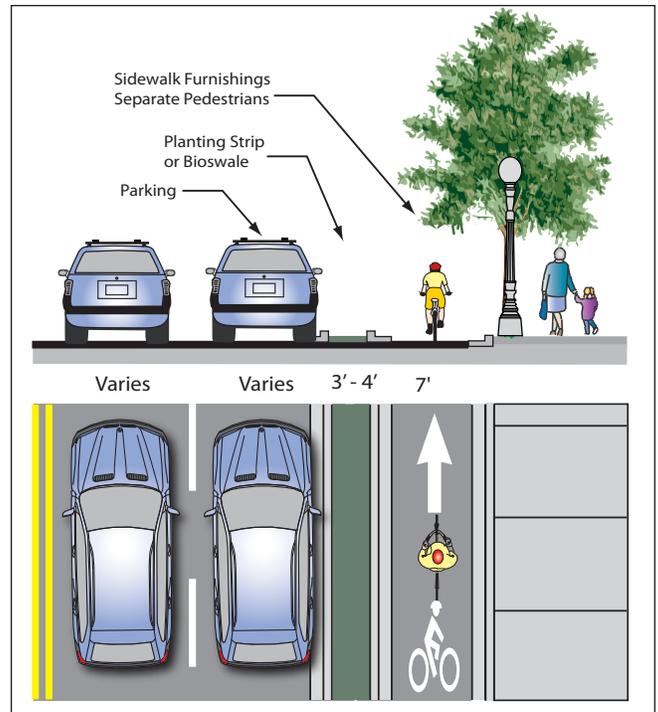
Bike Facility Design Options

Cycle Track, continued

Guidance

This treatment is not currently present in any state or federal design standards.

Suggested guidance is available in Cycle Tracks: Lessons Learned <http://www.altaplanning.com/cycle+tracks.aspx>



Alternative Design – On-Street Parking

Costs, Budget and Implementation



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As described in Chapter 3, Milwaukee’s recommended bikeway system consists of a comprehensive network of on-street bikeways. This chapter presents a brief overview of the planning-level cost opinions for proposed bicycle improvements and maintenance activities as well as a discussion of implementation policies that can bolster and institutionalize the development of a high-quality bikeway network. Individual project cost opinions are provided in Appendix J as are grant funding sources, potential local sources of revenue and an implementation strategy that presents a targeted methodology for how Milwaukee can implement projects under different funding scenarios. It should be emphasized that the City will always seek out state and federal grant opportunities and matching funds when implementing new facilities.

Cost Opinion Overview

This section summarizes planning level cost opinions associated with the recommended bicycle improvement projects. Cost opinions were provided by City of Milwaukee Staff and supplemented with costs from other similar Bicycle Master Plans and experience in nearby communities. Table 4 shows costs for bicycle improvements. It should be noted that the cost opinions include options that may not be necessary for all projects and that actual costs may be lower than the averages used here. Additionally, the many of the maintenance costs included here are already being carried out by the city and may not be new expenses. All costs are in 2010 dollars and are estimates only; actual costs should be evaluated in the planning stage of individual projects.

Implementation Cost Opinions

The total implementation cost for on-street and off-street bicycle facilities of the Milwaukee Bicycle Plan is estimated at approximately \$8.6 million, as shown in Table

5 (below). These costs do not include any land acquisition that may be necessary for projects.

Table 5: Summary Costs for Bicycle Facility Improvements

Improvement	Proposed (MI)	Cost
Bike Routes	9.53	\$47,650
Bike Lanes	125.36	\$4,829,316
Bike Boulevards	39.77	\$1,246,871
Raised Bike Lanes	3.39	\$754,207
Shared Use Paths	6.75	\$752,004
Path Connections	4 Ramps	\$1,000,000
Total	184.80	\$8,630,048

Table 6 (below) shows the project prioritization and construction and maintenance information for the recommended system. These costs summarize the detailed planning level cost opinions for individual facilities provided in Appendix J.

Short-term and medium-term facilities include bike lanes and signed routes. These facilities were chosen for early implementation based on their low-level of cost and relative ease of implementation. Both the bicycle lanes and signed routes should be implemented as soon as possible and can be implemented all at once.

Bicycle boulevards, raised bike lanes and shared use paths are included as long-term facility recommendations based on expense. These projects will need to be evaluated on a case-by-case basis and include neighborhood input to determine project prioritization.

The City may choose to prioritize facilities designated as medium or long-term facilities as opportunities arise. For example, bike lane striping is dependent on the purchase of a new paint truck. Once the truck is purchased, the city may proceed with bike lane installation immediately rather than waiting to first complete installation of all signs along proposed bicycle routes. A detailed maintenance budget is presented in Appendix J.

Table 6: Project Prioritization and Planning-Level Cost Opinions for Proposed Bicycle Projects

Phase	Proposed Bicycle Corridor Improvements		
	Length (miles)	Construction Cost	Annual Maintenance ¹
Short-Term (Bike Routes)	9.53	\$47,650	\$9,678.25
Medium-Term (Bike Lanes)	125.36	\$4,829,316	\$860,094.96
Long-Term (Raised Bike Lanes, Bicycle Boulevards, Shared Use Paths and Grade-Separated Path Ramps)	49.91	\$3,753,082	\$521,517.19
Total	184.80	\$8,630,048	\$1,391,290.40

(1) Maintenance costs for on-street bikeways are included as part of the annual roadway maintenance budget. These costs are an estimate of maintenance required on existing and proposed bikeway facilities (e.g., bicycle wayfinding signage and more frequent roadway patching to maintain a quality riding surface).

Costs, Budget and Implementation

Table 4: Planning-Level Cost Opinions for Bicycle Projects

Item Description	Unit	Qty	Unit Price	Notes
Bike Lanes (Roadway Re-striping)				
Striping Removal	LF	15,840	\$2.02	3 lanes
Re-striping	LF	26,400	\$0.02	5 lanes
Pavement markings	EA	20	\$175	Every 300'
Signage ¹	EA	10	\$250	Every 500'
Cost per Mile			\$38,525	
Construction Cost per LF:			\$7.30	
Bike Route				
Signage	EA	20	\$250.00	
Cost per mile:			\$5,000	
Construction Cost per LF:			\$0.95	
Raised Bike Lane²				
18" Mountable curb	LF	5280	\$12	
Class C Asphaltic Concrete	SF	52800	\$0.67	Assumes 5' lane each side
Asphalt color coating	SF	52800	\$0.67	
6" Aggregate base	SF	52800	\$0.73	
Drainage grate relocation	EA	10	\$5,000	
Cost per Mile			\$222,480	
Construction Cost per LF:			\$42.14	
Bicycle Boulevard³				
Level 1: Signage	EA	20	\$250.00	
Level 2: Pavement Marking	EA	50	\$50.00	Every 100'
Level 3: Intersection Treatments				
Turn stop signs	EA	4	\$300	4 per mile
Bike signal actuation	EA	2	\$1,000	2 per mile
Level 4: Traffic Calming				
Traffic circles	EA	1	\$20,000	1 per mile
Cost per mile:			\$30,700	
Construction Cost per LF:			\$5.81	
Shared Use Path (10' with 2' shoulders)⁴				
Clear & Grub	SF	73,920	\$0.15	14'
4" Aggregate base	SF	63,360	\$0.60	12'
Asphalt Path-3" Depth	SF	63,360	\$1.20	12'
Centerline stripe	LF	5,280	\$1.00	6"
Cost per mile:			\$111,408	
Construction Cost per LF:			\$21.10	
Path Connections⁵				
Construction Cost per ramp:			\$250,000	

(1) MUTCD Guidance: The BIKE LANE (R3-17) sign spacing should be determined by engineering judgment based on prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.

(2) Estimate is exclusive of raised parking option

(3) Note: Level 5 Bicycle Boulevard treatments (traffic diversion) are not included, as the majority of bicycle boulevards will not require traffic diversion.

(4) Note: planning level estimates do not include ROW acquisition costs; costs for potentially required bridges or retaining walls; or costs for amenities including lighting, benches, bicycle parking, interpretive kiosks, etc.

(5) Note: planning level estimates for a 10' wide paved path connecting a grade-separated path to a street or other path connection; actual costs may vary widely depending on grade change and other topographical features.

Sample Budget

Tables 7 and 8 on the following pages display a sample budget for the Milwaukee Bicycle Program for 2010 through 2015. These budgets are suggestions and are not proposed budgets. As is the case with all City departments, the budget for bicycle facilities, maintenance and programs will have to be evaluated on an annual basis. The budget focuses on the primary recommendations of this plan including expanding and maintaining the bicycle network; increasing the bicycle program staff; and adding funding for education, marketing, and encouragement programs. While this budget addresses many of the recommendations made in this plan, it is not a complete budget for the bicycle program, and there are many recommendations within this plan that are not included.

This budget includes implementation of the full bicycle network recommended in this plan by 2015:

- 9.53 miles of bike routes added in 2011 and 2012
- 125.36 miles of bike lanes added in 2011 through 2014
- 40.61 miles of bike boulevards added in 2011 through 2014
- 3.41 miles of raised lanes added in 2012 through 2014
- 6.74 miles of paths added in 2013 through 2015
- 4 path connections added in 2012 through 2015

As the network is expanded, increased maintenance costs are reflected in the following year. Facility maintenance costs are based on national best practices, and include regular surface patching, sign replacement, and restriping as highlighted earlier in this chapter. In practice, Milwaukee has spent considerably less money to maintain its facilities than is budgeted here.

The budget includes increased personnel for the bicycle program every year. Currently the city employees the equivalent of 1/3 of one full time employee dedicated to bicycle issues. This plan and the budget call for increasing full-time staff to the equivalent of two full time employees and 2,000 hours of intern funding per year.

Potential federal, state and local funding sources are presented in Appendix N.

Costs, Budget and Implementation

Table 7: Sample Milwaukee Bicycle Program Budget – 2010 – 2012

	Cost	per Unit	2010		2011		2012	
			Units	Subtotal	Units	Subtotal	Units	Subtotal
Operations & Maintenance								
On-Street Facilities*								
Bike Routes	\$1,025	Mile	65.26	\$66,892	65.26	\$66,892	70.03	\$71,776
Bike Lanes	\$6,861	Mile	51.28	\$351,832	51.28	\$351,832	82.62	\$566,856
Bicycle Boulevards	\$6,650	Mile	0.00	\$0	0.00	\$0	10.15	\$67,514
Other (raised lanes...)	\$6,971	Mile	0.00	\$0	0.00	\$0	0.00	\$0
Off-Street Facilities								
Maintenance	\$2,500	Mile	0.00	\$0	0.00	\$0	0.00	\$0
Support Facilities								
Bike Parking	\$200	Rack	0.00	\$0	50.00	\$10,000	50.00	\$10,000
Marketing								
Printing				\$0				
Bike Map				\$0		\$7,000		\$7,000
Pamphlets				\$0		\$5,000		\$5,000
Media				\$0		\$10,000		\$10,000
Mini-grants				\$0		\$10,000		\$10,000
SmartTrips Program				\$0		\$33,000		\$33,000
Bike To Work Week				\$0		\$5,000		\$5,000
Education								
Classes				\$0		\$5,000		\$5,000
O&M Subtotal				\$418,724		\$503,724		\$791,146
Capital								
On-Street Facilities								
Bike Routes	\$5,000	Mile	0.00	\$0	4.77	\$23,825	4.77	\$23,825
Bike Lanes	\$38,525	Mile	0.00	\$0	31.34	\$1,207,374	31.34	\$1,207,374
Bicycle Boulevards	\$30,700	Mile	0.00	\$0	10.15	\$311,682	10.15	\$311,682
Other (raised lanes...)	\$222,480	Mile	0.00	\$0	0.00	\$0	1.14	\$252,886
Hazard Elimination						\$10,000		\$10,000
Off-Street Facilities								
Paths	\$111,408	Mile	0.00	\$0	0.00	\$0	0.00	\$0
Path Connections	\$250,000	Ramp	0.00	\$0	0.00	\$0	1.00	\$250,000
Support Facilities								
Bike Parking	\$200	Rack	0.00	\$0	50.00	\$10,000	50.00	\$10,000
Capital Subtotal				\$0		\$1,562,880		\$2,065,766
Personnel								
Bike & Ped Coordinator	\$50,000	Employee	0.33	\$16,500	0.67	\$33,500	1.00	\$50,000
Interns	\$14	Hour	0.00	\$0	500	\$7,000	1,000	\$14,000
Fringe Benefits	\$0			\$7,425		\$18,225		\$28,800
Personnel Subtotal				\$23,925		\$58,725		\$92,800
Annual Total:				\$442,649		\$2,125,329		\$2,949,711

Costs, Budget and Implementation

Table 8: Sample Milwaukee Bicycle Program Budget – 2013 – 2014

	Cost	per Unit	2013		2014		2015	
			Units	Subtotal	Units	Subtotal	Units	Subtotal
Operations & Maintenance								
On-Street Facilities*								
Bike Routes	\$1,025	Mile	74.79	\$76,660	74.79	\$76,660	74.79	\$76,660
Bike Lanes	\$6,861	Mile	113.96	\$781,880	145.30	\$996,903	176.64	\$1,211,927
Bicycle Boulevards	\$6,650	Mile	20.31	\$135,028	30.46	\$202,542	40.61	\$270,057
Other (raised lanes...)	\$6,971	Mile	1.14	\$7,924	2.27	\$15,847	3.41	\$23,771
Off-Street Facilities								
Maintenance	\$2,500	Mile	0.00	\$0	2.25	\$5,617	4.49	\$11,233
Support Facilities								
Bike Parking	\$200	Rack	50.00	\$10,000	50.00	\$10,000	50.00	\$10,000
Marketing								
Printing								
Bike Map				\$7,000		\$7,000		\$7,000
Pamphlets				\$5,000		\$5,000		\$5,000
Media				\$10,000		\$10,000		\$10,000
Mini-grants				\$10,000		\$10,000		\$10,000
SmartTrips Program				\$33,000		\$33,000		\$33,000
Bike To Work Week				\$5,000		\$5,000		\$5,000
Education								
Classes				\$5,000		\$5,000		\$5,000
O&M Subtotal				\$1,086,491		\$1,382,569		\$1,678,648
Capital								
On-Street Facilities								
Bike Routes	\$5,000	Mile	0.00	\$0	0.00	\$0	0.00	\$0
Bike Lanes	\$38,525	Mile	31.34	\$1,207,374	31.34	\$1,207,374	0.00	\$0
Bicycle Boulevards	\$30,700	Mile	10.15	\$311,682	10.15	\$311,682	0.00	\$0
Other (raised lanes...)	\$222,480	Mile	1.14	\$252,886	1.14	\$252,886	0.00	\$0
Hazard Elimination				\$10,000		\$10,000		\$10,000
Off-Street Facilities								
Paths	\$111,408	Mile	2.25	\$250,297	2.25	\$250,297	2.25	\$250,297
Path Connections	\$250,000	Ramp	1.00	\$250,000	1.00	\$250,000	1.00	\$250,000
Support Facilities								
Bike Parking	\$200	Rack	50.00	\$10,000	50.00	\$10,000	50.00	\$10,000
Capital Subtotal				\$2,292,237		\$2,292,237		\$520,297
Personnel								
Bike & Ped Coordinator	\$50,000	Employee	1.33	\$66,500	1.67	\$83,500	2.00	\$100,000
Interns	\$14	Hour	1,500	\$21,000	2,000	\$28,000	2,000	\$28,000
Fringe Benefits	\$0			\$39,375		\$50,175		\$57,600
Personnel Subtotal				\$126,875		\$161,675		\$185,600
Annual Total:				\$3,505,604		\$3,836,482		\$2,384,544

Implementation Policies

The City of Milwaukee Bicycle Plan provides the long-term vision for the development of a community-wide bikeway network usable by all residents for all trip types. Implementation of the Plan will take place in small steps over many years. The following strategies and action items are provided to guide Milwaukee toward the vision identified in the Plan.

Projects have been prioritized based on facility type and are listed in Appendix J. This list should be reviewed every fiscal year, with new projects added, completed projects removed, and the priorities revised as conditions change. This strategy also represents an opportunity to correspond with nearby jurisdictions to collaborate on regionally-important walkways and bikeways.

Strategy 1: Strategically Pursue Infrastructure Projects.

Supporting Policies

Action Items

- Policy 1.1 Pursue capital improvements funding or grant funding for higher-priority bicycle and pedestrian improvements first.
- Policy 1.2 In the case where grant requirements or construction in conjunction with another roadway project make construction of a lower priority project possible or required by law, pursue funding sources for that project regardless of priority.
- Policy 1.3 Install approved bicycle and pedestrian projects simultaneous with road improvement projects scheduled in the same area, regardless of the priority placed upon the bicycle or pedestrian project.
- Policy 1.4 Review current posted speeds on major streets; identify opportunities for posted speed reductions, especially on roadways where bicyclists and motorists will share the same lanes.
- Policy 1.5 Publish a public report documenting the status and on-going actions for all bicycle and pedestrian projects at the end of each fiscal year.

Discussion

Milwaukee staff should strategically pursue infrastructure projects. Ideally, staff should pursue capital improvements funding or grant funding for short-term bicycle improvements first. However, if grant requirements or construction in conjunction with another roadway project make construction of a lower priority project possible, then the community should pursue funding sources for that project regardless of priority.

Strategy 2: Regularly Revisit Project Prioritization.

Supporting Policies

Action Items

Policy 2.1 Annually review and update the Bicycle Plan project and program list.

Policy 2.2 Share updated Bicycle Plan project list with the public and other jurisdictions.

Policy 2.3 Review and update the Plan as needed, at a minimum of every five years.

Discussion

Projects have been prioritized based on facility type and are displayed in Appendix J. This list should be reviewed every fiscal year, with new projects added, completed projects removed, and the priorities revised as conditions change. This strategy also represents an opportunity to correspond with nearby jurisdictions to collaborate on regionally-important walkways and bikeways.

Action Items

Annually review and update the bikeway and walkway project list with input from appointed persons within the City of Milwaukee and other relevant agencies. The updated list should be shared with the public.

Strategy 3: Integrate Bicycle Planning into Milwaukee's Planning Processes.

Supporting Policies

Action Items

Policy 3.1 Incorporate a bicycle facilities checklist into the Plan review process.

Policy 3.2 Adopt a bicycle parking ordinance and other local policies that promote bicycling.

Policy 3.3 Consider adopting a "Complete Streets" policy to ensure that bicycle and pedestrian facilities are included in all major construction and reconstruction projects. Bicycle facilities should be addressed at the project scoping stage.

Policy 3.4 Require sufficient right-of-way to be set aside for bicycle facilities as redevelopment projects occur.

Policy 3.5 Ensure that appropriate bicycle facilities are built in new developments in accordance with this Plan and other relevant plans.

Policy 3.6 Ensure that bicycle infrastructure improvements are funded through a dedicated funding source.

Discussion

This Plan presents a vision for the future of bicycling in Milwaukee. To ensure that that vision is implemented, the Plan must become a living document that is incorporated into the day-to-day activities of planning, design, funding, construction and maintenance in Milwaukee. This plan recommends several ways for bicycle planning to be integrated into the planning process.

Strategy 4: Implement Education, Encouragement and Enforcement Activities.

Supporting Policies

Action Items

Policy 4.1 Pursue grant funding for higher-priority programs first.

Policy 4.2 Seek funding for other supporting programs as appropriate.

Policy 4.3 Work with schools, youth groups, and other parties to provide education and encouragement programs to Milwaukee residents.

Policy 4.4 Work with the Police Department, media, advocacy and safety groups to create an educational program to educate pedestrians, bicyclists, and drivers of rights, responsibilities and safe practices to share the road comfortably and safely.

Discussion

This Plan presents a vision for the future of bicycling in Milwaukee. To ensure that that vision is implemented, the Plan must become a living document that is incorporated into the day-to-day activities of planning, design, funding, construction and maintenance in Milwaukee. This plan recommends several ways for bicycle planning to be integrated into the planning process.

Maps

