WISCONSIN RURAL BICYCLE PLANNING GUIDE

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WISCONSIN DEPARTMENT OF TRANSPORTATION

Credits

This report was prepared by John Williams of Tracy-Williams Consulting and the Wisconsin Department of Transportation, Bureau of Planning and Economic Development. Tom Huber and Dan Thyes of that Bureau were assigned to the preparation of the report. Phil VanValkenberg prepared the bicycle/roadway suitability model in 1982 which is featured in these guides and used for the Wisconsin Bicycle Map.

Photos

All photos by John Williams except:
Cover: photos on left from WisDOT files; upper right: Tom Huber; lower right: Mike Rewey.
P.1 Mike Rewey
P2. Dan Burden
P.5 Tom Huber
P.8 (Left) Dan Burden
P.14 Tom Huber

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I. Introduction

Bicycling is an important mode of transportation, whether used separately or with other modes. Since 1991, the federal government has recognized this role and its importance as part of a balanced transportation system. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) placed increased importance on the use of the bicycle from a transportation standpoint and called on each state Department of Transportation to encourage its use. With the passage of the Transportation Equity Act for the 21st Century (TEA-21), the federal government reaffirmed its commitment to bicycling, and SAFETEA-LU.

Figure 1: Striped shoulders on higher-volume rural roadways and bridges can serve bicyclists well — and provide a breakdown lane for motorists.

Even before the passage of the original ISTEA bill, the Wisconsin Legislature prescribed a "bicycling role" for the Wisconsin Department of Transportation (WisDOT). According to Wisconsin State Statute 85.023, WisDOT is to provide assistance in the development of bicycle facilities:

"The department (WisDOT) shall assist any regional or municipal agency or commission in the planning, promotion, and development of bikeways."

The focus of these rural planning guidelines is primarily on the utilitarian and transportation aspects of bicycling and less on recreation. The purpose of this document is to provide assistance in the form of a general set of guidelines that can be used by counties and Wisconsin's smaller communities as they plan and develop bicycle facilities. A separate guide has been developed for the particular needs of metropolitan planning organizations (MPOs) and larger communities, to address urban and suburban bicycle needs.

Although the emphasis of this guide is on planning rather than designing for bicycle transportation, some general design information (e.g., multi-use paths and paved shoulders) is provided. However, this document is intended for use in conjunction with the *Wisconsin Bicycle Facility Design Handbook,** which contains much more detailed information.

Consideration of the different types of bicycle facilities is necessary when alternative bicycle route options are evaluated. For example, knowing that a preferred facility type is a poor match for a specific corridor may lead to a different corridor choice or facility type.

**The Wisconsin Bicycle Facility Design Handbook may be found at this web address: http://www.dot.wisconsin.gov/projects/bike.htm*

Figure 2: Shared-use trails in rural areas attract bicyclists of all ages. They can provide a peaceful and worry-free recreational experience.

There are several bicycle planning models currently in use in the United States. The process described here was developed by WisDOT. A number of reference materials and guides were consulted in developing these guidelines. They were prepared by the American Association of State Highway and Transportation Officials (AASHTO), the National Center for Bicycling & Walking, and the Florida DOT, as well as Wisconsin's *Planning Guide for Development of Pedestrian and Bicycle Facilities* (Governor's Office of Highway Safety, 1977) and the 2003 edition of the *Wisconsin Bicycle Planning Guidelines for MPO's.* Any organization preparing a bicycle plan or designing bicycle facilities should consult the Wisconsin Bicycle Facility Design Handbook.

The planning process, as presented in these guidelines, incorporates a combined approach (route planning and design) to the development of a bicycle element of a county's long range transportation plan. The route planning component involves the identification of potential bicycle travel corridors and the recommendation of bicycle facility types on specific routes through these corridors. The design component includes the routine consideration of bicycles in all relevant projects and the establishment of minimum standards for all roads and highways where bicyclists are permitted.

This two-pronged approach ensures that even the roads not designated as bicycle routes, would have minimum accommodation for bicyclists. Road segments not meeting appropriate standards and new transportation projects with potential bicycle impacts should be identified in the bicycle plan along with the proposed bicycle route system. Step 5 of the "Bicycle Planning Process" discusses this approach in detail.

Figure 3: In small towns, many destinations are conveniently reached by bicycle.

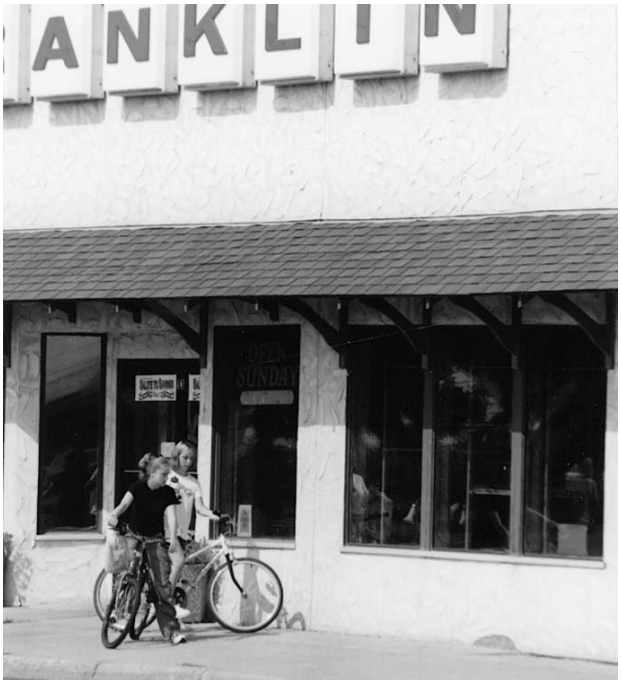
II. The Bicycling Public

These guidelines recommend that plans consider the needs of the broad range of bicyclists found in a typical county. Bicyclists vary by age, of course, but they also vary by cycling experience and knowledge, by attitudes toward traffic, by where they live and what's nearby, by physical fitness levels, and by typical trip purposes and common destinations.

By looking at some of these factors, it is possible to gain a greater appreciation for the diversity of the bicycling public and the possible implications for the development of policies, plans and projects. To assume all bicyclists are alike or that they fit neatly into a small number of categories is to distort reality. Ultimately, most members of society ride bicycles at some time for some purpose. As a result, defining the bicycling public is much like defining the public.

Age differences: In general, young bicyclists will not be found on a county's more rural roads and county trunk highways. However, in places where development is clustered, as in villages and small towns, children may well be found bicycling at very young ages. Some kids learn the basics of balance and control with their first two-wheeler by the age of four. By elementary school age, many students ride to school or to the store or to visit friends.

Figure 4: A bicycle may be many kids' primary means of independent mobility.



By the time they are in junior high school, kids often have good handling skills, if not good traffic-safety skills. It's important to remember that their bicycles are their primary means of independent mobility. Some kids learn bicycle safety in school or through recreational programs. Such programs are becoming increasingly popular and are encouraged by WisDOT.

Many high school students stop riding as infatuation with the car takes hold. But by post-high school age, some young people come back to the bicycle — particularly if they attend college. Many Wisconsin college towns are known for high levels of bicycle use. Beyond school, many people limit their bicycling to family outings, errands, recreational trail riding, and as a means of low-impact exercise. The latter reason for bicycling is increasingly important in a society plagued by ailments that result from inactivity, including diabetes and cardiovascular disease.

Some adults use the bicycle to commute to work. This use is most often seen in cities and towns but may also be found on rural roads where an isolated business is located. Other adults may use bicycles for touring and fast-paced riding and training and use Wisconsin's extensive network of scenic rural roads. Bicycle clubs, which tend to cater to people in the 25 to 50 age group, often sponsor rides through rural areas. By retirement age, many people who haven't ridden for years take up the bicycle again as a way to keep limber and fit. For some older Americans, the bike or adult tricycle may be their only means of independent travel. In many cases, these bicyclists will do their bicycling close to home or on a popular path.

Cycling experience and knowledge: Understanding of bicycling varies widely among the public, regardless of age. Many people know little about how to ride efficiently and safely, how to carry loads, what kinds of safety equipment are necessary, or even which side of the road to ride upon. Some bicyclists, however, are more knowledgeable about riding techniques, equipment, and other subjects. In many cases, these bicyclists are members of clubs and have taken advantage of formal and informal learning opportunities to extend their knowledge.

Figure 5: For seniors, bicycling is an excellent low-impact form of exercise and far less expensive than driving. For some, bicycling and walking may be their only means of independent travel.

Attitudes toward traffic: Some bicyclists have learned to ride comfortably on busy streets and highways. While few enjoy sharing a road with high volumes of car and truck traffic, some destinations may only be reached via major roads. Bicyclists who frequent these roads and highways often have a wary but not overly fearful attitude toward traffic. On high speed highways, they will appreciate — and use — smooth paved shoulders.

Other bicyclists prefer to avoid traffic and use quiet back roads that may be less direct. Such bicyclists may well see traffic as fearsome and unpleasant. As a result, they may forego using the bicycle for a particular trip if there is no quiet way to get to their destination. In small communities, they may use back streets to get around, staying off the main streets to the extent possible. Trails and short-cuts intended for bicyclists will be most appreciated by these riders.

Where they live and what's nearby: In villages and small towns, bicyclists often live near at least a few important services and destinations. They might be just down the road from a school, grocery store, drug store, park, or library. In towns and villages with well connected streets, they may have several choices of how to get from point A to point B. In such areas, residents may use bicycles for a variety of trips but may be discouraged by high levels of traffic on main streets or highways that pass through.

Farther from the center of a village or small town, homes may be isolated with few destinations within easy reach. In such areas (often called "semi-rural"), there may be only one way to get somewhere — and it may be the main road. As a result, people living in such areas may be less inclined to use the bicycle for trips. In very rural areas, the only bicyclists on the road are likely to be experienced recreational riders passing through.

Physical fitness levels: While bicycling requires relatively little energy use per mile, one's body is the engine. As a result, people who are physically fit will find bicycling longer distances easier than those who get little exercise. This is particularly noticeable in hilly areas or traffic situations where one must keep up a fast pace. According to the 2002 *National Household Travel Survey,* the average distance of a bicycle trip is approximately two miles in length, which would take a fit rider eight to ten minutes to cover. Some bicyclists would consider this too short a distance to bicycle and some planners agree, preferring to focus on longer distance trips. For others, however, a two-mile trip would be a challenge that could help improve their health and fitness.

Figure 6: Farther from the center of town, homes may be isolated with few destinations within easy reach. In such areas (often called "semi-rural"), there may be only a rudimentary road network.

Typical trip purposes and common destinations: Studies like the *National Household Travel Survey* have shown that people use the bicycle most often for social and recreational trips, trips to school, and short "personal business" trips (e.g., trips to the store or to visit friends). They use a bicycle less often for work commute trips, partly because the commute trip tends to be longer than most other trip types and it is typically constrained to certain times of day and inflexible destinations. In small communities, the commute trip, however, may be quite short. In rural areas, it may range from a walk from the house to the barn to a long trip to a distant city.

Figure 7: In smaller towns, bicycling to downtown may be easy and convenient. Providing improvements like bike racks, bike lanes, and the like can help bring new business to the town's center.

III. An approach to serve the range of bicyclists

More experienced bicyclists are generally well-served by design standards that include paved shoulders on major town roads and higher-volume rural roadways. This practice will benefit motor vehicle and bicycle users, allowing adequate space for sharing with minimum need for changing lanes or lane position. These bicyclists will also benefit from basic improvements to village and city streets (e.g., replacing unsafe drainage grates and patching pot holes). In addition, they may find long rural paths like the Elroy-Sparta enjoyable.

Less experienced bicyclists will benefit from these improvements, too, especially on lower volume roads. But they will also be well-served by the selective development creation of bicycle lanes, routes, and paths where needs are greatest (e.g., connecting community schools and parks with homes or bridging over a busy road) or where special opportunities arise (e.g., paths along abandoned railroad lines or waterways). These bicyclists will use rural paths, particularly if there are frequent stopping places, occasional services, and adequate links to the road network.

The Federal Highway Administration (FHWA) and WisDOT encourage bicycle use and support it as a legitimate transportation choice. Surveys have indicated a large number of occasional bicycle riders are interested in using their bicycles for transportation if provided an improved bicycling environment. Planning bicycle facilities to encourage more use among this group of adult casual users — for all trip purposes — appears to have the best opportunity for increasing overall bicycle usage.

Figure 8: The primary emphasis of these guidelines is on developing a more "bicycle-friendly" transportation system. Providing basic elements like paved shoulders and low-maintenance intersection and driveway designs can eliminate hazards like those shown.

A planning and design approach will encourage bicycling among occasional riders through a system of bicycle facilities while basic design considerations, like safe drainage grates and paved shoulders for rural roadways or bike lanes on arterial streets, will improve accessibility for all bicyclists.

Bicycling in the Planning Process

Including a bicycle section in a county's or town's long range transportation plan (or transportation element of the comprehensive plan) is critical to implementing bicycle-related projects. Once adopted, the plan becomes the basis for including projects in the local capital improvement program.

Throughout this entire process, local citizens need to be engaged in the discussion and responsible for the recommendations of the proposed bicycle plan.

Developing the Bicycle Plan

The bicycle element of a transportation plan should include an inventory and analysis of existing road and bikeway conditions, local transportation policies, and standard design practices. It should propose a vision, goals, and objectives for bicycling. It should suggest bicycle routing and a facilities improvement strategy; it should propose any necessary modifications to existing policies and practices. Finally, it should include a bicycle education and enforcement component.

The primary emphasis of these guidelines is on developing a more "bicycle-friendly" transportation system by establishing a facilities network and bringing all streets up to a minimum level of compatibility. Often the focus of a bicycle plan is solely on a network of improved roads and trails but it equally important to consider policies and practices.

For example, if adequate space for bicycles is not included as standard procedure in new roadway designs, it may be difficult and too clostly to retrofit shoulders or bike lanes or other measures in the future. Similarly, if new traffic signal systems are not sensitive to bicycles, then solving the problem will involve the added expense of painting extra pavement markings or installing new detector equipment.

In addition, when developing facility plans, communities should consider how education and enforcement issues will be addressed, as well as what impact facility designs may have on these needs and vice versa. For example, developing two-way bicycle facilities on one side of the road will cause problems for educators and police trying to discourage wrong-way riding. The best solution is to work with educators and enforcement officials to develop a consistent approach on these issues.

A comprehensive bicycle plan should contain goals and discussion relevant to educating both bicyclists and motorists of their rights and responsibilities, as well as how to enforce pertinent laws. Additionally, since there is a clear emphasis in the past three federal transportation acts on promoting bicycle use, an encouragement element is also recommended. These components are fairly straight forward and can probably be summarized in one section of the plan.

If adequate space for bicycles is not included as standard procedure in new roadway designs, it may be difficult to retrofit shoulders or bike lanes or other measures in the future.

Public Involvement in Developing the Bicycle Plan

Public participation is essential in all transportation planning — not just the development of the bicycle plan — and should begin early in the process. Community input can be obtained and citizen interest in the plan piqued in a variety of ways. It is best to use more than one or two approaches to reach the greatest audience and provide means for all to get involved.

For instance, while it is common to hold public meetings on a bicycle plan, it can also be vital to attend meetings of existing groups (e.g., civic organizations, neighborhood associations, church groups, and others). In this way, one can reach out to those who do not have time or inclination to get directly involved, or who may not have heard about the planning effort. Creating an advisory committee is also an effective means of gaining organized and sustained input. It can also lead to the creation of a permanent committee that oversees the community's bicycle (and, often, pedestrian) program.

Figures 9 and 10: Public involvement is more than simply holding a few evening meetings. Ever since the 1991 federal transportation bill (ISTEA) was signed into law, transportation professionals have been encouraged to reach out to the "traditionally underserved," This often means meeting them on their home ground and listening to what they have to say.

Figure 11: For years, bicyclists were largely left out of the transportation planning process. However, starting with the 1991 federal transportation bill (ISTEA), planning for bicyclists has become a legitimate element in that process.

IV. The Bicycle Planning Process

A complete planning process can be broken into six steps:

1. Develop vision, goals, and objectives.
2. Establish/refine planning criteria for the bicycle system.
3. Inventory crashes, bicycle use, and roadway conditions for bicycling.
4. Identify bicycle travel corridors.
5. Evaluate and select specific route alternatives and design treatments.
6. Prepare a safety component.

1. Develop a Vision, Goals, and Objectives

The vision, goals, and objectives of a plan form the framework for action. The vision gives the mission of the organization in the context of the services they are to provide. The goals suggest measurable end points for the process. The objectives give the specific steps for reaching those goals.

Although the development of these elements can be guided by county or small community planning staffs, representation of policy makers and bicyclists is important. In general, goals should address the needs of the full range of bicyclists, integration of the bicycle with other modes, funding and prioritization of funding, facility development, public participation, education, encouragement, and enforcement.

This section should also include local policies on minimum road width standards or a minimum level of service rating for bicyclists, and options necessary to accommodate bicyclists (see standard cross-section examples under Step 5). WisDOT has provided state goals and objectives as part of its Bicycle Transportation Plan 2020 (see sidebar on next page), but local goals may be established in advance or as a complement to the state goals.

Wisconsin Bicycle Transportation Plan 2020

The following vision, goals, and objectives are found in the Wisconsin Bicycle Transportation Plan and are offered as examples.

Vision statement:
To establish bicycling as a viable, convenient and safe transportation choice throughout Wisconsin.

Primary goals:
• Increase levels of bicycling throughout Wisconsin, doubling the number of trips made by bicycles by the year 2010.

• Reduce crashes involving bicyclists and motor vehicles by at least 10% by the year 2010.

Objectives:
Objective 1 - Plan and design new and improved transportation facilities to accommodate bicyclists and encourage their use.

Objective 2 - Expand and improve a statewide network of safe and convenient routes for bicycle transportation and touring, including safe and convenient access to and through the state's urban areas.

Objective 3 - Provide consistent safety messages and training to all roadway users by expanding the range of education activities through driver licensing and training, bicycle safety education, increasing understanding of traffic laws, and provision of public service information.

Objective 4 - Improve the enforcement of laws to prevent dangerous and illegal behavior by motorists and bicyclists.

Objective 5 - Encourage more trips by bicycles by promoting the acceptance and usefulness of this transportation mode.

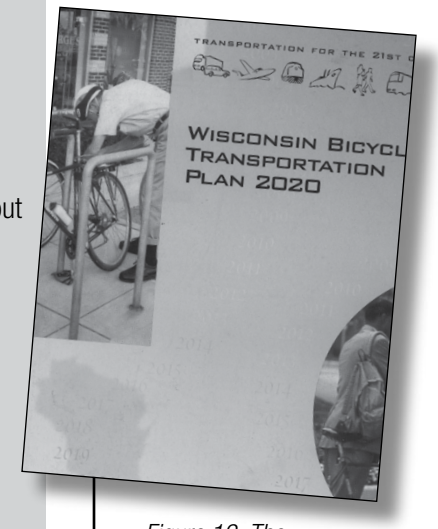


Figure 12: The Wisconsin Bicycle Transportation Plan 2020 may be requested from:

Bicycle and Pedestrian Coordinator
Wisconsin Department of Transportation
PO Box 7913
Madison WI 53707
It may also be downloaded from the Internet at: http://www.dot.wisconsin.gov/projects/state/bike2020.htm

2. Establish/Refine Bicycle Planning Criteria

Basic planning criteria should be used when evaluating and considering bicycle routes and facilities that will become part of a bicycle network. For rural roads, the planning criteria are outlined below.

For village and town roads, a sketch plan approach will generally suffice. Major roads (e.g., state or county highways that pass through town) should receive special attention, due to their traffic volumes. Wide outside lanes or bike lanes should be considered. Minor roads should be considered for basic improvements as needed.

Roadway bicycle improvements should be accomplished with two general sets of planning criteria in distinct steps. The first set of planning criteria addresses bicycle user demand and the general corridor locations of proposed routes. Included are usage (including trip length), directness, accessibility/spacing, system continuity, barriers, safety and aesthetics.

The second set of criteria can be used in siting bicycle facilities within identified bicycle corridors, and include directness, cost, funding, delays to bicyclists, safety (both real and perceived), and ease of implementation, including capitalizing on opportunities brought on by other roadway improvements (resurfacing, reconstuction, etc.).

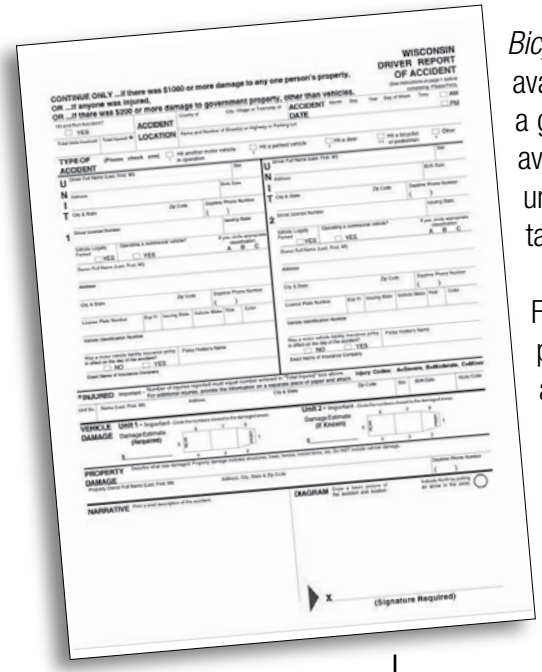
Ultimately, these criteria will help determine and test a bicycle facility system's desirability and effectiveness. They also bear a strong similarity to what motorists expect in a highway system.

The establishment of planning criteria should be an interactive process with the establishment of goals and objectives and the consideration of project alternatives. For instance, if a goal is to improve route directness, then the standards for directness should be tightened to ensure that, if the standards were met when alternative projects are considered. This would result in improved travel distance between identified destinations.

3. Inventory Crashes, Bicycle Use, and Bicycling Conditions

The bicycle plan's inventory section is an evaluation of existing conditions and should include the appropriate analysis of roadway conditions, existing bicycle facilities, and bicycle crashes. Additionally, an examination of the number and percent of people using bicycles for different purposes will help establish a baseline for monitoring changes in use. Also, it may give some direction on which projects should have the highest priority.

Figure 13: The MV4000 crash report form.


WISCONSIN DRIVER REPORT OF ACCIDENT

CONTINUE ONLY ...If there was $1000 or more damage to any one person's property.
OR ...If anyone was injured.
OR ...If there was $200 or more damage to government property, other than vehicles.

ACCIDENT LOCATION

ACCIDENT DATE

TYPE OF ACCIDENT

UNIT 1

UNIT 2

*INJURED

VEHICLE DAMAGE

PROPERTY DAMAGE

DIAGRAM

NARRATIVE

X (Signature Required)

Bicycle Crashes: This is the appropriate time in the planning process to review available bicycle crash data to determine common crash locations and to get a general idea of the types of crashes being reported. Bicycle crash data are available from local police authorities or WisDOT. Crash data are reported universally for Wisconsin on Form MV4000 (figure 13). However, it is important to highlight three shortcomings of crash evaluations.

First, bicycle crashes reported through the MV4000 reporting process comprise a minority of all crashes. Some studies have indicated that as few as only 10 percent of all bicycle crashes are reported. One recent federal study indicated that fewer than 50 percent of bicycle crashes that sent someone to an emergency room showed up in police reports.

Second, it is important to consider the exposure rate of bicyclists when reviewing these data. Some roads with a higher frequency of bicycle crashes may have higher bicycle use.

Third, such data may help identify problem areas that need immediate remedial treatment, but it is very likely that there will be no detectable pattern of bicycle crashes because of the small number reported for many rural areas in Wisconsin.

Bicycle Use: Current bicycle use data is often unavailable, especially data showing bicycle trip purpose. Routinely this data is not collected during transportation surveys or corridor counts. Unfortunately, when data on bicycling is missing, many officials assume there is little or no bicycling. Such assumptions often lead to a lack of investment in bicycling. When data is available, low numbers may also lead to a lack of investment.

Lack of investment in a bicycle-friendly infrastructure is one reason often cited for low usage numbers. Few people will ride if they believe the environment is dangerous for bicycling. The appropriate use of bicycle use data is to determine current levels prior to implementing plans that further the community's bicycling vision, goals and objectives.

As an example of the types of data that may be collected, WisDOT surveyed residents in the fall of 1998 and spring of 1999, and found that the bicycle was being used for 3.5% of all trips. Work commute information is also available. According to the U. S. Census Bureau, work trip commutes by bicycle are more common in MPO areas than in most non-MPO areas. Preliminary data from the 2000 Census indicates that work trips by bicycle are around 1% of all work trips. This may underreport bike use in the state since data was collected for the last week of March for the predominant means of commuting for that week.

As shown above, it is important to emphasize that other bicycle trip purposes are often more common than the journey to work trips. For example, the 2002 *National Household Travel Survey* for Wisconsin (available in expanded form for the state) showed that, for bicycling to school or shopping or for recreational/social purposes are more common than riding to work. In addition, survey data from the report, Participation in Outdoor Recreation in the 1990s, suggests that over 45% of Wisconsin residents participate in bicycling. For these reasons, the full spectrum of trips must be considered when planning for bicycle use.

It is also important to understand typical bicycle trip lengths. Some bicyclists ride long distances to work or for recreation. However, given the statewide average bicycle trip length of exactly 2 miles, planners should consider more of a "micro" view than they would for motor vehicle trips. For example, the short trip from a residential area to a nearby town center may be a better focus than a cross-county journey.

"45% of Wisconsin residents participate in bicycling."

Source: "Participation in Outdoor Recreation in the 1990s;" Wisconsin Dept. of Natural Resources; http://dnr.wi.gov/planning/scorp/past_scorps/2000/participation.html

Figure 14: On a warm summer day, the whole family might bicycle to the park for a picnic.

Roadway Conditions for Bicycling: A major component of these planning guidelines is the identification of bicycling conditions on rural roadways. Wisconsin has an excellent tertiary roadway system (town roads) connected by an excellent secondary system (county trunk highways). Many of these roads have low or very low volumes of traffic making them suitable, if not desirable, for cycling without any roadway changes. Wisconsin is unique, in that most of the tertiary road system in the state is paved. This is not the case in other states.

Figure 15: This rural highway bridge has a generous shoulder with a good surface, making it quite suitable for use by experienced adult cyclists.

Rating these roadways by their suitability or "level of service" can easily lead to an immediate way of providing cyclists with important condition information and also help the community prioritize which roadway facilities need the most immediate attention.

The following methods for evaluation of rural roadways are based on those used to produce the *Wisconsin Bicycle Map,* a statewide system of rated roadways that has been well accepted by the bicycling public for 25 years. The following is a summary. The appendix includes a more detailed methodology. It should be noted that there are other roadway rating tools, but they are more appropriate for rating urban streets. For example, the *Bicycle Compatibility Index* (BCI), a tool developed for the Federal Highway Administration, considers traffic volume, traffic speed, available space in the outside travel lane, presence or absence of a bicycle lane or paved shoulder, adjacent land use, parking, and several other factors, to give a rating for a particular stretch of urban or suburban roadway.

From the standpoint of the bicyclist, significant conflict with motor vehicles occurs when a bicycle, an oncoming motor vehicle and an overtaking motor vehicle are within a section of roadway of a length required by the overtaking vehicle to pass the bicycle and safely return to its lane of travel. A National Cooperative Highway Research Program Report 214, *Design and Traffic Control Guidelines for Low-Volume Rural Roads,* by John C. Glennon, indicated that the incidence of occurrences of expected numbers of head-on meetings of vehicles traveling in opposing directions on two-lane, two-way roads increased as the square of the increase in the traffic volume. By modifying Glennon's formula, it was possible to determine how many miles a bicyclist might expect to travel on various volume roads between such encounters.

The statistical probability of these motor vehicle/bicycle/motor vehicle conflicts has a major impact on the suitability of a roadway for shared use as very few road sections are of adequate width to allow the three vehicles to comfortably share the same linear space. However, due to low traffic volumes, many cyclists consider Wisconsin's rural roadway system ideal for cycling. This probably accounts for bicy-

Figure 16: Many cyclists consider Wisconsin's rural roadway system ideal for cycling.

clists' subjective impression that there is "no traffic on low volume roads," or that riding on a certain rural roadway is like "riding on a bicycle path interrupted by an occasional motor vehicle."

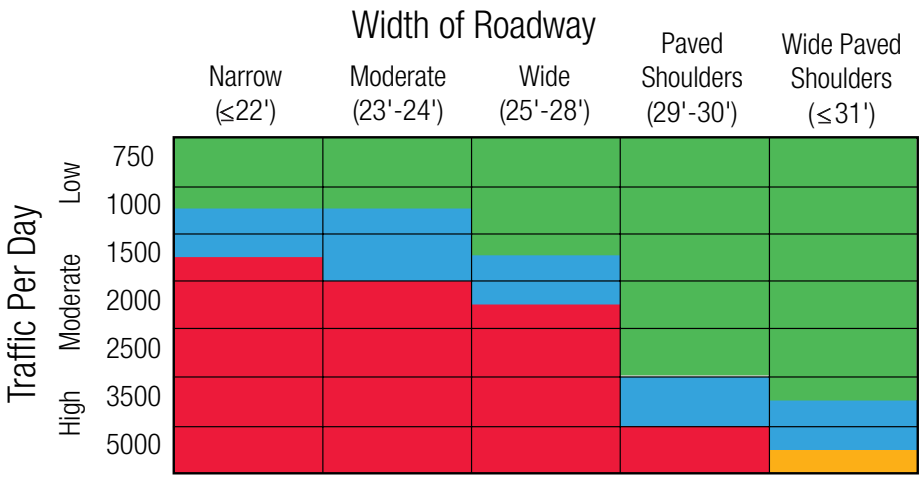
As an example, a bicyclist can expect to encounter nine times as many conflicts on a road with 1,500 vehicles per day as compared with a road which has 500 vehicles, and on a road with 5,000 vehicles, the conflicts would be one hundred times as great as on a 500 vehicle per day road.

It was also perceived that several different types of conflicts existed: two cars, a car and a truck, or two trucks traveling in opposite directions, and that the relevance of these conflicts would vary with the width of the pavement, the volume of traffic, and the percent of the traffic that is truck traffic. On narrow roads it was essential to have average daily traffic (ADTs) or truck percentages at such low levels as to render the incidence of car-truck or truck-truck conflicts insignificant. On very wide roads with paved shoulders, it is possible for oncoming and overtaking trucks to pass a bicycle without any problem.

Subjectively, there seemed to be a significant difference between conflicts involving cars and those involving trucks. Truck drivers seem reluctant to back off the throttle and sacrifice some momentum in order to ensure a safe pass, whereas car drivers are more willing to moderate their speed. Of equal importance in weighing the significance of trucks is their aerodynamic impact on bicyclists. Clearly, conflicts involving trucks are most critical, but the frequency of car-car conflicts must still be considered.

The table on the following page summarizes the rating thresholds used for the Wisconsin Bike Map. The two main factors affecting cycling conditions are represented. Secondary factors — truck traffic and percent solid yellow (indicator of hills

GENERALIZED BICYCLING CONDITIONS



The table illustrates, in a generalized fashion, how state and county highways were classified by their conditions for bicycling. Traffic and width of roadways are the two primary variables affecting bicycling conditions. Green – Best conditions; Blue – Moderate conditions; Yellow – Higher Volumes, Wider Paved Shoulders; Red – Undesirable Conditions

and curves) — are not represented in the table but are part of the model. Relatively favorable values were assumed in the table for these two secondary factors (see the notes below the table).

As an example using the table in the appendix, a county highway with an annual average traffic volume of 1550, with a width of 24 feet, 8% truck traffic, and 15% solid yellow line would receive a rating of Moderate, reflecting a midlevel set of conditions for cycling. Adding paved shoulders would easily place that roadway into the best category for cycling (examine the new pavement width of 30 feet and see that the threshold for the good to moderate cut-off point is 3,430 vehicle per day).

The appendix includes a complete methodology for use in determining cycling conditions for all rural roadways. It includes threshold values for a wide range of roadway widths and volume levels, with adjustment factors for percent truck traffic and percent solid yellow line. Although the above step leads directly to an assessment of existing cycling conditions, the methodology can easily be redirected to plug in "what if" analyses for planning purposes. For instance, if a certain roadway rates poorly using the rating methodology, but it is discovered through the planning process that it is an important connection for cyclists, the methodology can be used to determine a new rating with a planned change.

Taking that one step further, the roadway's rating would improve, if for example, paved shoulders were provided. A less likely situation would be that traffic would drop significantly due to a new bypass that will be constructed. Those types of changes should be considered under the next steps (Steps 4 and 5) of this guide.

4. Identify Bicycle Travel Corridors

Identifying bicycle travel corridors is not the same as simply plotting popular bicycling routes and/or assuming an increase in use. Estimating trip traffic is generally one of a transportation planner's most involved tasks, but does not have to be the case for estimating bicycle trip traffic.

To some extent, bicycle travel mirrors motor vehicle movements. When origin and destinations are paired (desire lines) the travel habits of bicyclists are much the same as motorists, while trip lengths are generally shorter. On week day mornings, travel is most common between residential areas and schools and places of employment. During the day, personal business trips tend to be more common. And in the afternoon, travel tends to focus on residential areas again.

Since many motor vehicle work trips made within villages or small cities are less than five miles, and a significant number are less than two miles, the potential for a shift to bicycling is considerable. By basing future bicycle travel on existing patterns alone, more direct linkages between origin and destination pairs will probably be underestimated, since current direct usage is often restricted by negative features of the cycling environment. For example, the only connection between a certain subdivision and a village's downtown may be a narrow and busy main street.

The important question that should be posed is "Where would bicyclists be going if they could go exactly where they preferred?", and not simply "Where are they now?" Certainly, if part of the goal of encouraging bicycle usage is to reduce single-occupant motor vehicle (SOV) traffic, then focusing on existing vehicle traffic patterns is essential.

Another way to identify higher bicycle use corridors is to visually plot major trip generating centers such as schools, commercial areas, major parks, and large employers, and then connect these generators with anticipated high use residential areas. For slightly longer distance bicycle travel considered in county-level plans, desire lines can be plotted between all of the villages and cities in a county.

Figure 17: Since many motor vehicle work trips made within villages or small cities are less than five miles and a significant number are less than two miles, the potential for a shift to bicycling is considerable.

This approach has worked very well for several counties in Wisconsin, especially when the desire lines were matched with roads that were rated as desirable for cycling using the rating methodology described in the above step or they could be scheduled for shorter-range improvements like the addition of paved shoulders. Drawing connection lines between traffic-generating sites and residential areas should give planners a general idea of the desire lines of cyclists. Census data can also be helpful.

For the first time, the 1990 U.S. Census provided bicycle commute mode splits for census tracts. However, this data was collected for the last weeks of March, 1990 and 2000, not a high bicycle usage month in Wisconsin. And it only considered the journey to work. The Census Bureau's "Look Up" tables on their Web site can be useful in this portion of the planning process. For instance, not only can they provide commute trip data (e.g., mode split and trip time) but they can identify parts of town with high numbers of school children, households without access to private autos, or other special characteristics.

The resulting bicycle corridor map(s) will give a strong indication of where cyclists want to go but not necessarily where they are today.

Whether the choice of bicycle forecasting methods involves plotting traffic generators and the resulting desire lines or estimate bicycle volumes as a projected share of a mode split using Census data, a few special situations may require adjustments. Some bicycle traffic generators, for instance, will attract an inordinately high number of bicyclists. First, educational institutions, especially middle schools or junior highs generate an extraordinary number of bicycle trips.

Elementary and middle schools generate child bicycle trips that may need special planning attention as a foundation for a "Safe Routes to School" program. Simple travel surveys conducted in cooperation with the schools may show bicycling to account for as much as 15 percent to 30 percent percent of trips, depending on trip lengths and street characteristics. University campuses typically generate bicycle trips in excess of 10 percent of all trips and often remain high through the winter months. In addition, many university students use a bicycle as their primary means of transportation. Second, parks, beaches, trails, parkways, scenic roads and other recreational areas attract a higher percentage of bike trips than the community average. Parks with long trails typically attract many users who drive to the trailhead with their bikes on their cars.

Figure 18: Elementary and middle schools generate child bicycle trips that may need special planning attention as a foundation for a "Safe Routes to School" program.

5. Evaluate and Select Specific Routes & Facility Types

A plan should consider the development of a bicycle routing system and the identification of major streets that are currently undesirable for bicycle travel — but that could be improved (e.g., upgraded when the street is reconstructed or the shoulders are paved).

The previous section described two ways to identify bicycle corridors. Two planning criteria — use and directness — were the primary factors used in determining the general location of these corridors. This phase of the planning process involves deciding which roads can be used and what changes will have to occur to the roadways, if any, to make them suitable for bicyclists. Within villages and small communities, identifying street segments that do not safely accommodate bicyclists typically results in evaluating the main streets.

In many small communities, the main roads are the two state highways or a state highway and a county trunk highway that intersect in downtown. Most streets and highways can be improved at the time of street reconstruction. These main streets or highways might never become part of a bicycle route system; however some form of minimum accommodation for bicyclists should be provided where feasible.

For county level bike plans, the suitability analysis should be very helpful at this point. By drawing the simple desire lines between communities and overlaying those on the suitability maps, some unacceptable and some desirable means of connecting between communities will naturally surface. If the immediate goal is to produce a bicycle map, routing cyclists an indirect way may be necessary to make suitable connections. However, for the long-term plans, the more direct ways should be identified for improvements.

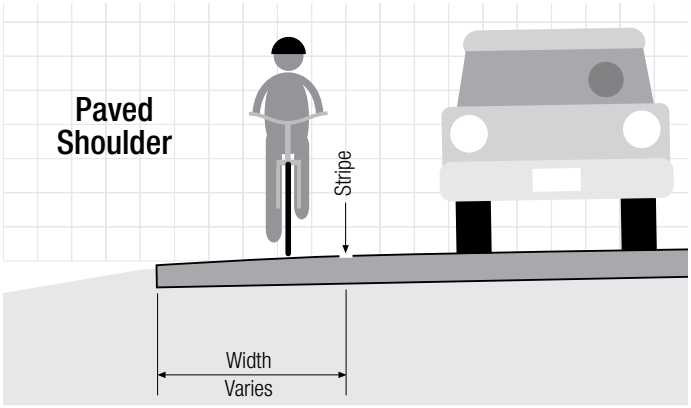
Figure 19: In many small communities, the main roads are the two state highways or a state highway and a county trunk highway that intersect in downtown. Most streets and highways can be improved at the time of street reconstruction.

For many of the state's counties, most of the identified connections already provide a desirable level of service, without any bike-related treatments. Providing paved shoulders for the lower rated roadways will be necessary. In a plan prepared for Jefferson County, only a very small number of county and state highways were identified that needed paved shoulders treatments.

Figure 20a: For many of the state's counties, most of the identified connections already provide a desirable level of service without any bike-related treatments. Providing paved shoulders for the lower rated roadways will be necessary.

In some exceptional cases, a shared-use path will be not only possible, but the preferred option. These paths are best reserved for their own corridors, like along an abandoned rail grade or along a river or utility corridor.

Within a community itself the major streets should be designed to have space for cyclists — a set of bike lanes, or unmarked bike lanes (extending rural paved shoulders to the urban cross-section but not having them marked as bike lanes). However, depending on the context, such a treatment may serve a broad range of bicyclists or it may primarily serve those with the most confidence and skill. Within communities that have gridded street patterns and have taken care to make connections between neighborhoods and subdivisions, another layer of bike accommodation is available for bicyclists to travel on low-volume residential streets.



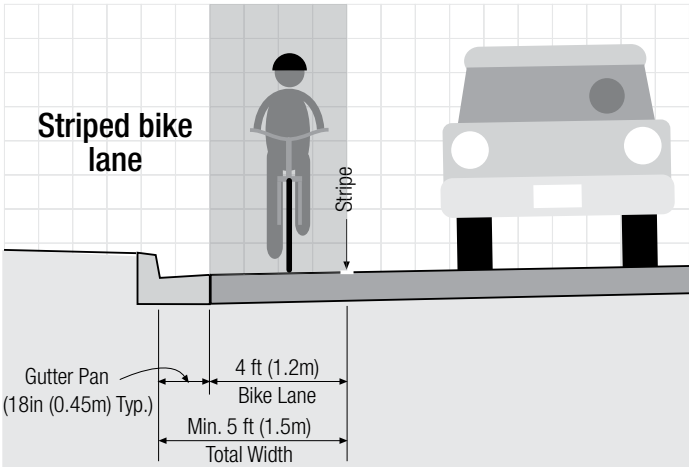


Figure 20b: Within a community itself the major streets should be designed to have space for cyclists (e.g, a set of bike lanes)

Another consideration that may influence the design treatment type, at least in the short-term, is the scheduling of construction or reconstruction work on the selected route. The roadway may be scheduled for 3-R (resurfacing, reconditioning, reconstruction) work or bike facility improvements may have to be retrofitted into the existing geometries or right-of-way widths. For this reason, transportation planners and engineers should always consider bicyclists' needs while doing such routine improvement projects.

Part of this step requires the planner to evaluate those major streets and highways that may not even be identified as key corridors. Even though these segments may not be part of the recommended "route system," their use by more experienced bicyclists for through-travel and all bicyclists for accessing important destinations on that roadway will not diminish. Often major streets are the only way cyclists of all abilities can access the first intersecting town road or county highway on the edge of the community. Providing paved shoulders is a way to improve the safety of cyclists and at the same time improve the comfort level of both bicyclists and motorists.

For existing urban arterials that need to be improved and can be practically improved (i.e., have sufficient right-of-way), the plan should reflect the costs of

bringing the arterial up to a basic level of accommodation (i.e. a 14 to 15 foot outside curb lane excluding the curb flag). In some cases, this may require roadway widening. However, using a "context-sensitive"approach,* it may be possible to identify ways to create bicycling space without widening.

In some cases, for instance, a two-way-left-turn-lane may be removed and replaced with turn bays only at specific locations where turning volumes warrant. In other cases, extra space may be shifted from interior through-lanes to outside lanes. It is important to keep in mind that this is a long-range plan. As such, bringing existing arterials and bridges up to a basic level of accommodation may only be accomplished over a 20-30 year period.

Figure 21: Elementary school students learn some of the basic elements of safe bicycling.

6. Safety Programming Component

While these guidelines focus on bicycle facility planning and improving bicycle accommodation, a major goal of most bicycle plans is to increase ridership while decreasing the number of crashes and fatalities. Building facilities or bicycle-friendly street improvements can enhance safety, but program-related measures can and should be taken as well.

In preparing the safety component, planners should learn key traffic laws. For instance, few planners realize that 346.075 of the Wisconsin State Statutes requires motor vehicles to pass bicycles with a minimum of three feet clearance. Appendix B includes Wisconsin statutes governing bicycle use and equipment.

An evaluation of bicycle crashes may identify certain locations and problems that could be abated through planning and design. For instance, building a "short-cut"

**Context sensitive design is a new approach which calls for early and often citizen involvement, more flexibility in design standards, and added amenities for projects. WisDOT's version is called Community Sensitive Design.*

trail may allow kids to bicycle to a nearby store without crossing a major roadway. Other potential crash situations can best be dealt with through education and enforcement.

For example, in most communities wrong-way bicycling, riding at night without lights, and motorist failure to yield are common crash causes. These can be dealt with through a variety of media and educational efforts supported by enforcement. A "3-E" approach (education, enforcement, engineering) has been used by bicycle educators for years as a comprehensive and integrated approach to safe bicycle usage. Such a comprehensive approach creates wide-ranging benefits and outcomes which are greater than the sum total of the elements. It does so partly by reducing the likelihood of different agencies working at cross-purposes.

The plan should include recommendations on strategies, how they can be implemented, and who should implement them. WisDOT's Bicycle and Pedestrian Safety Program Manager can also provide specific program information and funding, as well as assistance in implementing this safety component.

APPENDIX A - PLANNING FOR RURAL BICYCLE ROUTES

ROAD EVALUATION METHOD

The following evaluation method is based on the needs of the casual cyclist, typically age 16 or older with a drivers license. This method of evaluating rural roadways for shared bicycle/motor vehicle use is similar to that developed for the Wisconsin Bicycle Map. The basis for this methodology is the concept that no rural road exists which is not capable of accommodating one bicycle and one motor vehicle occupying the same lateral road section at the same time. A conflict arises, however, when a bicycle, an oncoming, and an overtaking motor vehicle arrive at the same lateral section at the same time. It is possible that paved shoulders will add sufficient width to allow a safe pass for all three vehicles without much variation of speed or deviation from lane of travel.

Of course, any safe passing encounter by any number or type of vehicles is dependent on the prudent judgment and behavior of all involved. At the same time, bicyclists are the most vulnerable of the vehicle operators and will be reluctant to use roadways with a high incidence of three vehicle passing conflicts. In addition, youth bicyclists may lack the skills and physiological development to deal with such situations. Where adequate paved shoulder width does not exist, it is in the best interests of bicyclists to select roads for a route system where the random occurrence of triple passes is minimal.

The incidence of triple pass occurrences can be calculated mathematically by using a road section's average daily traffic (ADT) *(See definitions at the end of this appendix item)*. Interestingly, as the ADT increases the incidence of triple passes progresses geometrically. This means that a road section with 5,000 ADT will have 100 times as many triple passes as a road with 500 ADT. This fact clearly favors the use of lightly traveled road sections for shared bicycle/motor vehicle use where adequate paved shoulder width does not exist.

The introduction of truck traffic into the mix creates even more stressful and potentially dangerous triple pass situations. The incidence of these occurrences can also be calculated based on the percent of the ADT which is truck traffic. Triples pass situations where a truck, a car, and a bicycle will be more common than triple passes with two trucks and a bicycle, but at very low ADT counts and at very low truck traffic percentages the potential occurrences are not significant. Wider roads tend to have higher ADT counts and higher percentages of truck traffic. Even when paved shoulders exist, the wind blast from passing trucks cause bike handling problems for youth and casual bicyclists.

Other road section characteristics also have an impact on their suitability for shared use. Seasonal and day-of-week peaking will always produce variations in ADT. This is because seasonal and daily auto volumes are often highest at the same time that bicycle travel is the highest, especially in tourism areas. Overall, autos counts could vary from around 10 percent to over 50 percent. A lack of shoulder width has the effect of narrowing the road section due to the tendency of bicycle riders to ride more towards the center of the pavement.

Hills and curves generally have negative effects on the suitability of roadways for cyclists. To degree to which these conditions have negative impacts can be measured by the percentage of solid yellow line (no passing because of restricted sight lines caused by the hill and/or curve. High percentages tend to be associated with a negative effect on a road section's suitability for shared use. However, in some situations, usually on narrow twisty roads, it has often the effect of lowering the traffic speed, moderating its impact somewhat and often reducing the incidence of triple pass occurrences.

ROAD SECTION EVALUATION

1. The first step is the evaluation process is to identify the **ADT**. The ADT thresholds developed for determining the bicycling condition of a particular road segment have been adjusted to take into consideration an increase in seasonal and weekend traffic. Roads in the following counties may need further ADT adjustments to account for additional tourist traffic:

- Adams, Bayfield, Burnett, Door, Forest, Green Lake, Lincoln, Oneida, Polk, Sauk, Sawyer, Vilas, and Washburn

To account for the increase in tourist traffic, multiply the ADT by 1.224. The result will be the ADT you want to use during the evaluation process.

2. Once you have your ADT, identify the percent of the segment that has a **SOLID YELLOW LINE**. The more solid yellow line on a road segment, the less suitable the road is for cycling due to curves and hills that limit sight lines. An adjustment to the ADT will be made based on the percent of the yellow line that is solid.

3. Identify the percent of the ADT that is **TRUCK TRAFFIC**. If the data is not available, assume 10% of the traffic is trucks.

4. The final piece of data you will need is the road section's **PAVEMENT WIDTH**. If the road section has paved shoulder(s), add the paved shoulder width(s) to the overall pavement width. For example, a 24-foot wide segment of road with a pair of 3 foot paved shoulders would have a total paved width of 30 feet.

Once you have identified the data for those 4 categories, the bicycling condition of a particular road segment can be determined using the following tables, broken down by the adjusted pavement width (including paved shoulders). It is still possible to rate roadway conditions for bicycling while knowing just *ADT* and *pavement width* by using default values or estimates for *percent yellow line* and *percent truck traffic*.

UP TO 22 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 359 is considered good for cycling. Any road section with an ADT greater than 1540 is not desirable for cycling.

If the ADT falls between 359 and 1540, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	*- 100*
21 – 40%	*- 25*
41 – 60%	*- 25*
61 – 80%	*+ 100*
81 % or more	*+ 400*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 10%	GOOD	*< 1050 <*	MODERATE	*< 1440 <*	POOR
11%		*< 1000 <*		*< 1380 <*	
12%		*< 970 <*		*< 1330 <*	
13%		*< 930 <*		*< 1280 <*	
14%		*< 860 <*		*< 1190 <*	
15%		*< 759 <*		*< 1043 <*	

23 TO 24 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT greater than 1860 is not desirable for cycling.

If the ADT falls below 1860, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	*GOOD*	*< 1350 <*	*MODERATE*	*< 1860 <*	*POOR*
10%		*< 1215 <*		*< 1670 <*	
11%		*< 1105 <*		*< 1515 <*	
12%		*< 1015 <*		*< 1395 <*	
13%		*< 930 <*		*< 1280 <*	
14%		*< 870 <*		*< 1195 <*	
15%		*< 805 <*		*< 1110 <*	

25 TO 26 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT greater than 2890 is not desirable for cycling.

If the ADT falls below 2890, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
5%	*GOOD*	*< 2105 <*	*MODERATE*	*< 2890 <*	*POOR*
6%		*< 1930 <*		*< 2655 <*	
7%		*< 1800 <*		*< 2475 <*	
8%		*< 1690 <*		*< 2325 <*	
9%		*< 1560 <*		*< 2145 <*	
10%		*< 1400 <*		*< 1925 <*	
11%		*< 1275 <*		*< 1755 <*	
12%		*< 1165 <*		*< 1600 <*	
13%		*< 1075 <*		*< 1480 <*	
14%		*< 1000 <*		*< 1375 <*	
15%		*< 940 <*		*< 1290 <*	

27 TO 28 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 345 is considered good for cycling. Any road section with an ADT greater than 3630 is not desirable for cycling.

If the ADT falls between 345 and 3630, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
5%	*GOOD*	*< 2640 <*	*MODERATE*	*< 3630 <*	*POOR*
6%		*< 2380 <*		*< 3270 <*	
7%		*< 2180 <*		*< 2995 <*	
8%		*< 1910 <*		*< 2625 <*	
9%		*< 1805 <*		*< 2485 <*	
10%		*< 1715 <*		*< 2360 <*	
11%		*< 1560 <*		*< 2145 <*	
12%		*< 1435 <*		*< 1970 <*	
13%		*< 1325 <*		*< 1820 <*	
14%		*< 1225 <*		*< 1690 <*	
15%		*< 1145 <*		*< 1575 <*	

29 TO 30 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 1490 is considered good for cycling. Any road section with an ADT greater than 4740 is not desirable for cycling.

If the ADT falls between 1490 and 4740, make an adjustment based on the percent yellow line, and use the second table to determine the rating.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 9%	*GOOD*	*< 3450 <*	*MODERATE*	*< 4740 <*	*POOR*
10%		*< 3435 <*		*< 4720 <*	
11%		*< 3125 <*		*< 4295 <*	
12%		*< 2860 <*		*< 3935 <*	
13%		*< 2640 <*		*< 3630 <*	
14%		*< 2455 <*		*< 3375 <*	
15%		*< 2290 <*		*< 3150 <*	

31 TO 32 FOOT WIDE ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 2160 is considered good for cycling. Any road section with an ADT greater than 6035 is not desirable for cycling.

If the ADT falls between 2160 and 6035, make an adjustment based on the percent yellow line, and use the second table to determine the rating. A fourth rating, *"High Volume, but Wide Shoulders,"* is used for road sections with widths of 31 feet or greater. This provides some flexibility for road sections that would not be recommended for bicycles due to higher ADTs, but have wider than 3 foot paved shoulders that provide additional safety.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 12%	*GOOD*	*< 3450 <*	*MODERATE*	*< 4740 <*	*HIGH VOLUME BUT WIDE SHOULDERS*	*< 6035 <*	*POOR*
13%		*< 3310 <*		*< 4550 <*		*< 5860 <*	
14%		*< 3165 <*		*< 4350 <*		*< 5680 <*	
15%		*< 2960 <*		*< 4070 <*		*< 5420 <*	

33 FOOT OR GREATER ADJUSTED PAVEMENT

Time Saver: Any road section with an ADT less than 2745 is considered good for cycling. Any road section with an ADT greater than 7325 is not desirable for cycling.

If the ADT falls between 2745 and 7325, make an adjustment based on the percent yellow line, and use the second table to determine the rating. A fourth rating, *"High Volume, but Wide Shoulders,"* is used for road sections with widths of 31 feet or greater. This provides some flexibility for road sections that would not be recommended for bicycles due to higher ADTs, but have wider than 3 foot paved shoulders that provide additional safety.

%Yellow Line	ADT Adjustment
0 - 20%	*0*
21 – 40%	*+ 100*
41 – 60%	*+ 200*
61 – 80%	*+ 400*
81 % or more	*+ 800*

Truck %	Rating	ADT Threshold	Rating	ADT Threshold	Rating	ADT Threshold	Rating
Up to 12%	*GOOD*	*< 4035 <*	*MODERATE*	*< 5545 <*	*HIGH VOLUME BUT WIDE SHOULDERS*	*< 7325 <*	*POOR*
13%		*< 3895 <*		*< 5355 <*		*< 7155 <*	
14%		*< 3750 <*		*< 5160 <*		*< 6975 <*	
15%		*< 3545 <*		*< 4875 <*		*< 6715 <*	

DEFINITIONS

ADT (Average Daily Traffic) represents the latest measure of annual average daily motor vehicle volume. The annual WisDOT book, *"Highway Traffic Volume Data"* offers a quick but not detailed reference for this data category.

PAVEMENT WIDTH is the total pavement width of the travel lanes and does include paved shoulder width.

PERCENT TRUCK ADT is the percentage of the ADT that is truck traffic (three or more axles). The PERCENT TRUCK ADT is one of the biggest factors affecting a road's suitability for bicycling. Identify generators of truck traffic such as industrial parks, factories, warehouses, areas with logging activity, and quarries that may exist along a road section. Again, local planning agencies and university extension offices are good sources for information on current and future examples. Assume that county roads with 22 foot or wider pavement widths, which connect two state roads with significant truck volumes, also have significant truck traffic. Once identified, field checking is necessary to obtain more exact figures on truck traffic.

PERCENT YELLOW LINE, actually percent solid line, indicates how much of the road section is not available for passing. The PERCENT YELLOW LINE can be roughly estimated from examining United States Geological Survey (USGS) topographical maps in the 1:100,000 to 1:24,000 scale. Road sections which vary greatly in horizontal alignment (twisty) are likely to have high percentages of yellow line as are sections which vary greatly in vertical alignment (hilly). Field checking is necessary to obtain exact figures. On narrower width local roads it is uncommon to have center lines. In this case it may be necessary to estimate the PERCENT YELLOW LINE by comparing the local road's character with that of a road where the PERCENT YELLOW LINE is known.

APPENDIX B - WISCONSIN BICYCLE LAWS

BICYCLE AND IN-LINE SKATE LAWS
ROAD SHARING RESPONSIBILITIES OF BICYCLISTS AND MOTORISTS, REQUIRED EQUIPMENT AND PARENTAL RESPONSIBILITY

The statutes in this material have been generated from the database of 2003-04 Wisconsin Statutes & Annotations through July 2006. Please refer to the Wisconsin Statutes for the official text.

85.07 Highway safety coordination.
(4) Bicycle rules. The department shall publish literature setting forth the state rules governing bicycles and their operation and shall distribute and make such literature available without charge to local enforcement agencies, safety organizations, and schools and to any other person upon request.

340.01 Words and phrases defined. In s. 23.33 and chs. 340 to 349 and 351, the following words and phrases have the designated meanings unless a different meaning is expressly provided or the context clearly indicates a different meaning:
(5) "Bicycle" means every vehicle propelled by the feet acting upon pedals and having wheels any 2 of which are not less than 14 inches in diameter.
(5e) "Bicycle lane" means that portion of a roadway set aside by the governing body of any city, town, village, or county for the exclusive use of bicycles, electric personal assistive mobility devices, or other modes of travel where permitted under s. 349.23 (2) (a), and so designated by appropriate signs and markings.
(5m) "Bike route" means any bicycle lane, bicycle way or highway which has been duly designated by the governing body of any city, town, village or county and which is identified by appropriate signs and markings.
(5s) "Bicycle way" means any path or sidewalk or portion thereof designated for the use of bicycles and electric personal assistive mobility devices by the governing body of any city, town, village, or county.
(24m) "In-line skates" means skates with wheels arranged singly in a tandem line rather than in pairs.
(43m) "Play vehicle": (a) Means a coaster, skate board, roller skates, sled, toboggan, unicycle or toy vehicle upon which a person may ride. (b) Does not include in-line skates.
(74) "Vehicle" means every device in, upon, or by which any person or property is or may be transported or drawn upon a highway, except railroad trains. A snowmobile or electric personal assistive mobility device shall not be considered a vehicle except for purposes made specifically applicable by statute.

346.02 Applicability of chapter. 4) Applicability to persons riding bicycles and motor bicycles. (a) Subject to the special provisions applicable to bicycles, every person riding a bicycle upon a roadway or shoulder of a highway is granted all the rights and is subject to all the duties which this chapter grants or applies to the operator of a vehicle, except those provisions which by their express terms apply only to motor vehicles or which by their very nature would have no application to bicycles. For purposes of this chapter, provisions, which apply to bicycles, also apply to motor bicycles, except as otherwise expressly provided. (b) Provisions which apply to the operation of bicycles in crosswalks under ss. 346.23, 346.24, 346.37 (1) (a) 2., (c) and (d) 2. And 346.38 do not apply to motor bicycles.

346.075 Overtaking and passing bicycles, electric personal assistive mobility devices, and motor buses.
(1) The operator of a motor vehicle overtaking a bicycle or electric personal assistive mobility device proceeding in the same direction shall exercise due care, leaving a safe distance, but in no case less than 3 feet clearance when passing the bicycle or electric personal assistive mobility device, and shall maintain clearance until safely past the overtaken bicycle or electric personal assistive mobility device.

346.16 Use of controlled-access highways, expressways and freeways. (1) No person shall drive a vehicle onto or from a controlled-access highway, expressway or freeway except through an opening provided for that purpose. **(2)** (a) Except as provided in par. (b), no pedestrian or person riding a bicycle or other nonmotorized vehicle and no person operating a moped or motor bicycle may go upon any expressway or freeway when official signs have been erected prohibiting such person from using the expressway or freeway.
(am) Notwithstanding s. 349.105 and except as provided in par. (b), no person riding an electric personal assistive mobility device may go upon any expressway or freeway when official signs have been erected prohibiting persons specified in par. (a) from using the expressway or freeway.
(b) A pedestrian or other person under par. (a) or (am) may go upon a portion of a hiking trail, cross-country ski trail, bridle trail or bicycle trail incorporated into the highway right-of-way and crossing the highway if the portion of the trail is constructed under s. 84.06 (11).

346.17 Penalty for violating sections 346.04 to 346.16.
(2) Any person violating ss. 346.05, 346.07 (2) or (3), 346.072, 346.08, 346.09, 346.10 (2) to (4), 346.11, 346.13 (2) or 346.14 to 346.16 may be required to forfeit not less than $30 nor more than $300.
(4) Any person violating s. 346.075 may be required to forfeit not less than $25 nor more than $200 for the first offense and not less than $50 nor more than $500 for the 2nd or subsequent violation within 4 years.

346.23 Crossing controlled intersection or crosswalk.
(1) At an intersection or crosswalk where traffic is controlled by traffic control signals or by a traffic officer, the operator of a vehicle shall yield the right-of-way to a pedestrian, or to a person who is riding a bicycle or electric personal assistive mobility device in a manner which is consistent with the safe use of the crosswalk by pedestrians, who has started to cross the highway on a green or "Walk" signal and in all other cases pedestrians, bicyclists, and riders of electric personal assistive mobility devices shall yield the right-of-way to vehicles lawfully proceeding directly ahead on a green signal. No operator of a vehicle proceeding ahead on a green signal may begin a turn at a controlled intersection or crosswalk when a pedestrian, bicyclist, or rider of an electric personal assistive mobility device crossing in the crosswalk on a green or "Walk" signal would be endangered or interfered with in any way. The rules stated in this subsection are modified at intersections or crosswalks on divided highways or highways provided with safety zones in the manner and to the extent stated in sub. (2).
(2) At intersections or crosswalks on divided highways or highways provided with safety zones where traffic is controlled by traffic control signals or by a traffic officer, the operator of a vehicle shall yield the right-of-way to a pedestrian, bicyclist, or rider of an electric personal assistive mobility device who has started to cross the roadway either from the near curb or shoulder or from the center dividing strip or a safety zone with the green or "Walk" signal in the favor of the pedestrian, bicyclist, or rider of an electric personal assistive mobility device.

346.24 Crossing at uncontrolled intersection or crosswalk.
(1) At an intersection or crosswalk where traffic is not controlled by traffic control signals or by a traffic officer, the operator of a vehicle shall yield the right-of-way to a pedestrian, or to a person riding a bicycle or electric personal assistive mobility device in a manner which is consistent with the safe use of the crosswalk by pedestrians, who is crossing the highway within a marked or unmarked crosswalk.
(2) No pedestrian, bicyclist, or rider of an electric personal assistive mobility device shall suddenly leave a curb or other place of safety and walk, run, or ride into the path of a vehicle which is so close that it is difficult for the operator of the vehicle to yield.
(3) Whenever any vehicle is stopped at an intersection or crosswalk to permit a pedestrian, bicyclist, or rider of an electric personal assistive mobility device to cross the roadway, the operator of any other vehicle approaching from the rear shall not overtake and pass the stopped vehicle.

346.25 Crossing at place other than crosswalk. Every pedestrian, bicyclist, or rider of an electric personal assistive mobility device crossing a roadway at any point other than within a marked or unmarked crosswalk shall yield the right-of-way to all vehicles upon the roadway.

346.30 Penalty for violating sections 346.23 to 346.29.
(1)(b) 2. Any operator of a bicycle or electric personal assistive mobility device violating s. 346.23, 346.24 or 346.25 may be required to forfeit not more than $20.

346.34 Turning movements and required signals on turning and stopping. (1) Turning. (a) No person may:
1. Turn a vehicle at an intersection unless the vehicle is in proper position upon the roadway as required in s. 346.31.
2. Turn a vehicle to enter a private road or driveway unless the vehicle is in proper position on the roadway as required in s. 346.32.
3. Turn a vehicle from a direct course or move right or left upon a roadway unless and until such movement can be made with reasonable safety.
(b) In the event any other traffic may be affected by such movement, no person may so turn any vehicle without giving an appropriate signal in the manner provided in s. 346.35. When given by the operator of a vehicle other than a bicycle or electric personal assistive mobility device, such signal shall be given continuously during not less than the last 100 feet traveled by the vehicle before turning. The operator of a bicycle or electric personal assistive mobility device shall give such signal continuously during not less than the last 50 feet traveled before turning. A signal by the hand and arm need not be given continuously if the hand is needed in the control or operation of the bicycle or electric personal assistive mobility device.
2) Stopping. No person may stop or suddenly decrease the speed of a vehicle without first giving an appropriate signal in the manner provided in s. 346.35 to the operator of any vehicle immediately to the rear when there is opportunity to give such signal. This subsection does not apply to the operator of a bicycle approaching an official stop sign or traffic control signal.

346.35 Method of giving signals on turning and stopping.
Whenever a stop or turn signal is required by s. 346.34, such signal may in any event be given by a signal lamp or lamps of a type meeting the specifications set forth in s.347.15. Except as provided in s.347.15, such signals also may be given by the hand and arm in lieu of or in addition to signals by signal lamp. When given by hand and arm, such signals shall be given from the left side of the vehicle in the following manner and shall indicate as follows:
(1) Left turn—Hand and arm extended horizontally.
(2) Right turn—Hand and arm extended upward.
(3) Stop or decrease speed—Hand and arm extended downward.

346.36 Penalty for violating sections 346.31 to 346.35.
(2) Any operator of a bicycle or electric personal assistive mobility device violating ss. 346.31 to 346.35 may be required to forfeit not more than $20.

346.37 Traffic-control signal legend. (1) Whenever traffic is controlled by traffic control signals exhibiting different colored lights successively, or with arrows, the following colors shall be used and shall indicate and apply to operators of vehicles and pedestrians as follows:
(a) *Green.* 1. Vehicular traffic facing a green signal may proceed straight through or turn right or left unless a sign at such place prohibits either such turn, but vehicular traffic shall yield the right-of-way to other vehicles and to pedestrians lawfully within the intersection or an adjacent crosswalk at the time such signal is exhibited.
2. Pedestrians, and persons who are riding bicycles or electric personal assistive mobility devices in a manner which is consistent with the safe use of the crosswalk by pedestrians, facing the signal may proceed across the roadway within any marked or unmarked crosswalk.
(b) *Yellow.* When shown with or following the green, traffic facing a yellow signal shall stop before entering the intersection unless so close to it that a stop may not be made in safety.
(c) *Red.* 1. Vehicular traffic facing a red signal shall stop before entering the crosswalk on the near side of an intersection, or if none, then before entering the intersection or at such other point as may be indicated by a clearly visible sign or marking and shall remain standing until green or other signal permitting movement is shown.
2. No pedestrian, bicyclist, or rider of an electric personal assistive mobility device facing such signal shall enter the roadway unless he or she can do so safely and without interfering with any vehicular traffic.
3. Vehicular traffic facing a red signal at an intersection may, after stopping as required under subd. 1., cautiously enter the intersection to make a right turn into the nearest lawfully available lane for traffic moving to the right or to turn left from a one-way highway into the nearest lawfully available lane of a one-way highway on which vehicular traffic travels to the left. No turn may be made on a red signal if lanes of moving traffic are crossed or if a sign at the intersection prohibits a turn. In making a turn on a red signal vehicular traffic shall yield the right-of-way to pedestrians, bicyclists, and riders of electric personal assistive mobility devices lawfully within a crosswalk and to other traffic lawfully using the intersection.
4. Notwithstanding subd. 1., a motorcycle, moped, motor bicycle, or bicycle facing a red signal at an intersection may, after stopping as required under subd. 1. for not less than 45 seconds, proceed cautiously through the intersection before the signal turns green if no other vehicles are present at the intersection to actuate the signal and the operator of the motorcycle, moped, motor bicycle, or bicycle reasonably believes the signal is vehicle actuated. The operator of a motorcycle, moped, motor bicycle, or bicycle proceeding through a red signal under this subdivision shall yield the right-of-way to any vehicular traffic, pedestrian, bicyclist, or rider of an electric personal assistive mobility device proceeding through a green signal at the intersection or lawfully within a crosswalk or using the intersection. This subdivision does not affect any authorization for a bicyclist under subd. 2.
(d) *Green arrow.* 1. Vehicular traffic facing a green arrow signal may enter the intersection only to make the movement indicated by the arrow but shall yield the right-of-way to pedestrians, bicyclists, and riders of electric personal assistive mobility devices lawfully within a crosswalk and to other traffic lawfully using the intersection. When the green arrow signal indicates right or left turn traffic shall cautiously enter the intersection.
2. No pedestrian, bicyclist, or rider of electric personal assistive mobility device facing such signal shall enter the roadway unless he or she can do so safely and without interfering with any vehicular traffic.
(2) In the event an official traffic signal is erected and maintained at a place other than an intersection, the provisions of this section are applicable except as to those provisions, which by their nature can have no application. Any stop required shall be made at a sign or marking on the pavement indicating where the stop shall be made, but in the absence of any such sign or marking the stop shall be made at the signal.

346.38 Pedestrian control signals. Whenever special pedestrian control signals exhibiting the words "Walk" or "Don't Walk" are in place, such signals indicate as follows:
(1) Walk. A pedestrian, or a person riding a bicycle or electric personal assistive mobility device in a manner which is consistent with the safe use of the crossing by pedestrians, facing a "Walk" signal may proceed across the roadway or other vehicular crossing in the direction of the signal and the operators of all vehicles shall yield the right-of-way to the pedestrian, bicyclist, or electric personal assistive mobility device rider.
(2) Don't walk. No pedestrian, bicyclist, or rider of an electric personal assistive mobility device may start to cross the roadway or other vehicular crossing in the direction of a "Don't Walk" signal, but any pedestrian, bicyclist, or rider of an electric personal assistive mobility device who has partially completed crossing on the "Walk" signal may proceed to a sidewalk or safety zone while a "Don't Walk" signal is showing.

346.43 Penalty for violating sections 346.37 to 346.42. (1)(b) 2. Any operator of a bicycle or electric personal assistive mobility device violating s. 346.37, 346.38 or 346.39 may be required to forfeit not more than $20.

346.47 When vehicles using alley or nonhighway access to stop.
(1) The operator of a vehicle emerging from an alley or about to cross or enter a highway from any point of access other than another highway shall stop such vehicle immediately prior to moving on to the sidewalk or on to the sidewalk area extending across the path of such vehicle and shall yield the right-of-way to any pedestrian, bicyclist, or rider of an electric personal assistive mobility device, and upon crossing or entering the roadway shall yield the right-of-way to all vehicles approaching on such roadway.

346.49 Penalty for violating ss. 346.44 to 346.485. (1)(b) Any operator of a bicycle or electric personal assistive mobility device violating s. 346.46 (1), (2m) or (4) may be required to forfeit not more than $20.
(2m)(b) Any operator of a bicycle or electric personal assistive mobility device violating s. 346.44 may be required to forfeit not more than $40.

346.54 How to park and stop on streets.
(1) (e) For the purpose of parking, mopeds and electric personal. assistive mobility devices shall be considered bicycles. Where possible without impeding the flow of pedestrian traffic, a bicycle, moped, or electric personal assistive mobility device may be parked on a sidewalk. A bicycle, moped, or electric personal assistive mobility device may be parked in a bike rack or other similar area designated for bicycle parking

346.59 Minimum speed regulation.
(2) The operator of a vehicle moving at a speed so slow as to impede the normal and reasonable movement of traffic shall, if practicable, yield the roadway to an overtaking vehicle whenever the operator of the overtaking vehicle gives audible warning with a warning device and shall move at a reasonably increased speed or yield the roadway to overtaking vehicles when directed to do so by a traffic officer.

346.60 Penalty for violating sections 346.57 to 346.595.
(5)(a) Any operator of a bicycle or electric personal assistive mobility device who violates s. 346.57 (duty to obey speed limits) may be required to forfeit not more than $20.
(b) Any operator of a bicycle or electric personal assistive mobility device who violates s. 346.59 (duty to obey minimum speed) may be required to forfeit not more than $10.

346.70 Duty to report accident. (1) Immediate notice of accident. The operator of a vehicle involved in an accident resulting in injury to or death of any person, any damage to state or other government-owned property, except a state or other government-owned vehicle, to an apparent extent of $200 or more or total damage to property owned by any one person or to a state or other government-owned vehicle to an apparent extent of $1,000 or more shall immediately by the quickest means of communication give notice of such accident to the police department, the sheriff's department or the traffic department of the county or municipality in which the accident occurred or to a state traffic patrol officer. In this subsection, "injury" means injury to a person of a physical nature resulting in death or the need of first aid or attention by a physician or surgeon, whether or not first aid or medical or surgical treatment was actually received; "total damage to property owned by one person" means the sum total cost of putting the property damaged in the condition it was before the accident, if repair thereof is practical, and if not practical, the sum total cost of replacing such property. For purposes of this subsection if any property which is damaged is held in a form of joint or multiple ownership, the property shall be considered to be owned by one person. (**NOTE**: this section does not apply to accidents involving **only** snowmobiles, all-terrain vehicles or vehicles propelled by human power or drawn by animals. See section 346.66.)

346.77 Responsibility of parent or guardian for violation of bicycle and play vehicle regulations. No parent or guardian of any child shall authorize or knowingly permit such child to violate any of the provisions of ss.346.68 to 346.804 and 347.489.

346.78 Play vehicles not to be used on roadway. No person riding upon any play vehicle may attach the same or himself or herself to any vehicle upon a roadway or go upon any roadway except while crossing a roadway at a crosswalk.

346.79 Special rules applicable to bicycles. Whenever a bicycle is operated upon a highway, bicycle lane or bicycle way the following rules apply:
(1) A person propelling a bicycle shall not ride other than upon or astride a permanent and regular seat attached thereto.
(2) (a) Except as provided in par. (b), no bicycle may be used to carry or transport more persons at one time than the number for which it is designed.
(b) In addition to the operator, a bicycle otherwise designed to carry only the operator may be used to carry or transport a child seated in an auxiliary child's seat or trailer designed for attachment to a bicycle if the seat or trailer is securely attached to the bicycle according to the directions of the manufacturer of the seat or trailer.
3) No person operating a bicycle shall carry any package, bundle or article which prevents the operator from keeping at least one hand upon the handlebars.
4) No person riding a bicycle shall attach himself or herself or his or her bicycle to any vehicle upon a roadway.
5) No person may ride a moped or motor bicycle with the power unit in operation upon a bicycle way.

346.80 Riding bicycle or electric personal assistive mobility device on roadway.
(1) In this section, "substandard width lane" means a lane that is too narrow for a bicycle or electric personal assistive mobility device and a motor vehicle to travel safely side by side within the lane.
(2)(a) Any person operating a bicycle or electric personal assistive mobility device upon a roadway at less than the normal speed of traffic at the time and place and under the conditions then existing shall ride as close as practicable to the right-hand edge or curb of the unobstructed traveled roadway, including operators who are riding 2 or more abreast where permitted under sub. (3), except:
1. When overtaking and passing another vehicle proceeding in the same direction.
2. When preparing for a left turn at an intersection or into a private road or driveway.
3. When reasonably necessary to avoid unsafe conditions, including fixed or moving objects, parked or moving vehicles, pedestrians, animals, surface hazards or substandard width lanes that make it unsafe to ride along the right-hand edge or curb.
(b) Notwithstanding par. (a), any person operating a bicycle or electric personal assistive mobility device upon a one-way highway having 2 or more lanes available for traffic may ride as near the left-hand edge or curb of the roadway as practicable.
(c) Any person operating a bicycle or electric personal assistive mobility device upon a roadway shall exercise due care when passing a standing or parked vehicle or a vehicle proceeding in the same direction, allowing a minimum of 3 feet between the bicycle or electric personal assistive mobility device and the vehicle, and shall give an audible signal when passing a bicycle or electric personal assistive mobility device rider proceeding in the same direction.
(3)(a) Persons riding bicycles or electric personal assistive mobility devices upon a roadway may ride 2 abreast if such operation does not impede the normal and reasonable movement of traffic. Bicycle or electric personal assistive mobility device operators riding 2 abreast on a 2-lane or more roadway shall ride within a single lane.
(b) Persons riding bicycles upon a roadway may not ride more than 2 abreast except upon any path, trail, lane or other way set aside for the exclusive use of bicycles and electric personal assistive mobility devices.
(4) No person may operate a bicycle, electric personal assistive mobility device, or moped upon a roadway where a sign is erected indicating that bicycle, electric personal assistive mobility device, or moped riding is prohibited.
(5) Except as provided in ss.346.23, 346.24, 346.37, and 346.38, every rider of a bicycle or electric personal assistive mobility device shall, upon entering on a highway, yield the right-of-way to motor vehicles.

346.803 Riding bicycle or electric personal assistive mobility device on bicycle way.
(1) Every person operating a bicycle or electric personal assistive mobility device upon a bicycle way shall:
(a) Exercise due care and give an audible signal when passing a bicycle or electric personal assistive mobility device rider or a pedestrian proceeding in the same direction.
(b) Obey each traffic signal or sign facing a roadway which runs parallel and adjacent to a bicycle way.
(2) Every person operating a bicycle or electric personal assistive mobility device upon a bicycle way open to 2-way traffic shall ride on the right side of the bicycle way.
(3) Every operator of a bicycle or electric personal assistive mobility device entering a bicycle way shall yield the right-of-way to all bicycles and pedestrians in the bicycle way.

346.804 Riding bicycle on sidewalk. When local authorities under s.346.94 (1) permit bicycles on the sidewalk, every person operating a bicycle upon a sidewalk shall yield the right-of-way to any pedestrian and shall exercise due care and give an audible signal when passing a bicycle or electric personal assistive mobility device rider or a pedestrian proceeding in the same direction.

346.82 Penalty for violating sections 346.77 to 346.805. (1) Any person violating ss.346.77, 346.79 (1) to (3), or 346.80 to 346.805 may be required to forfeit not more than $20.

(2) Any person violating s. 346.78 or 346.79 (4) may be required to forfeit not less than $10 nor more than $20 for the first offense and not less than $25 nor more than $50 for the 2nd or subsequent conviction within a year.

346.94 Miscellaneous prohibited acts. (1) Driving on sidewalk. The operator of a vehicle shall not drive upon any sidewalk area except at a permanent or temporarily established driveway unless permitted to do so by the local authorities.
11) Towing sleds, etc. No person shall operate any vehicle or combination of vehicles upon a highway when such vehicle or combination of vehicles is towing any toboggan, sled, skis, bicycle, skates or toy vehicle bearing any person.
(12) Driving on bicycle lane or bicycle way. No operator of a motor vehicle may drive upon a bicycle lane or bicycle way except to enter a driveway, to merge into a bicycle lane before turning at an intersection, or to enter or leave a parking space located adjacent to the bicycle lane or bicycle way. Persons operating a motor vehicle upon a bicycle lane or bicycle way shall yield the right-of-way to all bicycles and electric personal assistive mobility devices within the bicycle lane or bicycle way.
17) In-line skates on roadway. (a) A person riding upon in-line skates may go upon any roadway under the jurisdiction of a local authority, subject to any restrictions specified by municipal ordinance enacted under s. 349.235.
(b) Any person riding upon in-line skates upon any roadway shall ride in a careful and prudent manner and with due regard under the circumstances for the safety of all persons using the roadway.
(c) Notwithstanding any other provision of this subsection or s. 349.235, no person riding upon in-line skates may attach the in-line skates or himself or herself to any vehicle upon a roadway or, except while crossing a roadway at a crosswalk, go upon any roadway under the jurisdiction of the department.

346.95 Penalty for violating sections 346.87 to 346.94.
(1) Any person violating s. 346.87, 346.88, 346.89 (2), 346.90 to 346.92 or 346.94 (1), (9), (10), (11), (12), or (15) may be required to forfeit not less than $20 nor more than $40 for the first offense and not less than $50 nor more than $100 for the 2nd or subsequent conviction within a year.
(6) Any person violating s. 346.94 (17) or (18) may be required to forfeit not less than $10 nor more than $20 for the first offense and not less than $25 nor more than $50 for the 2nd or subsequent conviction within a year.

347.489 Lamps and other equipment on bicycles, motor bicycles, and electric personal assistive mobility devices. (1) No person may operate a bicycle, motor bicycle, or electric personal assistive mobility device upon a highway, sidewalk, bicycle lane, or bicycle way during hours of darkness unless the bicycle, motor bicycle, or electric personal assistive mobility device is equipped with or, with respect to a bicycle or motor bicycle, the operator is wearing, a lamp emitting a white light visible from a distance of at least 500 feet to the front of the bicycle, motor bicycle, or electric personal assistive mobility device. A bicycle, motor bicycle, or electric personal assistive mobility device shall also be equipped with a red reflector that has a diameter of at least 2 inches of surface area or, with respect to an electric personal assistive mobility device, that is a strip of reflective tape that has at least 2 square inches of surface area, on the rear so mounted and maintained as to be visible from all distances from 50 to 500 feet to the rear when directly in front of lawful upper beams of headlamps on a motor vehicle. A lamp emitting a red or flashing amber light visible from a distance of 500 feet to the rear may be used in addition to but not in lieu of the red reflector.
(2) No person may operate a bicycle, motor bicycle, or electric personal assistive mobility device upon a highway, bicycle lane, or bicycle way unless it is equipped with a brake in good working condition, adequate to control the movement of and to stop the bicycle, motor bicycle, or electric personal assistive mobility device whenever necessary.
(3) No bicycle, motor bicycle, or electric personal assistive mobility device may be equipped with nor may any person riding upon a bicycle, motor bicycle, or electric personal assistive mobility device use any siren or compression whistle.

347.50 Penalties.
(5) Any person violating s. 347.489 may be required to forfeit not more than $20.

349.06 Authority to adopt traffic regulations in strict conformity with state law.
(1)(a) Except for the suspension or revocation of motor vehicle operator's licenses or except as provided in par. (b), any local authority may enact and enforce any traffic regulation which is in strict conformity with one or more provisions of chs. 341 to 348 and 350 for which the penalty for violation thereof is a forfeiture.
(2) Traffic regulations adopted by local authorities, which incorporate by reference existing or future amendments to chs. 340 to 348 or rules of the department shall be deemed to be in strict conformity and not contrary to or inconsistent with such chapters or rules. This subsection does not require local traffic regulations to incorporate state traffic laws or rules by reference in order to meet the requirements o s. 349.03 or sub. (1).

349.105 Authority to prohibit certain traffic on expressways and freeways. The authority in charge of maintenance of an expressway or freeway may, by order, ordinance or resolution, prohibit the use of such expressway or freeway by pedestrians, persons riding bicycles or other nonmotorized traffic or by persons operating mopeds or motor bicycles. The state or local authority adopting any such prohibitory regulation shall erect and maintain official signs giving notice thereof on the expressway or freeway to which such prohibition applies.

349.18 Additional traffic-control authority of counties and municipalities. 2) Any city, town or village may by ordinance enacted pursuant to s. 349.06 regulate the operation of bicycles and motor bicycles and may by ordinance require registration of any bicycle or motor bicycle owned by a resident of the city, town or village, including the payment of a registration fee.
(3) Any county, by ordinance, may require the registration of any bicycle or motor bicycle owned by a resident of the county if the bicycle or motor bicycle is not subject to registration under sub. (2). Such ordinance does not apply to any bicycle or motor bicycle subject to registration under sub. (2), even if the effective date of the ordinance under sub. 2 is later than the effective date of the county ordinance. A county may charge a fee for the registration.

349.23 Authority to designate bicycle lanes and bicycle ways. (1) The governing body of any city, town, village or county may by ordinance:
(a) Designate any roadway or portion thereof under its jurisdiction as a bicycle lane.
(b) Designate any sidewalk or portion thereof in its jurisdiction as a bicycle way.
(2) A governing body designating a sidewalk or portion thereof as a bicycle way or a highway or portion thereof as a bicycle lane under this section may:
(a) Designate the type and character of vehicles or other modes of travel which may be operated on a bicycle lane or bicycle way, provided that the operation of such vehicle or other mode of travel is not inconsistent with the safe use and enjoyment of the bicycle lane or bicycle way by bicycle traffic.
(b) Establish priority of right-of-way on the bicycle lane or bicycle way and otherwise regulate the use of the bicycle lane or bicycle way as it deems necessary. The designating governing body may, after public hearing, prohibit through traffic on any highway or portion thereof designated as a bicycle lane, except that through traffic may not be prohibited on any state highway. The designating governing body shall erect and maintain official signs giving notice of the regulations and priorities established under this paragraph, and shall mark all bicycle lanes and bicycle ways with appropriate signs.
(c) Paint lines or construct curbs or establish other physical separations to exclude the use of the bicycle lane or bicycle way by vehicles other than those specifically permitted to operate thereon.
(3) The governing body of any city, town, village or county may by ordinance prohibit the use of bicycles and motor bicycles on a roadway over which they have jurisdiction, after holding a public hearing on the proposal.

349.235 Authority to restrict use of in-line skates on roadway. (1) The governing body of any city, town, village or county may by ordinance restrict the use of in-line skates on any roadway under its jurisdiction. No ordinance may restrict any person from riding upon in-line skates while crossing a roadway at a crosswalk.
(2) The department of natural resources may promulgate rules designating roadways under its jurisdiction upon which in-line skates may be used, except that no rule may permit a person using in-line skates to attach the skates or himself or herself to any vehicle upon a roadway.

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