

## Chapter 2

# The Importance of Bicycling and Bicyclists' Needs

The overall goal of the adopted regional transportation plan is to “provide an integrated, all-mode transportation system, which offers the efficient, effective, and safe movement of people and goods, and provides mode choice wherever possible while enhancing and, where relevant, preserving the character and liability of neighborhoods.” If this goal is to be achieved, the needs of bicyclists and other “alternative” transportation users must be considered when planning and designing all transportation improvements and new neighborhoods.

This chapter of the plan draws attention to the benefits of bicycling, and the different types of bicyclists and their needs. This information provides a useful context for the discussion and analysis of existing facilities, programs, and policies that follows. It will also help in understanding and interpreting the recommended plan goals and policies, implementation actions, and facility improvements. Detailed bicycle facility design guidelines are provided in Appendix A.

### A. The Benefits of Bicycling

The bicycle is an effective means of transportation that is quiet, non-polluting, versatile, healthy, and fun. Bicycling is the most energy-efficient form of transportation, and is particularly well suited for shorter trips up to five miles. Bicycling offers low-cost mobility. For those who do not use or have access to a motor vehicle, such as school-age children and students, this is especially important.

While bicycling will not replace all trips by motor vehicle, it can be practical for many, such as:

- Trips to work or school;
- Visits to friends or relatives;
- Errands, such as picking up a few grocery items;
- Children’s activities;
- Combined trips, such as a recreational trip and an errand; and
- Intermodal trips, such as bicycling to a park-and-ride carpool or transit facility.

Increasing bicycling opportunities and levels will improve the efficiency of the region’s transportation system and improve neighborhood livability by:

- Reducing motor vehicle traffic and associated pollution and congestion.
- Reducing the need for motor vehicle parking; and
- Reducing motor vehicle crashes, injuries, and property damage.

Bicyclists take up little roadway space. Under most urban traffic conditions, bicyclists do not significantly limit traffic flow. Therefore, converting motorists to bicyclists will increase roadway capacity, reduce congestion, and decrease trip times for everyone.<sup>1</sup>

Improving the bicycling environment can also provide non-transportation-related benefits to communities. Communities benefit from bicycle riders who purchase foods and other needs locally. The tourism industry benefits as more bicycle riders are attracted from outside the county. Most importantly, the overall quality of life of communities is enhanced by the presence of bicyclists and pedestrians. For example, social interactions can occur spontaneously and people feel safer being outdoors.

Increasing bicycling opportunities and levels will benefit Dane County families by:

- Providing those unable to drive or without access to a car with more independence;
- Reducing the need for parents to “chauffeur” their children to school and social and recreational activities;
- Allowing households to meet transportation needs with fewer cars; and
- Improving recreational opportunities and public health.

<sup>1</sup> John Forester, *Bicycle Transportation*, 2nd edition (1994), pp. 87-95.

In addition to playing an important role in the Madison area's transportation system, bicycling is also a popular recreational activity. Improving bicycle facilities for transportation purposes benefits those who bicycle for recreation and exercise as well. Recreational bicycle rides can begin at home and be combined with other trip purposes. Off-street paths in urban areas that serve transportation needs also provide recreational benefits. When linked with a larger bikeway system, off-street paths built primarily for recreational use can also provide important transportation linkages. For example, paths through parks can provide short-cuts and rural trails can serve inter-community trips.

## **B. Improving Bicycling Conditions**

Improving bicycling conditions requires construction of facilities for bicyclists. There are many improvements that can be made to make the transportation system work better for bicyclists. However, it also requires consideration of land use practices, street design, and connections with other transportation modes. If land use practices and the street network result in long distances between origins and destinations, bicycling is less practical. Educational and encouragement programs and enforcement of traffic laws are also needed.

The following is an overview of the planning principles, facility improvements, and other strategies necessary for creating a bicycle-friendly community.

### **Meet the Needs of All Types of Bicyclists**

While bicyclists tend to be younger than the overall population, they are still a very diverse group in terms of age, level of fitness, skills, riding habits, etc. Some people bicycle to meet their daily needs (i.e., commuting to work,



running errands, etc.), while others bicycle primarily for exercise and recreation.

Some people bicycle long distances, while others rarely travel more than a few miles per trip. Some people bicycle throughout the year, while others only bicycle during the warmer months. Some bicyclists are experienced, highly skilled riders who are comfortable riding in traffic on busier roads. Others prefer riding primarily on local streets and off-street facilities. Bicycles also come in different shapes and sizes.

The needs of all of these bicyclists need to be considered in planning and designing bikeway systems. All streets should be designed to accommodate bicyclists. Streets designed to accommodate bicyclists with moderate skills will meet the needs of most riders. Alternative through routes to major arterial roads on parallel streets, and/or off-street paths should be designed and identified wherever possible. Special consideration should be given to areas close to schools and parks, where facilities designed specifically for children should also be provided. Neighborhood design should incorporate a "grid" of streets and paths, connecting all areas of the neighborhood and adjoining neighborhoods. Special attention should be given to providing safe crossings of major streets that divide neighborhoods.

### **Accommodate Bicyclists on Roadways**

Roadways must serve as the backbone for any bikeway system. The roadway system already exists and therefore presents the greatest opportunity for improving bicyclists' mobility and access needs. Creating a totally new infrastructure for bicyclists is not physically or financially feasible. In



addition, the destinations that bicyclists want to reach are located along the existing roadway system.

Neighborhood streets have low volumes of traffic and slow speeds, so bicyclists can use them without the need for any special treatments. However these streets are usually not continuous and have frequent stops, making them inconvenient for all but the shortest of trips.

Likewise, in rural areas, roads with a low traffic volume (generally less than 1,000 vehicles per day) can be shared by adult bicyclists and motorists without the need for extra space for bicyclists.



To safely accommodate bicyclists on busier collector and arterial roadways, however, the roadway system needs to include additional space. Accommodating bicyclists on arterials and collectors is critical because they:

- Serve mobility needs by providing the most direct, continuous routes;
- Have many destination points located on them for which they provide convenient access;
- Are protected from minor street cross traffic;
- Provide controlled crossings of other arterial streets; and
- Bridge obstacles such as expressways and railroad tracks.

### **Provide Appropriate Facilities**

Well-designed bicycle facilities attract users. Lack of facilities on major streets denies access to bicyclists, results in a fragmented bikeway system, and creates hazardous conditions for bicyclists, pedestrians, and motorists.

In urban areas, the appropriate facilities on arterial and collector streets are bicycle lanes and wide curb lanes. Bicycle lanes are the preferred facility, particularly on arterial roads, because they:

- Help define the road space;
- Provide bicyclists with adequate space free of obstructions;
- Decrease the stress level of bicyclists riding in traffic; and
- Signal to motorists that bicyclists have a right to share the road.



Bicycle lanes can be designed as shared use facilities with parking, as shown, or as bus/bicycle lanes.



On those roads where bike lanes are warranted, but cannot be provided due to physical constraints, widening the right-hand or curb lane is an alternative design solution. Wide curb lanes should be at least 14 feet wide, excluding the gutter on streets without parking, and 16 feet wide excluding the parking lane on streets with parking. The extra width is needed to provide sufficient space for a motorist and bicyclist to operate parallel to each other in the same lane without coming too close, and without the motorist having to change lanes to pass a bicycle.



On rural roadways, the appropriate facility is paved shoulders (four feet minimum), which can accommodate bicyclists with few conflicts with motor vehicles. Generally, paved shoulders are desirable when average daily traffic volumes reach 750-1,000, depending on truck volumes and roadway characteristics. They are particularly important in areas with high bicycle use, such as in semi-rural residential areas, near parks, or close to urban areas.



Bicycle lanes and paved shoulders provide additional benefits beyond those provided to bicyclists. Bike lanes can help serve as a buffer between motorists and pedestrians and improve motorists' sight distance. Paved shoulders reduce run-off-the-road motor vehicle crashes and provide an emergency breakdown area. They also reduce road maintenance costs by limiting edge deterioration problems.

### Provide Safe Intersections and Street Crossings

Most conflicts between various roadway users occur at intersections and driveways. Intersections and ramp interchange areas designed for the movement of motor vehicles can be very difficult for bicyclists to cross. A network of streets with bike lanes does not fully meet bicyclists' needs if intersections present obstacles.



Intersection design should create space and a travel path for bicyclists that is direct, logical and as consistent with the path of motor vehicle traffic as possible.



## Ensure that Traffic Signals Work for Bicyclists

Traffic signals can also present problems for bicyclists. Demand-actuated (vs. pre-timed) traffic signals, which turn green only when the system detects traffic, often do not detect bicyclists well. Bicycle-sensitive loop detectors should be used to make traffic signals work for bicyclists. Stencils, like the one shown below, can be used to show bicyclists where to ride to cross the most sensitive portion of a loop.



The City of Madison has recently installed loop detectors on its bicycle paths at street crossings as a means of counting bicycles and detecting them in order to change the signal to green.

Bicycles should also be considered in the timing of the signal cycle to ensure bicyclists have adequate time to clear the intersection.



## Eliminate Barriers and Hazards to Bicyclists

Barriers and hazards create gaps in the bikeway system and present safety risks to bicyclists. They need to be identified and removed or addressed to ensure network continuity and connectivity as well as safety.

Major barriers and hazards and some solutions to overcoming them are:

- Freeways and rivers divide a community if there are few crossings.

**Solutions:** Build bridges with adequate space to accommodate bicycles and pedestrians, build separate pedestrian/bicycle bridges, overpasses, or underpasses to provide important links in the bikeway system.



- At-grade railroad crossings can be difficult for bicyclists to negotiate if the road surface is not at the same elevation as the railroad tracks and/or bicyclists are unable to cross the tracks at a right angle.

**Solutions:** Widening of the roadway to allow bicyclists to cross at a safe angle and use of rubberized mats to provide a smooth crossing of the tracks.



- Improperly designed and/or located drainage grates.

**Solutions:** Install bicycle safe stormwater drainage grates and locate them outside of bicyclists' path.



### Ensure Regular Facility Maintenance

Bikeways are subject to debris accumulation and surface deterioration, and require regular maintenance to function well. Bicycles ride on two narrow, high-pressure tires. Small rocks, sand, and other debris can deflect a wheel, and minor ridges in the pavement can cause spills. Broken glass can puncture tires. Bike lanes and paved shoulders in particular require regular sweeping, as motor vehicle traffic tends to sweep debris onto them. Bikeways must also be kept free of snow and ice in the winter.

### Utilize Opportunities for Off-Street Facilities

Off-street paths can supplement the roadway system to improve bikeway system continuity and linkages, overcome barriers, and provide recreational opportunities. Off-street paths are most effective when they:

- Provide short cuts and improve connections within and between neighborhoods;
- Can be built with a minimal number of street or driveway crossings;
- Take advantage of opportunities such as rail corridors, greenways, watercourses, and other linear corridors; and
- Provide network continuity where bicyclists cannot be safely accommodated on the roadway.



## Implement Neighborhood Traffic Management Strategies

Residential streets—especially those that run parallel to higher-volume arterial streets—are generally ideal for bicycling. However, cut-through traffic and speeding may also occur on those residential streets, making them less comfortable and safe for bicyclists and pedestrians.

“Traffic calming” measures can be used to divert and/or reduce the speed of traffic. Examples include traffic circles, diverters, and speed humps. Some of these measures can increase bicyclists’ mobility on residential streets by reducing stops and providing pedestrian/bicycle-only connections. Traffic calming devices must be properly applied and designed, however, so as not to create bicycling hazards or barriers.



## Provide Convenient, Secure Parking and Other Ancillary Facilities

Just as motorists expect conveniently located and secure parking at their destination, so should bicyclists. Adequate, secure parking should be provided at all likely destination points. Bicycle theft is common and the lack of secure parking is often cited as a reason people do not ride to certain destinations. Bicycle racks should accommodate the high security U-shaped bike locks and allow securing of the frame and at least one wheel.

Other important ancillary facilities include lighting for off-street paths and shower and locker facilities at employment centers.



## Provide Intermodal Connections

Transit and bicycling have the potential to complement each other well. The transit system can benefit from bicycle-bus trips. Bicyclists can benefit from transit, which can increase their access to the overall transportation system by bridging long distances. In order to develop this connection and encourage use of both modes, secure bicycle parking needs to be provided at bus stations and major stops, and bicycles must have access to the transit system, such as through bike racks on buses.

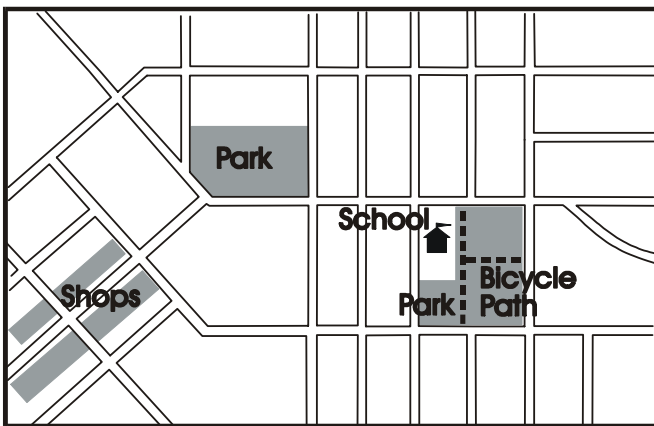


## “Bicycle-Friendly” Land Use and Street Design

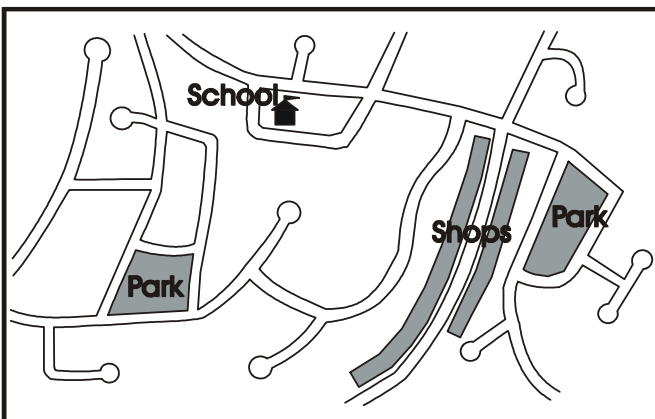
The general patterns of land use in communities and the design of neighborhoods determine to a large degree whether bicycling is practical and attractive for meeting one’s transportation needs.

The most important features of bicycle-friendly land use and urban design are:

- An interconnected street system, which provides bicyclists with direct routes and alternatives to travel along high-volume roadways, as illustrated below.



Many newer neighborhoods include numerous cul-de-sacs, as illustrated below. This requires a long circuitous route to cover a short distance and forces bicyclists to use busy arterial streets to reach many common destinations. The number of cul-de-sacs should be minimized.



Where cul-de-sacs are incorporated into developments, a path should be provided between the cul-de-sac and other streets for bicycle and pedestrian access.



A highly connected street system spreads motor vehicle traffic over a larger number of streets. This helps to minimize the need for multi-lane roadways with large, complex intersections that create barriers for bicyclists.

- Compact, mixed-use development, which provides destinations within easy bicycling of people’s homes and workplaces.

Land uses should be organized so that schools, neighborhood-oriented shopping, parks, and other destinations are within walking and bicycling distance. A network of streets and paths should connect the different land uses. Mixed-use employment centers allow bicyclists to run errands at lunch time and after work.





- Access management on arterial streets.

Limiting and consolidating driveways and providing raised or landscaped medians on urban arterial roads benefits bicyclists and pedestrians in several ways. It reduces the number of points of conflict between cars entering or leaving a roadway and bicyclists riding on the road and pedestrians walking on the sidewalk. It also improves crossing opportunities for pedestrians and bicyclists turning pedestrian style at non-signalized street intersections by providing a refuge and helping to maintain gaps in the traffic stream. Traffic flow is also improved, which may delay the need for road widening. While driveway access should be limited, a sufficient number of local street crossings should be provided to ensure adequate crossing opportunities for pedestrians and bicyclists.

- Open space between communities along bicycle commuter and recreational routes.

Provision of green space between communities helps limit “urban sprawl” and can provide pleasant areas for the location of bicycle routes out of and into urban areas.

### **Provide Education and Training Opportunities and Encouragement**

Construction of bicycle facilities must be combined with education and encouragement activities in order to increase bicycling for transportation. The positive effect of facility improvements is increased when combined with training and promotion.

The most critical education program for bicyclists is traffic operation. Training bicyclists to ride as vehicle operators on the street system in mixed traffic increases their effective mobility and reduces their crash potential.

Education of motorists in sharing the roadway with bicyclists, and education of developers, planners, engineers, and others involved in the land development process about the needs of bicyclists is also important.

Encouragement policies by public agencies and private employers, such as provision of covered bike parking, showers and changing rooms, flextime, a guaranteed ride home program, and financial incentives can make bicycle commuting easier and more attractive.



### **Enforce Traffic Laws**

Most motor vehicle-bicycle collisions occur from motorists or bicyclists not following the “rules of the road.” Safety education programs need to be combined with enforcement programs focusing on common violations by motorists and bicyclists that lead to crashes.

