





4 DESIGNING FOR BICYCLISTS

Many people keep bicycles in the garage for occasional exercise or recreation. But they may forget that bicycles are also a fast, fun, and healthy form of everyday transportation. By using a bicycle to travel to work or run errands, you get extra exercise and a chance to see your community in a different way. Increasing the number of people riding bikes for transportation, especially on short trips, could ease auto congestion and minimize air pollution from cars. Active living communities encourage biking for the health of each resident and the entire community.

Considerations for Bikeability

Share the Road with Bicyclists

The American Association of State Highway and Transportation Officials (AASHTO) bicycling facilities guidelines (AASHTO, 1999), as well as state and federal laws, make it clear that all types of roads (except limited-access highways, where bikes are prohibited) should be designed to accommodate bicycles. This includes neighborhood streets, downtown commercial corridors, and busy suburban thoroughfares that are sometimes the sole access point for many businesses and services. Ideally, this attention to bikeability occurs as roads are built, but bicycle-friendly features can also be added later.

Design for All Types of Bicyclists

When designing roads and paths that effectively accommodate bicyclists, planners must remember that different bicyclists have different goals, skill levels, and expected speeds. Consider the three main types of bicyclists:

- *Advanced or experienced riders*, who use a bicycle like a motor vehicle. They often ride for transportation and want direct access to destinations like workplaces, scenic routes, and recreational facilities. They typically ride fast on the road with cars. They need sufficient room to ride without having to squeeze in and out of faster motor vehicle traffic.

Photo credit: © Hans F. Meier, <http://www.iStockphoto.com>.



On low-volume streets without designated bike lanes, signs remind drivers of the presence of non-motorized road users. Photo credit: John Warbach.

FIND MORE INFORMATION ONLINE

Design Guidelines for Active Michigan Communities provides a general overview of important active living concepts. The Pedestrian and Bicycle Information Center, the National Center for Bicycling and Walking, the Michigan Department of Transportation and the League of Michigan Bicyclists have great websites with more specific information about accommodating bicyclists. Check them out at <http://www.pedbikeinfo.org>, <http://www.bikewalk.org>, <http://www.michigan.gov/mdot>, and <http://www.lmb.org>.



This commuter is an experienced rider. Bike lanes on arterial roads would provide a direct and safer commute to his workplace. Photo credit: Mark Fenton.



Many states require children under the age of 16 to wear helmets. Helmets are the best protection against head injury. Photo credit: © Rob Friedman, <http://www.iStockphoto.com>

GET ON YOUR BIKE

The best way to learn about what your community needs for cycling is to jump on a bike and ride around town. Even if you haven't ridden your bike in a while, pump up the tires and see where it takes you. Be sure to wear your helmet.



From the perspective of a bicycle seat, many issues become clearer. Which part of the road or path do you ride on? Is there enough room for a comfortable ride? Do barriers such as busy roads, highways, narrow bridges, or debris in bike lanes limit you? Can you get to important destinations? Do any signs guide you? Is adequate lighting provided? What do you do with your bike once you've reached your destination?

- *Basic or less confident riders* also may cycle for transportation, but they prefer to avoid busy streets unless there is ample room and a designated lane. They are more comfortable riding on neighborhood streets and paths.
- *Younger children*, riding with or without adults, and *some older adults or challenged riders* travel at slower speeds but still need access to key destinations like schools, libraries, and parks. Low-volume residential streets connected by shared-use paths can accommodate young children. Older children may be able to ride on busier roads with well-marked bike lanes.

Your community can set goals to provide a variety of bicycle paths, lanes, and signs to address the needs of all types of bicyclists.

Design for All Types of Environments

Just as there are different types of bicyclists, there are also different types of roads. Many roads, such as neighborhood streets, function well for bicyclists without any changes. You may already have bicyclists riding in your neighborhoods because they feel comfortable on those roads.

Other roads can provide safer cycling environments if minor changes are made, such as marking bike lanes or providing signs that help bicyclists find a safe route and/or warn drivers to expect bicyclists. Creating wide paved shoulders (to replace gravel) or wider outside travel lanes can improve the bikeability of some roads, such as those in rural areas.

However, other routes need even more attention. For example, heavily traveled, narrow roads can be perilous for bicyclists. Roads that have high levels of cycling might need further design modifications to affirm the presence of bicyclists on the road and to help drivers expect them.

The important thing to remember is that just as all bicyclists aren't the same, all roads and traveling conditions aren't the same. A solution may be successful in one instance but not in another. This chapter highlights some things to think about when trying to encourage and accommodate cycling as a part of creating an active community.

This chapter focuses on design elements for on-road bicycle accommodations and other supports. The next chapter deals with shared-use paths and trails for bicyclists and pedestrians. Together, these approaches provide opportunities for bicyclists with a range of skills and comfort levels to enjoy using bicycles for recreation and transportation.

Street Design Elements for Safe Cycling

This section highlights examples of specific street design elements that make it safer and easier for people to bicycle.

Bike Lanes

Bike lanes are designated lanes for bikes on busy roads. They should be marked with a painted line and a stenciled symbol indicating their use. Another option is to offset the bike lanes with different materials or colors.

SIDEWALK OR STREET?

Many people feel safer bicycling on sidewalks than on busy roads. As a result, some local governments have built very wide sidewalks along streets—known as side paths—with the idea that these will be safer. But placing bike routes on sidewalks rather than bike lanes is not recommended unless the road circumstances are extremely limited (such as on long, narrow bridges). The reason is this: When entering roads, motorists tend to pull out all the way to the street (past the sidewalk) before looking for a break in oncoming traffic. This is fine for slow-moving pedestrians on the sidewalk; motorists and pedestrians generally have ample time to notice each other and react accordingly. But most motorists are not looking for fast-moving bicyclists on the sidewalk, and bicyclists often cannot anticipate quickly enough the movement of cars (see photo at top right). Ensuring that bicyclists have facilities on the street avoids this conflict. On the road, bicyclists have the right of way, and motorists watching for cars will see bicyclists, too.



Big signs = big trouble. If you need big signs to tell cars to look out for bikes and big signs to warn bicyclists to look out cars you have a strong indicator that this sidepath is dangerous! Photo Credit: Crazybikerchick.



A major consideration when planning bike lanes is the interface between bikes and parked cars. In this photo, the wider bike lane enables the bicyclist to pass the open car door with minimal conflict with moving vehicles to the bicyclist's left. Photo credit: Norm Cox.

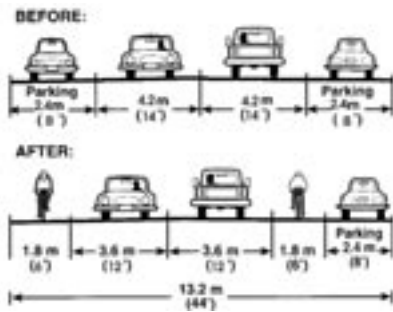


This heavily used route is well marked; bicyclists are highly visible to drivers. Photo credit: Dan Burden.

A bike lane should be at least 4 feet wide, with 5-foot-wide lanes next to on-street parking (allowing 6 feet is even better). Bike lanes need more room next to parking to help bicyclists avoid opened car doors. Some cities that have made significant investments in bicycle infrastructure, such as Chicago, mandate that all bicycle lanes be 5 feet wide. The measurement should include only the smooth road surface, not separate gutters or grates.

ROADS GO ON A DIET

On existing streets, the best approach to creating a more bikeable road may be to restripe the pavement with narrower vehicular travel lanes and new bike lanes. Narrowing travel lanes can slow auto speeds and is a less expensive option for creating bike lanes than widening a street.



Graphic credit: From the *Wisconsin Bicycle Facility Design Handbook*.

Safe Cycling: Design Alternatives

Lane width is important because the more room for error motorists have, the faster they will drive. Most roadways are constructed with lane widths of 12–14 feet, which results in highway- or expressway-like roads that permit traffic at 50+ mph. Limiting lanes to 10–11 feet still accommodates most users, including trucks. Auto travel lanes can even be reduced to 9 feet in some cases.



Signage at this intersection informs drivers turning right to watch for bicyclists and yield to them. For optimal safety, the bicyclist should be wearing a helmet! Photo credit: Mark Fenton.

Road Diets

Striping bicycle lanes in existing streets does not require widening the street (an expensive and time-consuming process). Communities can create adequate space for bike lanes by eliminating or narrowing some auto travel and parking lanes—and this road diet offers the extra benefit of slower traffic speeds. Auto travel lanes can be as narrow as 10 feet, and parallel parking lanes can be reduced to 7 feet. Ideally, both the parking lane and bike lane should be marked with striping. See the Road Diet graphic on the left for more information.

Other on-road bike facilities include paved shoulders, wide outside lanes, and shared roadways.

Paved Shoulders

Paved shoulders should be at least 4 feet wide to accommodate bicycle travel. Paved shoulders have the added benefits of lengthening the life of rural roads and offering a safer spot for motorists who break down or need assistance. If cost or space concerns prohibit paving all shoulders, consider giving first priority to uphill portions of the roadway (where bikes move slowest), sections where outside travel lanes are narrowest, or shoulders narrower than 4 feet. Maintenance of paved shoulders is vital—they quickly attract gravel, glass, salt, and debris.



This paved shoulder provides sufficient space for enjoyable and safe cycling on rural roads. Photo credit: Mark Fenton.

Wide Outside Lanes

The terms wide outside lane and wide curb lane refer to an outside (next to the curb) car lane built wider than the typical width of an auto lane. This lane provides unmarked space for bicyclists to ride. Wide curb lanes should be at least 14–15 feet wide, possibly wider on steeper uphill grades.

Signed and Un-signed, Shared Roadways

Shared roadways are roads designated as bicycle routes to important destinations or as main cycling corridors. Before designating a roadway as a bicycle route, the pavement should be assessed and barriers removed. Residential streets and other low-volume roads function well as shared roadways, and these roads may not need special treatment. Bicycling signs on shared roadways to popular destinations can help bicyclists identify the route and let motorists know to expect bicyclists on the road. Shared low-volume streets may not need to be signed.

Safe Intersections

There are many important considerations for accommodating bicycles at

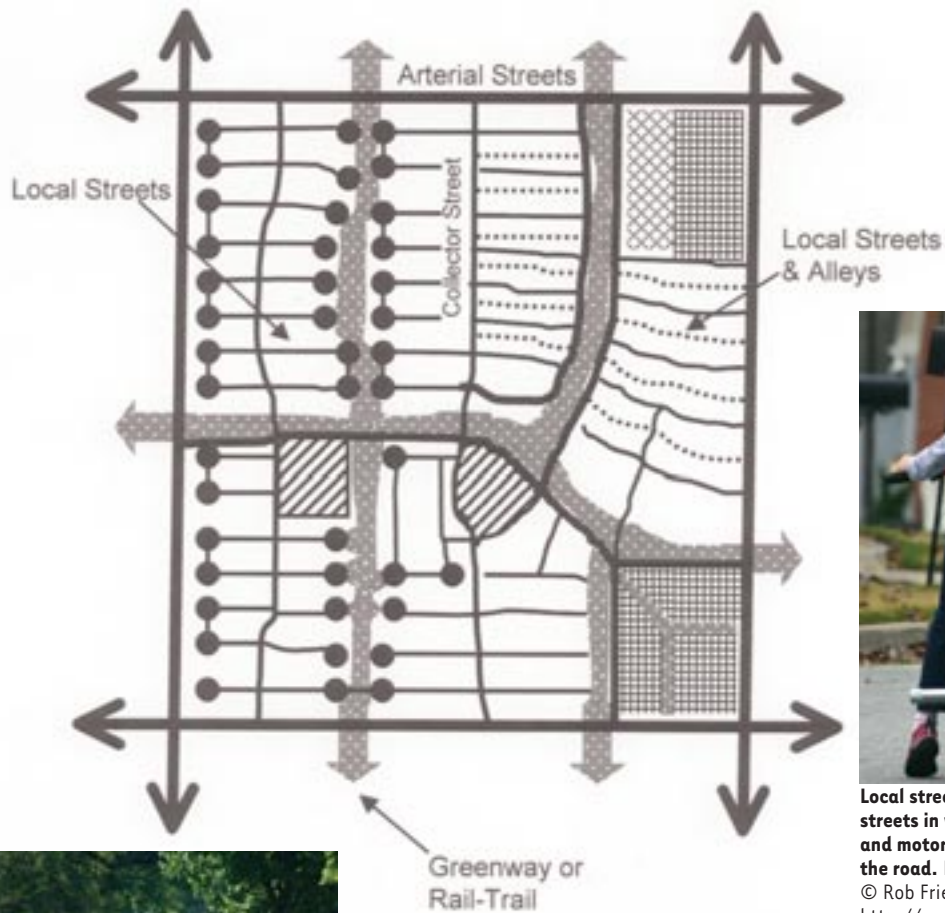
PROVIDING FOR CYCLING WITHIN A TRANSPORTATION NETWORK

Cars must share the road with bicyclists, but some routes are better for bicyclists than others. Choose the level of bicycle infrastructure to provide based on the street's traffic load and

whether the setting is rural or urban. Where possible, a transportation network should include separate routes, such as greenways, that serve only non-motorized travel.



Arterial and collector streets: Marked bike lanes and wide curb lanes. For higher volume rural roads, paved shoulders should be provided.
Photo credit: Russ Soyring.



Local streets: Low-volume streets in which non-motorized and motorized users can share the road. Photo credit: © Rob Friedman, <http://www.iStockphoto.com>.



Greenways: Shared-use paths for non-motorized users like pedestrians, bicyclists, runners, and inline skaters. Photo credit: Russ Soyring.

intersections. Special care should be taken at railroad crossings, near highway access ramps, and in other specific situations. The presence of busy intersections does not preclude the possibility of creating safe areas for cycling. Consult the Guide for the Development of Bicycle Facilities (AASHTO, 1999) or other resources mentioned at the end of this book for advice on handling tricky situations. For areas with the most conflicts, it is critical to meet with road agencies and experts to address problems properly.

Other Factors That Encourage People to Bicycle

This section addresses some non-design factors that are essential for communities who want to encourage residents to bicycle more.

Bike Parking

Convenient, secure, and well-maintained bike parking is an essential part of an active living community. If residents are going to ride their bikes to school, the library, work, or shopping, they need places where they can lock their bikes. Bicyclists prefer to park close to the entrances of their destinations. If nearby bike parking is inadequate, bicyclists will lock their bikes to anything available—trees, signposts, and other places not intended to serve as bike parking.



These racks provide easy, flexible parking for bicycles. Photo credit: The Metropolitan Design Center Image Bank. © Regents of the University of Minnesota. All rights reserved. Used with permission.

Here are some general guidelines for providing effective bike parking.

- *Multiple small, minimalist racks* distributed throughout the area and located close to individual destinations are preferable to a smaller number of large racks, which may not fit easily into a commercial site plan. Larger destinations, such as schools and shopping areas, need more bike racks.
- Racks should *enable secure locking without damaging the bike*. Racks should allow a bicyclist to secure the frame of a bike with a U-lock or a combination of a U-lock and cable. Old-style racks that hold the front wheel can damage the bike and prevent secure locking. These racks are no longer viable options for bike parking. Smaller racks that support the frame of the bike work best to keep the bicycle safe from damage and theft.
- Racks should be in *well-lit public areas*, near building entrances and along busy sidewalks. The presence of pedestrians and other casual observers discourages theft.
- Racks should be *close to building entrances* and, if possible, separated from automobile parking. This offers convenient access and casual monitoring. Racks in plain sight also remind residents that bicycling is



This bike locker in Ann Arbor provides safe and sheltered bike storage for the city's residents. Photo credit: Norm Cox.



Poorly parked bikes present dangerous obstacles to pedestrians and other users of the sidewalk. Photo credit: Russ Soyring

a viable means of transportation.

- Long-term parking racks should be *covered* to offer some protection from rain and snow.
- Bicycles *should not block sidewalks* or pedestrian routes. Smaller racks distributed throughout the area, instead of one large rack, can help keep sidewalks open.
- *Parking meters and street signs* can sometimes double as convenient and secure bike parking, as long as the base of the meter or pole is narrow enough for a U-lock, and the pole is long enough to prevent lifting the bicycle over the top.
- Provide *enough secure racks* to dissuade bicyclists from using trees, which are poor bike parking options.

Offering safe, monitored, and covered bicycle parking provides a vital incentive for bicyclists. Companies that dedicate some of the best parking spaces to bicycles reward bicyclists for improving their health, the environment, and potentially, the success of their companies.

Public Transportation

Bicycles and public transportation are complementary forms of transportation. People who ride their bikes for transportation can rely on buses and trains as backup options during bad weather, when bicycles are being repaired, or even if a breakdown occurs on a trip. People can take their bikes on public transportation for part of the trip and ride their bicycles for the rest, extending the distance they can travel.

To meet these needs, public transportation should be frequent and reliable. Buses should include inexpensive, easy-to-operate bike racks. These racks usually hold two bikes and are attached to the front of the bus.

Bicycle Route Maps

Producing and distributing a bicycle map of your community is a great way to highlight bicycling possibilities, publicize the “rules of the road,” and identify problem areas that could be improved in the future. Most maps indicate the locations of bike lanes and shared-use paths. They may also rate local roads for their bikeability. Maps should indicate bike storage locations and destinations such as shopping, parks, and other places bicyclists want to access. Some maps may include information about bicycle repair shops and may be sponsored by local businesses that want to attract more customers on bikes. Map designs should allow for easy use while cycling; make sure they are not too large or flimsy. Regional bike maps are available from the Michigan Department of Transportation and the League of Michigan Bicyclists at www.michigan.gov/mdot and www.lmb.org.

BICYCLE SAFETY

Programs to help people develop their riding skills and learn how to bike safely should also be part of any plan to encourage more cycling in your community. The League of Michigan Bicyclists has great information on education programs at <http://www.lmb.org>.



Equipping buses with bike racks increases the distances bicyclists can cover and greatly enhances the practicality of bicycles for commuting. Bad weather arrives mid-day? No problem if you can put your bike on the bus!
Photo credit: Norm Cox.



A bicyclist stops to pick up a trail map provided on a shared-use path. A good map also shows bike lanes and traffic levels. Photo credit: John Warbach