BASIC IMPROVEMENTS FOR BICYCLISTS
.by John Williams, editor of Bicycle Forum

Here are some simple ways to improve bicycling in your community. These improvements are mostly inexpensive and require a minimum of specialized bicycle planning. They can help ease conflicts and congestion for all modes of transportation—cars, bikes, and even pedestrians.

Why encourage bicycling?

Bicycling is one of the most popular forms of recreation in America — in fact, it’s number two overall. It’s also excellent aerobic exercise. According to the Bicycle Federation of America, more than 80 million Americans ride bicycles. Further, the bicycle is an economical non-polluting energy-efficient means of transportation. Some communities have worked hard to support bike use and, as a result, significant percentages of their work forces commute by bike.

For example, more than 10% of the commute trips in Madison, Wisconsin, are made by bike. Other bicycling cities include Davis, California, Eugene, Oregon, Boulder Colorado, and Gainesville, Florida. By encouraging bicycle use, these cities reap benefits like improved air quality, reduced traffic congestion, and a healthier citizenry. While some of their projects have been expensive, others have not. Let’s look at those mostly inexpensive—but good—ideas.

Approaches for all streets

Studies show that bicycle users can be found in all parts of a city. They share destinations and trip purposes common to other road users and use all types of streets. For this reason, add basic bicycle improvements to all streets where bikes are allowed.

Different types of users, however, prefer different types of streets. Children and casual adult riders often ride on quiet neighborhood streets or paths. Serious commuting and recreational cyclists often ride on major streets and highways.

Fix or replace dangerous drain grates.

Drainage grates can be the bane of the bicyclist’s existence. The worst ones are parallel-bar grates which can trap a bicyclist’s wheel, causing a serious crash.

Replacing such grates with bicycle-safe models is the best approach. There are numerous designs that are both bicycle-safe and hydraulically-efficient. One good design is the curb-face inlet. These present no obstacle at all to the bicycle, as long as slopes to the inlets are not excessive.

Other safe designs include “vane” grates with short angled slots and honeycomb-style steel grates. Most grate manufacturers produce bike-safe models.

In the short term, retrofitting may be a viable approach. Some agencies weld flat steel bars across the grate, perpendicular to the flow of traffic. This approach may work well for a while if you don’t have to worry about snow plows. Other agencies use covers of one sort or another. If not cleaned frequently, however, these can collect debris that restricts the flow of water.

Retrofitting can solve the immediate problem and reduce an agency’s potential exposure to liability. However, replacing dangerous grates is the best solution and has the lowest maintenance costs. Also, don’t forget to change grate standards so that future installations will use bike-safe models.

Patch and sweep carefully.

Many bicycles have relatively narrow tires and no shock absorbers. So, good surface conditions are essential. And paying particular...
lar attention to the roadway edge and patching practices can do a lot of good.

For example, a Palo Alto, California, policy requires utility companies to patch their roadway excavations to a high standard, with no big gaps or ridges. And if a patch fails within one year, the company must fix it.

Sweeping is also important for bicyclists. Passing motor traffic moves debris off to the side of the roadway, where bicyclists often ride. Sweepers should pay special attention to the right edge and to places in intersections where debris builds up.

Fix railroad crossings.

There are two main railroad crossing problems. First, tracks that cross the roadway at less than 45º can divert a bicyclist's front wheel and cause a crash. Second, rough crossings can cause a bicyclist to lose control or damage a wheel.

For rough crossings, replacement with smooth concrete or rubberized installations can eliminate the problem entirely. While these are expensive, they can significantly reduce maintenance costs. Some cities, such as Seattle, Washington, install 4-foot sections of rubberized crossing near the right edge of popular bicycling streets. This can save money while benefiting bicyclists.

One good way to solve the angle crossing problem is to flare the approaches on either side of the crossing. This allows bicyclists to cross the tracks at a right angle (see below).

On slow-speed rail lines with rubberized crossings, an alternative is to install flange-way fillers, which fill the wheel-grabbing gap next to the rail. However, this approach isn't recommended on high speed railroad lines; the filler does not compress quickly when a fast-moving train wheel hits it.

Reference: North Carolina Bicycle Facilities Planning and Design, 1994

Use current bike facility guidelines.

Since the 1960s, bicycle facility designers have learned much about how bikes perform and what riders need. Some common mistakes still exist, however, and some are being re-created today; such mistakes can lead to multi-million dollar law suits. Here are a few tips from the AASHTO (American Assn. of State Highway & Transportation Officials) 1991 Guide:

Don't designate sidewalk bikeways.

These cause car-bike conflicts at intersections and driveways, as well as conflicts with pedestrians. Eugene, Oregon, and other cities have found that sidewalk bikeways have very high crash rates.

Don't put two-way bikeways on one side of a street. These also cause serious conflicts at intersections and driveways. Two-way bike lane use has led to a number of fatal head-on collisions. And it encourages wrong-way riding.

Use a realistic design speed on separate trails. Twenty miles per hour is a reasonable design speed on level ground. On hills, increase it to 30mph or more.

Be especially careful designing bike path curves and intersections. Unexpectedly tight curves can cause crashes, as can sight restrictions at intersections.

Shared trail use can cause problems. While it’s seldom possible to avoid, mixing bikes and pedestrians on a trail can lead to serious conflicts if either bike volumes or pedestrian volumes are high. Some cities, like Calgary, Alberta, and Denver, Colorado, separate bicyclists and pedestrians onto individual trail segments in areas where use is particularly high. When shared use is unavoidable, add width and increase sight distance on curves and at intersections.

Improving Major Streets

For experienced bicyclists, cycling on major roads, while not always pleasant, has important benefits. These benefits are the same ones that motorists appreciate. Major roads tend to be more direct than quiet neighborhood streets. They are often protected by stop signs and signals at intersections. And those intersections often have good sight distance. Skilled bicyclists have little trouble riding safely on major roads.

In some cases, it is possible to add bike lanes to arterial streets. Some cities have done this by removing a traffic lane with positive results. If this is not possible, it’s still feasible to improve conditions for bicyclists. Here are some important options:

Create wide curb lanes.

One option for improving cycling conditions on major roads is to add width to the curb lanes. This approach gives motorists and bicyclists enough room to coexist in relative comfort.

Further, wide curb lanes can reduce conflicts between cars on the roadway and cars waiting to exit from driveways.

Install bike-sensitive traffic signals.

Demand-actuated signals are known for being unresponsive to bicycles. Bikes generally don’t have enough metal to trip the actuators. And, as a result, many bicyclists have poor attitudes regarding signals.

But modern detection systems can detect bicycles. The best standard design for general purpose lanes is a modified quadrupole loop (CalTrans Type D). This loop (shown below and above right) is sensitive over its entire width but the sensitivity falls off rapidly outside. This feature helps avoid detection of vehicles in adjoining lanes. The diagonal quadrupole is an excellent design for new intersection loop installations.

How wide is wide enough? On a four-lane arterial street with 12-foot lanes, simply narrowing the inside lanes to 11 feet and widening the outside lanes to 13 feet is worth the effort, according to a study done by the Maryland DOT.

The consensus, however, seems to be that 14 to 15 feet of usable lane width (not counting curb and gutter) is the best.


Improving Local Streets

Many bicyclists prefer riding on quiet neighborhood streets. These bicyclists are often less skilled than those who ride on major roads. Quiet streets may be less stressful than busy streets. However, they may harbor hazards that can catch bicyclists unaware.

Several Federally-sponsored studies have shown that the majority of car-bike crashes happen on residential streets AND that residential streets may even have higher crash rates than do busier roadways.

The next sections discuss some of the improvements that will make local streets safer.
Here are a few local road tricks:

**Improve sight distance at crossings.**
Visibility at intersections is crucial to everyone’s safety. This is especially true for bicyclists, since they are so much smaller and often harder to see than the typical car. Many car-bike crashes result from motorists’ and bicyclists’ inability to see each other due to sight obstructions like large bushes, fences, and parked cars.

Keeping sight lines clear at intersections can do much to improve bicycle safety. While such improvements aren’t exotic, they can be very effective.

**Add effective intersection controls.**
In the West, many residential street intersections are uncontrolled. Unfortunately, experience suggests that motorists (and bicyclists) often misunderstand the traffic laws governing such intersections.

Consider installing traffic controls on low-volume streets which meet popular bicycle routes. These can be stop or yield signs, depending on local preference.

**Use traffic calming measures.**
While not strictly bicycle improvements, carefully-designed traffic calming techniques can often reduce dangers of riding on local streets. By reducing either traffic speeds or traffic volumes on residential streets, such provisions as mini-traffic circles, chicanes, diverters, and speed humps can help make quiet streets even quieter.

Seattle’s mini-traffic circle program is one example of a program that has been both popular with residents and has reduced the number of crashes in residential street intersections significantly.

Improve Rural Roads
Rural roads offer miles of quiet and enjoyable cycling. Many bicyclists consider this type of riding to be the very best recreation available. What can be done to improve rural roadways?

**Pave shoulders on busy rural roads.**
Some states, such as Wisconsin, add paved shoulders to rural highways when they reconstruct. They do this to encourage bicycling — they have a very active tourism program — and to improve conditions for motorists as well.

On narrow rural roads without paved shoulders, cars and trucks occasionally drop a wheel off the pavement edge. When the driver corrects, the wheels tend to tear up that edge. This damage can lead to continuing maintenance problems. Paved shoulders can cut down on maintenance costs by giving the motorists more room to correct steering errors. Further, paved shoulders can cut the incidence of run-off-the-road accidents.

How wide is wide enough? Consider paving at least three to four feet to a reasonable high standard with adequate sub-base. The Maryland Department of Transportation, for example, covers their previously-paved shoulders with a slurry seal for smoothness. They find that cyclists appreciate and use the smooth shoulders.

Use caution with rumble strips.
Rumble strips along the edge of rural highways have been shown to reduce the incidence of run-off-the-road crashes among motorists. However, unless carefully designed, they can cause serious problems for bicyclists. A rumble strip that covers the entire paved shoulder gives the bicyclist nowhere to ride except in the travel lane.

A number of states have worked hard to design rumble strips that cause fewer problems for bicyclists. For example, some state policies require the use of a narrow 12” rumble strip next to the shoulder stripe and discourage use on shoulders narrower than 6 feet.

Use traffic calming measures.
While not strictly bicycle improvements, carefully-designed traffic calming techniques can often reduce dangers of riding on local streets. By reducing either traffic speeds or traffic volumes on residential streets, such provisions as mini-traffic circles, chicanes, diverters, and speed humps can help make quiet streets even quieter.

Seattle’s mini-traffic circle program is one example of a program that has been both popular with residents and has reduced the number of crashes in residential street intersections significantly.

**References:**
- Traffic Calming, CART, 1989;
- Traffic Calms in Residential Areas, City of Seattle, 1993;

**Improving Rural Roads**
Rural roads offer miles of quiet and enjoyable cycling. Many bicyclists consider this type of riding to be the very best recreation available. What can be done to improve rural roadways?

**Pave shoulders on busy rural roads.**
Some states, such as Wisconsin, add paved shoulders to rural highways when they reconstruct. They do this to encourage bicycling — they have a very active tourism program — and to improve conditions for motorists as well.

On narrow rural roads without paved shoulders, cars and trucks occasionally drop a wheel off the pavement edge. When the driver corrects, the wheels tend to tear up that edge. This damage can lead to continuing maintenance problems. Paved shoulders can cut down on maintenance costs by giving the motorists more room to correct steering errors. Further, paved shoulders can cut the incidence of run-off-the-road accidents.

How wide is wide enough? Consider paving at least three to four feet to a reasonable high standard with adequate sub-base. The Maryland Department of Transportation, for example, covers their previously-paved shoulders with a slurry seal for smoothness. They find that cyclists appreciate and use the smooth shoulders.

**References:**
- Guidelines for Wide Paved Shoulders on Low-Volume, Two-Lane Rural Highways; Rollins & Crane, TRB, 1989;

**Use caution with rumble strips.**
Rumble strips along the edge of rural highways have been shown to reduce the incidence of run-off-the-road crashes among motorists. However, unless carefully designed, they can cause serious problems for bicyclists. A rumble strip that covers the entire paved shoulder gives the bicyclist nowhere to ride except in the travel lane.

A number of states have worked hard to design rumble strips that cause fewer problems for bicyclists. For example, some state policies require the use of a narrow 12” rumble strip next to the shoulder stripe and discourage use on shoulders narrower than 6 feet.

**References:**
- Rumble Strips & Bicycle Wheels, Bicycle Forum, 1987;
- Survey of State Rumble Strip Policies, Adventure Cycling Assn., 1996

For more information...
Contact the author at Tracy-Williams Consulting, PO Box 8311, Missoula MT 59807 or call (406) 543-8113. email: john@montana.com web: www.bikeplan.com

A free sample copy of the latest Bicycle Forum is available for the asking.