

RURAL ROAD SHOULDERS

Smoothly paved shoulders adjacent to the travel lanes can greatly improve conditions for bicyclists along rural highways.



PROBLEM STATEMENT

While rural roads seldom serve large numbers of bicyclists, they are often the only connections between points A and B. Thus, bicyclists who, for example, live on a farm and want to ride to town will have relatively few options, compared to bicyclists who live in town and want to ride to the store. In addition to having few options, rural bicyclists may have to contend with high speed traffic and, in some key instances, high traffic volumes with significant percentages of truck traffic. To further exacerbate the problem, the roadway itself may be narrow with damaged pavement and debris deposits near the right edge, and drainage ditches or rough gravel verges immediately adjacent to the edge of pavement.

Other bicycle users known to frequent rural roadways include touring bicyclists, racing cyclists on training rides, and those out for a day's recreational ride. In some parts of the country, these users can be quite numerous, particularly on certain routes and during certain times of year.

SOLUTION STATEMENT

Smoothly paved shoulders adjacent to the travel lanes can significantly improve the situation for bicyclists. They can provide a reasonably safe area for bicyclists to ride that is out of the stream of high-speed motor vehicle traffic. Further, shoulders can provide a buffer between bicyclists and the turbulence created by passing trucks. But paved shoulders can help non-bicyclists as well. Studies have shown that they can reduce roadway maintenance costs and run-off-the-road motor vehicle crashes.

The AASHTO has enumerated many benefits of well-designed and properly maintained shoulders on rural highways (A Policy on Geometric Design of Highways and Streets, 1991, AASHTO, p.337). Most of the benefits accrue to motorists. The 14 points are as follows:

- 1 Space is provided for stopping free of the traffic lane because of mechanical difficulty, a flat tire, or other emergency.
- 2 Space is provided for the occasional motorist who desires to stop to consult road maps, to rest, or for other reasons.
- 3 Space is provided to escape potential accidents or reduce their severity.
- 4 The sense of openness created by shoulders of adequate width contributes much to driving ease and freedom from strain.
- 5 Sight distance is improved in cut sections, thereby improving safety.
- 6 Some types of shoulders enhance the aesthetics of the highway.
- 7 Highway capacity is improved; uniform speed is encouraged.
- 8 Space is provided for maintenance operations such as snow removal and storage.
- 9 Lateral clearance is provided for signs and guardrails.
- 10 Storm water can be discharged farther from the pavement and seepage adjacent to the pavement can be minimized. This may directly reduce pavement breakup.
- 11 Structural support is given to the pavement.
- 12 Space is provided for pedestrian and bicycle use.
- 13 Space is provided for bus stops.
- 14 Improved lateral placement of vehicles and space for occasional encroachment of vehicles is provided.

IMPLEMENTATION STRATEGIES

Providing smoothly paved shoulders on rural roads is typically done in one of three ways. First, shoulders are often provided as part of the construction of a new road or a reconstruction project. This is, typically, the least expensive way to provide shoulders; when included as an original part of a larger project, shoulder provisions can benefit from possible savings in right-of-way acquisition, utility relocation, grading, and paving that, in many cases, must be done anyway.

The second alternative is to provide shoulders as an independent project. While this may well prove more expensive than including shoulders when a road is constructed or reconstructed, there are instances where it should be done anyway. For example, consider the case where development overtakes a previously adequate two-lane rural road. A new park may be built near a school and a subdivision may go in just up the road. As a result of these use changes, the road may well start attracting higher levels of bicycle traffic than previously. And, while there may be plans to improve the roadway in the long term, such a project may be 10 or 20 years off.

Third, shoulders may be provided as part of an overlay project.

In addition, rural road design standards could be modified to provide adequate paved shoulders as part of the typical cross section.

OBJECTIVES

To provide adequately paved shoulders on rural roads:

- By including such shoulders wherever possible in new construction, reconstruction, and overlay projects.
- By independently adding paved shoulders to existing roadways where sufficient need has been identified.
- By adopting design standards for rural roads that include reasonably wide and smoothly paved shoulders.
- By restricting the use of rumble strips and other similar devices where bicycle traffic is expected.
- When shoulders cannot be provided immediately, by locating utilities and drainage structures far enough from the roadway to allow for eventual paving.

RESOURCE REQUIREMENTS

Providing smoothly paved shoulders requires no special resources or skills. It is simply a matter of following commonly understood engineering practice and budgeting adequate funding for the extra paving and other needs.

SUBTASKS

1. Review design standards for rural roadways and highways

Identify typical cross sections used by public work agencies in rural road and highway work. Compare the requirements with bicycle-safe approaches described in the Specifications section below. Unsuitable designs should be replaced with better ones.

2. Determine the likely scope of the problem

Determine the approximate mileages of the different categories of rural roads that do not include paved shoulders.

3. Identify high priority locations

While all hazardous locations should eventually be improved, the best place to start is on popular bicycling routes, connections between important destinations (e.g., schools and housing developments), and locations where bicycle safety problems have been previously identified.

4. Include smoothly paved shoulders on new construction and reconstruction projects

When new roads are built or current ones are renovated, specify smoothly paved shoulders as part of the typical cross section.

5. Set up an on-going shoulder program

Identify those problem locations that are not likely candidates for inclusion

in currently planned road construction or reconstruction projects. Prioritize these and budget a set amount for shoulder provision each year.

6. Evaluate results

On at least an annual basis, determine what progress has been made toward the goal of providing adequate shoulders on rural roads. Consider the number of miles of shoulder paved, changes to the current design standards, and the proportion of new construction and reconstruction projects that include adequate shoulders.

SCHEDULE

For the most part, this program requires an on-going commitment to making bicycle-related improvements part of the routine business of road building and renovation.

SPECIFICATIONS

Shoulder width

To accommodate bicyclists, a minimum paved shoulder width of 1.2 m (4 ft) should be provided. However, paved shoulders that are as narrow as 0.9 m (3 ft) can also help improve conditions for bicyclists and are recommended where 1.2-m (4-ft) widths cannot be achieved. Generally, any additional paved shoulder width is better than none at all. The width of a usable paved shoulder should be measured from the edge of a gutter pan. Where guardrails, curbs, or other roadside barriers exist, the minimum recommended width of a paved shoulder is 1.5 m (5 ft). Additional shoulder width over the recommended minimums is always desirable where higher bicycle usage is expected; where motor vehicle speeds exceed 90 km/h (56 mi/h); where there is a high percentage of large vehicles such as trucks, buses and recreational vehicles; or where static obstructions exist at the right side of the roadway.

In general, the recommendations for paved shoulder widths found in AASHTO's A Policy on Geometric Design of Highways and Streets serve bicycles well since wide shoulders are required on heavily traveled, high-speed roads carrying large numbers of trucks.

To be useful for bicyclists, shoulders should be smoothly paved. A policy for paving rural shoulders as developed by the Wisconsin Department of Transportation appears on the next page.

Paved surface

To encourage bicycle use, the surface of the shoulder should be at least as smooth as that of the adjacent travel lanes. Further, in order to ensure long-term utility, the paved section and subgrade should be structurally adequate for at least occasional motor vehicle use and should be adequately supported at the edge of pavement. In addition, seams should be smooth or, preferably, kept away from the shoulder area. And such devices as rumble strips should only be used when there is a documented safety problem and the needs of bicyclists may be served through, for example, provision of adequate extra width that is not rumbled.

Shoulder continuity

Providing short stretches of shoulder connected by roadway sections with no shoulders does little to solve the problem. On the other hand, if including shoulders as incidental features of roadway reconstruction or overlay projects can provide important pieces of the puzzle, such opportunities should not be overlooked. The remaining sections can be connected at a later date to provide continuity at a substantially reduced cost.

Ultimately, shoulders should be provided continuously between logical origins and destinations. This includes providing adequate width on

Wisconsin Department of Transportation's Rural Shoulder Policy:

The policy for paving shoulders on two-lane rural state trunk highways shall be as follows:

- 1.** When constructing new highway surfaces or when resurfacing existing roadways, the shoulder next to designated driving lanes shall be paved on highways functionally classified as arterials, regardless of traffic volume. Shoulders on state trunk highways classified as collectors or locals and having a current ADT in excess of 1250 vehicles shall also be paved. The paved width shall be as shown in Figure 5 of this procedure.
- 2.** Segments of highway having a current ADT in excess of 1,000 vehicles and consistently carrying bicycle traffic of 25 or more per day two ways during the normal bicycling season shall have the shoulders paved. See Procedure 11-45-10 for guidance on shoulder bikeways.
- 3.** Shoulders may also be paved full width along highways in suburban areas where closely spaced driveways and/or frequent turning movements cause unpaved shoulders to require excessive maintenance.
- 4.** Continuity of shoulder paving between logical termini is desirable. Gaps of unpaved shoulders should not be left due to a short segment of highway not meeting the warranting criteria. Similarly, if only a short segment of highway meets the warrants, than paved shoulders may not be appropriate. Also, for purposes of continuity and the closing of short gaps, it may be desirable to pave the shoulders on sections of highway where surfacing of traffic lanes may not be planned for several years, provided the shoulder paving is done in conjunction with surfacing or resurfacing an abutting highway segment.
- 5.** On highways with existing narrow pavements when paving

is warranted, the 3-ft. width shall be in addition to any widening to increase the width of traffic lanes.

6. The thickness of shoulder paving should be based on usual design considerations appropriate for each situation. The above policy on paving shoulders is for rural state trunk highways only. Projects on county trunk highways which fit the above criteria may also have their shoulders paved at the discretion of local officials. If the shoulders of a county trunk highway are to be paved, the paved width shall conform to the dimensions given in Figure 5 of this procedure.

Procedure 11-45-10: Shoulder Bikeways

Table 1 provides shoulder paving requirements to accommodate bicycles on rural two-lane state trunk highways. When shoulder bikeways are provided on four-lane divided expressways the paved shoulder width should be 10 feet.

Where a bike route is planned or located on a CTH [County Trunk Highway] or town road, the paved width, if any, should be determined by the local government.

Table 1: Rural Two-Lane State Trunk Highway Paved Shoulder Width Requirements to Accommodate Bicycles

Motor Vehicle ADT	Bicycle ADT	
	0-24	≥25
Under 1000	0 ¹	0 ¹
1000 - 1250	0 ¹	5ft.
Over 1250	Varies ^{1,2}	5ft. ¹

1 See Figure 5 of Procedure 11-15-1 for other shoulder paving standards not related to bicycles.

2 For Great River Road only, paved shoulders 5ft. wide. See Procedure 11-15-5

bridges and other structures. In addition, the benefits to be gained from the use of shoulders for right-turn-only lanes should be carefully weighed against the consequences for bicyclists.

Debris

Debris on a paved shoulder can render it unusable for bicyclists. Broken glass can easily destroy tires, gravel can cause loss of control, and rocks can wreck a wheel. Careful design can eliminate many of the problems by, for instance, paving 4.5 m to 6.1 m (15 to 20 ft) into intersecting gravel roads,

providing extra width and, perhaps, garbage cans in areas where motorists are likely to pull off, and including barriers to intercept falling rocks. Maintenance can help as well. However, it is often better to design in low-maintenance solutions than to require frequent sweeping or cleaning.

REFERENCES

ABCs of Bikeways, MDDOT, 1977

A Policy on Geometric Design of Highways and Streets, AASHTO, 1998
(pending)

Facilities Development Manual: "Shoulder Bikeways," WISDOT, 1993

Guidelines for Wide Paved Shoulders on Low-Volume, Two-Lane Rural Highways, Woods, Rollins, & Crane, TRB, 1989

"Rumble Strips and Bicycle Wheels," John Williams, *Bicycle Forum*, 1987