Rural Bicycle Safety Practices

Minnesota averages approximately 55 severe bicycle-related crashes per year.

- 20% are along rural county roadways
  - 75% are segment-related (versus intersection)
  - 75% occur under daylight conditions
  - 50% occur along roadways with volumes above 1,000 vehicles per day

What is the Issue?

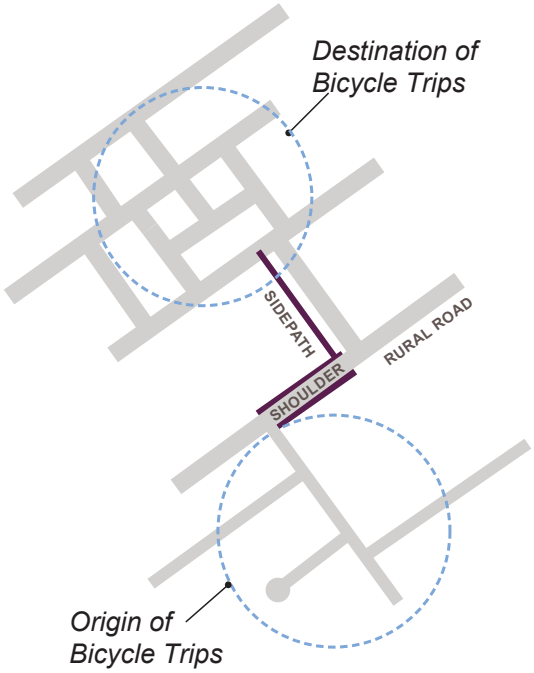
Nationally, approximately 25 percent of bicycle-related crashes that result in serious injuries or fatalities occur on rural roadways.[1] Due to this small proportion of bicycle-related crashes, limited rural-specific research has been conducted, resulting in limited data and existing research.

In contrast to urban areas, rural roadways (defined by the road design and land use) have characteristics that pose an increased risk for bicyclists including higher vehicle speeds (and speed differentials), a high fraction of heavy commercial vehicles, and a general lack of bicycle facilities.

Where to start?

A good first step is understanding the local bicycle network, including existing facilities and identifying potential users and destinations along the rural system of roadways (see figures). This provides the basis to identify a subset of an agency's road system that could provide opportunities for bicyclists to travel between origins and destinations while minimizing exposure to high speed and high volume roadways.

Possible resources to support this effort include existing state, county, or municipal bicycle maps. If such resources are not available, consider mapping alternative routes for connecting destinations along existing roads.

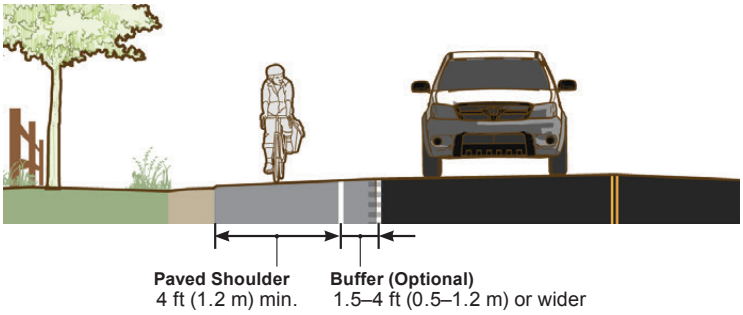


What are potential countermeasures?

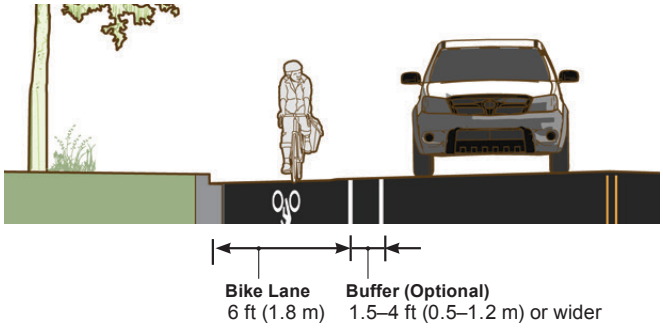
Where rural roadways are the only connections in the local bicycle network, countermeasures to address rural bicycle safety fall into two categories; (1) providing a physical space to accommodate bicyclists, and (2) enhancing crossing locations for bicyclists to cross rural roadways.

Strategies for providing a physical space for bicyclists include on-road facilities such as paved shoulders/designated bicycle lanes.

Strategies for enhancing crossing locations include providing marked crosswalks, refuge islands, (Rectangular Rapid Flashing Beacons (RRFBs), and street lights.



When adequate width is provided, shoulders can serve bicycle trips along roads too busy for comfortable shared roadway travel.



Bike lanes establish an area for exlusive bicycle use outside the path of motor vehicles.

How effective are these countermeasures?

Limited research conducted on rural bicycle safety results in limited information about the safety effectiveness of specific countermeasures in rural applications.

Paved Shoulders as Dedicated Space for Bicyclists would separate motorists' and bicyclists' paths and likely reduce crashes. However, no estimate of crash reduction is yet documented.

Enhanced crossings in rural context have neither been widely deployed nor researched. Specific to urban/suburban applications, simply marking crossings almost always increases the frequency of crashes[3] and should not be used by itself.

- The addition of median refuge islands and street lighting has crash reductions in the range of 35 to 45 percent.
- National research on RRFBs does not yet cite any crash reduction factors but does note that vehicle yielding rates are improved by approximately 80 percent.

What are possible locations for implementation?

Along Roadways: Rural county roadways with volumes greater than 1,000 vehicles per day account for less than 20 percent of the system by mileage, but account for 50 percent of rural bicycle-related severe crashes. The higher volumes equate to increased vehicle and bicycle interaction, and these roads would be better candidates for dedicated bicycle facilities.

Crossings: Candidate locations for an enhanced crossing may include where bicyclists must cross a rural roadway to either access or continue along a bicycle route. Although marking a crosswalk alone is not recommended[3], combining it with a refuge island, street lights, or a flashing beacon would likely result in better safety outcomes.[4]

What are the additional considerations?

The research[1] identifies a number of roadway design features that have created challenges for bicycle safety, including: drainage grates, longitudinal joints, bridge expansion joints, clear zones, and sight distance. No research raises concerns about bicycles encountering rumble strips when employing the design that includes 12 foot gaps every 48 feet.

The installation of "Share the Road" warning signs and reducing speed limits along rural roadways are frequently requested by bicycle advocates. Not enough research has been conducted to conclude an effectiveness of either of these strategies specific to bicyclist safety. However, studies on the general topics of warning signs and regulatory sign-based speed reductions have concluded that neither strategies are successful at either improving safety or achieving a speed reduction.

Comprehensive approaches to addressing safety likely yield the best results. In addition to considering infrastructure improvements, other topics should address the **rider** (wearing helmets and reflective clothing; adhering to traffic laws), the **bicycle** (reflective tape and lights), and **driver behavior** (distraction, speeding, or passing too close). END

References

1 Carter, D. and F. Council. 2006. *Factors Contributing to Pedestrian and Bicycle Crashes on Rural Highways.* FHWA HRT-06/06-10(1M)E.

2 Nabors, D., E. Goughnour, L. Thomas, W. DeSantis, and M.Sawyer. 2012. *Bicycle Road Safety Audit Guidelines and Prompt Lists.* Report FHWA-SA-12-018. https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa12018/. Accessed June 2017.

3 Zegeer, C. 2005. *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations.* Report FHWA HRT-04-100. https://www.fhwa.dot.gov/publications/research/safety/04100/04100.pdf. Accessed June 2017.

4 Preston, H., Nikki Farrington, and Charles Zegeer. 2013. *Minnesota's Best Practices for Pedestrian/Bicycle Safety.* MnDOT Report 2013-22. http://www.dot.state.mn.us/research/TS/2013/201322.pdf. Accessed June 2017.

5 Federal Highway Administration (FHWA). 2016. *Small Town and Rural Multimodal Networks*. FHWA HEP-17-024. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/fhwahep17024_lg.pdf. Accessed June 2017.