

Notes on AASHTO Bike Guide content on Advisory Bike Lanes & Advisory Shoulders

The 2024 AASHTO Bike Guide includes content on the advisory bike lane and advisory shoulder treatments (referred to as “edge lane roads” or “ELRs” here). Few American practitioners have knowledge of ELR research findings and the experience gained over the last 13 years and close to 90 installations in the U.S. These comments supplement and critique the guide’s contents on this treatment.

General Comments

It’s a Shared Street, not a Bike Lane or Shoulder

A car-centric perspective drives the definition of ELRs as a bike lane that motorists can enter. The road is demarcated with broken lines; this means VRUs can move into the center just as drivers can move into the edge lanes. ELRs are a shared street, not a type of bike lane that allows cars to infringe. Classifying ELRs as a bike lane is problematic because states have laws prohibiting driving in a bike lane and ELR use would require changes to those laws. For more info, https://www.edgelaneroads.com/uploads/1/0/5/7/105743465/why_edge_lane_road_is_a_better_name.pdf.

ELRs have a favorable Crash Modification Factor in the CMF Clearinghouse

CMF 10976 cites improved safety (CMF value .56) when two-lane roads are converted to ELRs.

Are we allowed to use them?

The guide recommends that an agency ask for FHWA’s permission to use an ELR. But it does not address the FHWA’s late 2021 announcement that they are no longer granting approvals to experiment.

Failure to address ELR variants

The guide omits design variants that are successfully used in the U.S. and other countries, e.g.



Definitions

The guide provides definitions for the treatments:

"advisory bicycle lanes - continuously dashed bicycle lanes on narrow, low-volume streets without center lines, which allow motorists to temporarily enter the bicycle lane to provide oncoming traffic sufficient space to pass."

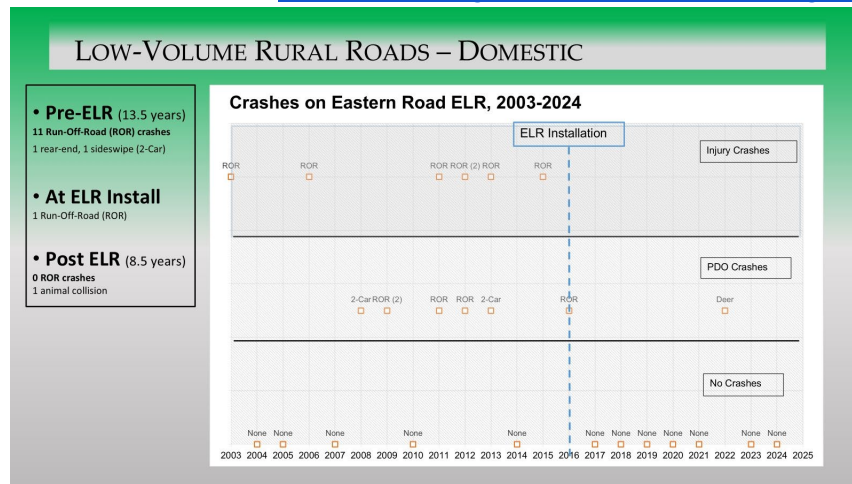
"advisory shoulder - continuously dashed shoulders on narrow, low-volume roadways without center lines, which allow motorists to temporarily enter the shoulder to provide oncoming traffic sufficient space to pass."

These definitions raise the following problems:

- The term "narrow" is undefined and ignores successful use of ELRs on "non-narrow" streets
- The term "low-volume" is undefined and ignores successful use of ELRs on streets with volumes near and greater than 6,000 ADT
- The treatments are defined in terms of drivers being allowed to enter the edge lanes rather than as a shared street
- The near-identical definitions prompt one to ask why two names are used for the same treatment
- The definitions fail to capture the intended distinction between advisory shoulders and advisory bike lanes, i.e. the former supports pedestrians in the edge lanes.

ELRs are not just for VRUs

Capturing the non-VRU benefits of ELRs is not the guide's purpose but this is an important aspect of the treatment. German guidance has recognized this safety benefit and domestic data supports further investigation into the use of ELRs to address the single vehicle, roadway departure crash type that dominates low volume rural roads. The graph below shows the safety improvement on a Maine road following conversion to an ELR. More information is available at <https://www.edgelaneroads.com/rural-edge-lane-roads.html>.



Siting Criteria

Sight Distance

The guide recommends passing sight distance (PSD) as a siting criterion. PSD uses assumptions that are inappropriate for ELRs. A more appropriate sight distance for two-way, one-lane roads already exists in the 2001 and 2019 AASHTO Low-Volume Road guides but was not used. Those guides recommend twice the stopping sight distance, a value used in other countries for ELRs. These issues and an ELR-specific sight distance model are more completely addressed in https://www.edgelaneroads.com/uploads/1/0/5/7/105743465/sight_distance_for_edge_lane_roads_august_2021_michael_williams.pdf.

Regular Bicycle Traffic

The guide recommends "regular bicycle traffic" as a siting criterion for both treatments without defining a threshold. There appears to be no data supporting this recommendation and it contradicts years-long, successful use. A large proportion of the ELRs in the U.S. have low levels of bicycle traffic and are demonstrably safe. The lack of a specific threshold, the lack of supporting data, the documented safety improvements for drivers, and the many successful ELRs with low bicycle use make this criterion questionable.

Motor Vehicle Volumes

The guide cites a preferred limit of 3,000 ADT and a maximum limit of 6,000 ADT but provides little information on the import of the two different thresholds. Restricting shared street use to low vehicular volumes is a traditional approach to achieving desired safety and comfort levels for VRUs. But vehicular volume, on its own, fails to do that.

1. The interplay of volume and speed is more important for a shared street than for exclusive facilities. We have American ELRs that have been operating successfully for years near and above 6,000 ADT. Experience with these higher volume ELRs suggests that success comes with low speeds and certain design features.
2. A shared street with 3,000 ADT and high VRU volumes will generate many more MV-VRU interactions, lower safety, and lower comfort than one with few VRUs. The facility with high VRU volumes will be less safe and will be less comfortable. The rate of MV-VRU interactions is not linear and increases faster than MV volume suggests and calls into question these magic volume numbers.
3. I am unaware of any data supporting the guide's assertion "Bicyclists who fit the "interested but concerned" profile will prefer not to operate in shared lanes unless traffic volumes are below 3,000 vehicles per day and operating speeds are at or below 25 mph." to shared streets in general and ELRs specifically. The magic 3,000 threshold has been copied from guidance to guidance for many years but the reality is more nuanced. This topic needs more research; a start on that research is found in the simulations performed in <https://transweb.sjsu.edu/research/1925-Safety-Edge-Lane-Roads>.

Motor Vehicle Speeds

The guide recommends the treatment only be used "< 35 MPH maximum". I assume this is an editing mistake since it sets a maximum speed of 30 MPH which is less than the FHWA Small Town guide recommendation. As with the Small Town guide, there appears to be no data supporting this recommendation and precludes use on roads which may benefit.

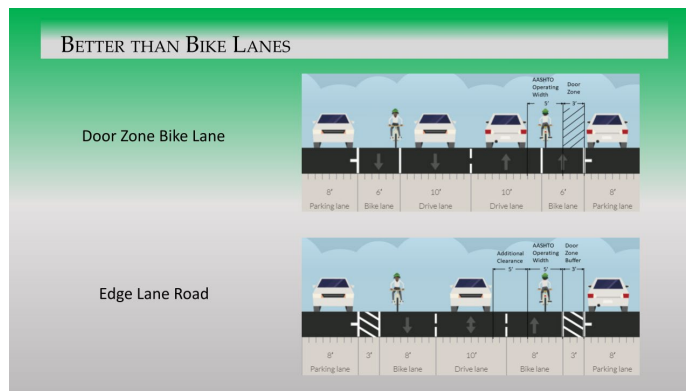
The guide recommends use of traffic calming if speeds are more than 35 MPH. The intent is to avoid MV-VRU collisions which have a high probability of injury or fatality but it precludes use on roads where VRUs are least safe. The U.S. road inventory is dominated by millions of miles of rural roads which are often low-volume, narrow two-lane roads with speeds above 35 MPH. Funding and political will is rare for traffic calming on these roads. Ask yourself which is safer - keeping VRUs in the traffic lane at the mercy of imperfect drivers or establishing a default separation where MVs and VRUs are allocated to normally-exclusive zones?

ELRs don't always Calm Traffic

The guide describes ELRs as providing a traffic calming effect. This is not accurate according to both domestic and international research. According to speed data from U.S. facilities, most ELRs see either no change or only a small reduction in vehicular speeds (less than 1-2 MPH). Some ELRs have seen an increase in speeds. The impact of ELRs is setting-dependent and reductions are usually minimal. This parallels international research findings.

ELRs may be better than Standard Bike Lanes on some Streets

The guide defines ELRs as being for use on narrow streets. This is not accurate. ELRs are successfully used on wider streets and can provide greater clearance than standard bike lanes on streets with sufficient width for both treatments.



Even the Dutch have replaced standard bike lanes with an ELR treatment. The city of Utrecht converted a two-lane street with bike lanes to an ELR in 2016 with good success.

The case study is titled "BETTER THAN BIKE LANES" and "Case Study: Maliesingel, Utrecht, 2016". It shows a "BEFORE" image of a "50 kph road with standard bike lanes" and an "AFTER" image of a "30 kph edge lane road". A table summarizes the changes:

	BEFORE	AFTER	
BIKES	5066	6432	↑
CARS	5998	4135	↓
SPEED	26.4 MPH	18.3 MPH	↓

Courtesy: Bicycle Dutch, December 4, 2018 Blog Entry

Design Guidance

ADA Guidance for Advisory Shoulders

The guide mentions the need for ADA compliance for ELRs that support pedestrians. The text refers to other sources and implies this issue is addressed. But there is no explicit ADA design guidance for shared streets where pedestrians and drivers truly share the street. This is an area needing more work.

Center Lane Width

The guide appears to copy Dutch guidance which recommends the use of either a narrow center lane or a wide center lane but not an intermediate center lane width. Dutch guidance allows use of wide center lanes only in urban areas where a higher vehicle capacity is desired.

Copying Dutch guidance into the American setting poses problems which are not addressed:

1. Traffic Calming

Unlike the U.S., the Dutch quickly respond with traffic calming on streets where speeds are too high. Use of wide center lanes, especially on streets with little visual friction, can raise MV speeds. Use of wide center lanes in locations where interventions are unlikely can reduce safety. If safer facilities are desired, wide center lanes should either be avoided or only used in conjunction with monitoring and traffic calming.

2. Wide Edge Lanes

The Dutch normally use wider edge lanes than the 5 feet normally used in the U.S. Wide center lanes

are designed to allow passenger vehicles to pass each other with little or no use of the edge lanes. Designs with 5' edge lanes and wide center lanes create situations where drivers must get close to VRUs in the edge lanes while they are passing an oncoming driver, especially if VRUs are rolling or walking side-by-side. Wide center lanes should be paired with wider edge lanes.

3. MV Volumes

A wider center lane is recommended in Dutch and German guidance to support higher volumes of MV traffic. If we are copying this guidance, we should also specify the increased MV traffic volumes that are allowed with a wide center lane but nothing is mentioned. Guidance should not recommend a speed-inducing feature if there is no benefit.

Edge Lane Width

The guide repeats the mistake I've seen many practitioners make. Edge lane widths should be wider than standard bike lanes, especially if pedestrians are supported. Since the entire street is open to motorist use, the edge lanes should be wide enough for side-by-side riding and VRU-VRU passing.

Parking Lane Buffers

The guide fails to recommend or even mention the use of buffers between parking lanes and edge lanes. German research found this lack to reduce safety and they now recommend it in their design guidance. We should not be duplicating the mistakes of standard bike lanes with this treatment.

Signage and Pavement Markings

The guide's recommendations on signs and pavement markings are copied from early FHWA guidance which has no supporting data.

One of the troubling recommendations is that no edge lane symbols should be used when pedestrians are supported. Absence of edge lane markings has led to road user confusion in the past and omitting them may repeat that, especially with wide edge lanes or unused parking lanes. Bike and pedestrian symbols communicate the intended use clearly and explicitly.

The only significant data available on signs and markings is a nationwide survey of 50 facilities found at https://www.edgelaneroads.com/uploads/1/0/5/7/105743465/2023_elr_survey_with_comments_addressed_1.docx.

Transitions to Full-Width Travel Lanes:

The guide recommends termination of the ELR at a number of conditions without supporting data and in contrast to successful U.S. and Dutch designs. The most common of these conditions is an intersection. The guide recommends use of a short length of center line at intersections. A center line is used here for two reasons:

1. To move drivers to the right to create room for opposite-direction drivers entering the facility and
2. To communicate the two-way nature of the roadway.

But a center line is often used with sharrows at these locations to force MVs and VRUs back into one traffic lane just as driver cognitive workload increases. This design increases the LTS (level of traffic stress) rating. As a result, this strategy reduces VRU safety and comfort. And it is unnecessary. Minneapolis has 7 ELRs and has used the treatment since 2011. Some of their ELRs cross signalized intersections. Their practice is to bring the ELR markings right up to the crosswalk without a center line, even at these signalized intersections. This works because they use a wide center lane which provides room for entering MVs even if a driver stops near the center. If a design provides sufficient room for an MV to enter with another MV near the middle of the center lane, a centerline is unnecessary.

There are a number of alternatives to communicate the two-way nature of a street including a STOP line/text, a W6-3 sign, or a pavement marking showing two-way vehicular traffic. Not knowing whether an ELR is one-way or two-way street is one of the most common complaints jurisdictions hear from unfamiliar drivers so these clues can be important.

Broken Lines versus Dotted Lines versus Dashed Lines

The Guide refers variously to dashed, dotted, and broken lines in the text describing the treatment.

Per the 2023 MUTCD's definition of line types on page 538,

“C. A broken line indicates a permissive condition.

D. A dotted lane line provides warning of a downstream change in lane function.

E. A dotted line used as a lane line or edge line extension guides vehicles through an intersection, a taper area, or an interchange ramp area.”

The permissive condition communicated by a broken line is appropriate for the ELR treatment as it permits road users to move across it. A dotted line is not applicable to ELRs. Dashed lines are not defined in the MUTCD. Because the guide refers to a broken line in the most detail (page 9-28), it appears editorial mistakes were made and that broken lines are what was intended.

Other

Experiments?

The guide describes the advisory shoulder as an experimental treatment but the FHWA only has an ongoing experiment with dashed bicycle lanes and their webpage makes no mention of pedestrian use. Do we need another experiment for advisory shoulders? Are dashed bike lanes equivalent to facilities that also support pedestrians? Inquiring minds want to know...

Also noteworthy is the fact that the Hanover facility shown as an example of an advisory shoulder in the guide was installed without using the FHWA request-to-experiment process. Over 2/3 of the ELR facilities in the U.S. have been installed without FHWA approval. The experimentation process is not working for this treatment because so many jurisdictions recognize its utility and non-experimental nature.