

An Introduction to Edge Lane Road Striping

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2023 Spring Conference

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City of  Port Townsend

Edge Lane Roads Introductions

Laura Parsons, P.E.: Civil Engineer III, City of Port Townsend: Licensed engineer for twenty years, California and Washington. Primarily do project management of Port Townsend's larger capital improvement projects (design through construction). This is the work I was doing when introduced to Edge Lane Roads (ELRs).

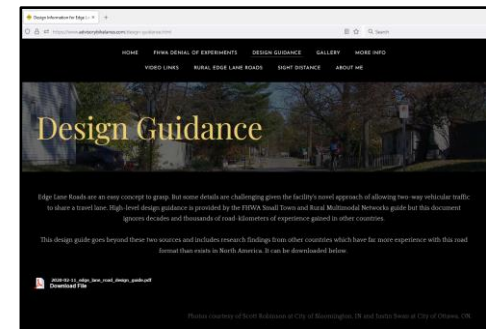
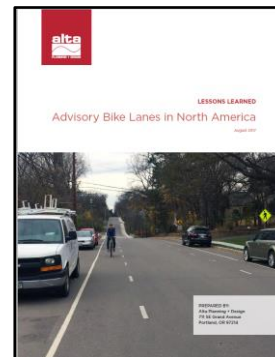
Water Street Enhancement Project: City wanted to accommodate all modes of transportation in a cross section where it didn't all fit. ELRs provided the solution Port Townsend was looking for.

ELR Success: Michael Williams, national ELR expert, contacted City to learn about Water Street ELR. Port Townsend staff invited by Michael to present at several national conferences about Water Street ELR. Became interested in benefits of ELRs through these experiences and now want to share what City of Port Townsend staff has learned with as many as possible.

Edge Lane Roads Introductions

Thank you to Michael Williams: National expert and advocate for ELRs. It is thanks to the ELR white paper he authored (through Alta and with others) that Port Townsend felt confident to try an ELR, even though they were a new idea for our community. He maintains a website about all things ELR. Many of the visuals you will see in this presentation are from his webpage and presentations. They are used with his permission.

<https://www.advisorybikelanes.com/>



Edge Lane Roads

This presentation provides an introduction to Edge Lane Roads (ELRs):



- **ELRs - What they are**
- **Port Townsend ELR experience**
- **Review of Port Townsend's ELR data**
- **Frequently Asked Questions**
- **Group Discussion**

Edge Lane Roads

Other Names



ELR on Blaine Street, Port Townsend

ELRs are also sometimes referred to as “Advisory Bike Lanes” or “Advisory Shoulders”. “ELRs” is the preferred term.

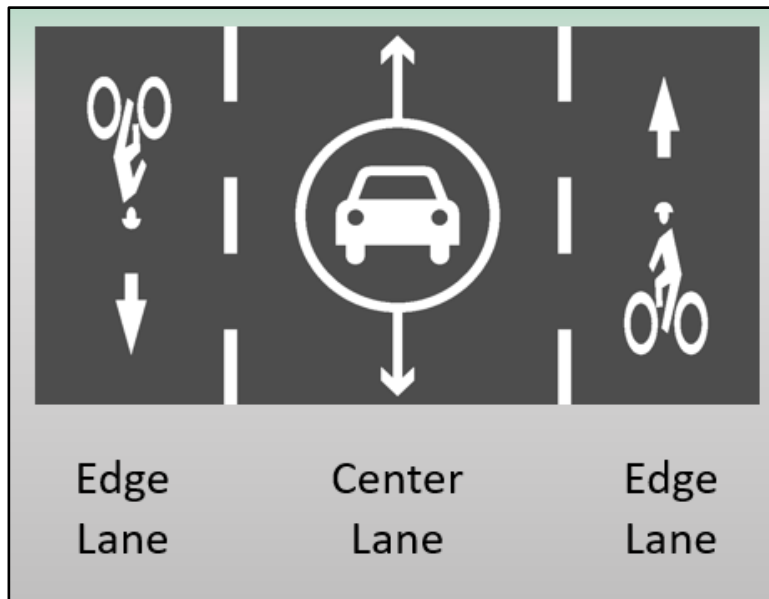
Reasons why:

- The term “Edge Lane Road” is mode neutral.
- The edge lanes are neither bike lanes nor shoulders.
- The name, ELR, suggests their role beyond vulnerable road user safety, such as reducing risk for roadway-departure crashes.
- The name is used in other countries.

Edge Lane Roads

What They Are - Description

With two dashed edge lines, ELRs provide two-way motor vehicle traffic in a single center lane. There is no centerline. Bicyclists and pedestrians use the edge lanes on either side of the street.



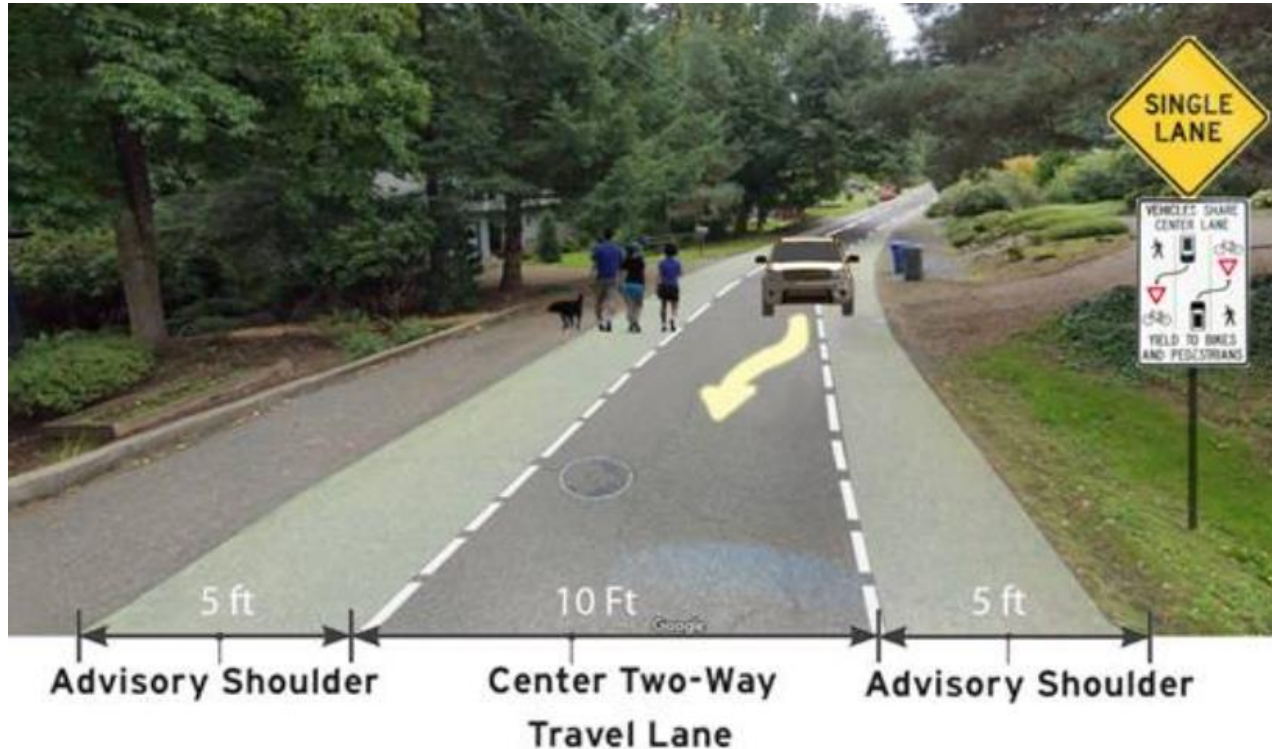
Graphics from ELR Design Guide, on www.advisorybikelanes.com.

Edge Lane Roads What They Are - Video

<https://youtu.be/4smg1uDY-OQ>

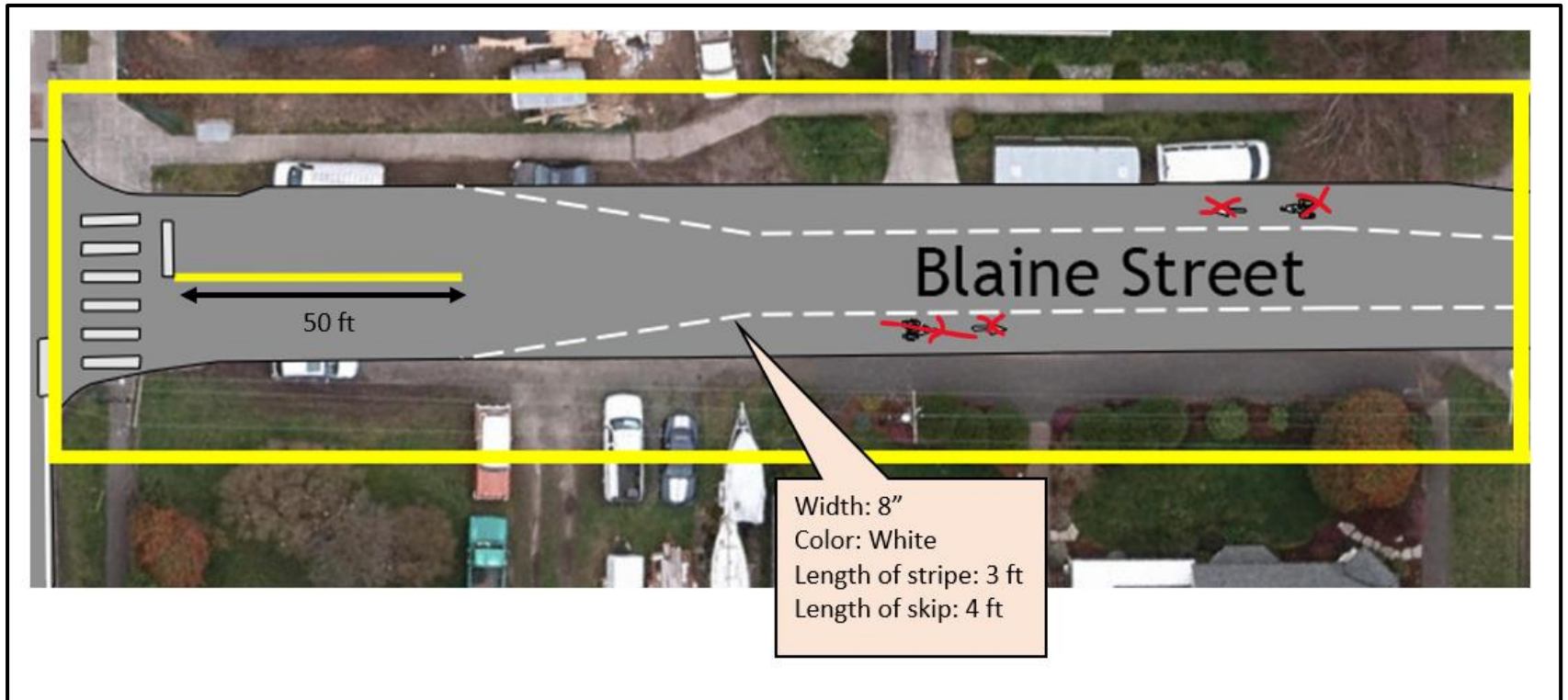
<https://www.youtube.com/watch?v=MzFPI94pXy0>

Edge Lane Roads Typical Dimensions



Center lane width: 7.2 – 12.5 ft; Edge lane width: 5.0 – 8.0 ft
Speed limit: 20 mph – 35 mph

Edge Lane Roads Typical Dimensions



“Edge Lane Road Design Guide” by Michael Williams, Pages 29 - 30

https://www.advisorybikelanes.com/uploads/1/0/5/7/105743465/2020-02-11_edge_lane_road_design_guide.pdf

Edge Lane Roads In the USA

ELRs are growing in popularity in the United States. Some are intended for use by both bicycles and pedestrians, others are only for bicycles.



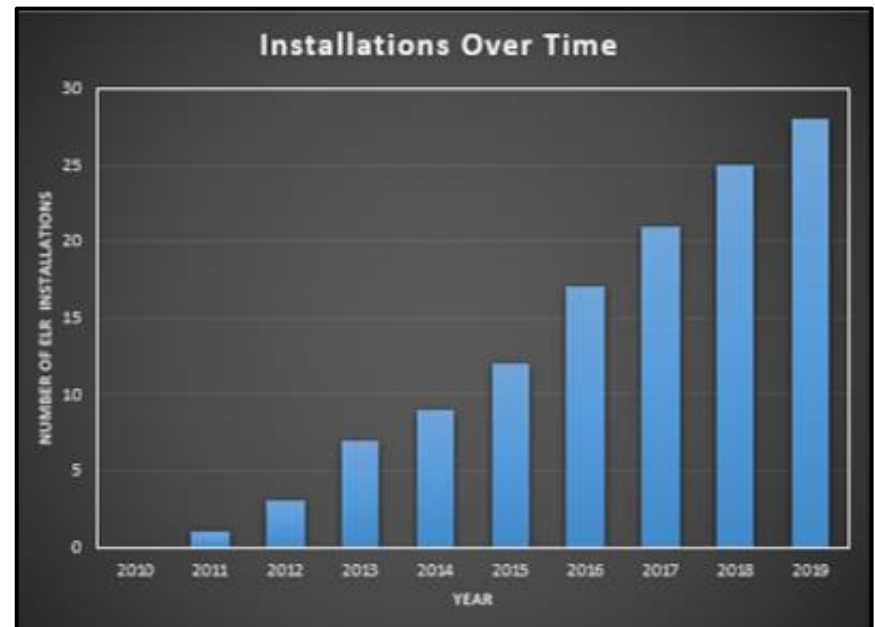
Yarmouth, Maine



Vail, Colorado

Edge Lane Roads In the USA

- First USA ELR in 2011
- As of June 2022, > 70 ELRs
- 6 City studies found their ELR facilities safe and effective.
- 11 ELRs, studied over 8 years and approximately 60 million vehicle trips, found a 44% decrease in crashes from the previously existing 2-lane configurations. (*Mineta Transportation Institute Report No. 20-55, March 2021*)



ITE Journal, December 2019, "Advisory Bike Lanes & Shoulders"

Edge Lane Roads Benefits

Reduces Speeds: Visually narrows the street.

Safer Passing: Motor vehicles leave more space between themselves and the bikes/peds they pass, since no centerline. Also, dooring zone can be provided if there is on street parking, with additional space.

Organizes modes: Clear indication where bikes and peds should be in relation to both parked and moving motor vehicles.

Installation costs less: Provides bike and ped facilities without adding shoulder or concrete sidewalks.

Minimizes environmental impacts: No facilities constructed which could encroach on an adjacent natural feature (like wetlands).

Extends pavement life: Motor vehicles do not drive on the edge of the street, which helps preserve pavement.

Edge Lane Roads Considerations

New to most USA communities: Lead up to installation must include thorough public outreach and education work from agency staff.

Design: Effort for design can be more complex than initial estimates. ELRs appear simple, but there is much to consider in a design.

Standards: The Manual on Uniform Traffic Control Devices (MUTCD) does not currently provide direct guidance for ELRs designs.

FHWA position: Federal Highway Administration (FHWA) is not currently accepting applications for experimentation with ELRs because they have said they have a sufficient number to review.

Limited number in the USA: Data on ELRs in USA context is limited, and thus may cause some designers to hesitate using them.

Edge Lane Roads Port Townsend - Water Street



Photo by Samantha Lorenz (Thomas) of Terra Soma, LLC

Edge Lane Roads Port Townsend - Water Street



Edge Lane Roads Port Townsend - Water Street



Edge Lane Roads Port Townsend - Water Street



ROW: 73'

Parking Lane: 7'

Buffer: 2.5'

Bike Lane: 4.75'

Travel Lane: 9.75'

Sidewalk/Curb: 12.5'

Edge Lane Roads Port Townsend - Water Street

Results of Installing ELRs:

- Delivery trucks can continue to safely park and at the same time provide traffic calming.
- Room for wide sidewalks and parallel parking on both sides of the street, truck parking, bicycle facilities, plus a dooring zone.
- Bike facility provided and cars can legally enter bike facility while going around parked trucks.
- Dooring zones provide for increased bike safety and safety of drivers getting out of their parked cars.

Edge Lane Roads Port Townsend - Water Street



Edge Lane Roads

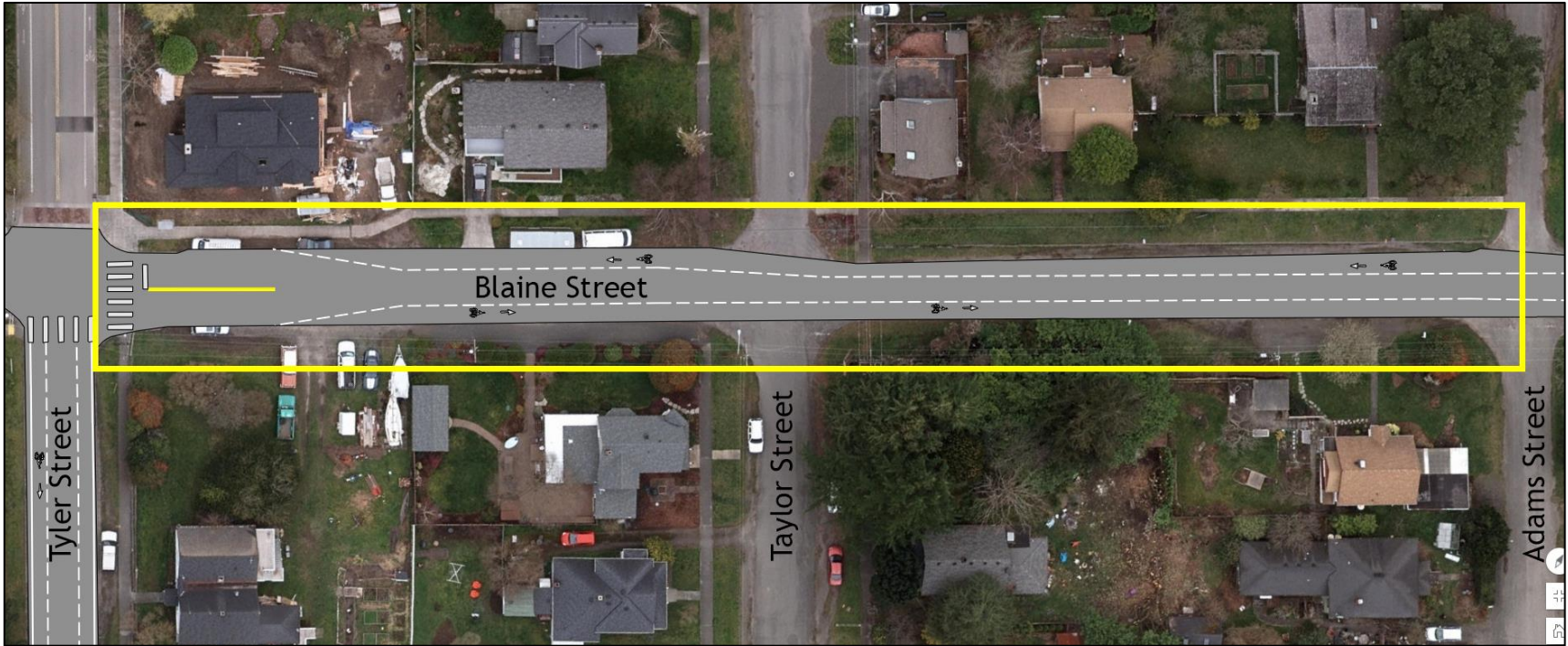
Blaine Street - Temporary Installation

Blaine Street before installation:



Edge Lane Roads

Blaine Street - Temporary Installation



Edge Lane Roads

Blaine Street - Temporary Installation

Why this location:

- Part of proposed location for a permanent ELR.
- Road surface in good shape for adhering tape.
- Easy access for wider community to try out.

Signs:

How to use ELR, background information.

Duration:

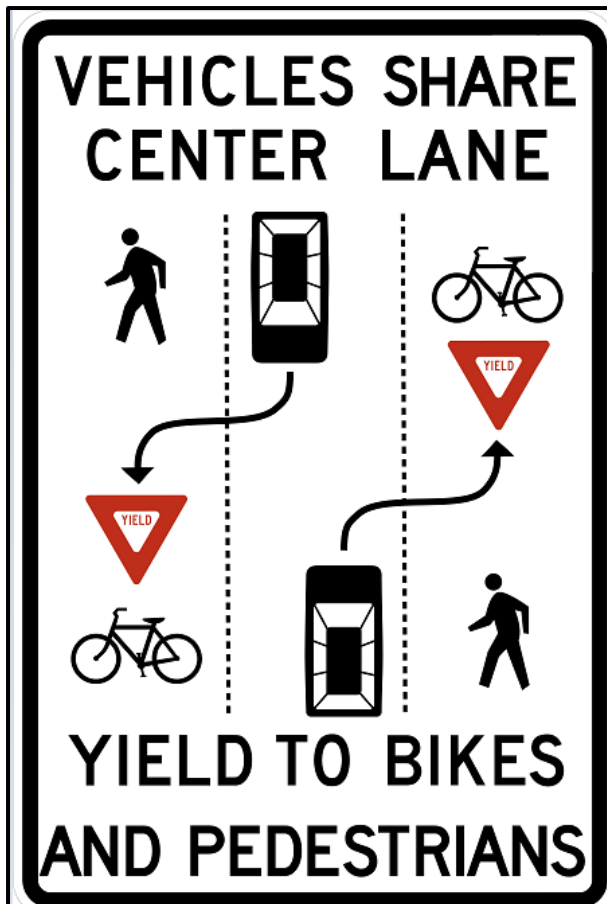
June 1 – June 24, 2022.



Blaine Street after temporary installation



Edge Lane Roads Temporary Signs

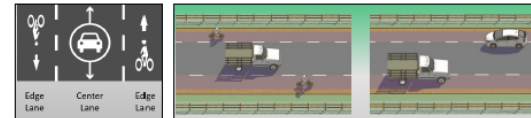


EDGE LANE ROADS

What are Edge Lane Roads (ELRs)?

The dashed white lines on Blaine Street (between Tyler Street and Monroe Street) are a new type of striping pattern called "edge lane roads". ELRs can be used by both bicyclists and pedestrians.

How do ELRs work?



ELR Design Guide, courtesy of www.edmontonbikelanes.com and Courtesy of the 2016 FHWA Small Town & Rural Multimodal Networks Guide.

Motorists use the center lane, and when passing an oncoming vehicle, they move temporarily into the edge lanes. This is done while yielding to bikes and pedestrians that may be in the edge lane. Once the motorized vehicles have gone around each other, they proceed by moving back into the center lane.

Why is the City installing three ELRs in Port Townsend this summer?

The primary intent of installing ELRs is to increase safety for all street users. Motorists tend to drive more slowly in ELRs which in turn increases safety for all. Studies from 11 US cities over 8 years and 60 million vehicle trips showed a 44% overall reduction in crashes compared to previously existing 2-lane configurations. (Mineta Institute. Safety Considerations for All Road Users on Edge Lane Roads. 2022)

What are the benefits of installing ELRs?

- **Reduces Speeds:** Visually narrows the street.
- **Safer Passing:** Motor vehicles leave more space between themselves and the bicyclists/pedestrians they pass, since there is no centerline.
- **Organizes modes:** ELRs clearly indicate where bikes and pedestrians should be in relation to both parked and moving motor vehicles.
- **Installation costs less:** ELRs provide bike and pedestrian facilities without adding shoulders or concrete sidewalks.
- **Increases pavement life:** Motor vehicles do not drive on the edge of the pavement, which helps the street surface last longer.

For questions, please contact:

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Edge Lane Roads Port Townsend - Permanent Signs



R2-1 Speed Limit (20 mph)



W6-3 Two-Way Traffic

Edge Lane Roads

Blaine Street – Lessons Learned

Locations: Initially only install on streets with a volume lower than 2,000 Average Daily Trips (ADT). No centerline required up to 6,000 ADT (MUTCD, Section 3B.01.09). Focus on streets with high bike/ped use and that need shoulder preservation.

Speed Limit: Lower the speed limit to 20 mph on local access streets with the installation of an ELR. (RCW 46.61.415). Requires Ordinance.

Public Outreach: The more, the better. Important to notify adjacent neighbors with door hangers. Neighborhood meetings. Receive and respond to public comment. City Council education and support. Educational materials available to the broader community.

Edge Lane Roads Blaine Street – Public Outreach

Results of public outreach:

June 3, 2022 - Reaction to just-installed temporary ELR on Blaine Street:

“You've got to be kidding! It seems unnecessary and likely to cause confusion and accidents (if drivers even bother to comply with the one-way single lane). Deciding whether an oncoming car was there first will be problematic...”

July 8, 2022 – Comments by same person after learning more about ELRs:

“...having heard the presentation, if ELRs indeed do save on overall road maintenance costs and do make roads without sidewalks feel safer for pedestrians and bicyclists, and do calm the speediest drivers, then I would change my mind (especially because cost savings plus these other benefits is a win/win solution)...”

Edge Lane Roads 2022 Permanent PT Installations



KUHN STREET



HANCOCK STREET



BLAINE STREET

Edge Lane Roads Blaine Street – Example Costs

Engineering/public education:

Engineering/public ed. per location (staff time and temporary signs and door hangers): approximately \$2,500.

Temporary installation by City's crew:

Material installation on Blaine Street by City crew \$1,023.

Permanent installation – 5 blocks:

- Contract unit price \$0.198/LF for a double shot of dashed white paint.
- Two sides of street for length of 1,392 LF (approx. 275 LF/block).
- Cost: $(2)(1,392 \text{ LF})(\$0.198/\text{LF}) = \551.23 .

Total cost per LF of road:

$\$2,500 + \$1,023 + \$551 = \$4,074/1392 \text{ LF} = \mathbf{\$2.93/LF}$.

Comparison:

Cost in PT for sidewalk is \$115/LF (one side of street)
\$230/LF for both sides of road.

Edge Lane Roads PT Installations – Data Review

Traffic Counters: Put out tubes shortly before and after ELR installation. Will put out tubes at the same locations one year later. Collects ADT and speeds, which can be sorted in different ways. Looking at vehicle speeds in groupings (speed bins) seems to tell us the most complete story. Quantitative results.

Limitations of Traffic Counters: Counters cannot describe how drivers behave differently when bikes or pedestrians are present. This would have to be done by observation or cameras. Presence as an observer may affect driver behavior as well.

User feedback: Qualitative. “The cars are too close.” “It feels safer.”

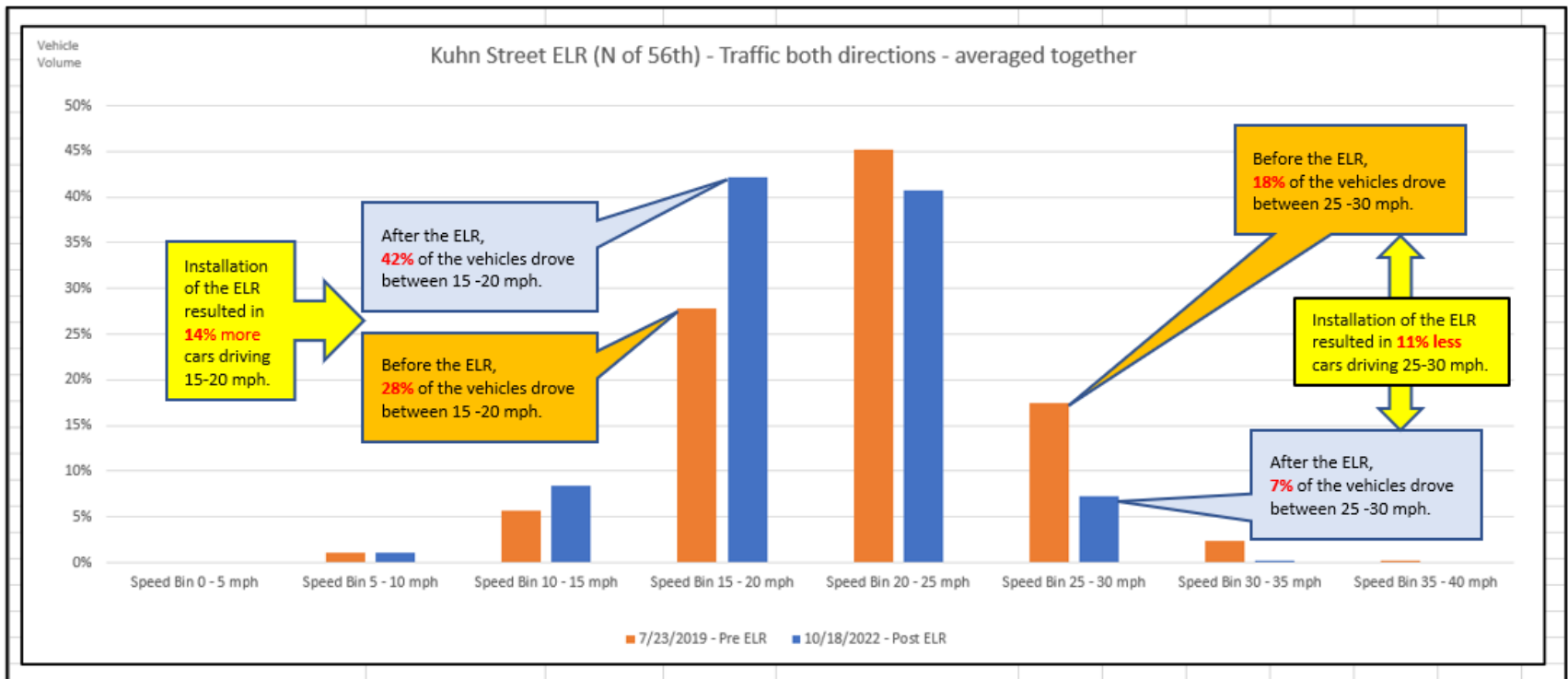
Edge Lane Roads PT Installations – Data Review



Kuhn Street
North of 56th
Looking North

Surrounding environment: Lots of trees, a small crest in the road, houses close to the street. These elements may compliment the traffic calming influence of the ELR.

Edge Lane Roads PT Installations – Data Review



Increased % of drivers in 15-20 mph bin: Pattern replicated at multiple locations.

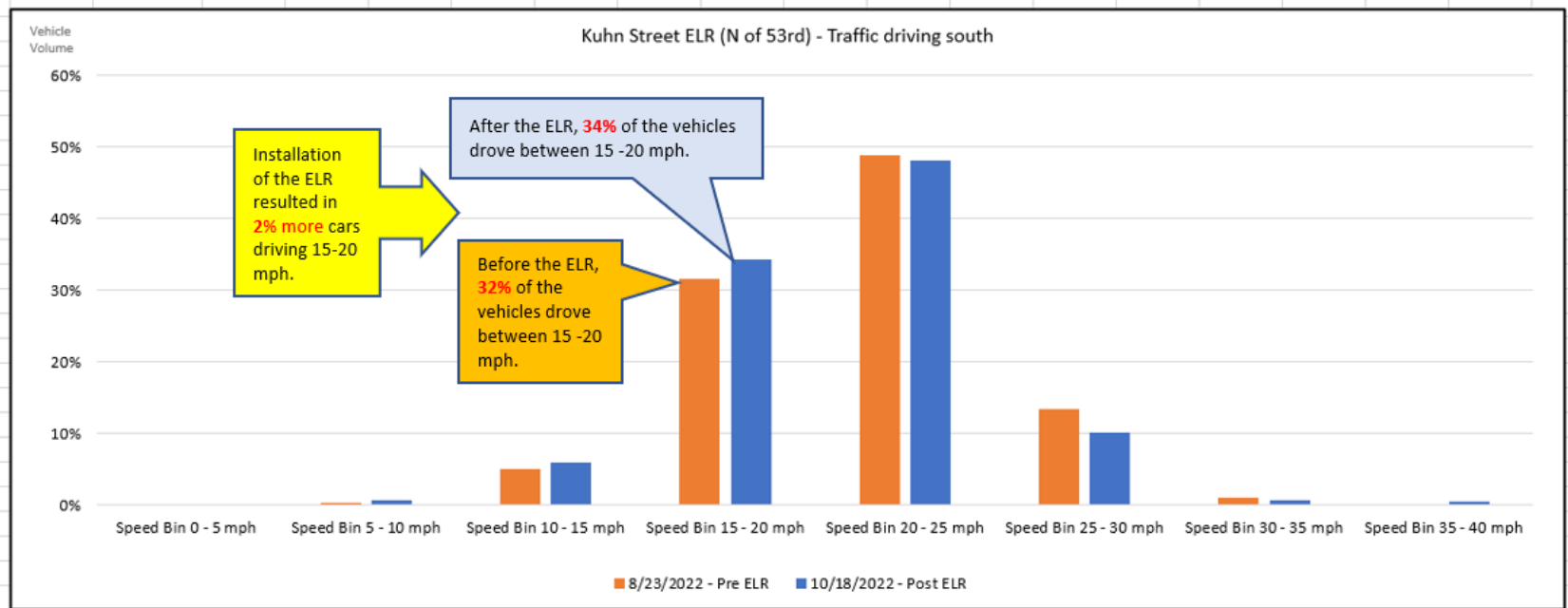
Edge Lane Roads PT Installations – Data Review



Kuhn Street
North of 53rd
Looking South

Surrounding environment: Road section wide open, drivers away from road edge, can be sure no other drivers coming for quite a distance.

Edge Lane Roads PT Installations – Data Review



Minimal increased % of drivers in 15-20 mph bin: This may indicate there is a need to augment this section of the corridor with additional traffic calming.

Edge Lane Roads Frequently Asked Questions

**How is sight distance
considered in designing ELRs?**

Edge Lane Roads Sight Distance

Sight Distance: Sufficient sight distance must be available for drivers to be able to respond to approaching vehicles and either come to a full stop or maneuver into the edge lanes to pass around each other.

Types of sight distance applicable to ELRs:

- American guidance indicates Passing Sight Distance (PSD), but there are other more appropriate types of sight distance for ELRs.
- Avoidance Sight Distance (ASD) with/without ELR scan.
- Head-On Sight Distance (HOSD) is most conservative.

ITE Journal Article about Sight Distance for ELRs:

https://www.advisorybikelanes.com/uploads/1/0/5/7/105743465/sight_distance_for_edge_lane_roads_august_2021_michael_williams_4_.pdf

Edge Lane Roads Sight Distance

Types of Sight Distance:

- Avoidance Sight Distance (ASD) with/without ELR scan. For two approaching vehicles to have time to move into ELR, without stopping and maneuver by each other.
- Head-On Sight Distance (HOSD). For two approaching vehicles to have time to come to a complete stop when they are not be able to move into the ELR.

Speed	HOSD (ft)	ASD w/ scan (ft)	PSD (ft)
20 mph	165	170	400
25 mph	230	225	450
30 mph	305	280	500

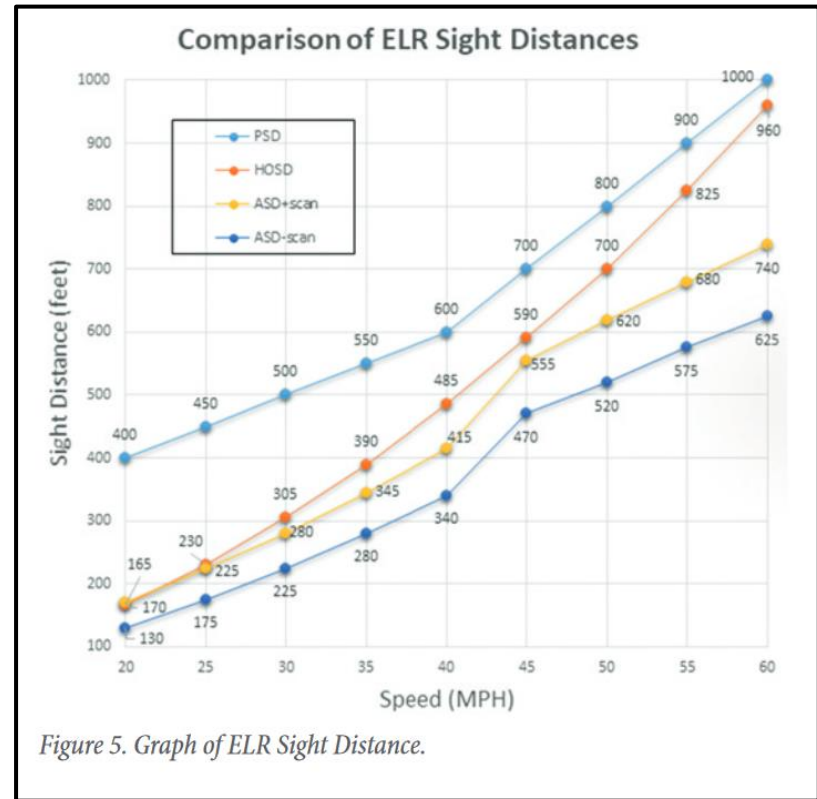
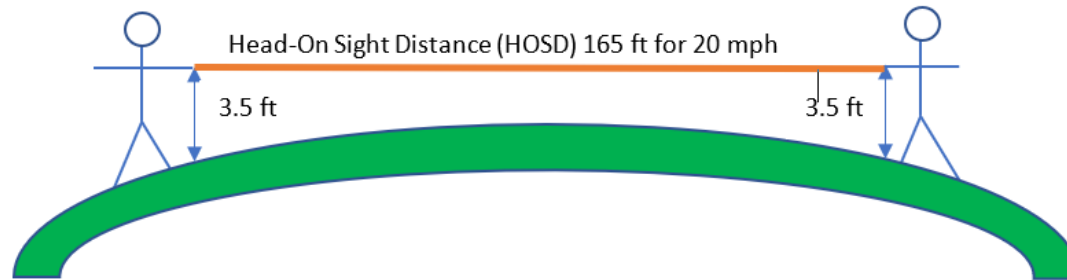


Figure 5. Graph of ELR Sight Distance.

ITE Journal, December 2019, "Advisory Bike Lanes & Shoulders"

Edge Lane Roads Sight Distance

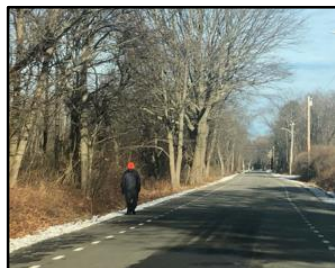
Port Townsend observation:
Beneficial traffic calming effects of ELRs augmented when paired with elements where sight distance is a consideration (like a vertical curve).



Edge Lane Roads Frequently Asked Questions

Is it safe to install ELRs on rural roads?

Edge Lane Roads On Rural Roads



Most common crash types on rural roads: 56% of rural crashes are single vehicle, roadway departure crashes. *(NCHRP Report 362, 1994)*

How to address rural crash rates: Wider shoulders reduce crash rates by up to 59%. *(NCHRP 362, CMF 5285, FHWA-RD-87/008)*

ELRs could help reduce the number of crashes on rural roads: ELRs provide similar amount of space between the edge of pavement and a vehicle as a wide shoulder would. This means, installation of ELRs could reduce the number of single vehicle roadway departure crashes on rural roads without the cost of building shoulders. Applicable in urban environments too, like Port Townsend. (Local Road Safety Plan.)

Edge Lane Roads Frequently Asked Questions

What is the regulatory status of ELRs?

Edge Lane Roads Regulatory Status

Manual on Uniform Traffic Control Devices (MUTCD): ELRs are not currently directly described in the MUTCD. “Shared roadways” are in the MUTCD, and their description aligns with ELRs. (See next slide.) The National Committee on Uniform Traffic Control Devices – Bicycle Technical Committee (NCUTCD BTC) has drafted MUTCD language to support ELRs.

Federal Highway Administration (FHWA): Classified as an experimental treatment by FHWA. Requests for experimentation for ELRs not being approved currently because FHWA says they have a sufficient number to review.

Edge Lane Roads As Shared Roadways

MUTCD definition of Shared Roadway: “Shared Roadway—a roadway that is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.” (2009 MUTCD, Section 1A.13)

Designated bicycle route: Designation process not defined in the MUTCD, so the procedure for designation is left to the local agency.

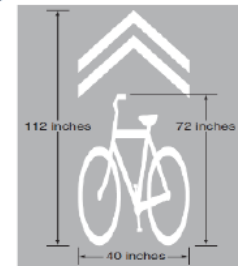
Sign option: If an agency decides a bike route should be marked, then a D11-1 sign may be installed.



D11-1

Markings: If lane markings are desired in the shared roadway, no bike lane markings can be used. However, shared lane markings (SLMs), also called sharrows, could be used in a shared roadway. SLMs cannot be placed on shoulders, and ELRs are not shoulders. Pedestrian symbols could also be used.

Figure 9C-9. Shared Lane Marking



Edge Lane Roads Frequently Asked Questions

Why is Port Townsend comfortable installing ELRs considering the regulatory status?

Edge Lane Roads

Why in Port Townsend

Professional engineering judgement: Creates more safety for pedestrians, bicyclists and motorists (at applicable locations). Indication that ELRs may reduce single vehicle roadway departures - Noted in Port Townsend's local road safety plan as most common crash type.

In alignment with MUTCD: ELRs fit with guidance for shared roadways, all ELR signage and line widths etc. used in Port Townsend are in the MUTCD.

Well thought out designs and outreach: Temporary installations, sight distance, speed limit reduction, community engagement.

Support of experts and local leadership: Michael Williams, Dan Burden, State Traffic Engineer Dangho Chang, Director of Public Works and PT City Council.

Successful in other places: Studies and on-the-ground experience demonstrate success in the United States and internationally. Alta/Michael Williams white paper about edge lane roads (10 examples). Water Street, Port Townsend.



Group Discussion

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Thank you