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TRANSPORTATION RESEARCH BOARD

TRB Webinar: On the Edge—New Applications and Safety Outcomes of Edge Lane Roads

February 15, 2021

2:00- 3:30 PM Eastern

@NASEMTRB
#TRBwebinar

PDH Certification Information:

- 1.5 Professional Development Hours (PDH) – see follow-up email for instructions
- You must attend the entire webinar to be eligible to receive PDH credits
- Questions? Contact Beth Ewoldsen at Bewoldsen@nas.edu

#TRBwebinar

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

RCEP

REGISTERED CONTINUING EDUCATION PROGRAM

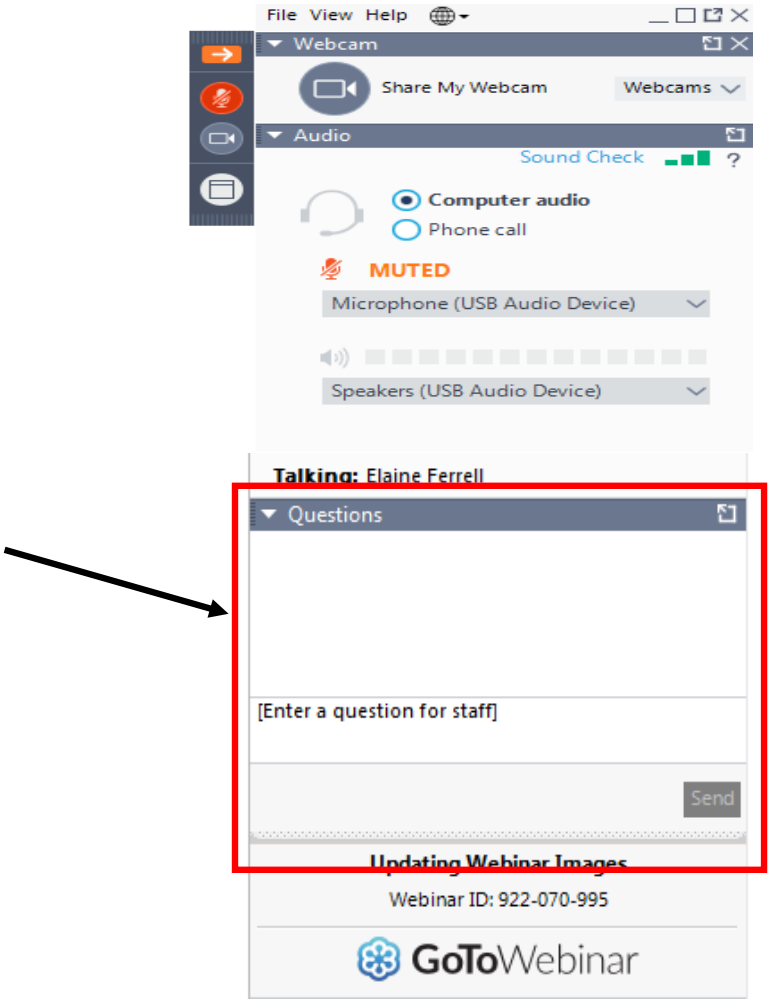
Learning Objectives

- Identify potential applications of ELRs
- Discuss safety research about ELRs

#TRBwebinar

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



#TRBwebinar

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Michael Williams Company

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Town of Vail, Colorado

Laura Parsons
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City of Port Townsend, Washington

PRESENTATION BY

Thomas Kassmel,
Town Engineer

EDGE LANES

Vail Valley Drive

Safety Improvements

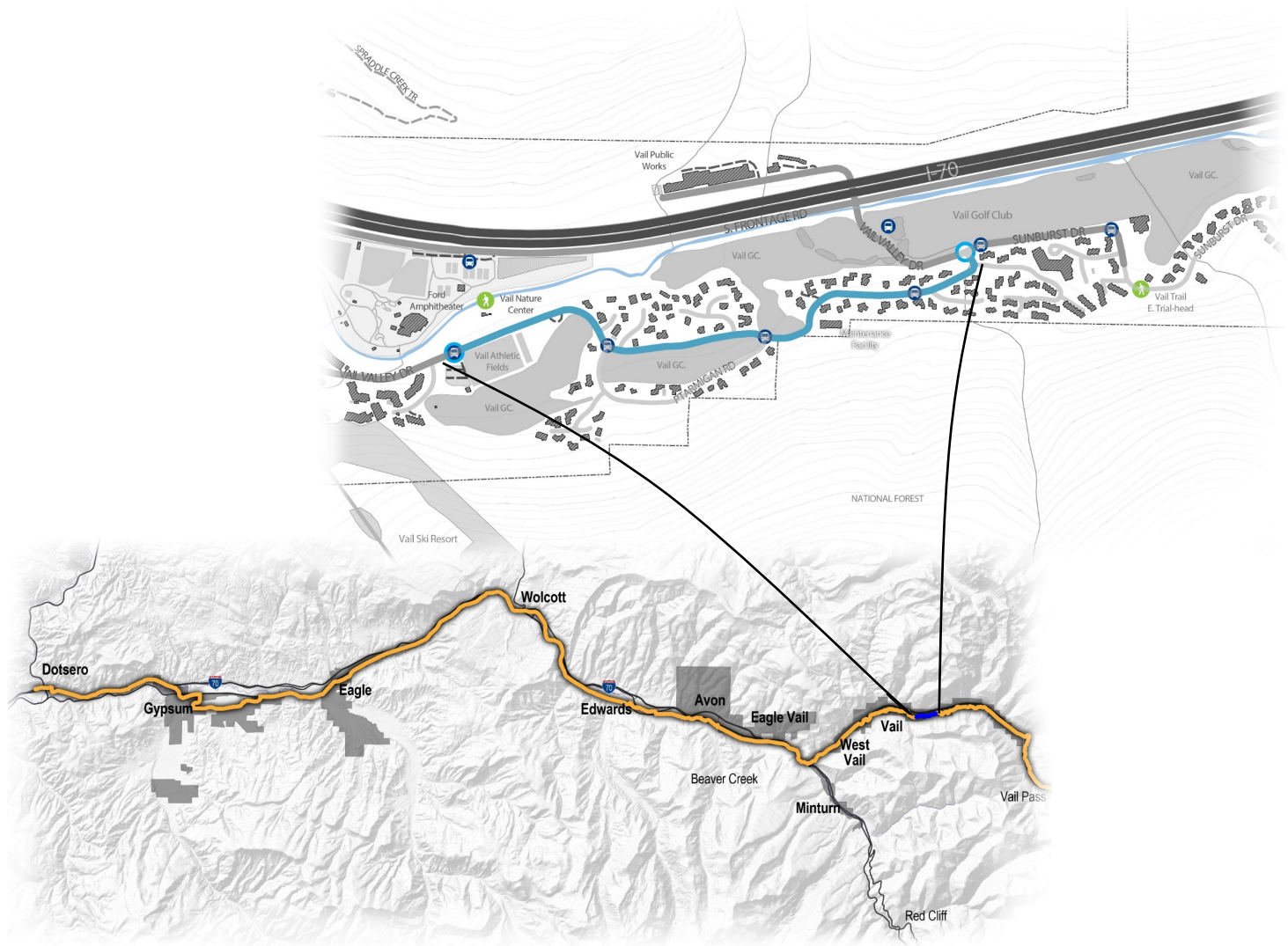
PROJECT BACKGROUND

Vail Valley Drive

- 20-22’ wide
- Vehicles
- Bus route

Gore Valley Trail

- Part of Eagle Valley Regional Trail
- Pedestrians, bicyclists
- Shares Vail Valley Drive

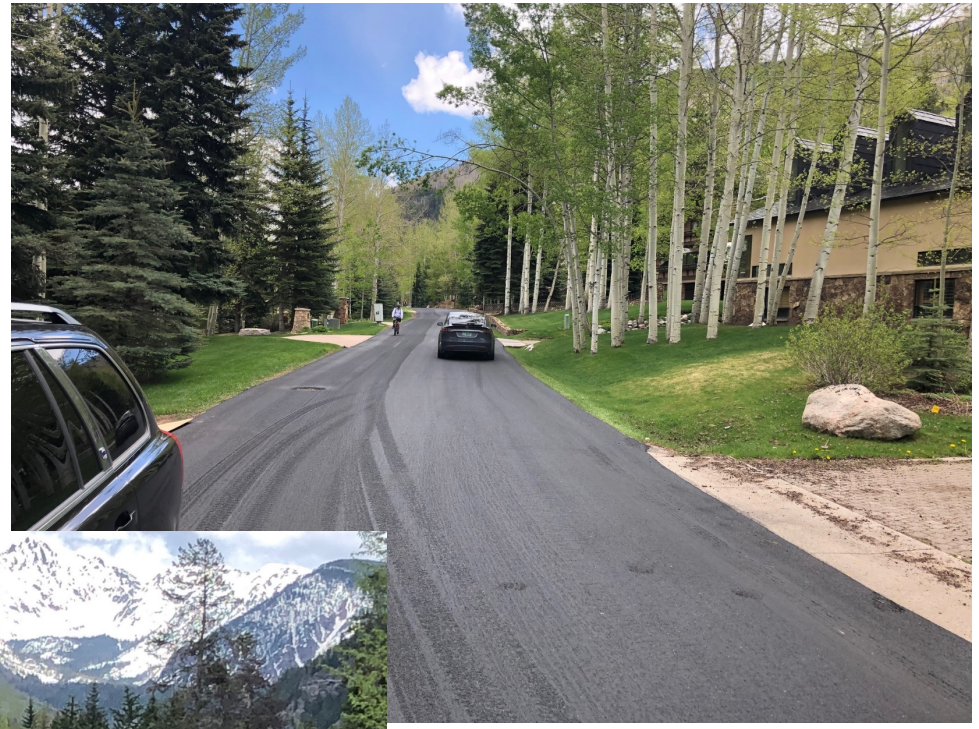


Vail Valley Drive

SAFETY IMPROVEMENTS

PROJECT GOAL

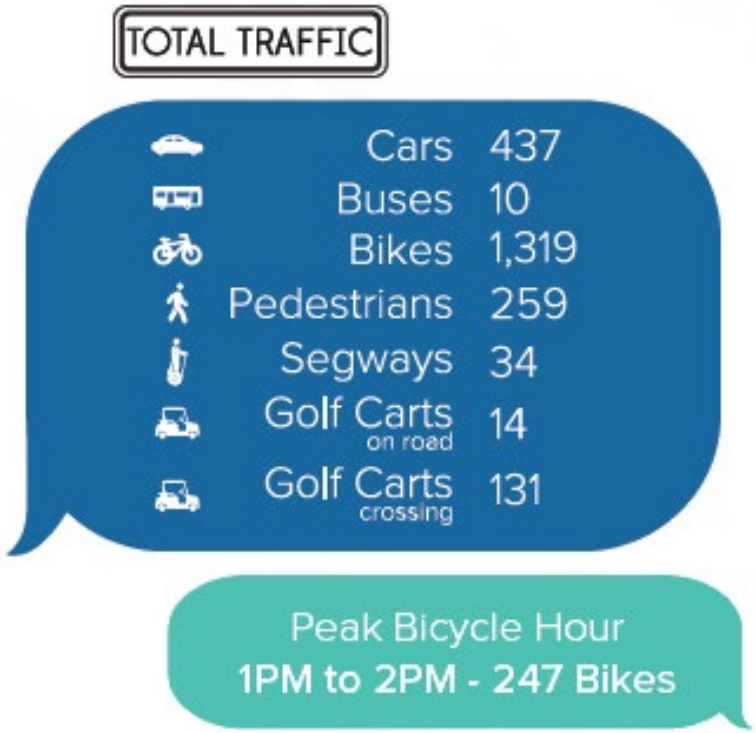
- Safe experience for all
- Define clear and aesthetically pleasing separation between motorists and pedestrians/cyclists

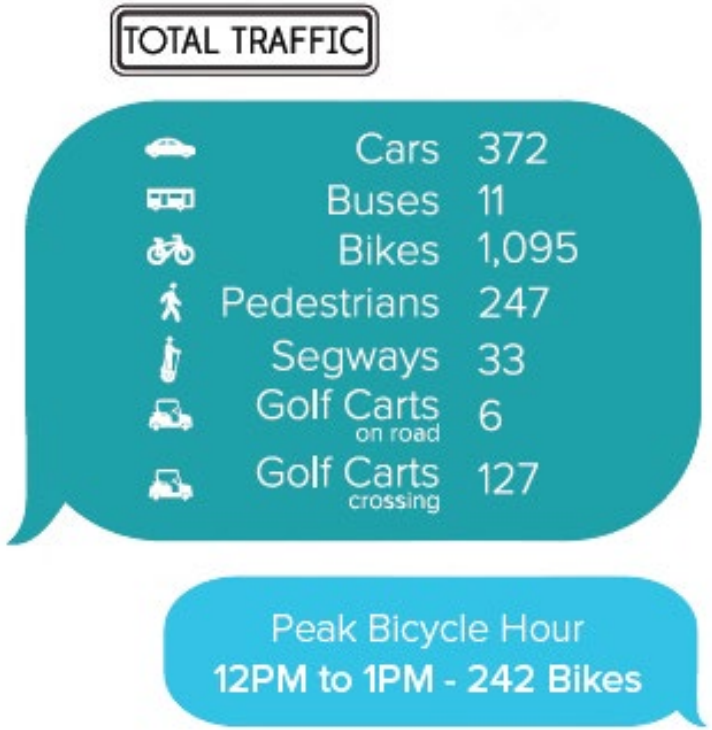


TRAFFIC COUNTS

JULY 5 & 6, 2019

3x More Bicyclists Than Vehicles





EDGE LANE OPTIONS

Option A

- 6’ ABL’s
- 14’ Shared Drive Lane
- Pave 2.5’ along shoulders

EDGE LANE OPTIONS

Option B

- 5’ ABL’s
- 14’ Shared Drive Lane
- Pave 1.5’ along shoulders

EDGE LANE OPTIONS

Option C

- 5’ ABL’s
- 11’ Shared Drive Lane

EDGE LANES IMPLEMENTED

Vail Summer 2020 Trial

- 5’ Edge Lanes
- 11’ Shared Drive Lane
- 3’ Skip line

EDGE LANES

Sight Distance Issues

-Single Lane/Bi- Directional

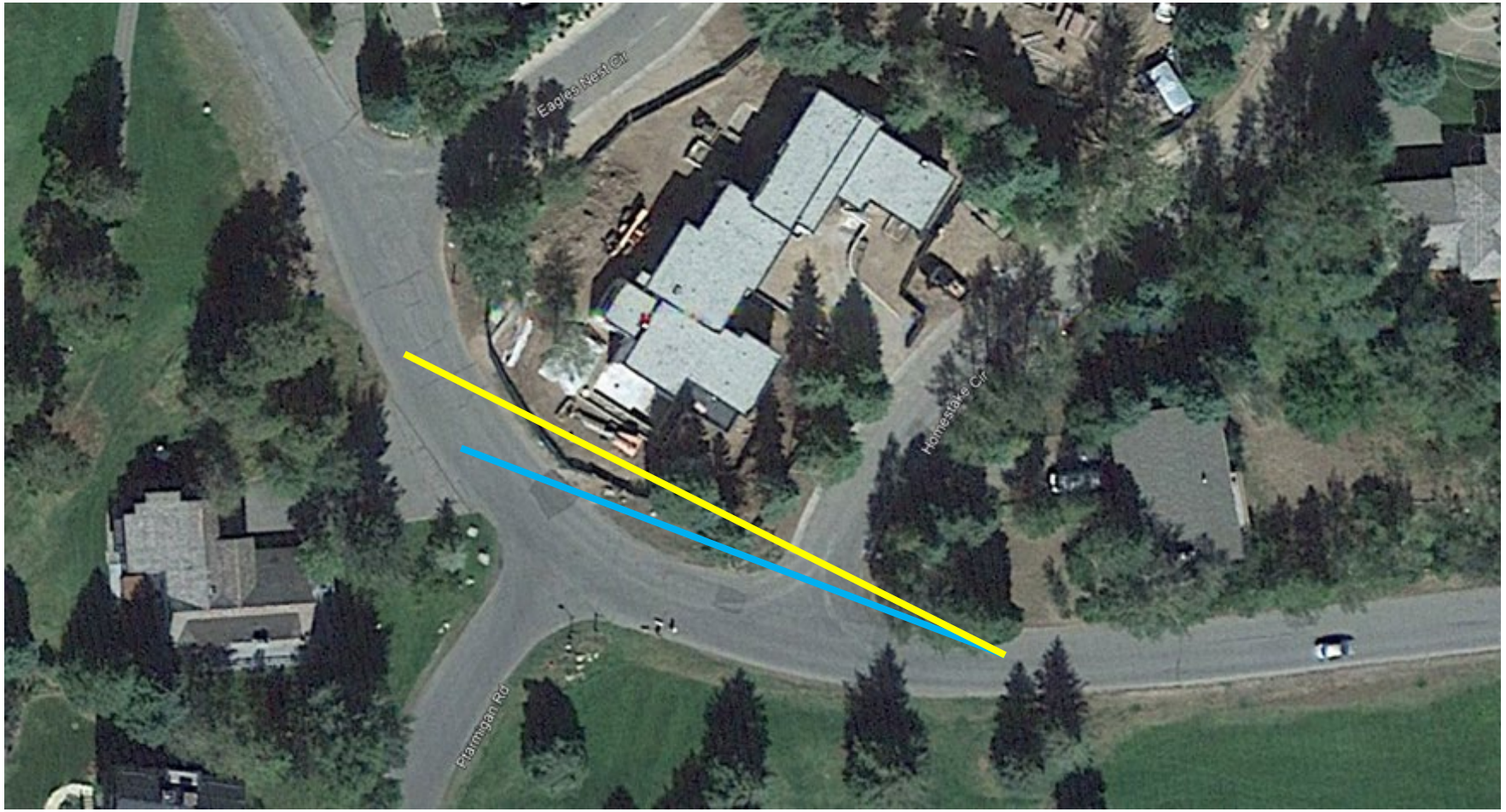
-Vehicle Travel Head On Stopping Sight Distance (2 x SSD)

- 15 MPH – 160’
- 20 MPH – 230’

-3 Limited Sight Distance Locations

- Hole #6 Curve
- Golf Maintenance Shed Curve
- Sunburst Curve

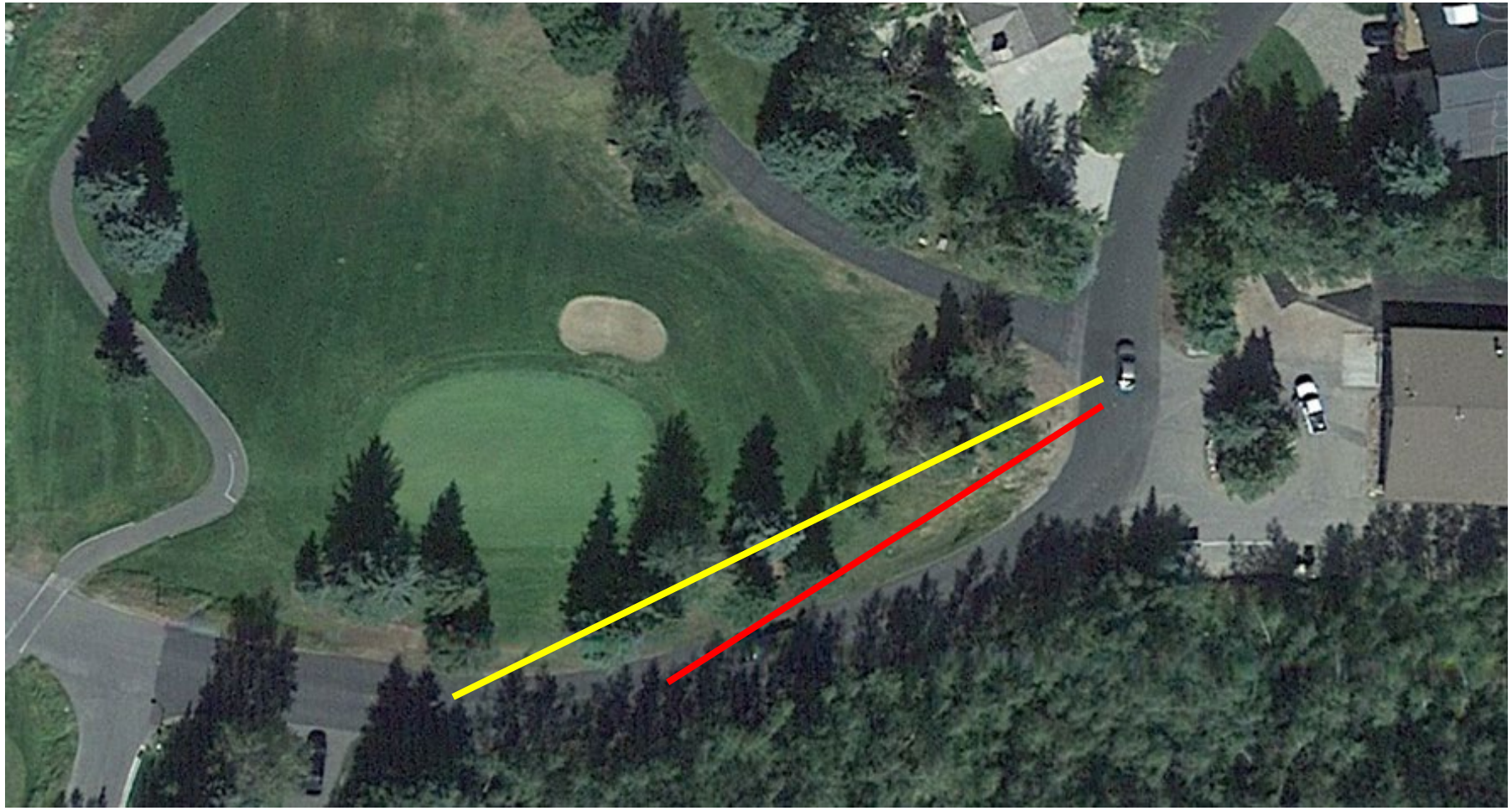
EDGE LANES



Hole #6 Curve

- 190’ clear SSD
- 230’ SSD w/ limbed trees

EDGE LANES



Golf Shed Curve

- 160’ SSD
- 230’ requires removal 5-7 trees

EDGE LANES

Golf Shed Curve

- Potential future widening of 6’

EDGE LANES

Sunburst Curve

- 100’ SSD
- Start Edge lane west of curve

Vail Valley Drive

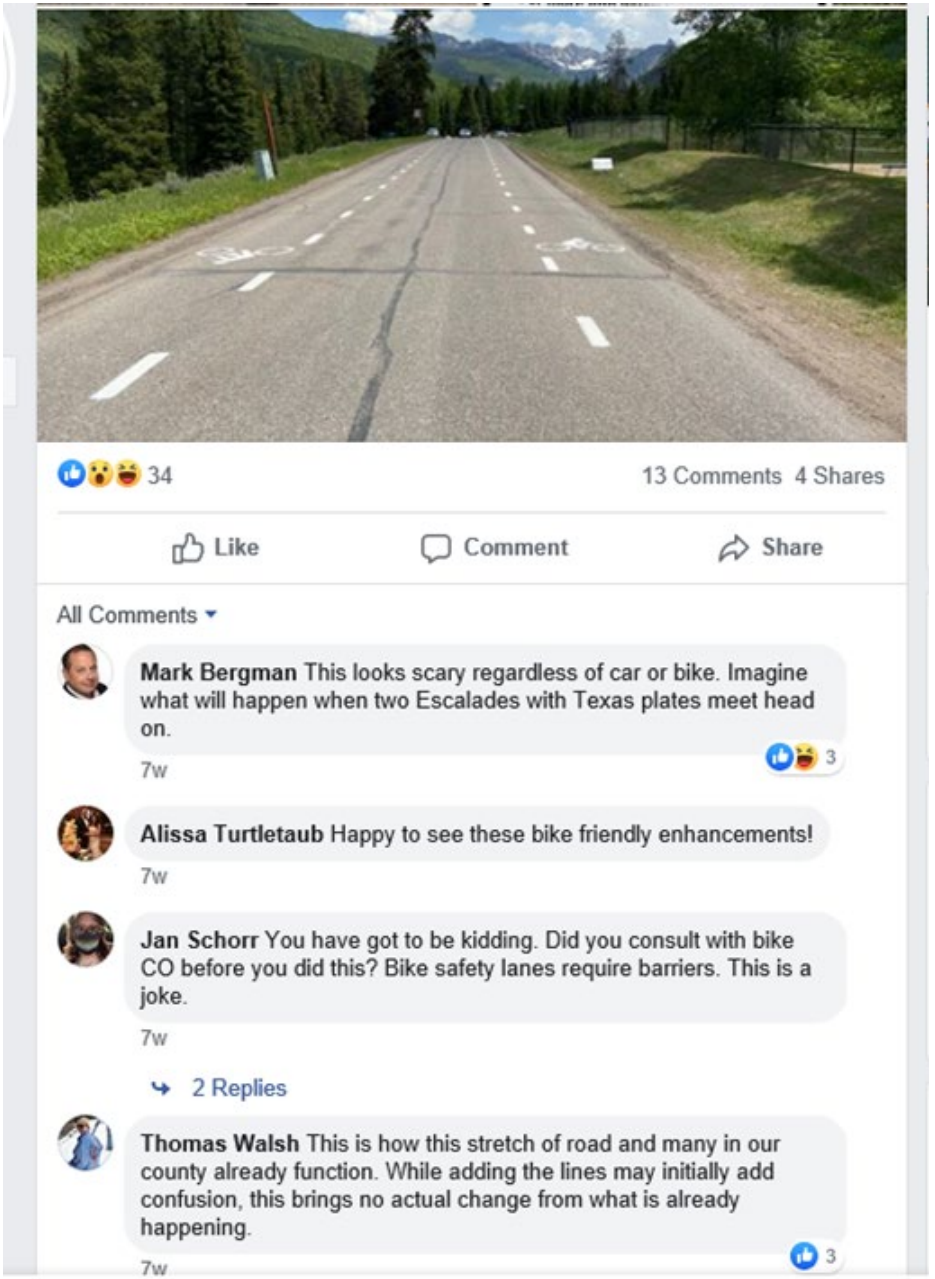
SAFETY IMPROVEMENTS

Vail Valley Drive

SAFETY IMPROVEMENTS

EDGE LANE FEEDBACK

- Facebook Feedback
- Engagevail.com Feedback
- E-mail Feedback
- Verbal Feedback
- “Drive-By” Survey
- Traffic and Compliance Counts
- Speed Study



EDGE LANE FEEDBACK

- **Engagevail.com Feedback Forum:**
  - 5 in Favor;
  - 2 in Favor from bicycle standpoint but needs improvement for vehicles
  - 1 Against (*Edge Lane too narrow; Empower selfish drivers; Confusing for vehicles*)
- **Direct E-mail**:
  - 1 in Favor
  - 1 Against (Same as in Forum Feedback)
- **Verbal Response**:
  - Dozens in Favor
  - A few passionately Against (Safety concerns, Confusion, Non-Yielding, Speeding)

EDGE LANE FEEDBACK

- "Drive-By" Survey

On Friday, July 10 we were on-site to collect real-time feedback about the new Advisory Bike Lanes painted on Vail Valley Drive. We encouraged people to try it via social media and talked with people taking a drive, bike, or stroll. If people didn't want to stop and talk, we simply asked them to give us feedback via a 👍 or 👎 while passing.

Here are the results:

Bikes:	70 👍	2 👎
Walkers:	25 👍	0 👎
Cars:	10 👍	7 👎

Feel free to head over to Vail Valley Drive and give it a try. You can still provide your feedback via this forum.

EDGE LANE STATISTICS

- **Traffic and Compliance Counts July 17th** ***93% Edge Lane Compliant***
- Vehicles 83
- Bicyclists 300 (22 Non-Compliant)
- Pedestrians 45 (0 Non-Compliant)
- **Traffic and Compliance Counts August 7th** ***97% Edge Lane Compliant***
- Vehicles 214
- Bicyclists 340 (10 Non-Compliant)
- Pedestrians 63 (1 Non-Compliant)

EDGE LANE STATISTICS

Speed Study

- **Hole #4 85% Percentile Speed**
  - 2019: 25 mph
  - 2020: 23 mph (with Edge Lane)
- **Soccer Field 85% Percentile Speed**
  - 2019: 29 mph
  - 2020: 28 mph (with Edge Lane)

EDGE LANE SUMMARY

- **Pros**
  - 99% of Bicyclist & Pedestrians / 60% of Drivers are in favor*
  - Provides “Delineated” lanes for Vehicles, Bicyclist & Pedestrians to Share the Road
  - 90%+ Edge Lane compliance – Bicycles are not spread out unaware of vehicles behind them
  - Ability to direct users (tours/families/kids) to stay in your lane for safety
  - Vehicle speeds slightly decreased
- **Cons**
  - Striping can be confusing at first
    - Is it a one-way? Which lane is which? Confused driver may not yield
  - Difficult to navigate with on-coming vehicles and bicyclists at same time

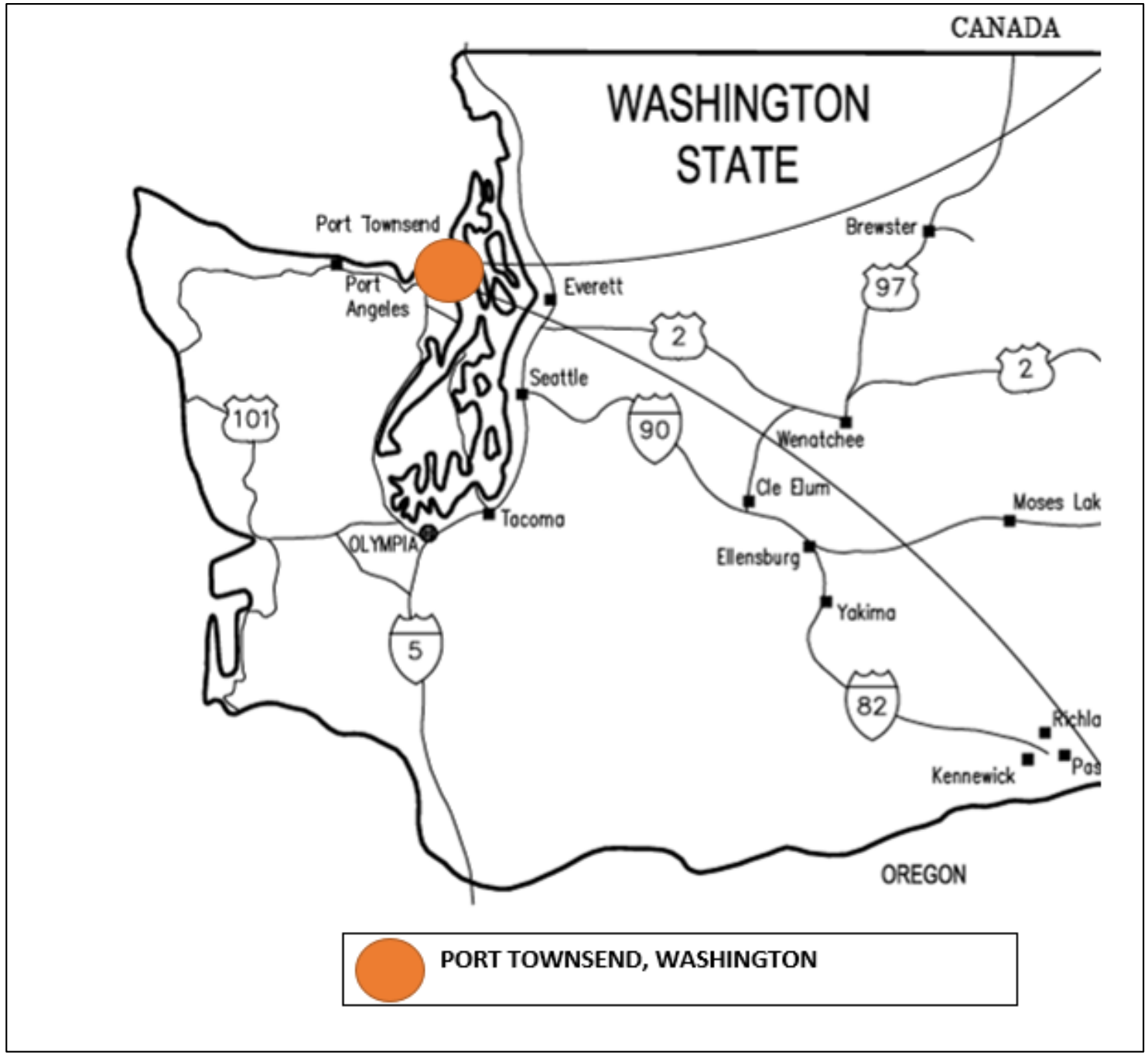
EDGE LANE
2021 FOLLOW UP

- Council Feedback & Direction
  - Maintain Edge Lanes for 2021
  - Extend Edge Lanes further west
  - Increase sight distance at Hole #3 (Tree Removal & Limbing)


Thank you

Port Townsend
Washington

Edge Lane Roads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Kennewick
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Founded 1851


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HASTINGS
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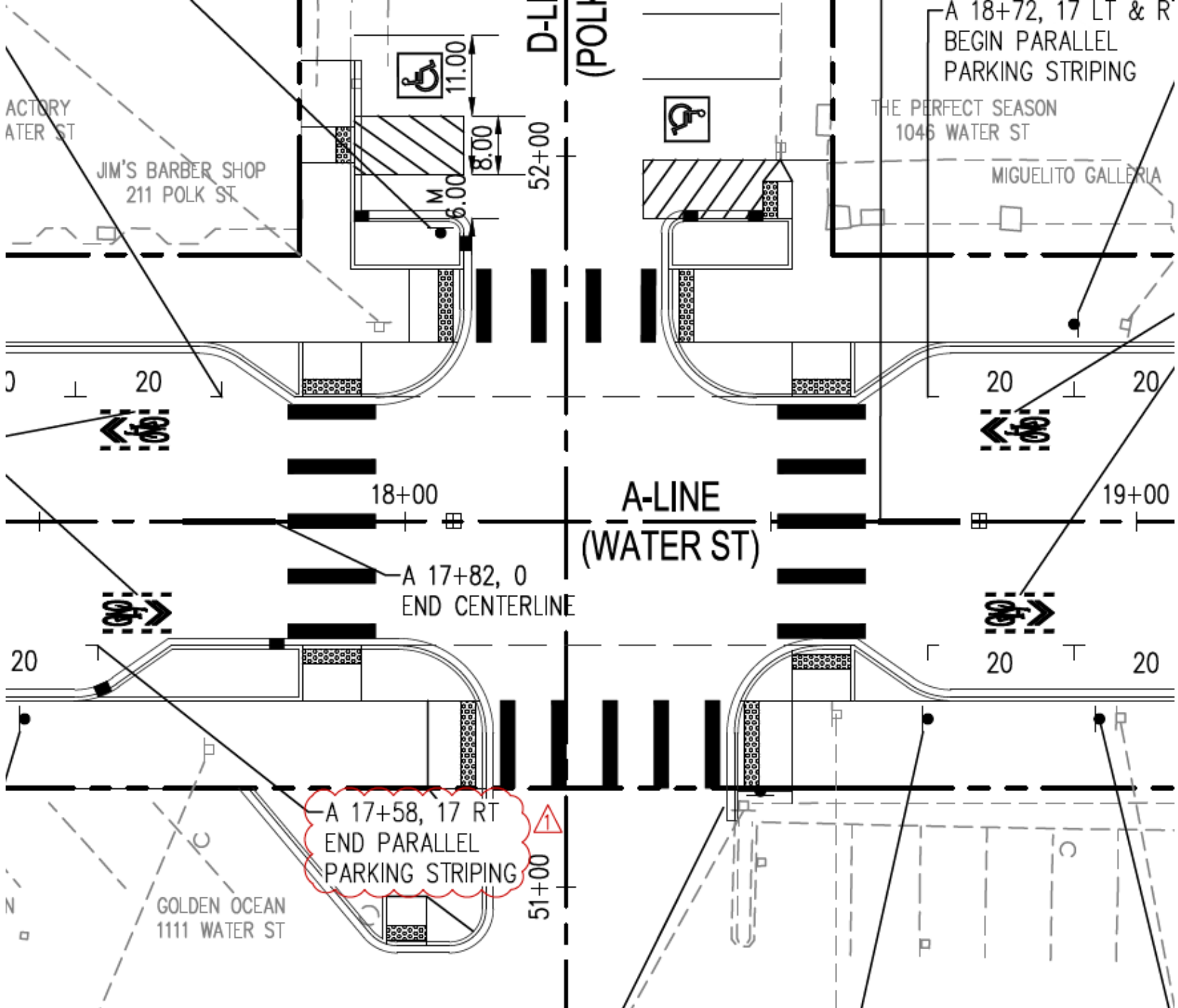
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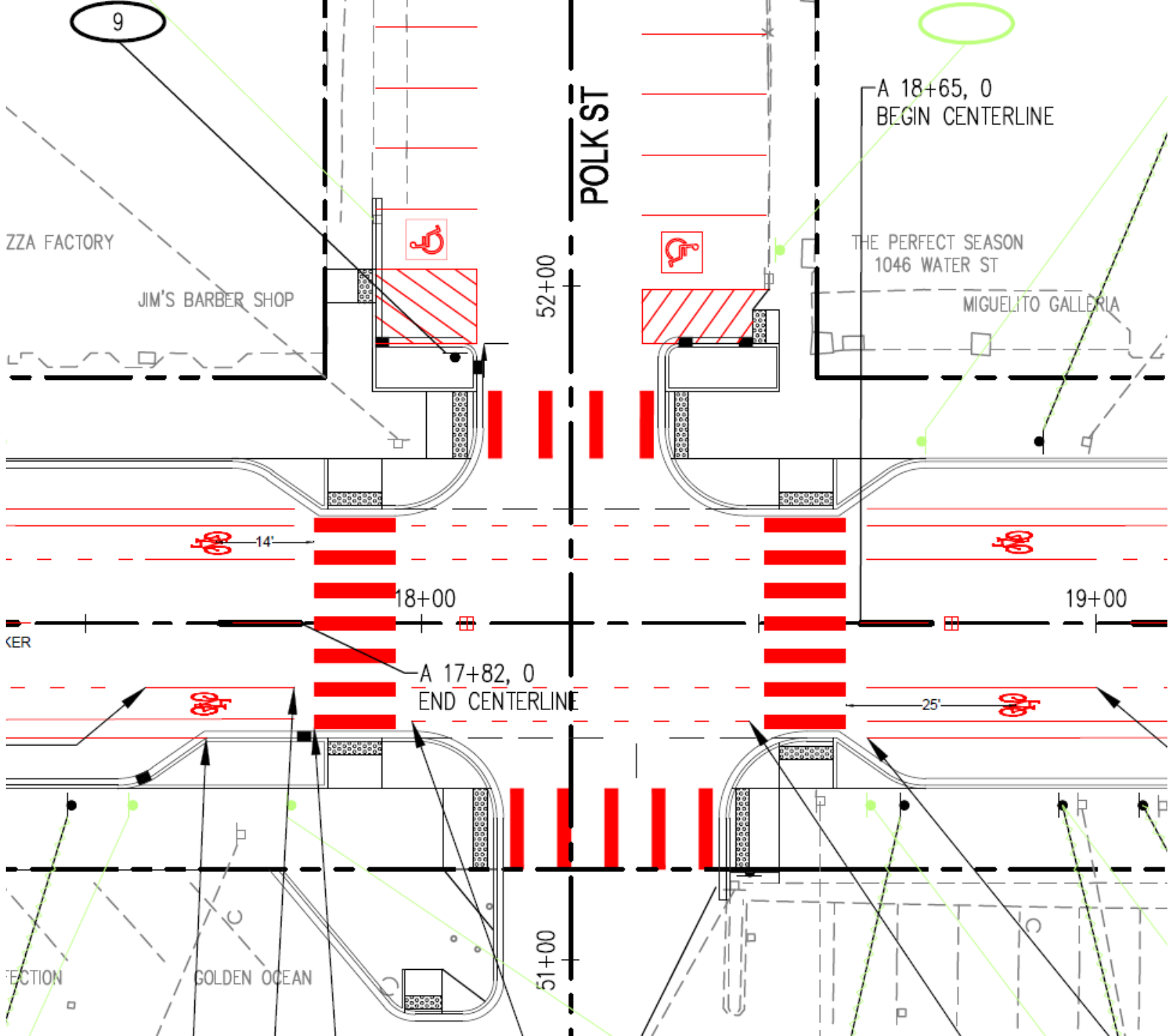
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GOLDEN OCEAN


Sysco

Results of Installing ELRs:

- Delivery trucks always find parking.
- Delivery trucks provide traffic calming.
- Parallel parking on both sides of the street.
- Bike facility provided.
- Cars/Buses legally enter ELRs to go around trucks.
- Dooring zone keeps bikes and pedestrians safe.

ROW: 73'

Parking Lane: 7'

Buffer: 2.5'

Bike Lane: 4.75'

Travel Lane: 9.75'

Sidewalk/Curb: 12.5'

ADT: 6,268
in July 2019

Thank you

Laura Parsons, PE
City Engineer
City of Port Townsend

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360-379-4432

Novel Uses and Safety of Edge Lane Roads

2022 TRB Webinar

Outline

- Panel Outline
- What is an Edge Lane Road?
- International Experience
- American Experience
- Better than Bicycle Lanes
- Low-Volume Rural Roads

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Panel Outline

- Michael Williams
  Introduction to ELRs, Safety
  Better than Bicycle Lanes
  Use on low-volume, higher-speed rural roads
- Laura Parsons, Port Townsend, WA
  Small town main street with unique parking requirements
- Tom Kassmel, Vail, CO
  On-street connector for a busy, shared use trail

Outline

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- What is an Edge Lane Road?
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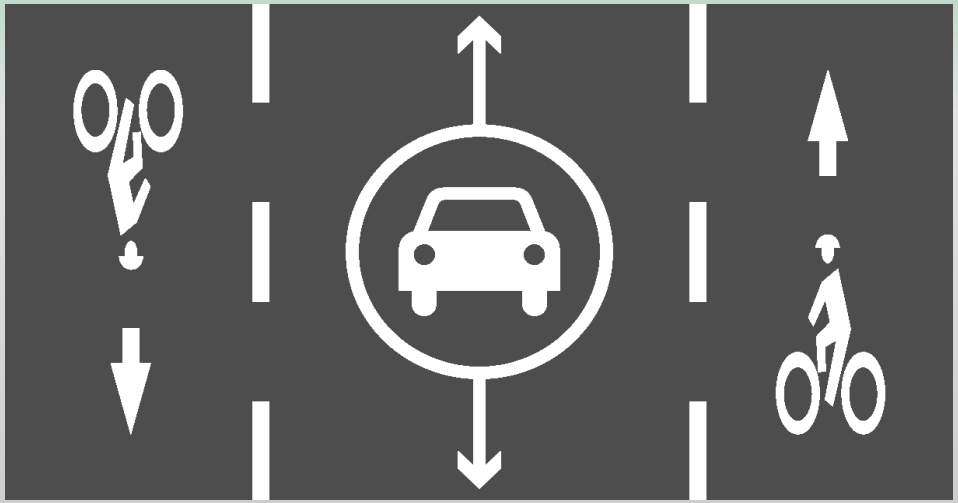
- Low-Volume Rural Roads

What is an Edge Lane Road?

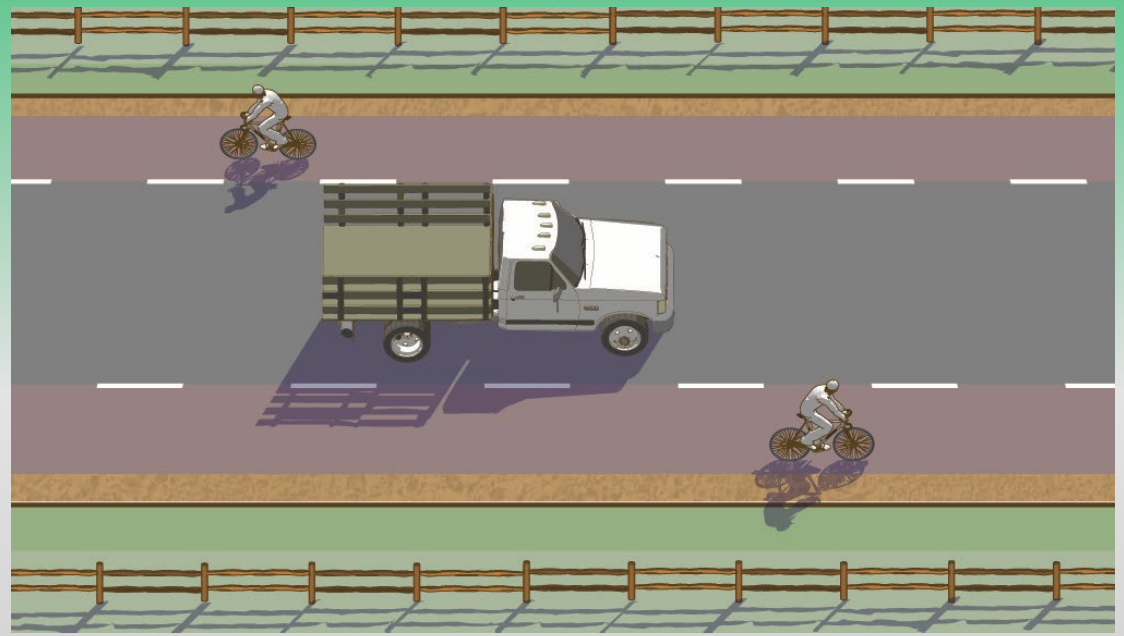
An ELR is a roadway that supports two-way motor vehicle traffic in a single center lane and vulnerable road users in the edge lanes on either side. To bypass approaching motor vehicles drivers merge into the edge lanes, after yielding to any VRUs there. No centerline!

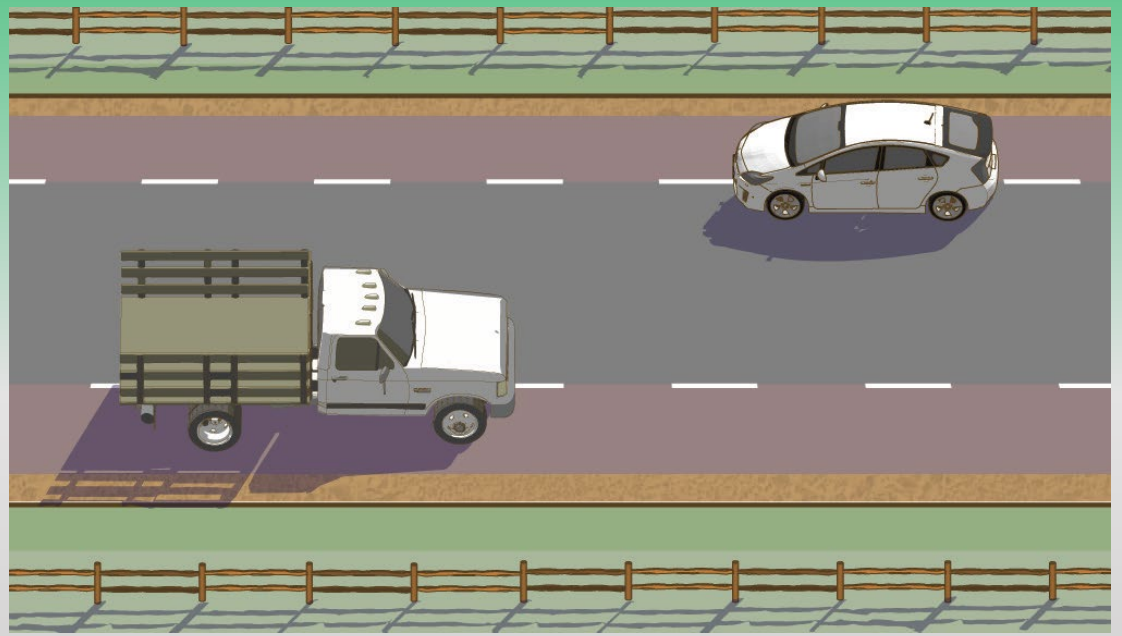


Edge Lane | Center Lane | Edge Lane

ELR Design Guide, courtesy of www.advisorybikelanes.com

Operation





Courtesy 2016 FHWA Small Town & Rural Multimodal Networks Guide

North American Examples

Hanover, NH

North American Examples

Yarmouth, ME

Lincoln, VT

North American Examples

Outline

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International Experience

Survey of 21 Countries, 2013

Country	***Date of First Use***
Netherlands	**(<1970)**
Sweden	**(<1970)**
UK	**(<1970)**
Belgium	(2000)
France	(2000)
Germany	(2000)
Spain	(2000)
Hungary	(2010)
Canada	(2011)
Switzerland	(N/A)

2013 International Transport Forum report titled Cycling, Health & Safety

Outline

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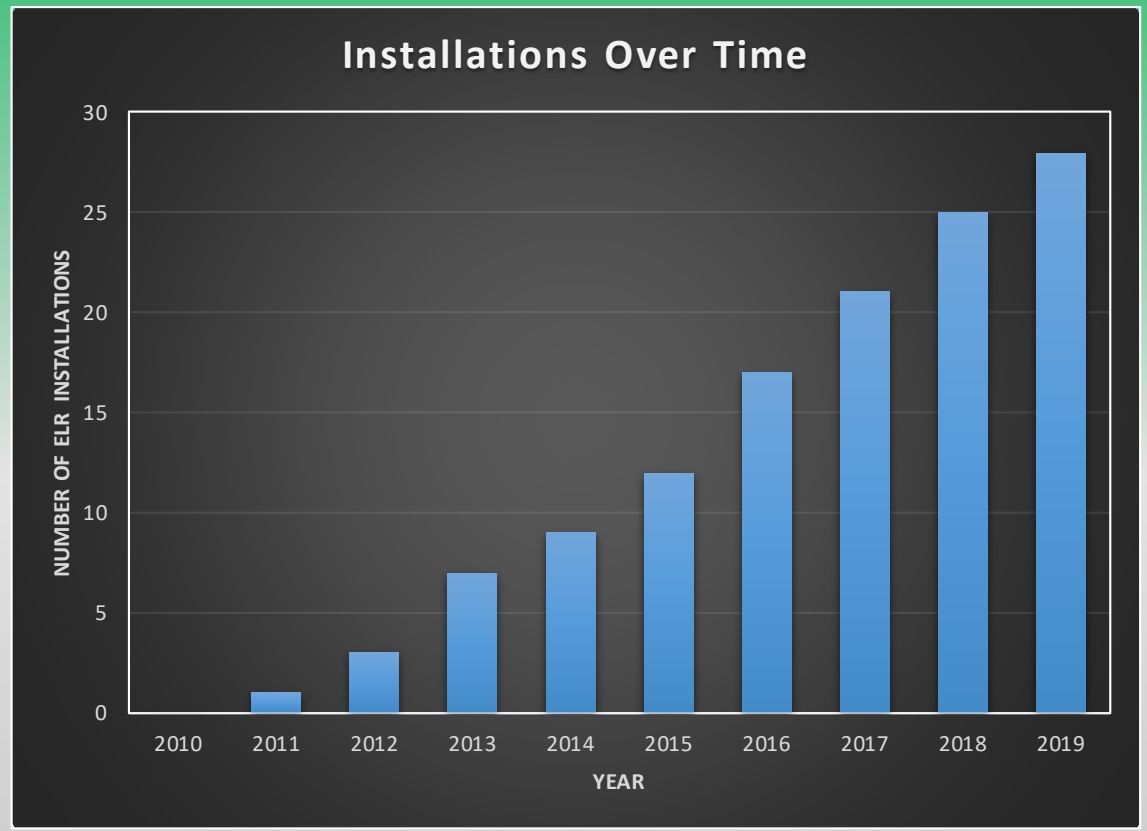
American Experience

- **First ELR in 2011**
- **~60 ELRs as of January, 2022**
- **6 City Studies found their facilities safe & effective**
- **11 US ELRs, studied over 8 years & ~60 million MV trips found a 44% reduction in crashes (CMF of .56)**

Safety Considerations for All Road Users on Edge Lane Roads, Mineta Transportation Institute Report No. 20-55, March, 2021.



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

American Experience - Guidance

- **Included in:**

  2009 Fundamentals of Bicycle Boulevard Planning & Design

  2016 FHWA Small Towns and Rural Multimodal Networks

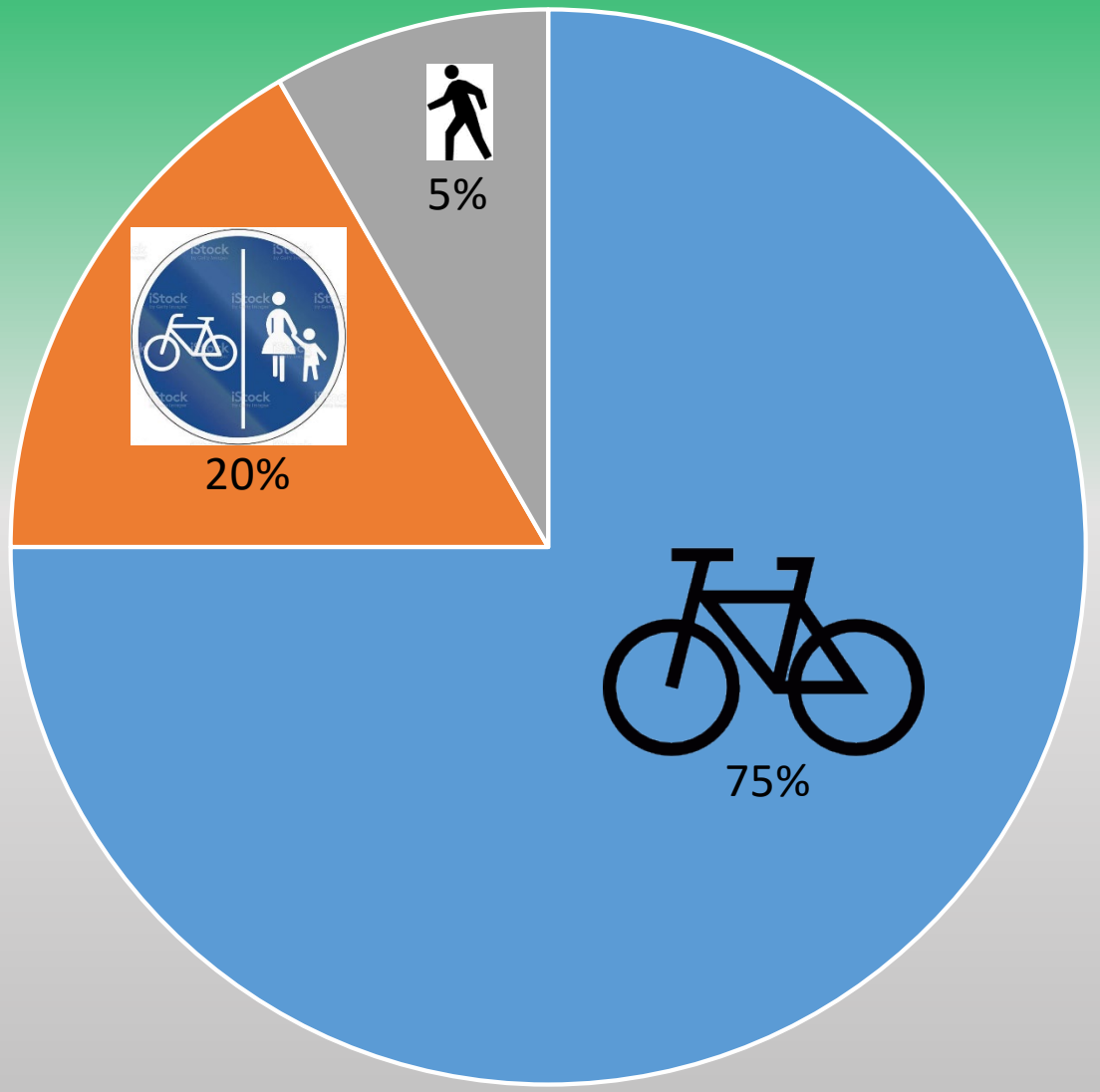
  2019 FHWA Bikeway Selection Guide

  5th Edition AASHTO Bike Guide (2022?)

- **Classified as experimental treatment by FHWA**
- **NCUTCD BTC has drafted MUTCD language to support ELRs**

American Experience

- Most ELRs are for bicyclists
- Some ELRs are shared use
- A few ELRs are for pedestrians



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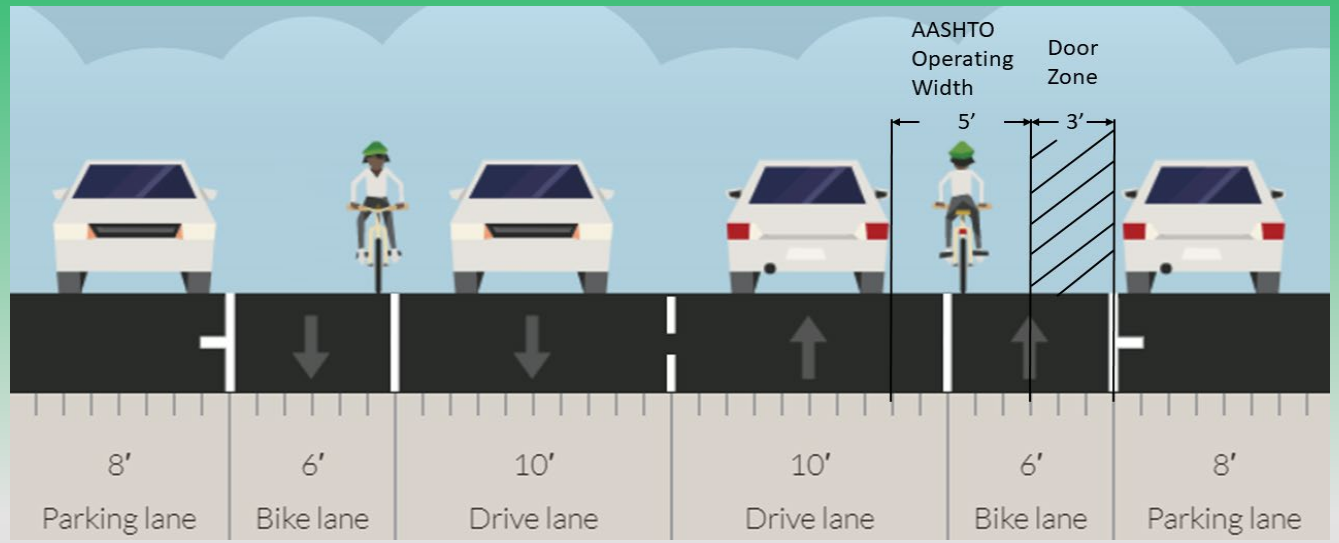
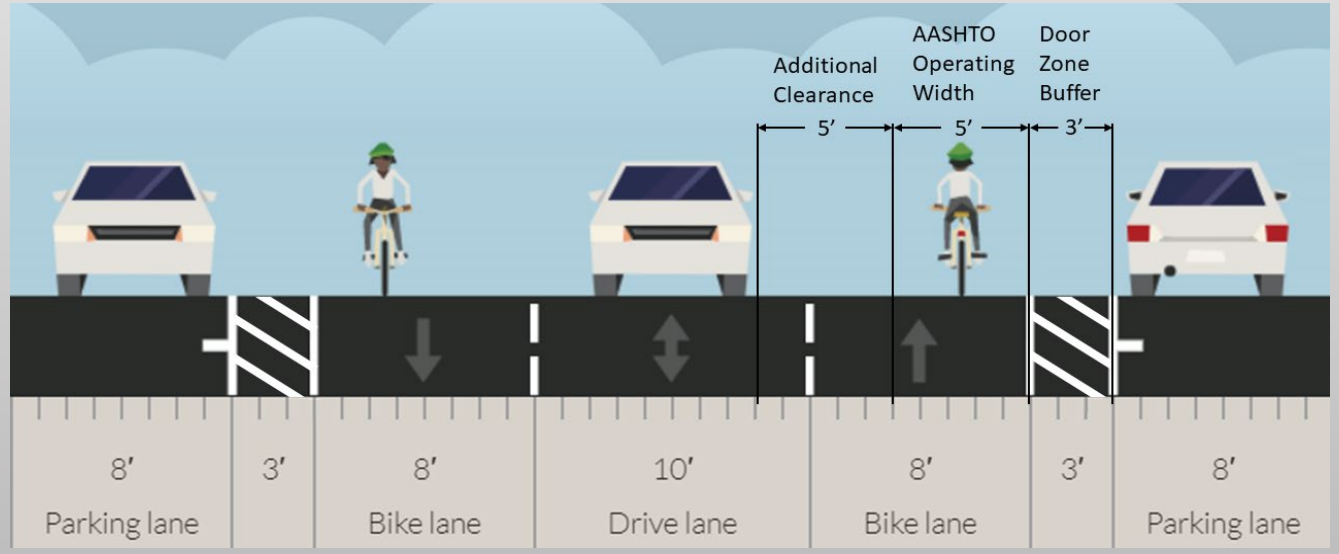
Better than Bike Lanes

Door Zone Bike Lane



Edge Lane Road



Better than Bike Lanes

Case Study: Maliesingel, Utrecht, 2016

BEFORE
50 kph road with standard bike lanes

Courtesy: Bicycle Dutch, December 4, 2018 Blog Entry

Better than Bike Lanes

Case Study: Maliesingel, Utrecht, 2017

AFTER
30 kph edge lane road

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

Courtesy: Bicycle Dutch, December 4, 2018 Blog Entry

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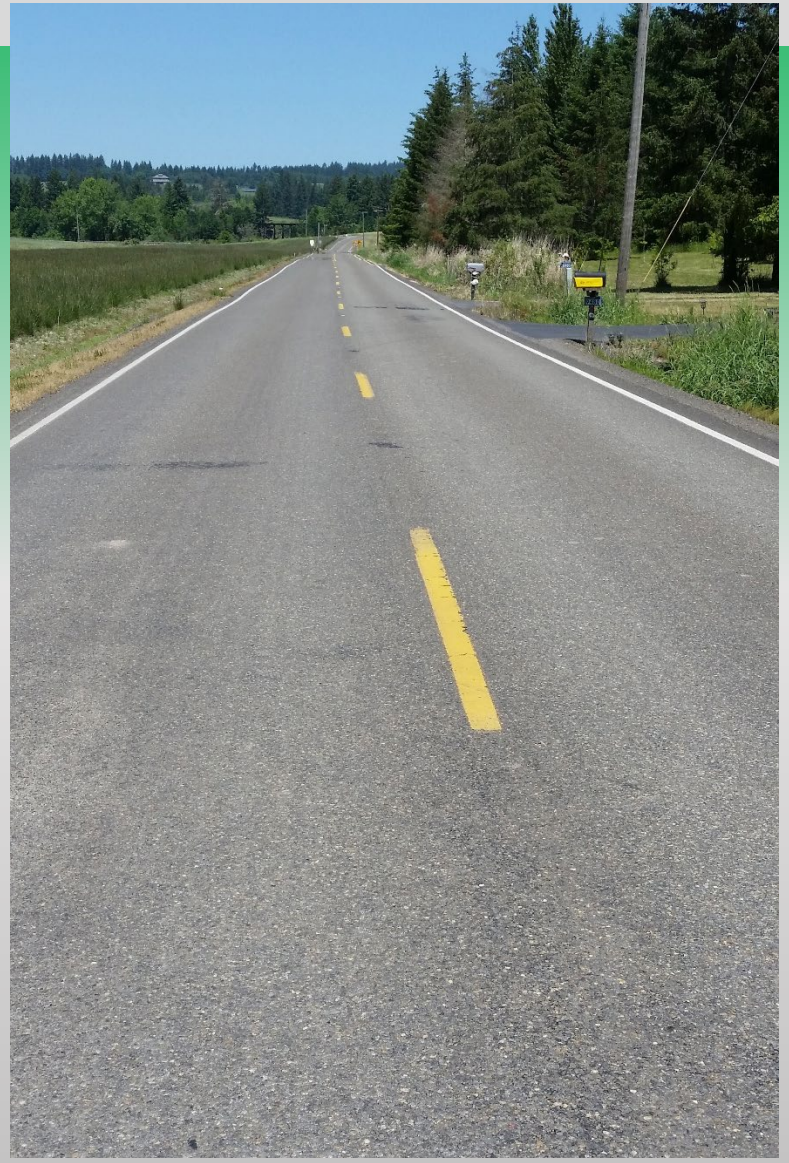
Low-Volume Rural Roads

- Serve 19% of the population but see 54% of all fatalities (https://safety.fhwa.dot.gov/local_rural/)
- 56% of rural crashes are single-vehicle, roadway departure crashes (NCHRP Report 362, 1994)
- Rural fatalities tend to be randomly located requiring a systemic treatment (https://safety.fhwa.dot.gov/systemic/fhwasa17010/)
- Wider shoulders reduce crash rates by 24%-59% but widening is expensive (NCHRP 362, CMF 5285, FHWA-RD-87/008)

➢ ELRs offer 5-6’ wide shoulders and are cheap!



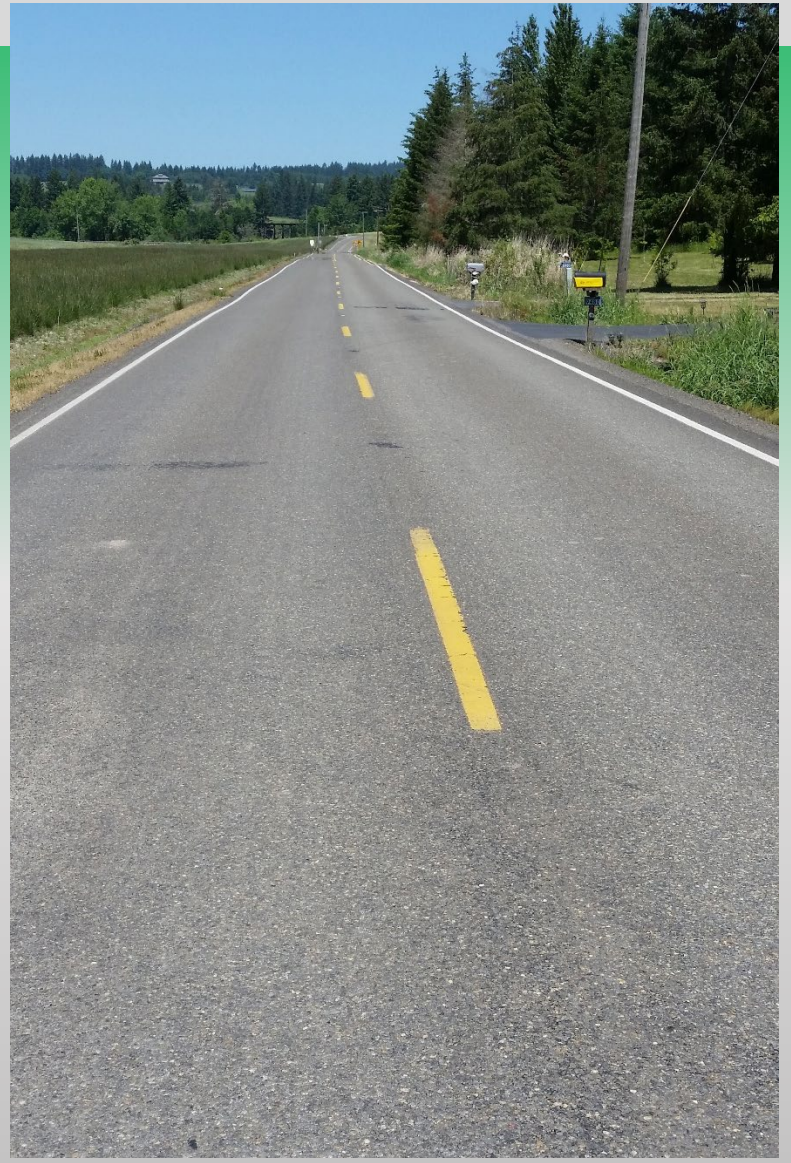
www.advisorybikelanes.com/rural-edge-lane-roads.html

LOW-VOLUME RURAL ROADS

HEAD-ON COLLISIONS?

- Road departure is the root cause of unknown % of head-ons → possible reduction in head-ons.
- CMF ID 87 predicts injury crash rate after adding center lines to unmarked rural 2-lane roads.
  CMF ID 87 = .99 (*3 stars*) – no change
- 2013 VDOT study on narrow roads of <3,000 ADT found no safety benefits to longitudinal markings – (5 years crash data on 4,797 road segments).

Lance E. Dougald, Benjamin H. Cottrell, Jr., P.E., Young-Jun Kweon, Ph.D., P.E., In-Kyu Lim, Ph.D., P.E. Investigation of the Safety Effects of Edge and Centerline Markings on Narrow, Low-Volume Roads. Report FHWA/VCTIR 14-R3. November, 2013



www.advisorybikelanes.com/rural-edge-lane-roads.html

Low-Volume Rural Roads – International

- Highway B764 Scotland
- 60 MPH
- 1,400 ADT
- 10 – 100+ bikes/day
- 22’ pavement width
- Installed 2005 (>7.5 million MV trips)
- “Improved safety” per engineer, wishes he could repeat it

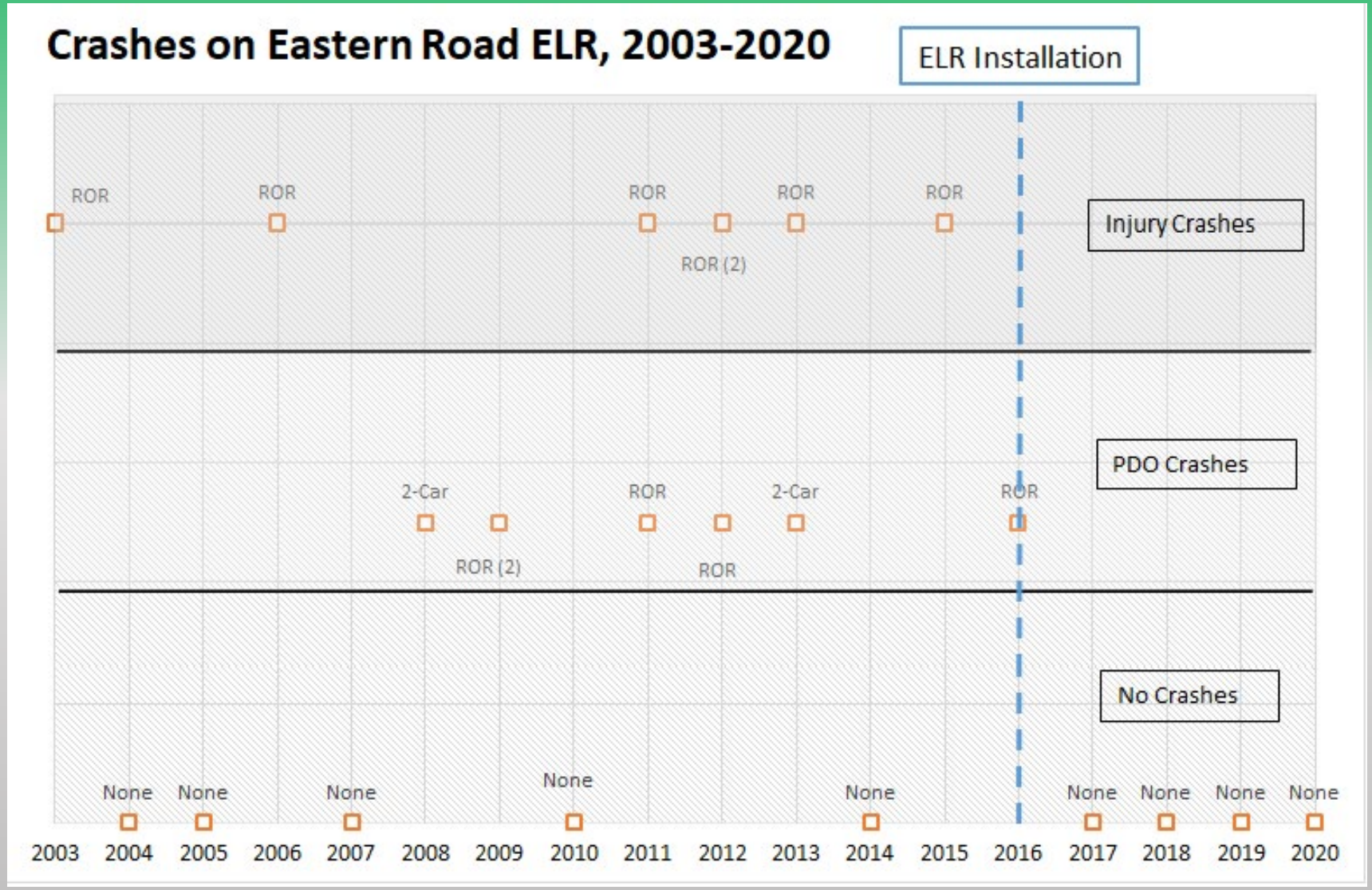
www.advisorybikelanes.com/rural-edge-lane-roads.html

Low-Volume Rural Roads – Domestic

- Eastern Road Scarborough, ME
- Accesses dispersed clusters of rural homes
- ~1,000 ADT
- Posted 25 MPH
- No speed data, actual speeds likely higher

Low-Volume Rural Roads – Domestic

- **Pre-Install**
  13 crashes in 13.5 years:
  11 Run-Off-Road,
  2 Rear End/Sideswipe;
  7 Injury (non-fatal),
  6 PDO.
- **Install**
  1 ROR, PDO crash
- **Post-Install**
  0 crashes in 4+ years
- **No Head-Ons**



Low-Volume Rural Roads

- ELRs create 5-6 foot wide “shoulders”
- 24% - 59% crash rate reduction potential
- Speeds reduced by up to 8 MPH
- Bonus: Space for VRUs

- Successful examples exist
- Further research is warranted

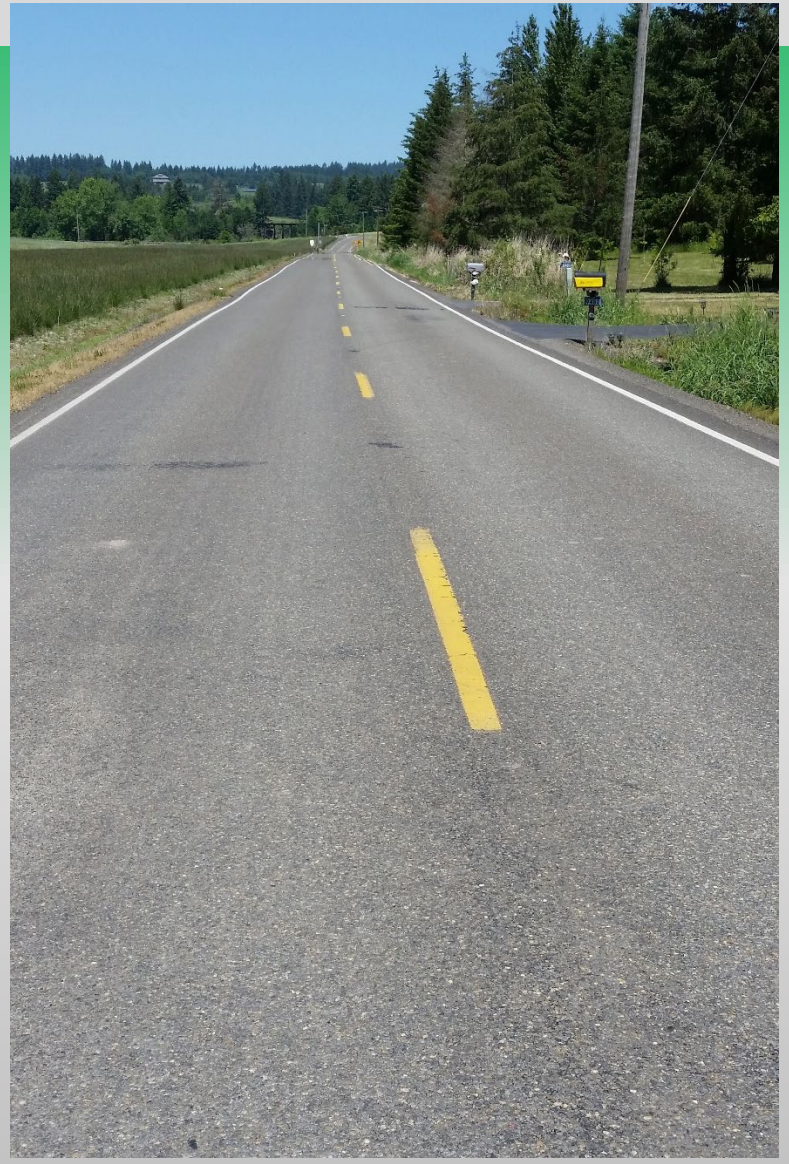
www.advisorybikelanes.com/rural-edge-lane-roads.html


Thank You
Michael Williams
bikepedx@gmail.com
www.edgelaneroads.com

Low-Volume Rural Roads

SAFETY OF WIDER SHOULDERS

- CMF ID 5285 predicts a 29% crash rate drop after widening paved shoulders from 3 to 8 feet.
- FHWA-RD-87/008 predicts a 40% crash rate drop for a 6’ increase in shoulder width.
- NCHRP 362 predicts crash rate drops ranging from 24% to 59% for addition of 6.5’ shoulders.



www.advisorybikelanes.com/rural-edge-lane-roads.html

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Michael Williams Company

Tom Kassmel
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TOWN OF VAIL

Laura Parsons
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City of Port Townsend

Other Events for You:

- **March 22, 2022**

  TRB Webinar:How Rough is Your Pavement? Measuring Pavement Profiles for Low-Speed Roads

- **April 2022**

  TRB Webinar on inclusive mobility through accessible walkways and integrated services

https://www.nationalacademies.org/trb/events

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