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Confessions of a Traffic Engineer: How the MUTCD Impacts Everything

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Portland Bureau of Transportation

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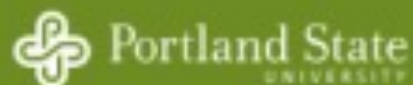
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PSU TRANSPORTATION SEMINAR

Confessions of a Traffic Engineer: How the
MUTCD Impacts Everything



May 25, 2023
12:00 PM (Pacific)



Outline

- Safety as Job #1 – Are we doing a good job?
- Role of the MUTCD and City of Portland's Response
- Confessions of a Traffic Engineer
- Recommendations for our Industry

Portland traffic deaths by travel mode, 2018-2022

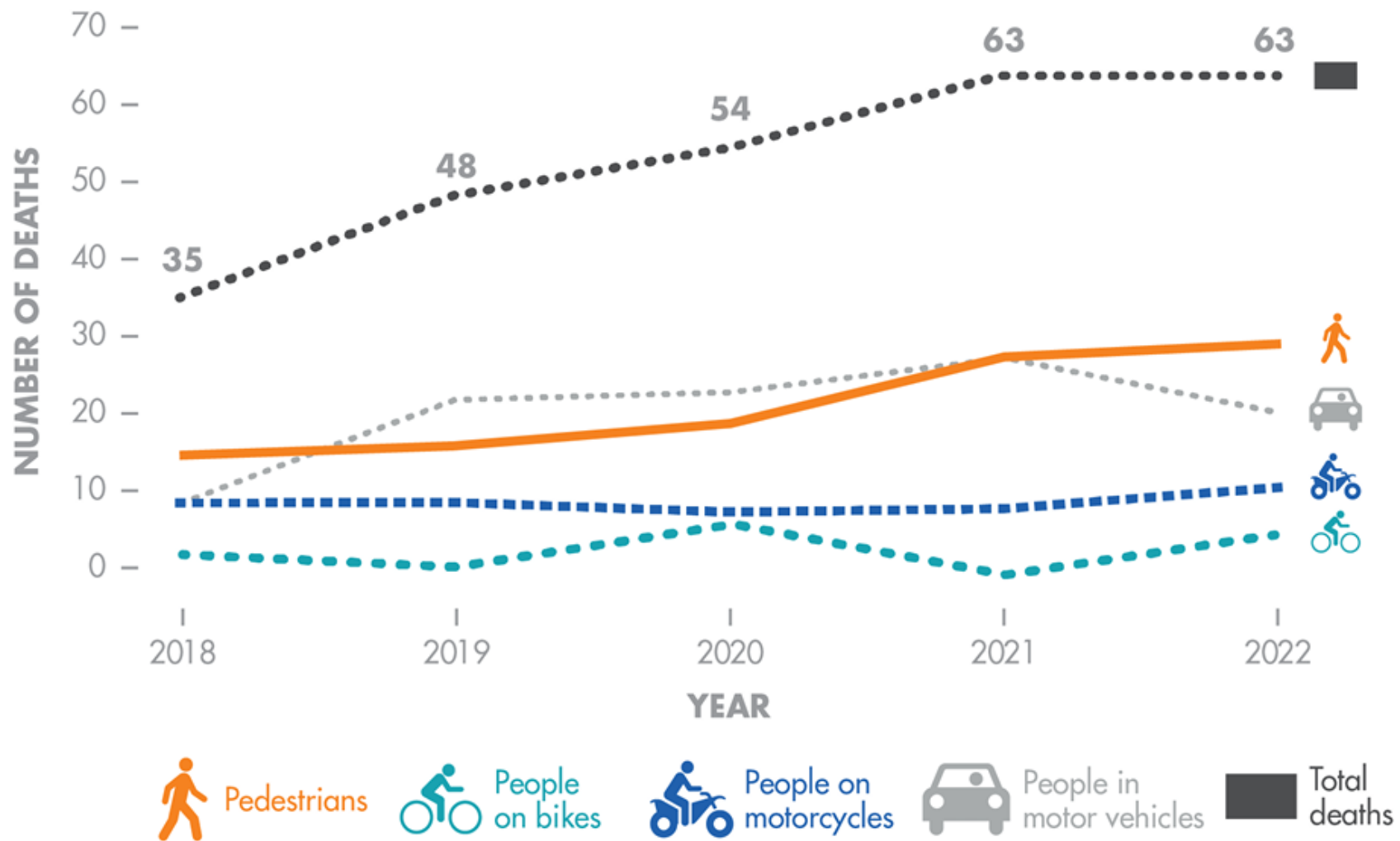
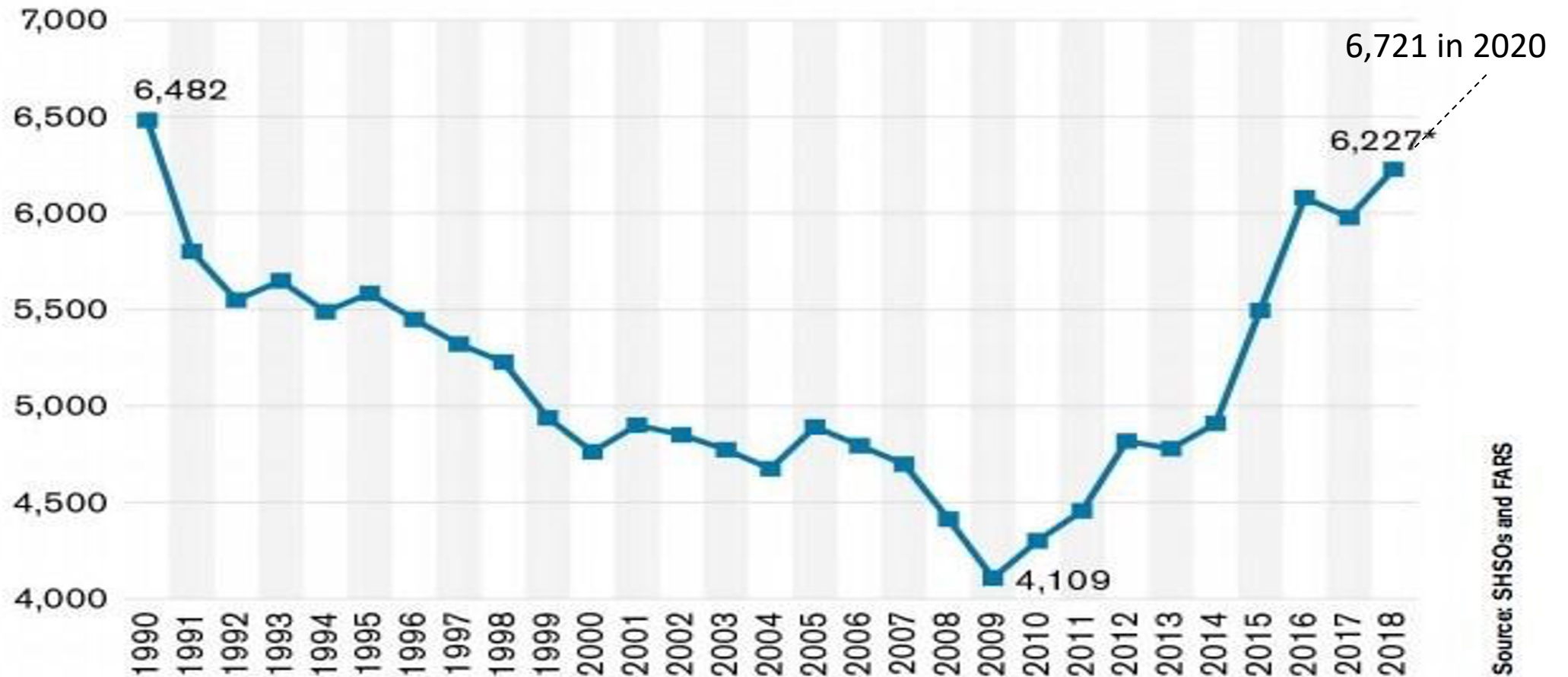


Figure 1. Portland traffic deaths by travel mode, 2018-2022.

Data: Portland Police Bureau (2021-2022), ODOT (2018-2020).

U.S. Safety Performance

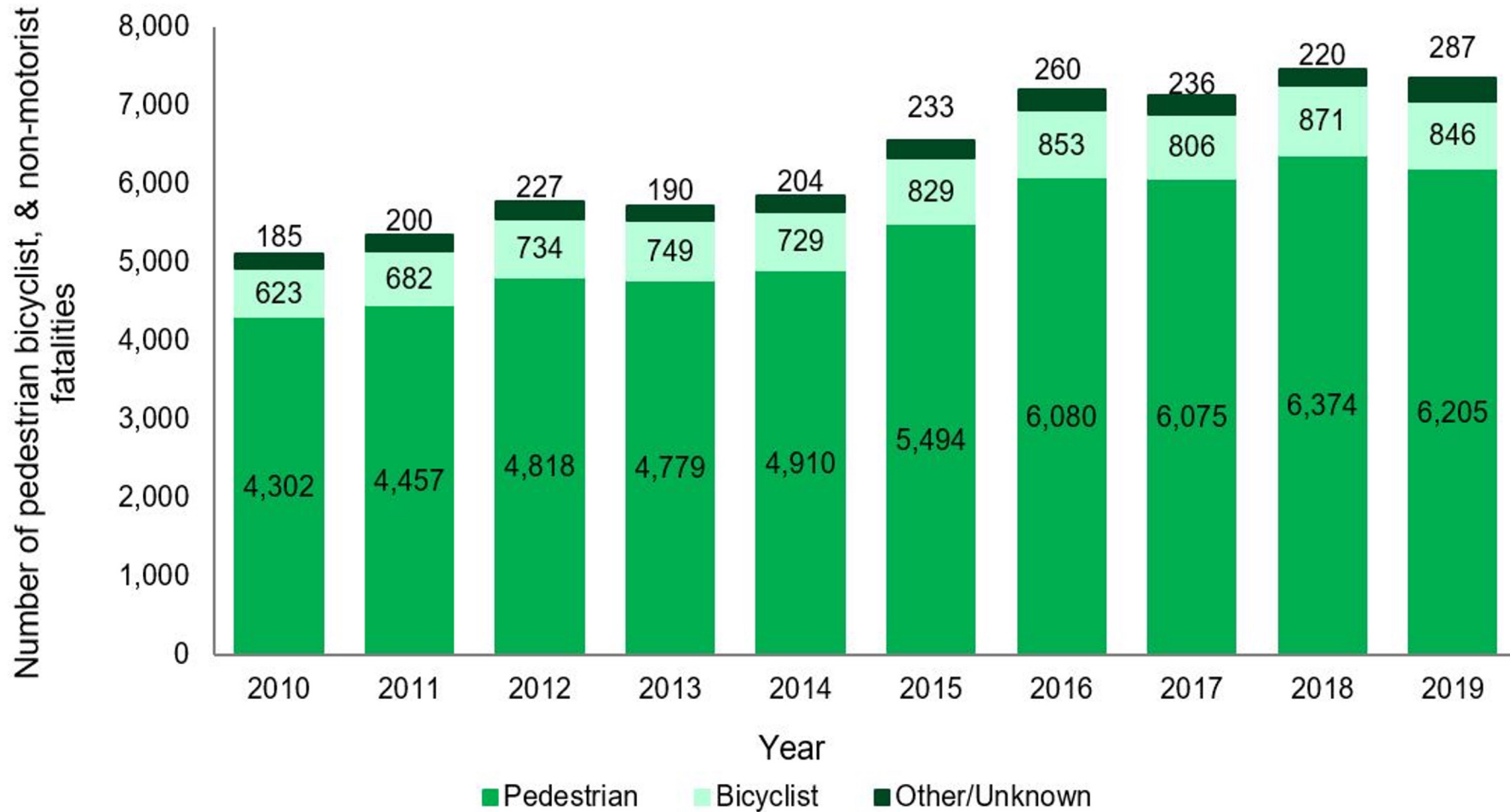
Figure 3 U.S. Pedestrian Fatalities: 1990 - 2018



Source: SHSOs and FARS

* 2018 estimate based on preliminary data and historical trends

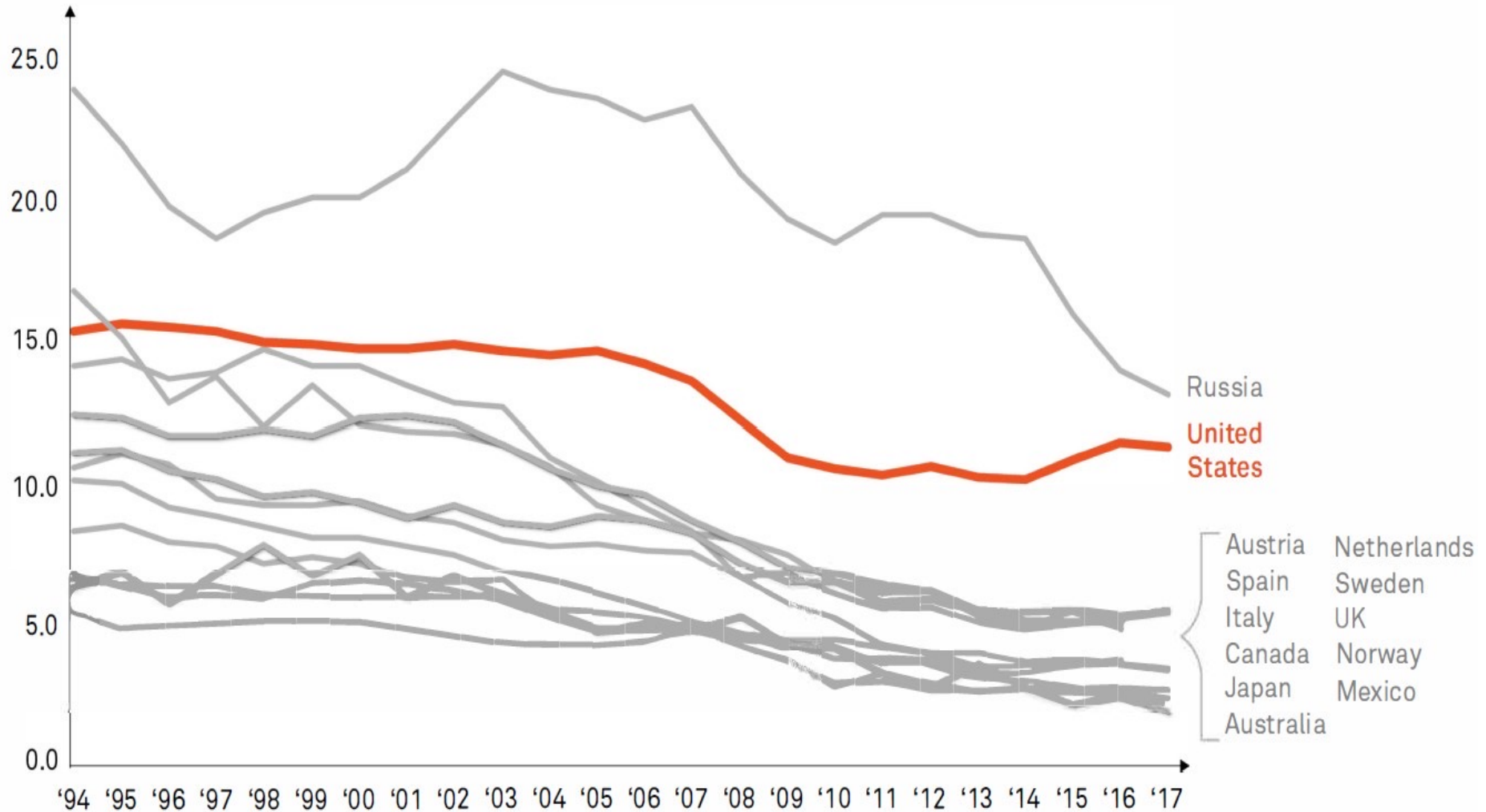
Number of Pedestrian, Bicyclist, & Other Non-Motorist Fatalities



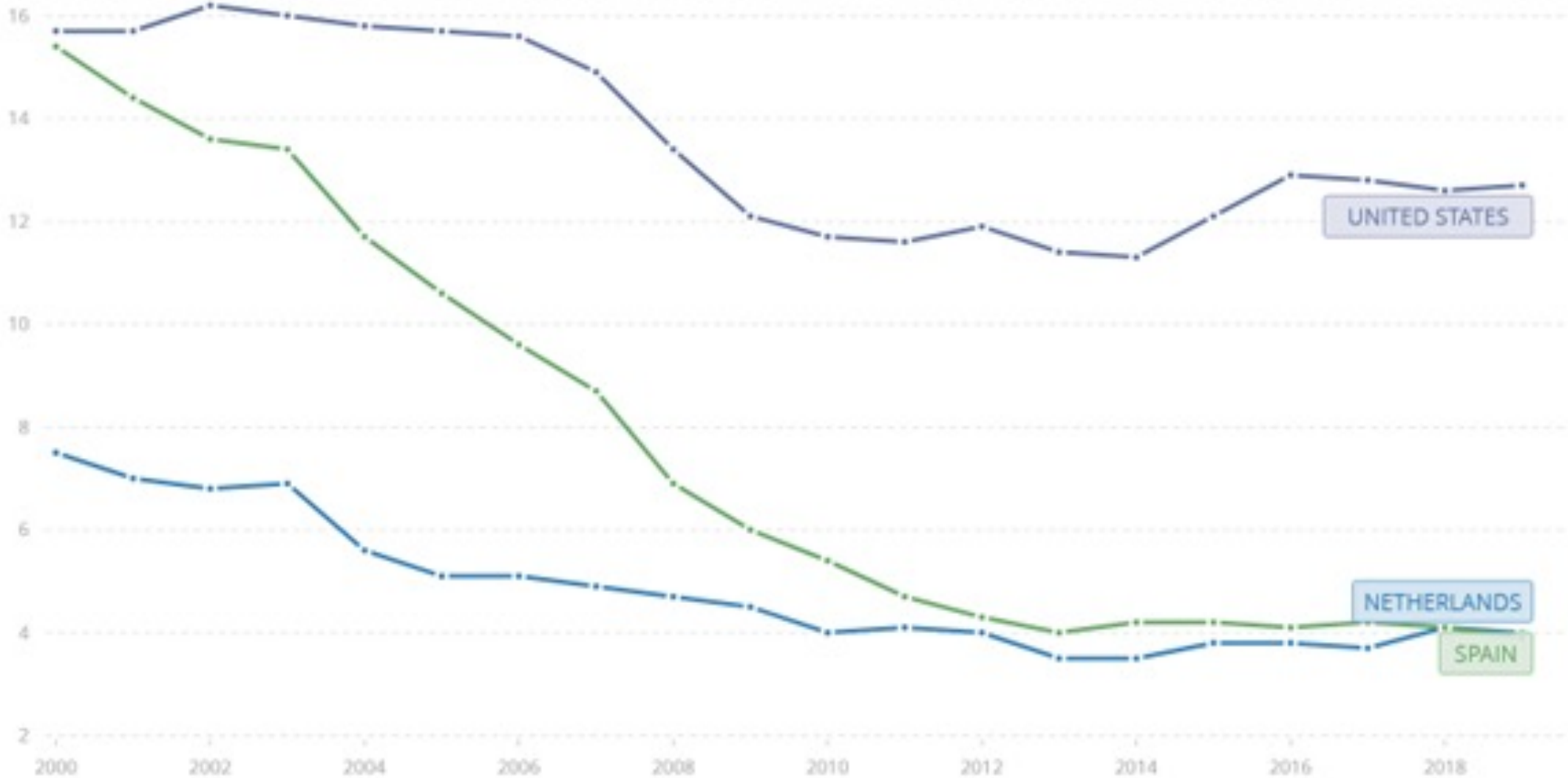
National Highway Traffic Safety Administration. (2021, September 02). Fatality Analysis Reporting System (FARS): 2005-2018 Final File and 2019 Annual Report File (ARF). Version 4.0. Retrieved October 19, 2021, from <https://cdan.dot.gov/query>.

Safety Performance

Deaths per
100,000
population:

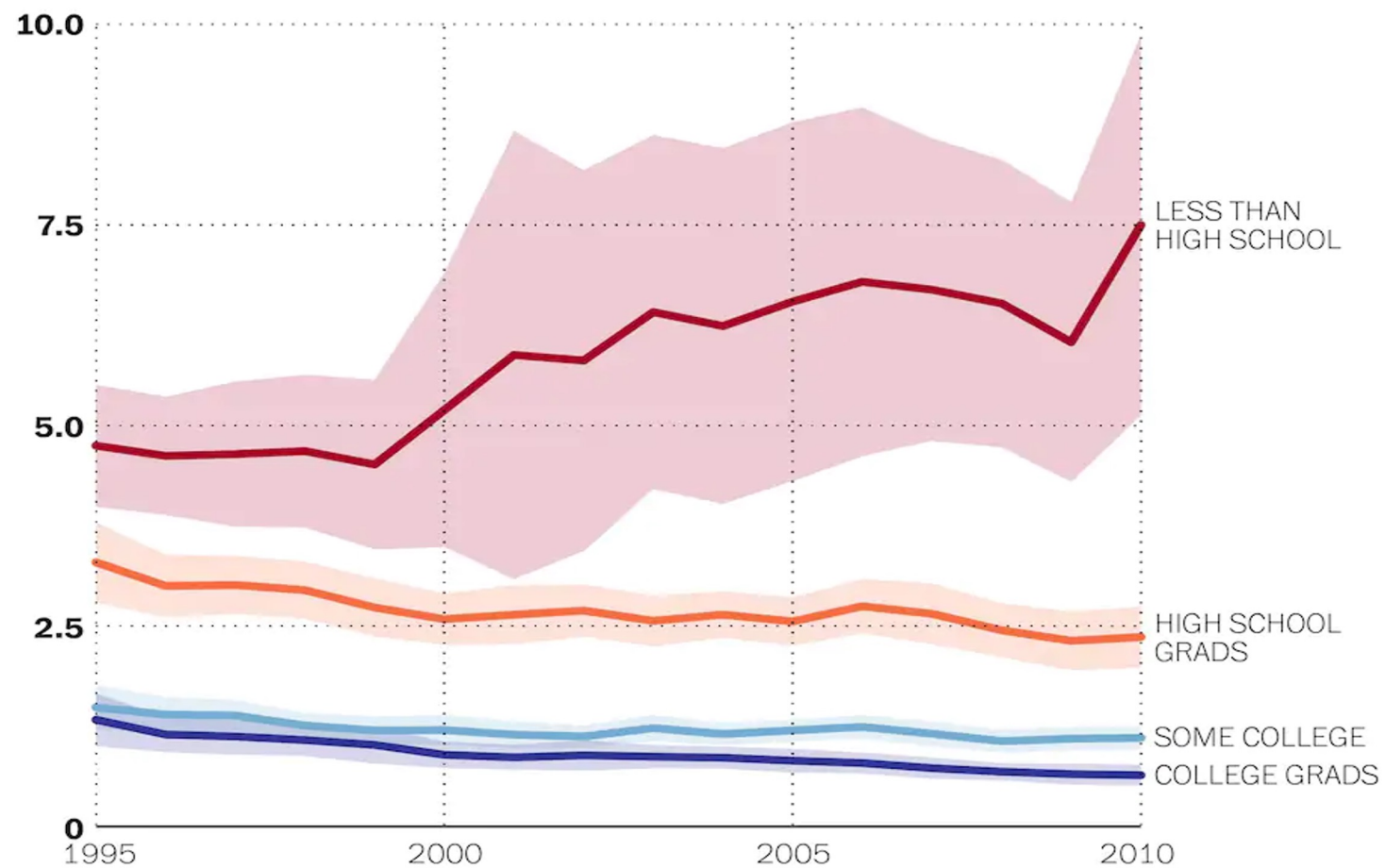


Mortality Rate per Population



The inequality of who dies in car crashes

Motor vehicle crash deaths per 100 million vehicle miles traveled among people aged 25 or older. Shading indicates 95% confidence intervals.



WAPO.ST/**WONKBLOG**

Source: Trends in Socioeconomic Inequalities in Motor Vehicle Accident Deaths in the United States, 1995-2010



The 'Notorious' MUTCD - Why Fixing a Federal Manual is Critical to Safety, Equity...



Watch Later



Share

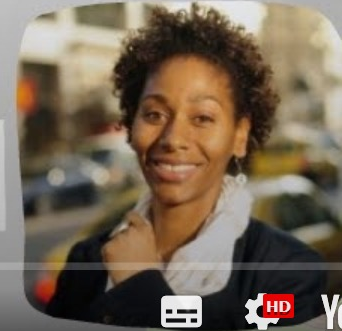
AMERICA WALKS WEBINAR

THE 'NOTORIOUS' MUTCD

WHY FIXING A FEDERAL MANUAL IS CRITICAL TO SAFETY, EQUITY AND CLIMATE



A PANEL OF EXPERTS DISCUSS WHY THE MUTCD MATTERS, WHAT'S WRONG WITH IT, AND HOW YOU CAN HELP.



Watch on YouTube 0:00 / 1:15:03



YouTube



POLICY

A traffic manual 'to fall asleep by' stirs road rage

The 862-page 'Manual of Uniform Traffic Control Devices' is getting an update, and there are differences over vehicles vs. pedestrians



Rainbow colors are inappropriate for crosswalks, says the Manual of Uniform Traffic Control Devices. (Bill Clark/CQ Roll Call)

By **Jessica Wehrman**

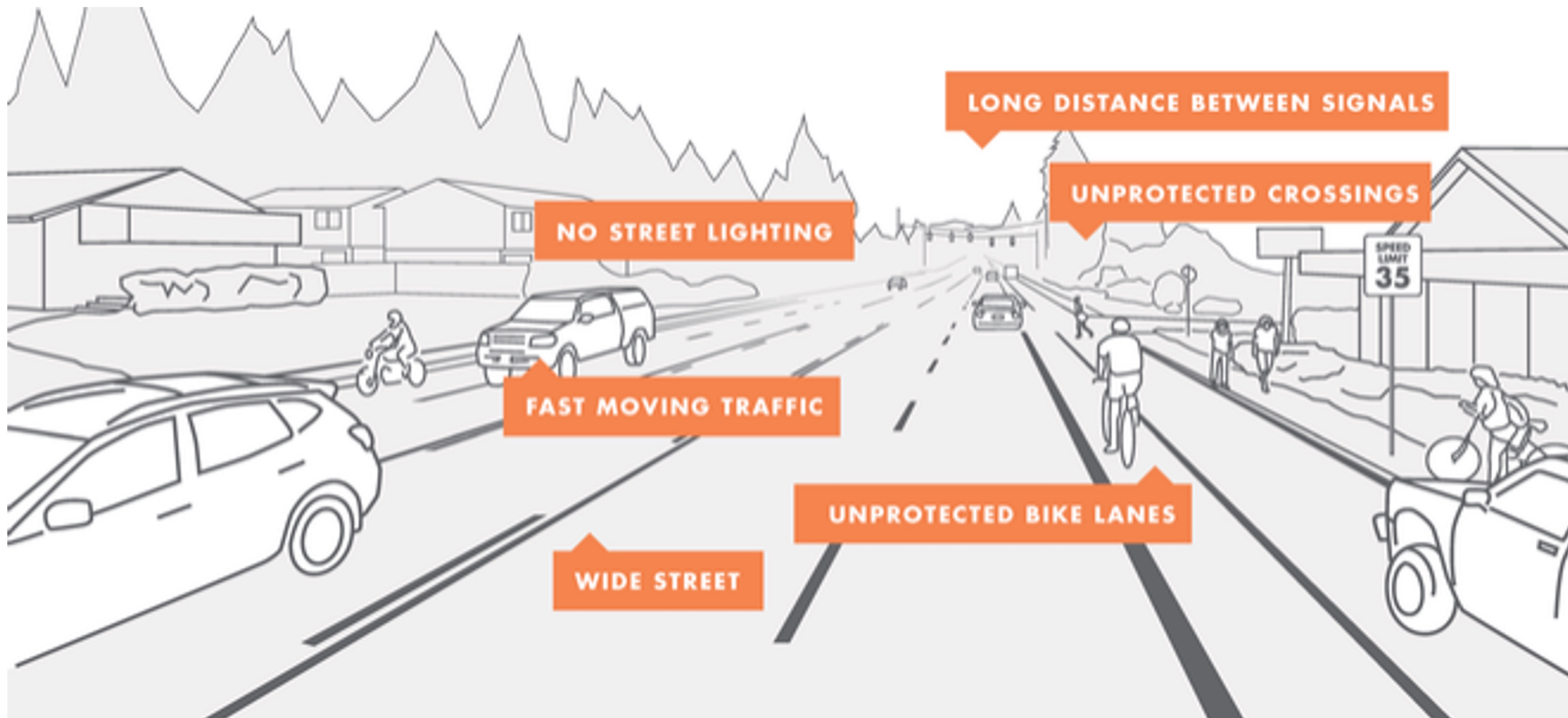
Posted April 5, 2021 at 7:00am

An 862-page manual governing traffic signs and signals that one analyst calls “a good book to fall asleep by” has ignited a pitched battle over how the federal government approaches transportation policy.



“How that manual is written and what it calls for could actually have a lot of consequences in terms of how people get around, in terms of safety, even in terms of equity”

Why is the MUTCD “Notorious”







Barcelona









MAY USE
FULL LANE

Neighborhood
Greenway

P

Transportation Policy

- Speed Kills – Physics is well established
- Climate is Warming – Science is real
- Demand is price sensitive – build it, they will come
- Realities – Change is hard

Portland's Response

Reframe the MUTCD as a proactive safety regulation

1. Rescind the NPA and rewrite for proactive safety.
2. Publish a revised back-to-basics manual focused on core regulation
3. Increase the diversity of the people involved

PBOT

PORTLAND BUREAU OF TRANSPORTATION

1120 SW Fifth Ave, Suite 1331, Portland OR 97204

Main: 503-823-5185 TTY: 503-823-6868 Fax: 503-823-7576 Portland.gov/Transportation

Jo Ann Hardesty Commissioner Chris Warner Director

March 11, 2021

Stephanie Pollack, Acting Administrator
Federal Highway Administration / US Department of Transportation
1200 New Jersey Ave S.E.
Washington, DC 20590

RE: Request for reframing the MUTCD as a proactive safety regulation

Dear Acting Administrator Pollack:

The Portland Bureau of Transportation respectfully **requests that FHWA reframe and rewrite the Manual on Uniform Traffic Control Devices (MUTCD), creating a path for the creation of comprehensive safety-based guidance.** Doing so will allow FHWA and the Biden Administration to make strides towards equity and sustainability, while reducing traffic deaths and serious injuries.

Portland, Oregon is well-known for its effective and efficient transportation system. Portland has realized great success applying the local and long-developed knowledge of our traffic engineers and others to create transportation networks that emphasize the movement of people by walking, bicycling, and using transit. We have developed a system reflecting best practices from Portland and other cities in the U.S. and around the world. We consistently look to cities that advance the goals commonly held to improve safety, reduce emissions, and address growth in a sustainable manner.

MUTCD Comments and Concerns

- Rewrite and Revise to address outdated practices
 - Speed limits that address NTSB recommendations
 - Signal warrants that addresses multimodal inequities
 - Pedestrian signal heads should not be optional at a traffic signal
 - Integration of needs of all users
- Specific Concerns
 - Accessibility as a requirement
 - Bike facilities as a starting point
 - Street lighting is key for traffic control

Pedestrian Signal Heads – Chapter 4E Section 4E.01

Support:

- 01 Pedestrian signal heads provide special types of traffic signal indications exclusively intended for controlling pedestrian traffic. These signal indications consist of the illuminated symbols of a WALKING PERSON (symbolizing WALK) and an UPRAISED HAND (symbolizing DONT WALK).

Guidance:

- 02 *Engineering judgment should determine the need for separate pedestrian signal heads (see Section 4D.03) and accessible pedestrian signals (see Section 4E.09).*

The design and operation of traffic control signals shall take into consideration the needs of pedestrians, but pedestrian signal heads are not always required. (4D.03)

NACTO Discussion on MUTCD

- Traffic control devices are prohibited unless they're allowed
- FHWA unilaterally decides what counts as a TCD
- Manual adopted as a regulation (with 'shall' & 'shall not' language) but majority of text is guidance, clarification/support for other statements
- Many jurisdictions and practitioners assume that illustrations are also standards
- Circularity of permission to experiment cuts off FHWA from its best sources of information

Are we designing for the future we want?



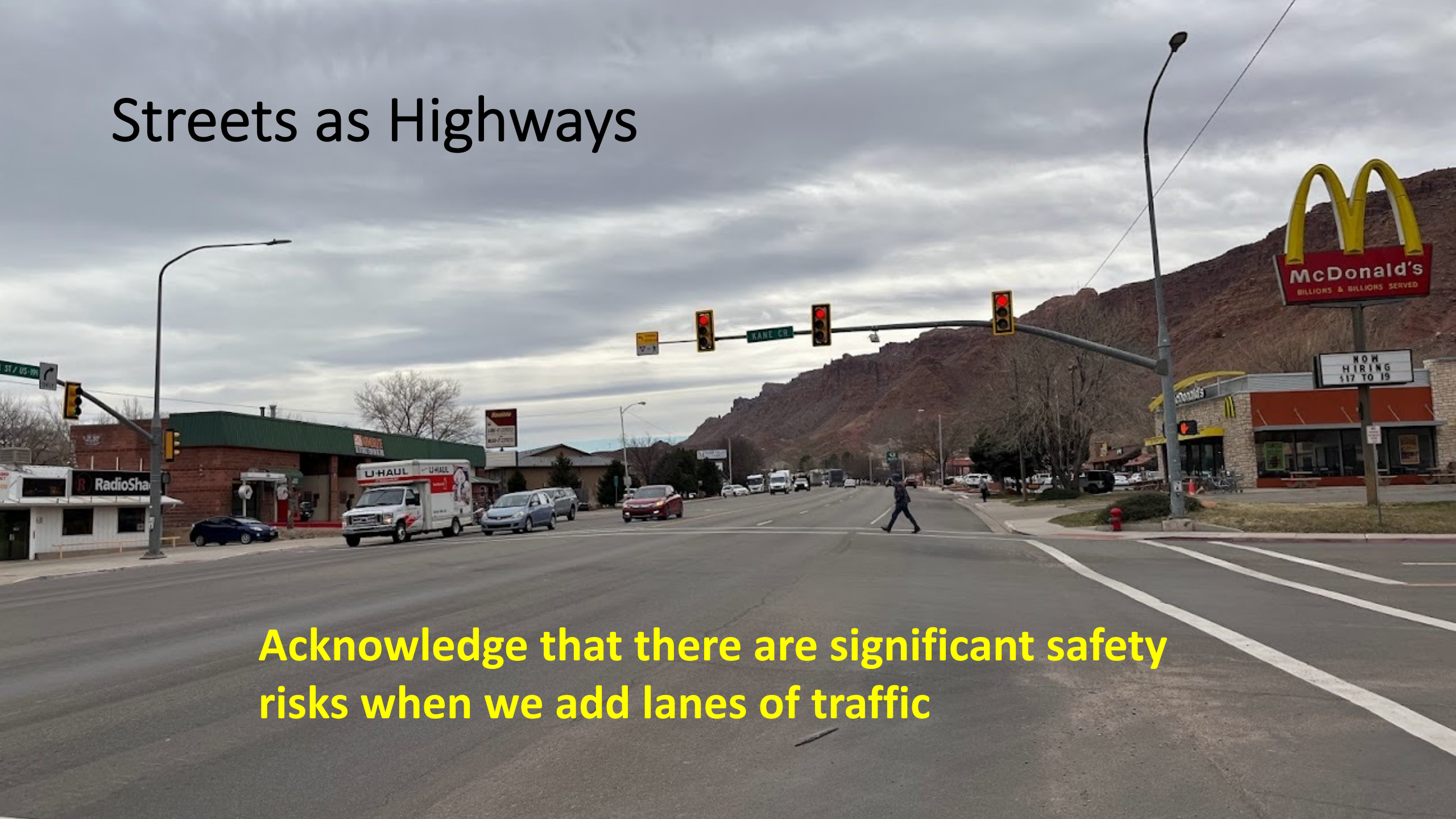
Confessions of a Traffic Engineer



Confessions of a Traffic Engineer

1. Streets as Highways – cross section
2. Speed Limit – context matters
3. Treatments for accountability
4. Street lighting
5. No Turn on Red
6. Leading Pedestrian Intervals

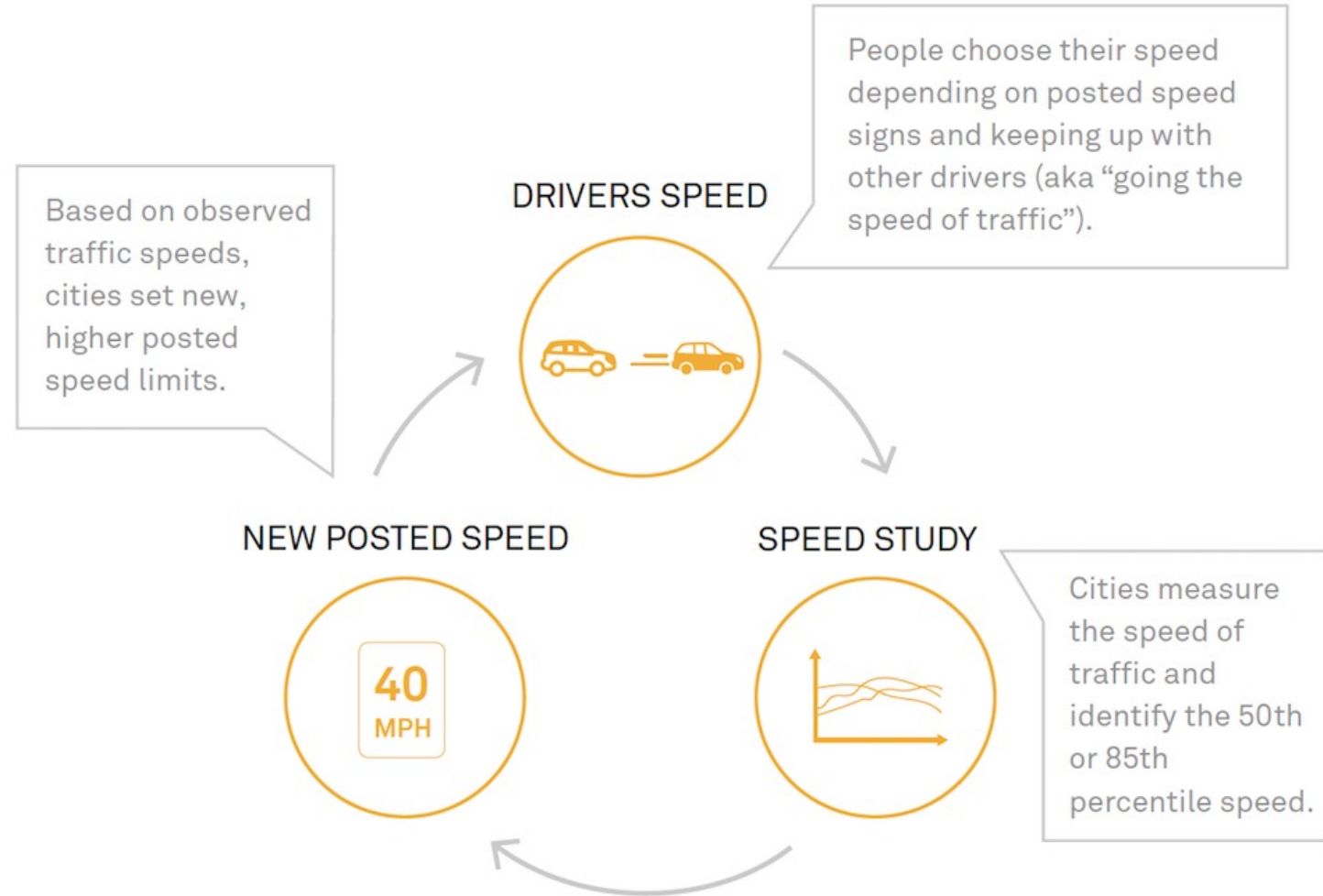
Streets as Highways



Acknowledge that there are significant safety risks when we add lanes of traffic

Speed Limit Setting

- National Committee has adopted more flexibility for how an agency sets speed limits
- WSDOT has an Injury Minimization concept that is a paradigm shift



Source: NACTO

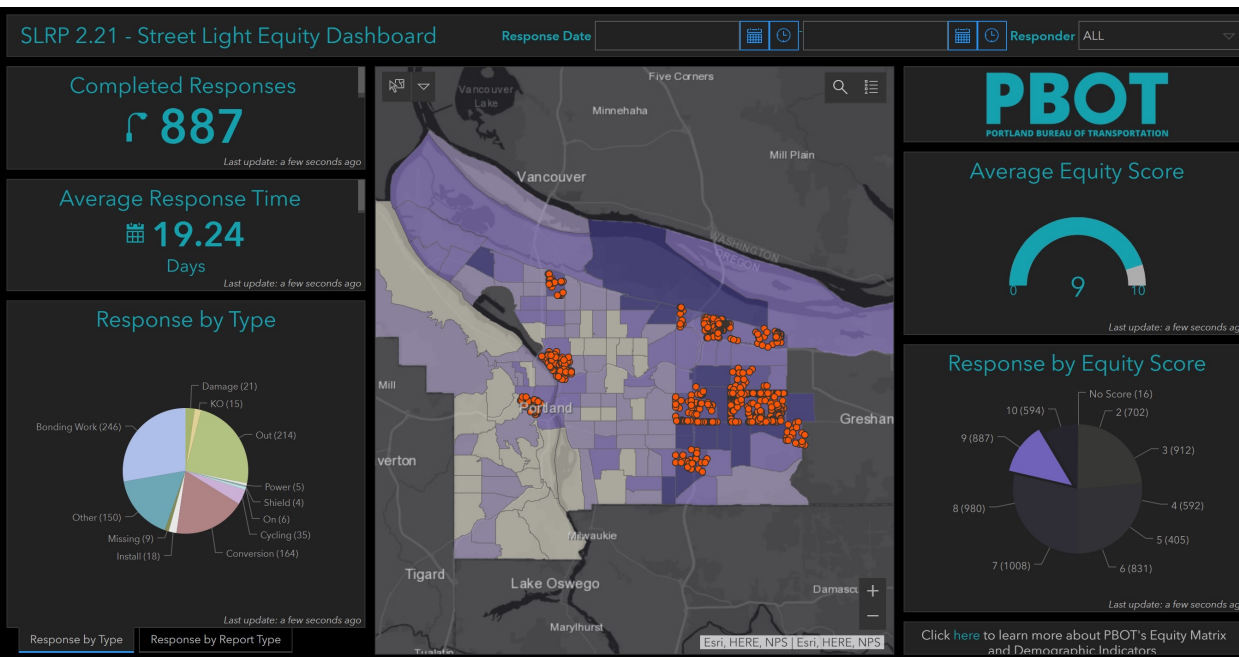
Signals that hold people accountable

- Use automated enforcement strategically in the City
- Expand locations to address safety
- Deploy with thoughtful consideration to equity



Street Lighting

- Encourages higher yielding rates to pedestrians
- Improves multimodal safety
- Basic service that advances equity



No Turn on Red

- The Energy Policy and Conservation Act of 1975 mandated that states allow right turns at red signals.
- To receive federal highway money, states were required to adopt what was then seen as a fuel conservation measure.
- Right on red remains the law of the land in most of the U.S., unless prohibited by signage. (Turning right on red was never adopted in New York City, outside of certain intersections on Staten Island.)
- MUTCD allows/requires turn restrictions for specific applications

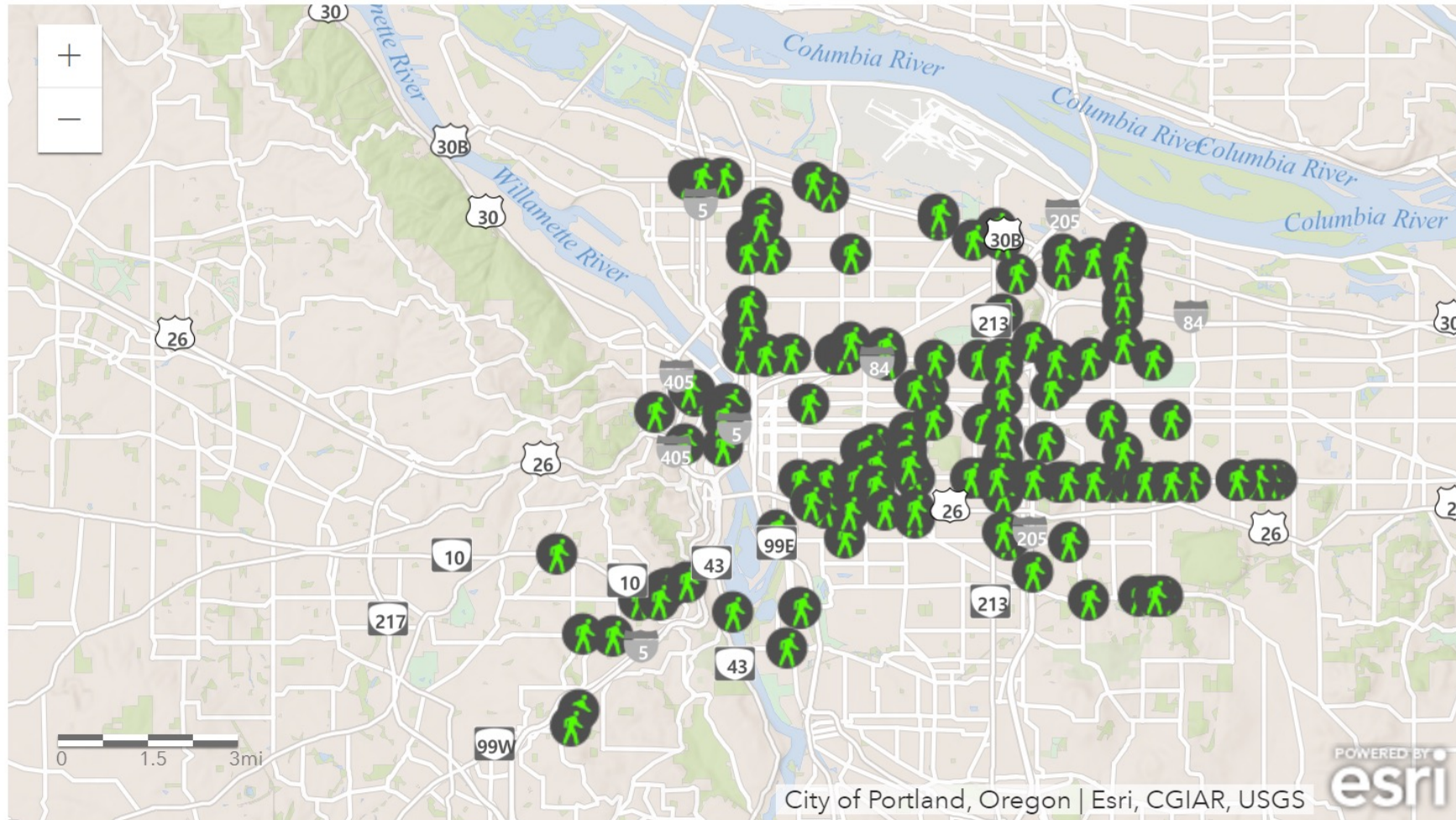
No Turn on Red Next Steps

- Follow SF, DC, Seattle progress on this issue
- For PBOT, assume Turn on Red restrictions as a starting point
- Require No Turn on Red with
 - bike signals,
 - bike boxes,
 - Leading pedestrian intervals,
 - Pedestrian priority areas.



Leading Pedestrian Intervals

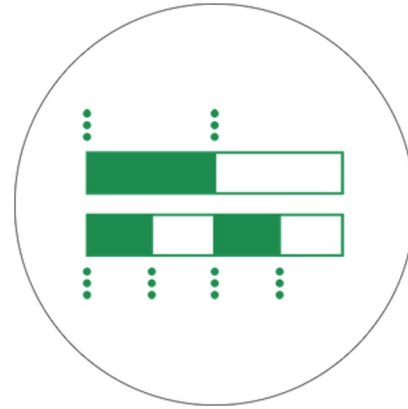
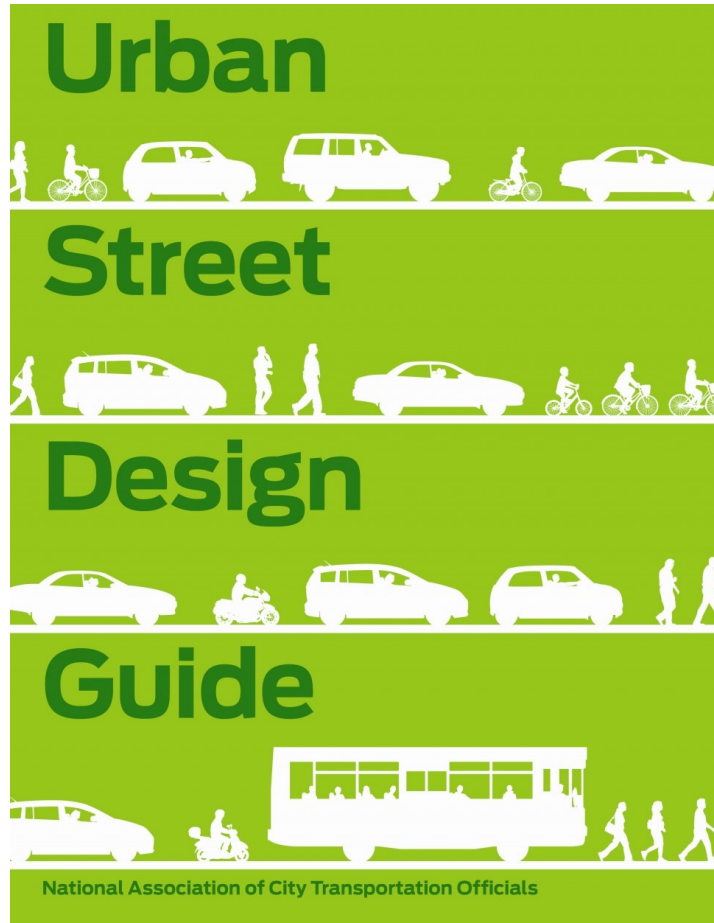
View Portland's Pedestrian Head Starts signals with this map:



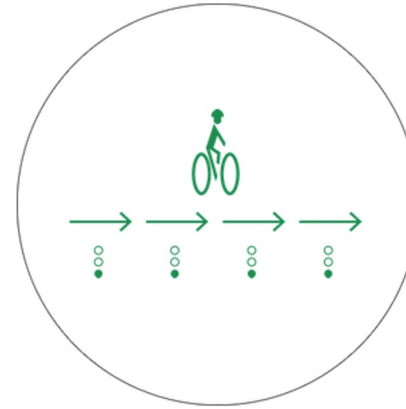
Traffic Signal Opportunities

1. Signals that delay pedestrians – coordination
2. Signal timing – low cycle length
3. Signals that speed cars – progression speed
4. Signals ignore transit – transit signal preemption/priority
5. Signals that ignore cyclists – bike signals
6. Signals that address needs of the blind community – APS/ADA

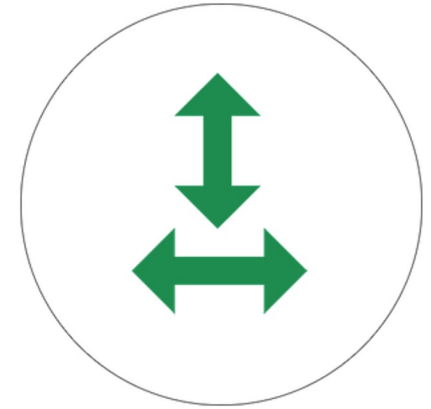
Signalization Principles



Keep Cycles Short



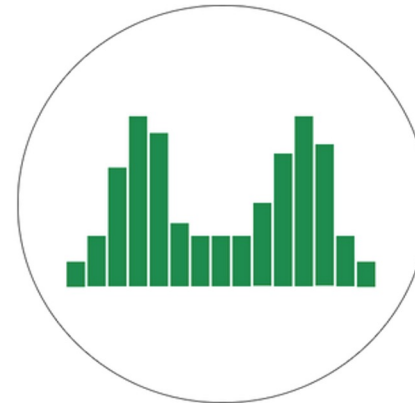
Prioritize VRUs



Signal Phasing



Use Intended
Speed



Adjust by Time
of Day



Context Sensitive
Timing

Signals timed for slow speed traffic

- Traffic signal timing is invisible urbanism
- Time and/or space can be used effectively to implement objectives



Signal Phasing – Protected Turns

- Increased pedestrian comfort
- Improved safety
- Improve vehicle turning capacity
- Guidance to references in MUTCD is lacking
- More research is necessary



Source: Dongho Chang

Traffic signals that prioritize people



Signals that inform and acknowledge cyclists



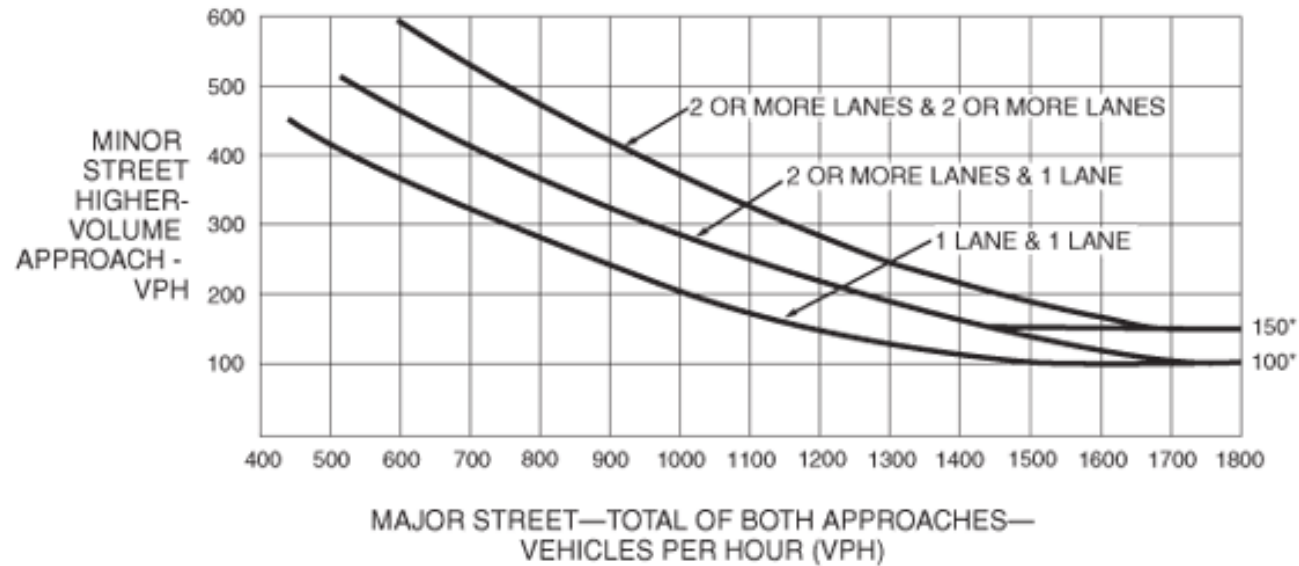
Signals that address Vulnerable Users

- Not required in the MUTCD NPA
- Will they be in the new edition?
- PROWAG & ADA
- Consider new solutions...



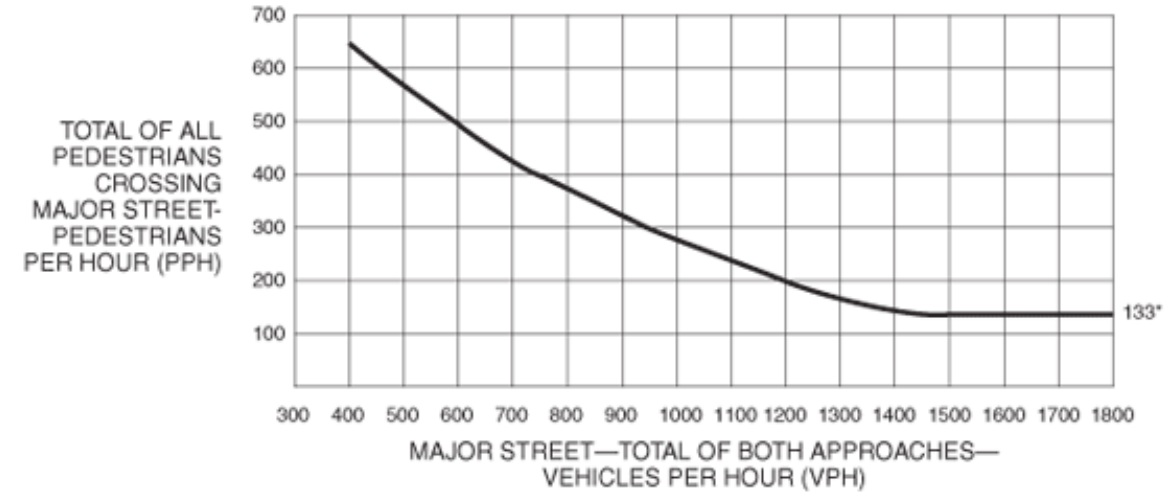
Does the MUTCD value vehicles more important than pedestrians?

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-7. Warrant 4, Pedestrian Peak Hour



*Note: 133 pph applies as the lower threshold volume.

Does the MUTCD value uniformity more than innovation?

- **Section 4D.13 Lateral Positioning of Signal Faces**

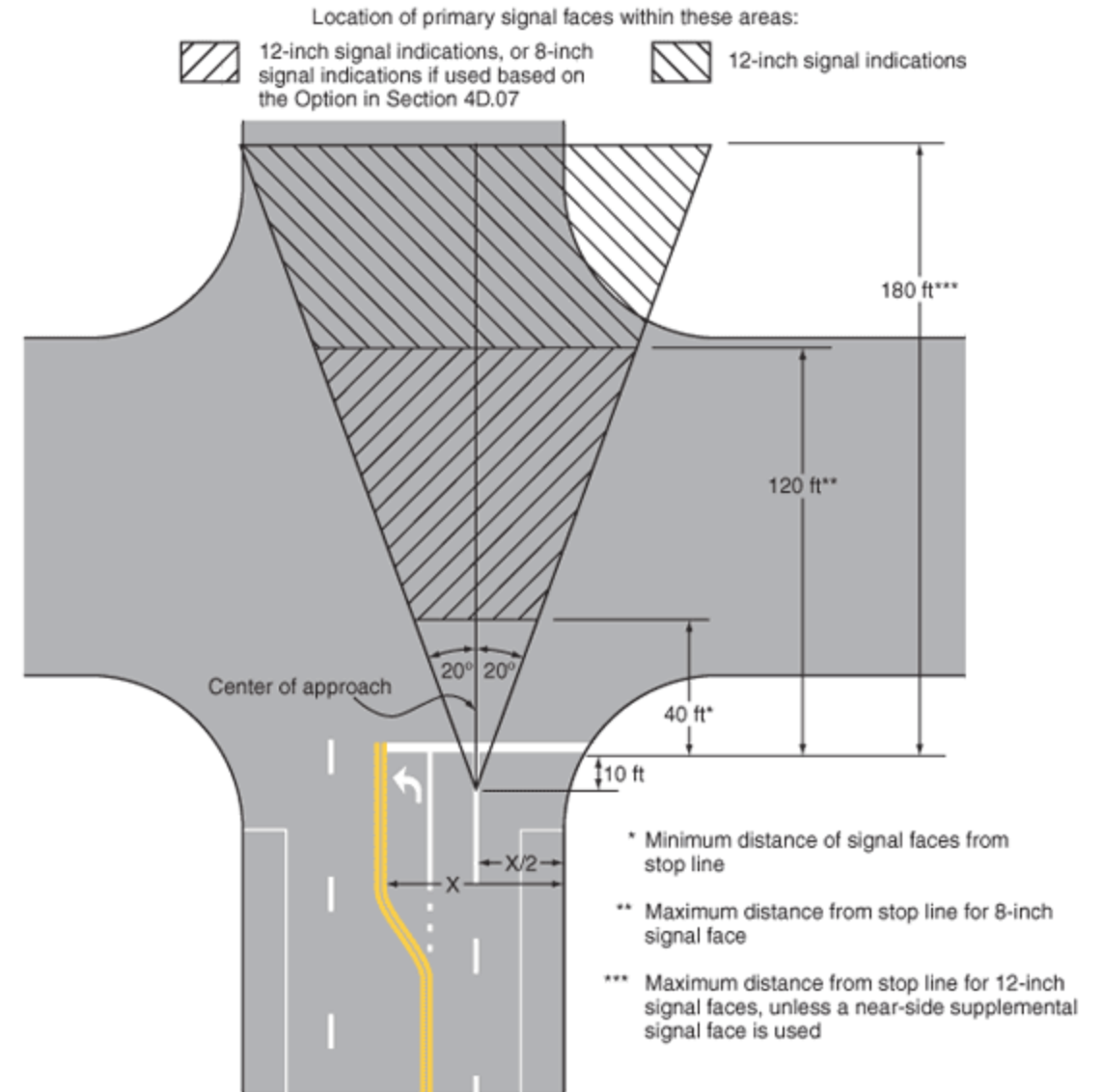
- **Standard:**

01 At least one and preferably both of the minimum of two primary signal faces required for the through movement (or the major turning movement if there is no through movement) on the approach shall be located between two lines intersecting with the center of the approach at a point 10 feet behind the stop line, one making an angle of approximately 20 degrees to the right of the center of the approach extended, and the other making an angle of approximately 20 degrees to the left of the center of the approach extended. The signal face that satisfies this requirement shall simultaneously satisfy the longitudinal placement requirement described in [Section 4D.14](#) (see [Figure 4D-4](#)).

Figure 4D-4 Lateral and Longitudinal Location of Primary Signal Faces

- Predictable locations for signal indications are useful for high speed roadways
- Are they equally important for lower speed facilities?

Figure 4D-4. Lateral and Longitudinal Location of Primary Signal Faces



Notes:

1. See Section 4D.11 for approaches with posted, statutory, or 85th-percentile speeds of 45 mph or higher
2. See Section 4D.13 regarding location of signal faces that display a CIRCULAR GREEN signal indication for a permissive left-turn movement on approaches with an exclusive left-turn lane or lanes



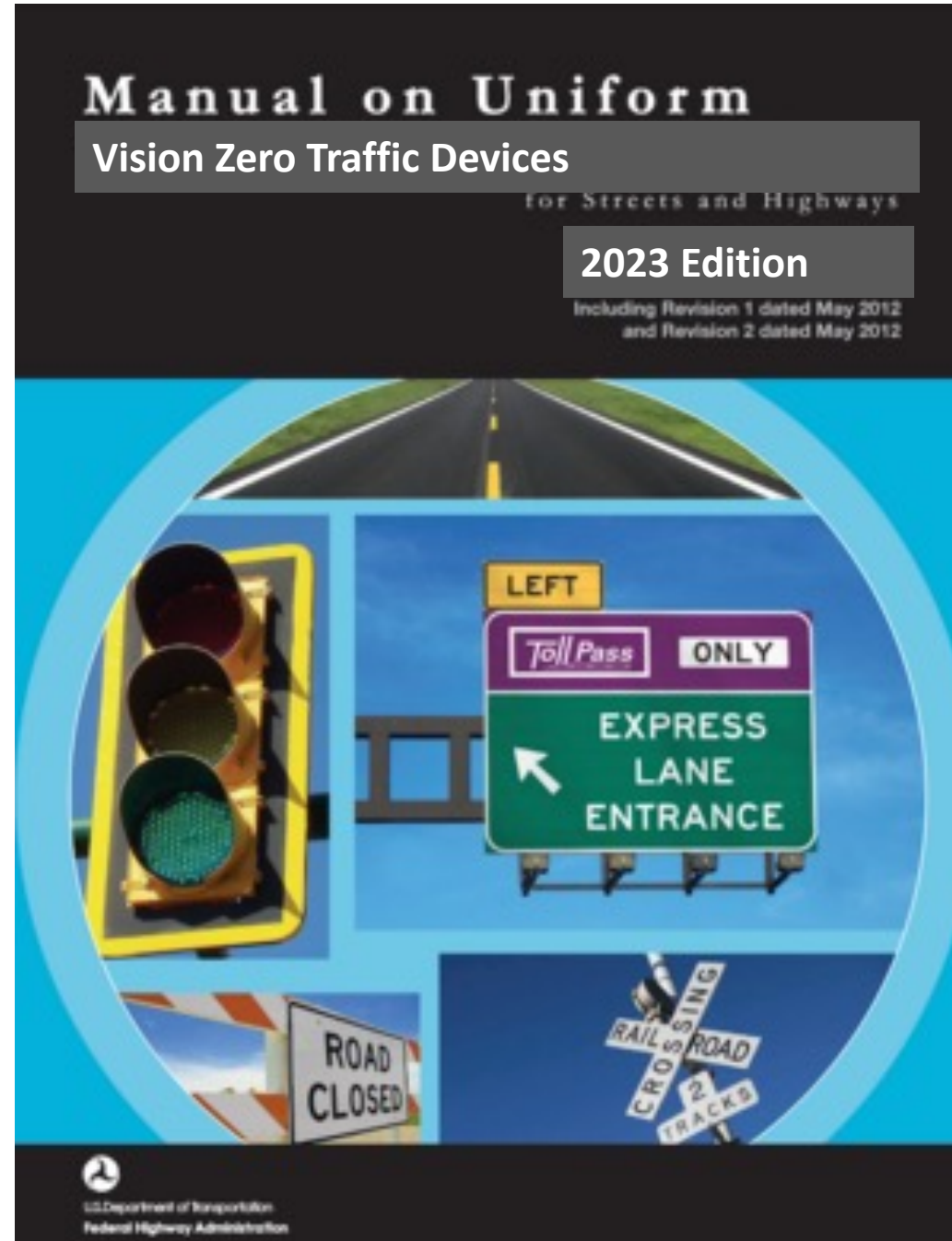







MUVZTD

Manual of Uniform
Vision Zero Traffic
Devices??



Recommendations for the Engineering Community

- Strengthen ties to research programs and encourage innovation within Cities
 - Integration research into Bipartisan Infrastructure Law grants
 - Build stronger City to City consortiums working on technical topics
 - Encourage stronger partnerships with University Transportation Centers
- Reconsider an Urban Version of the MUTCD that focuses on low speed considerations for future edition
- Adopt proven countermeasures and actions from countries that are achieving policy goals



LET KNOWLEDGE SERVE THE CITY

Discussion