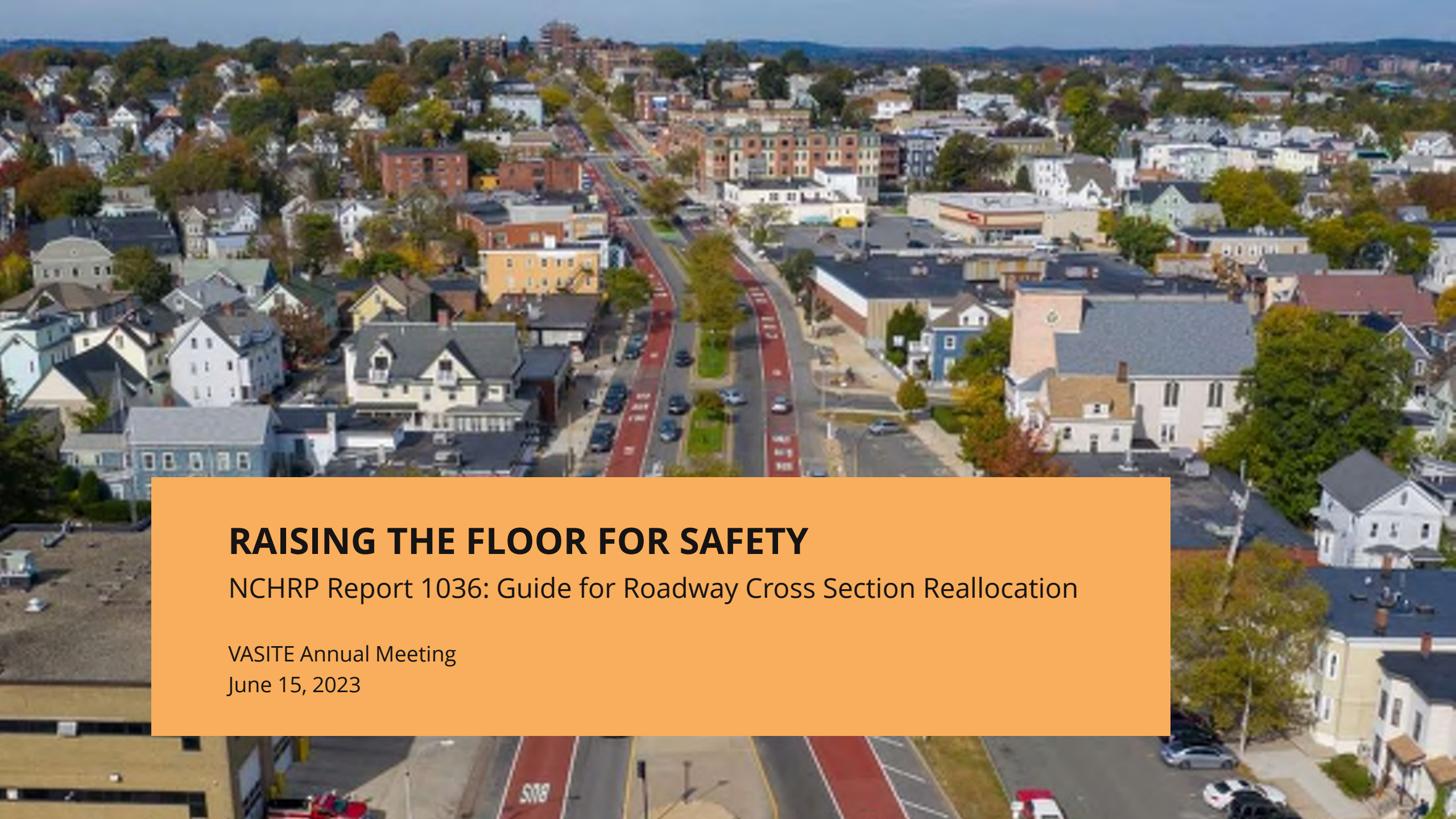


RAISING THE FLOOR FOR SAFETY

NCHRP Report 1036: Guide for Roadway Cross Section Reallocation

VASITE Annual Meeting
June 15, 2023

Raising the Floor For Safety – Guide for Cross Section Reallocation (aka NCHRP 1036)

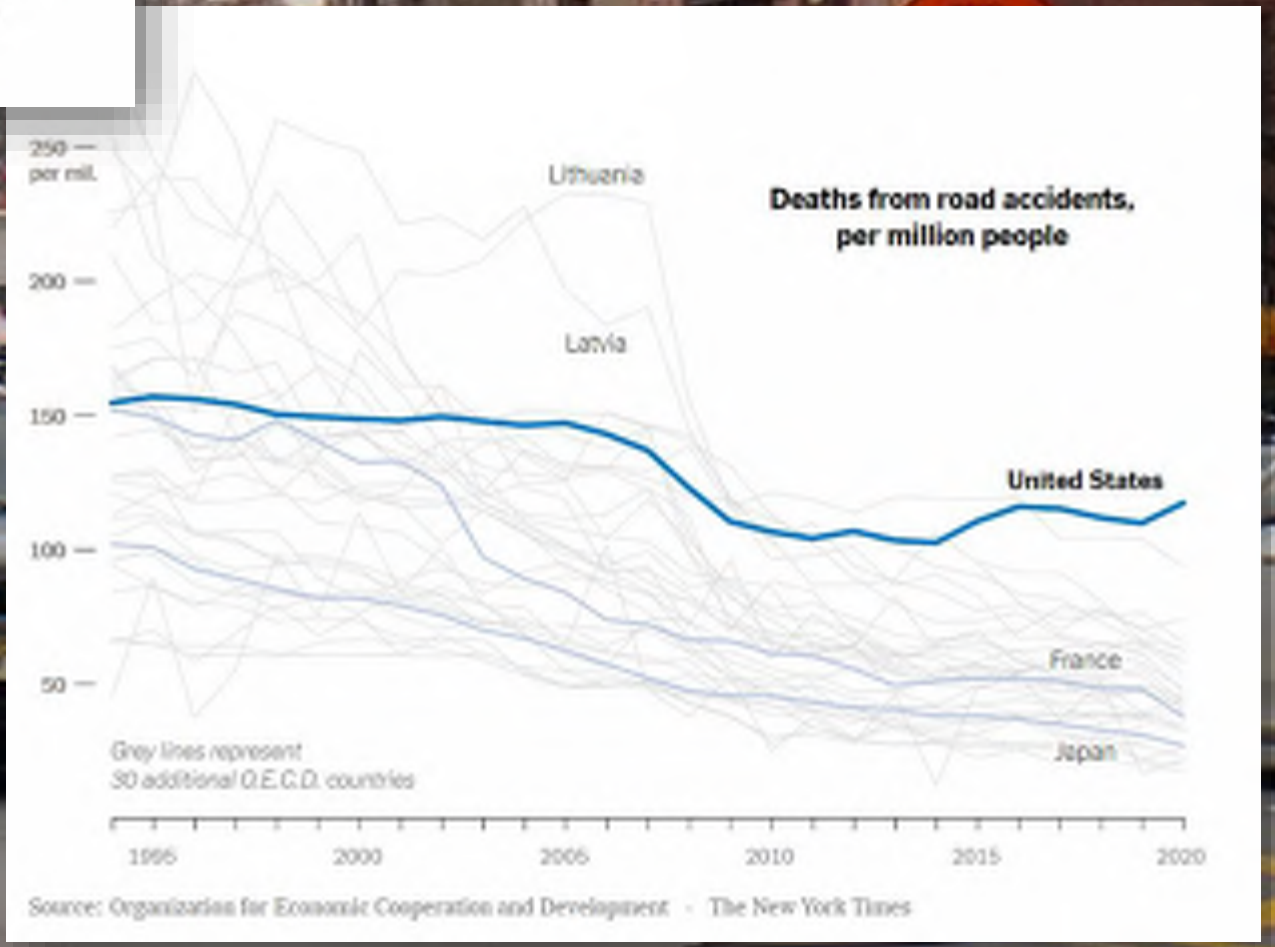
- Why + Who
- What: Three key takeaways
  - Daylighting decision making
  - Raising the floor for safety
  - All day operations
- How could you use this research?

Nov. 27, 2022

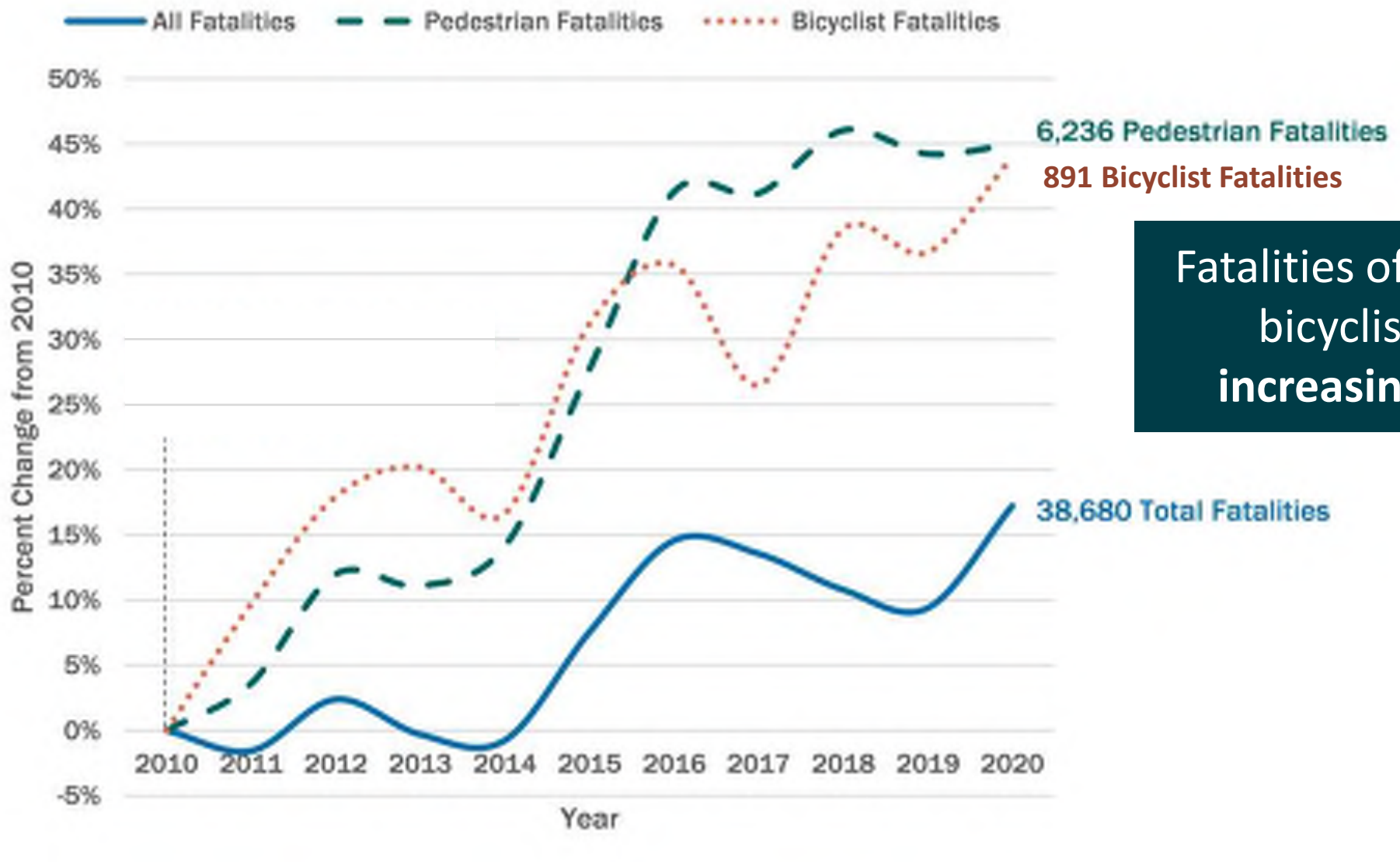
The New York Times

The Exceptionally American Problem of Rising Roadway Deaths

Why other rich nations have surpassed the U.S. in protecting pedestrians, cyclists and motorists.



WE HAVE A NATIONAL ROADWAY SAFETY PROBLEM – AND IT IS GETTING WORSE… ESPECIALLY FOR PEOPLE WALKING AND BIKING



Fatalities of pedestrians and bicyclists have been **increasing even greater**

Source: US DOT

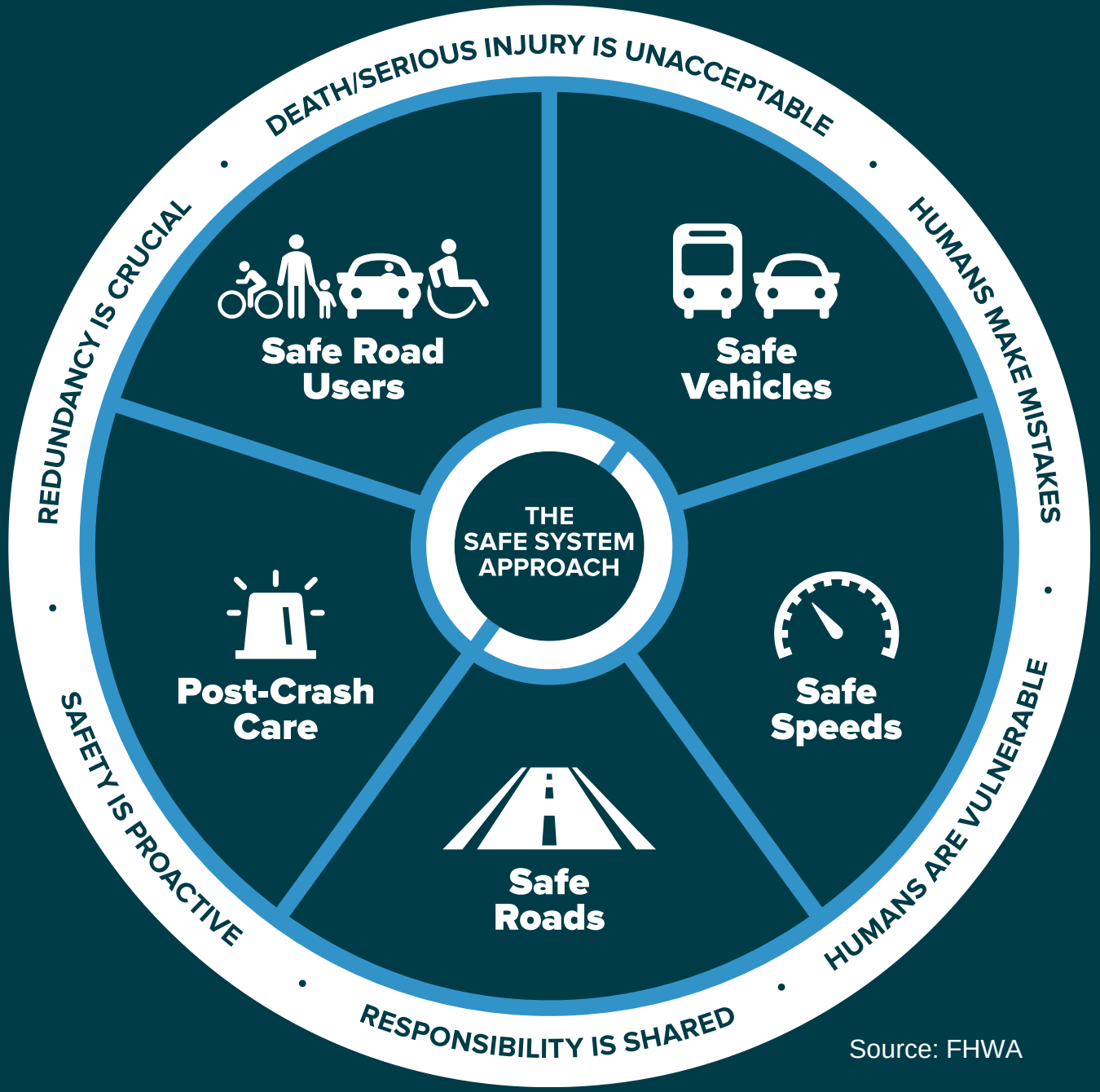
FHWA IS LEADING THE SHIFT – TO THE SAFE SYSTEM APPROACH

The **Safe System Approach** aims to eliminate fatal and serious injuries for all road users by:

Accommodating human mistakes

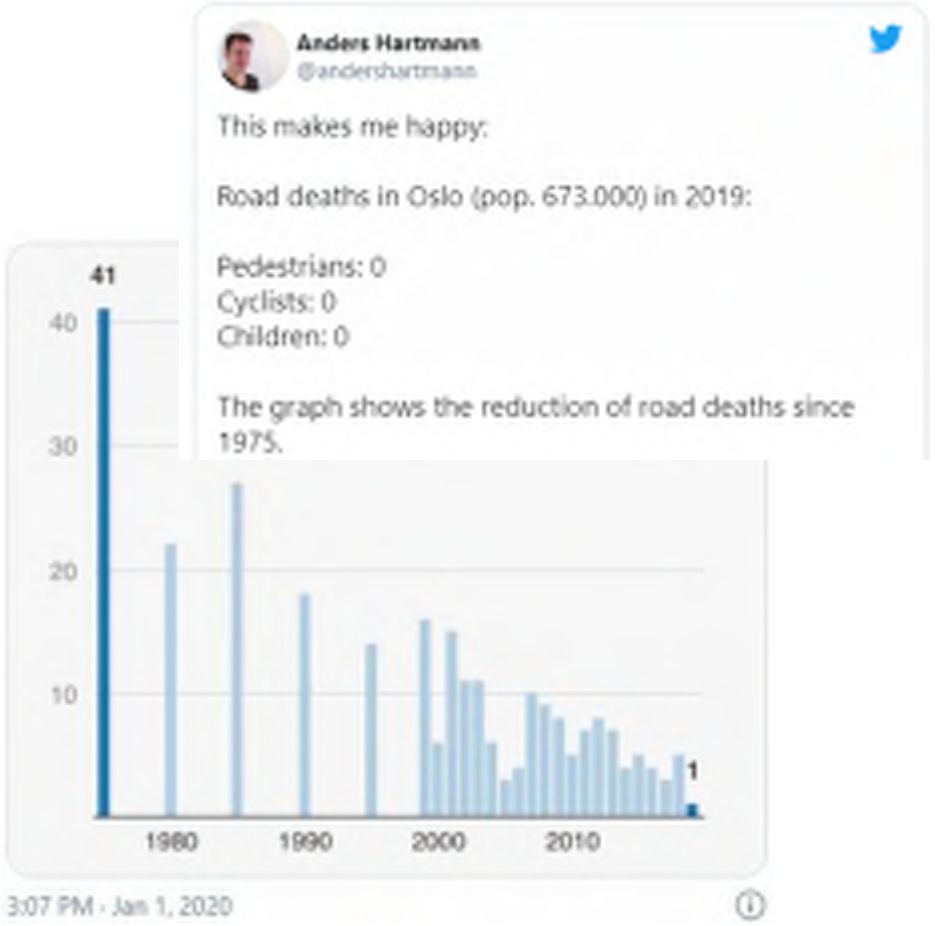
Keeping impacts on the human body at tolerable levels

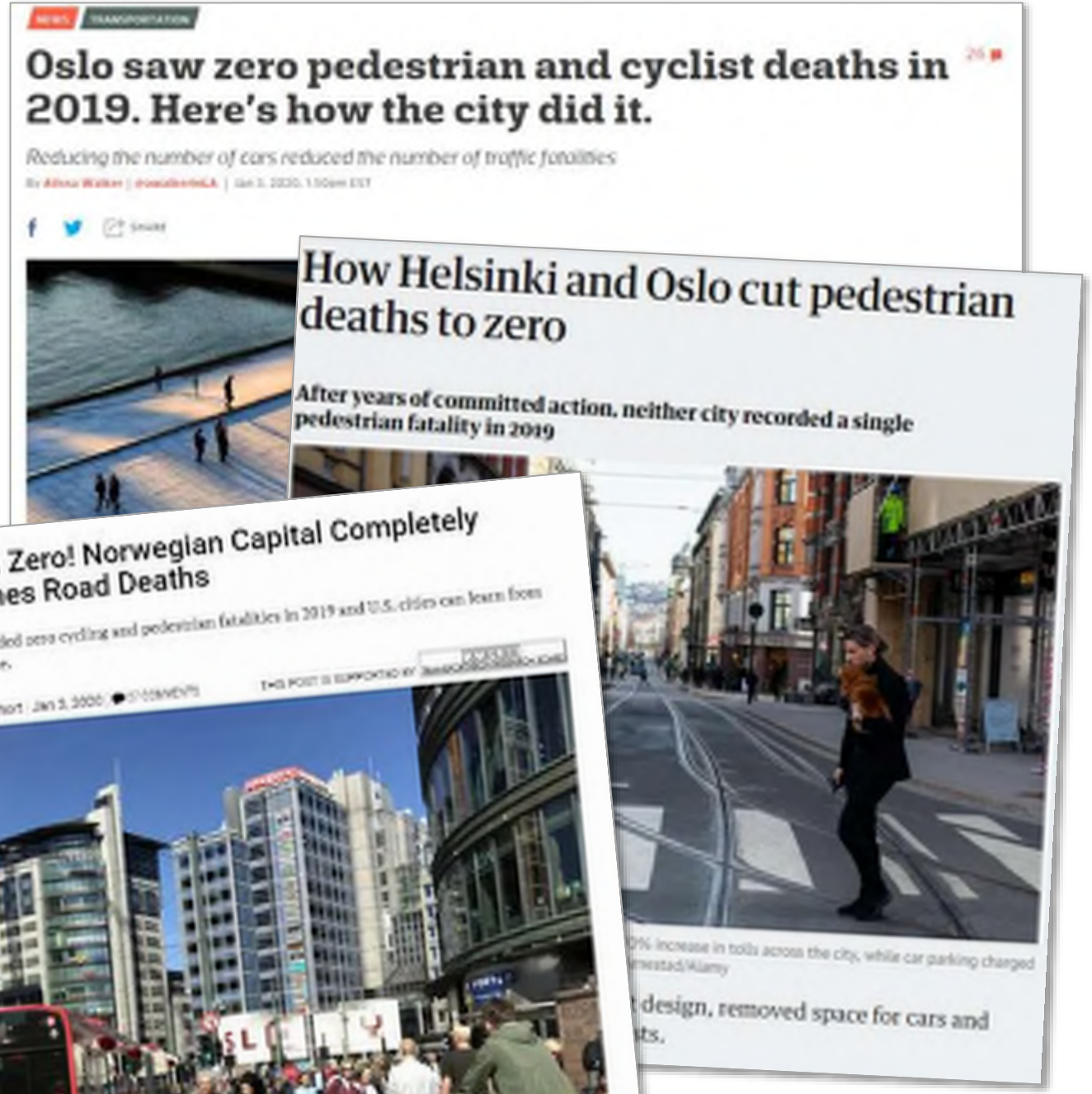
THE SAFE SYSTEM APPROACH



Source: FHWA

ZERO IS POSSIBLE – OSLO, NORWAY





HOBOKEN VISION ZERO

CURBED

GETTING AROUND | JUNE 17, 2022

Hoboken Hasn't Had a Traffic Death in Four Years. What's It Doing Right?

By Christopher Robbins

Photos: Chris Robbins

WHY DOES HOBOKEN NEED VISION ZERO?

PREVENTABLE CRASHES ARE OCCURRING ON HOBOKEN'S STREETS

There were 4,451 total crashes, 13 of which resulted in serious injury or death, between 2014 and 2018 on the streets of Hoboken. Many of these occurred at specific 'high crash frequency intersections' at major gateways to Hoboken. Most crashes involve vehicles, but people walking or biking are much more likely to be injured or killed in crashes.

VULNERABLE TRAVELERS

92% Motor Vehicle

5% Pedestrian

3% Bicyclist

60% Motor Vehicle*

27% Pedestrian

13% Bicyclist

People walking and bicycling are involved in 8% of all crashes but 40% of those resulting in serious injury or death.

CRASHES THAT RESULT IN SERIOUS INJURY OR DEATH

People walking and bicycling are more likely to be severely injured or killed than those in a car.

76% of pedestrian-involved crashes

67% of bicycle-involved crashes

9% of auto-involved crashes

31% of head on auto involved crashes

21% of right angle auto involved crashes

COMMON CRASH CAUSES AND LOCATIONS

71% Driver inattention caused 71% of preventable crashes.

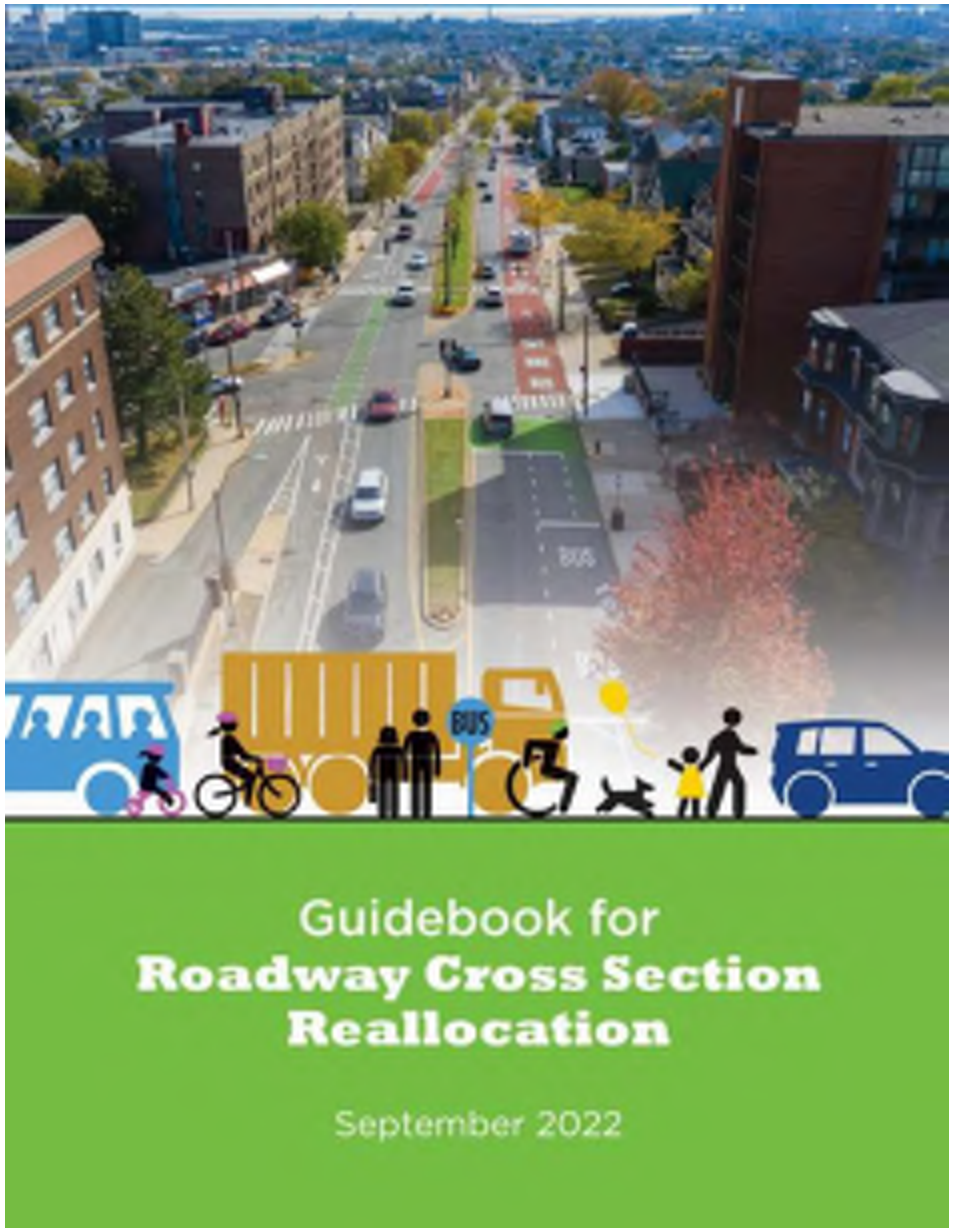
88% A large majority of bicycle and pedestrian crashes occurred in crosswalks at intersections.

63% More bicycle crashes occurred on a bicycle facility.

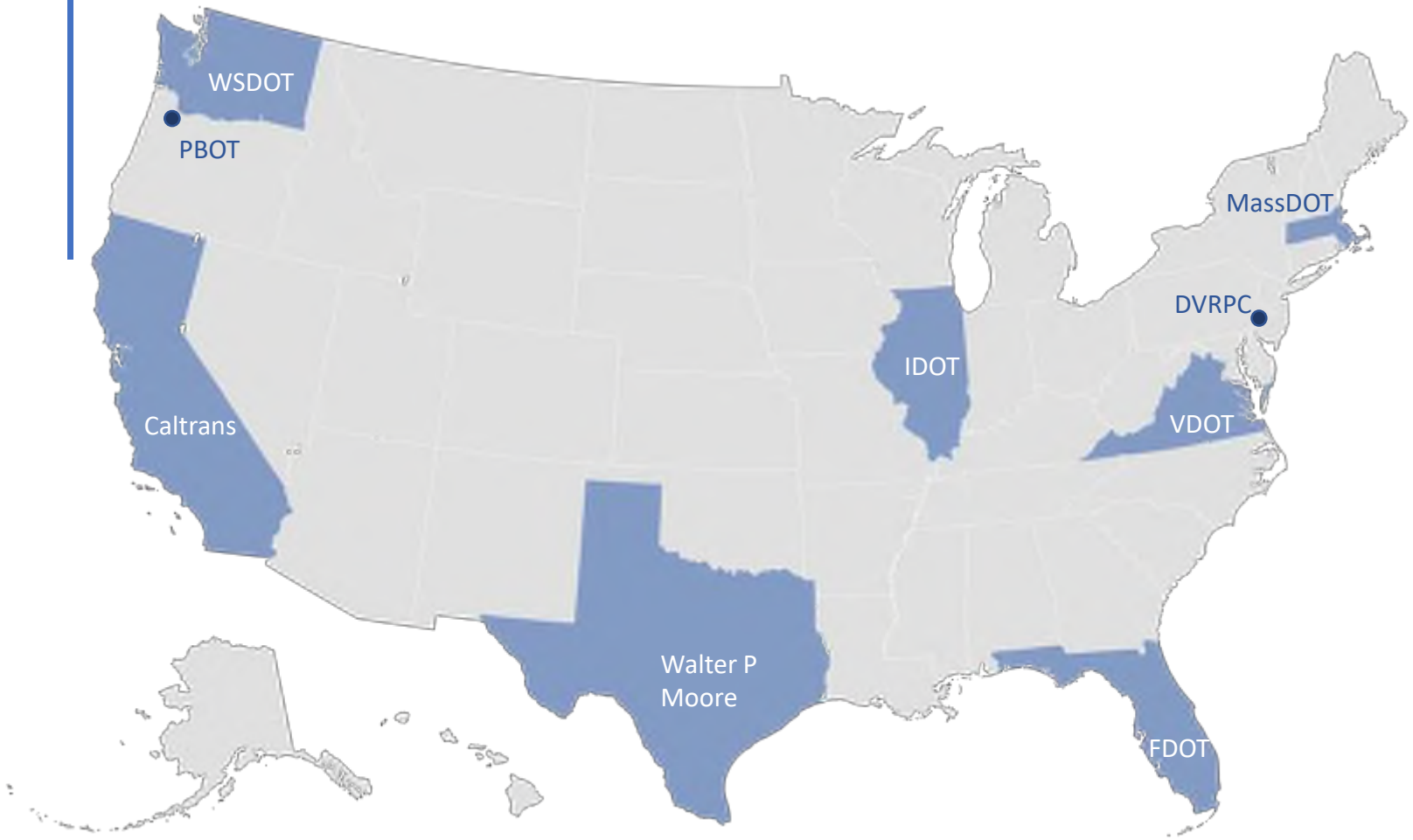
30% Vehicles hitting parked cars accounted for 30% of all crashes.

A NEW PARADIGM

- **NCHRP 1036**: Roadway Cross Section Reallocation – A Guide
- A new framework for allocating roadway space
- Daylighting decision-making
- Raising the floor on safety
- Connecting decisions to outcomes



WHO WAS INVOLVED?



NCHRP Research Panel

Agency (Current Role)	Panel Member
Caltrans	Antonette Clark
Delaware Valley Regional Planning Council (CALSTART)	Al Beatty
Florida DOT	Jeremy Fletcher
Illinois DOT	Jonathan McCormack
Massachusetts DOT (Toole Design)	Michelle Danila
Portland Bureau of Transportation	Karla Kingsley
VDOT/VTRC	Peter Ohlms
Walter P Moore	April Eke
Washington DOT	Celeste Gilman
FHWA	Clayton Wellman
AASHTO	Patricia Bush
NCHRP	Dianne Schwager

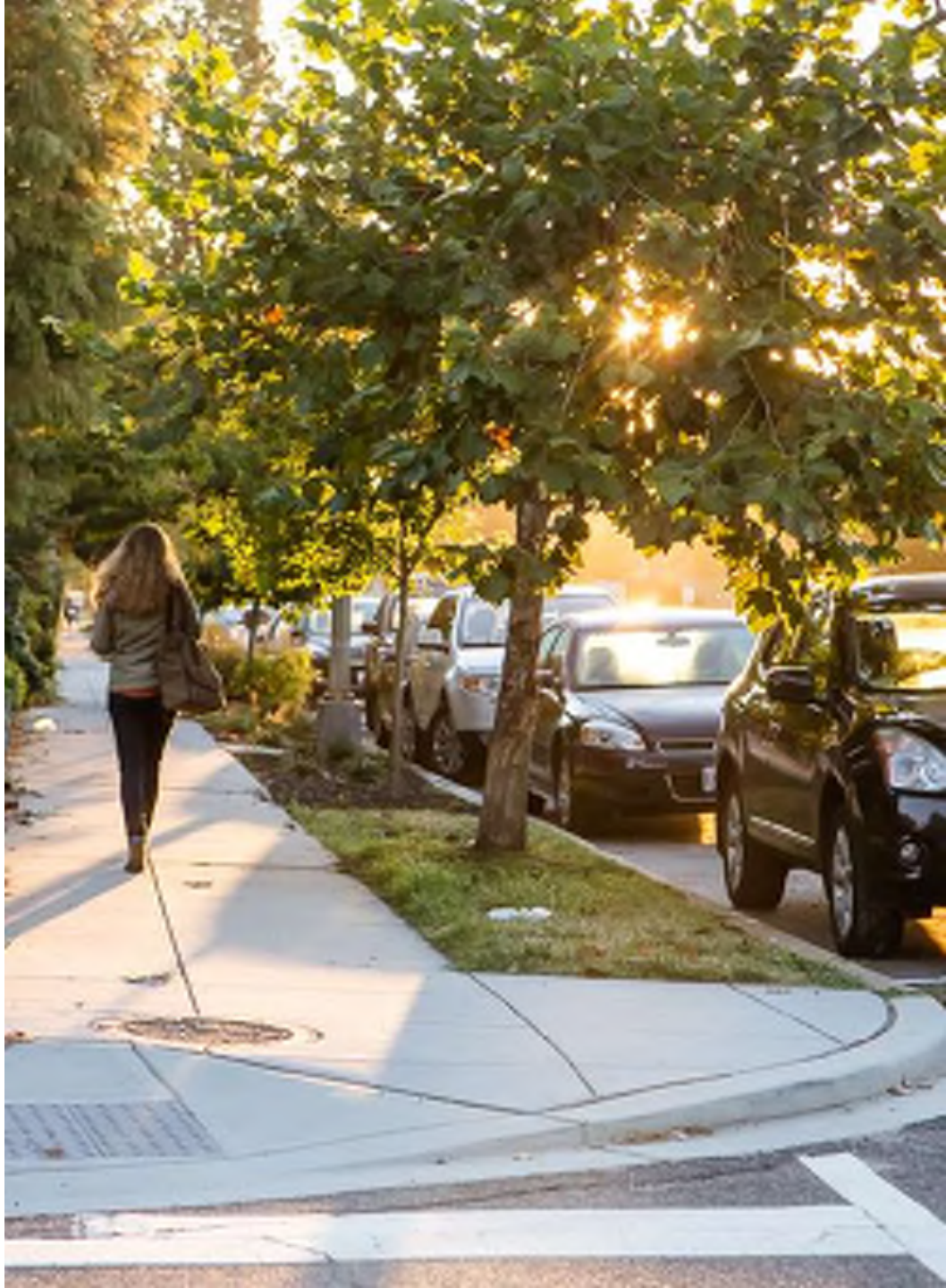
Project Team

Kittelson, Mobycon, Safe Streets, ITRE

DAYLIGHT DECISION-MAKING

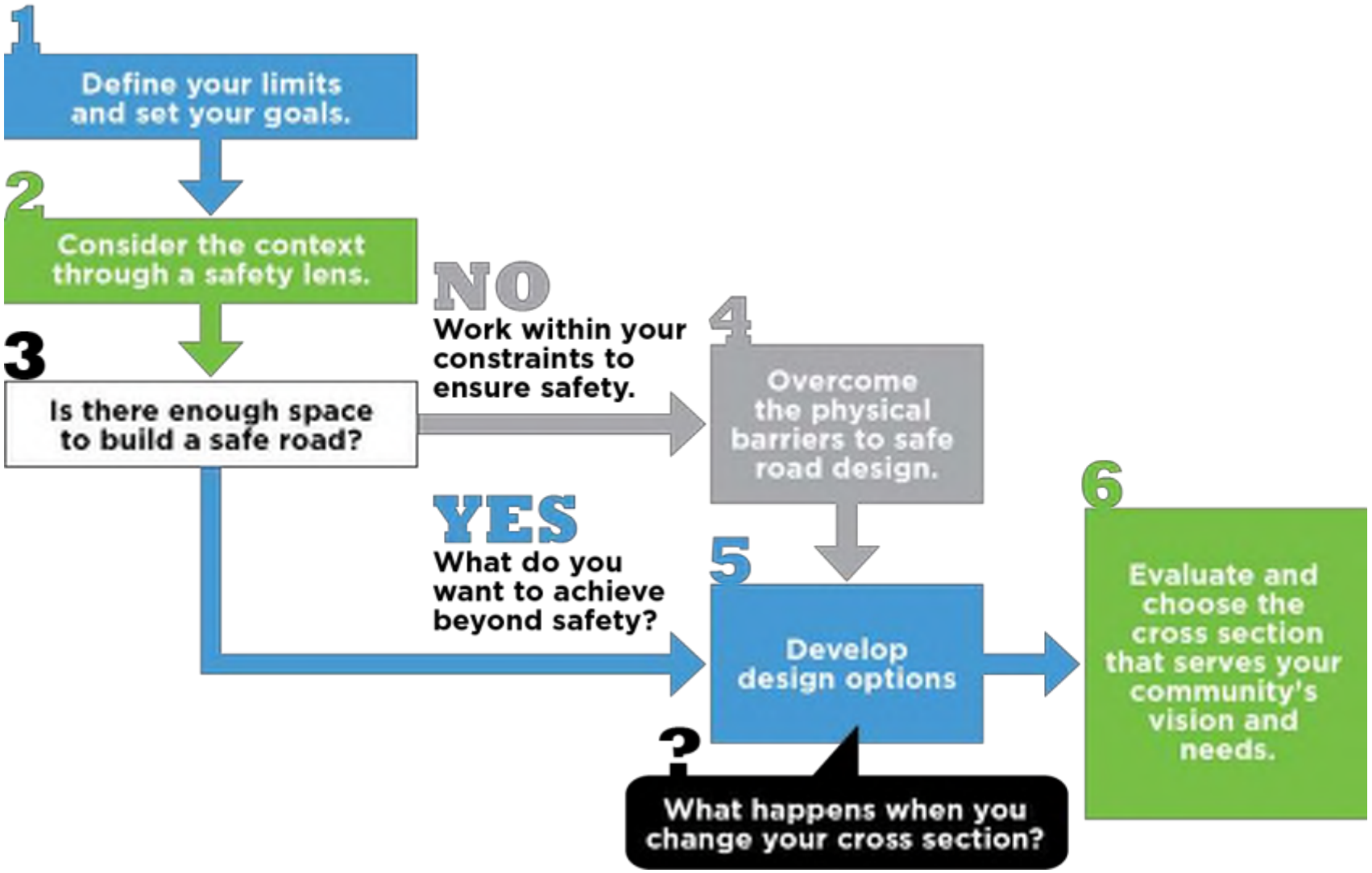
BARRIERS TO SAFE STREET DESIGN

- Agencies are looking for information to support changes to the cross section
- Peak hour intersection operations limit cross section opportunities
- Lack of transparency in the decision-making process
- In practice, safety has not always been the top priority



RETHINKING HOW WE USE OUR STREETS

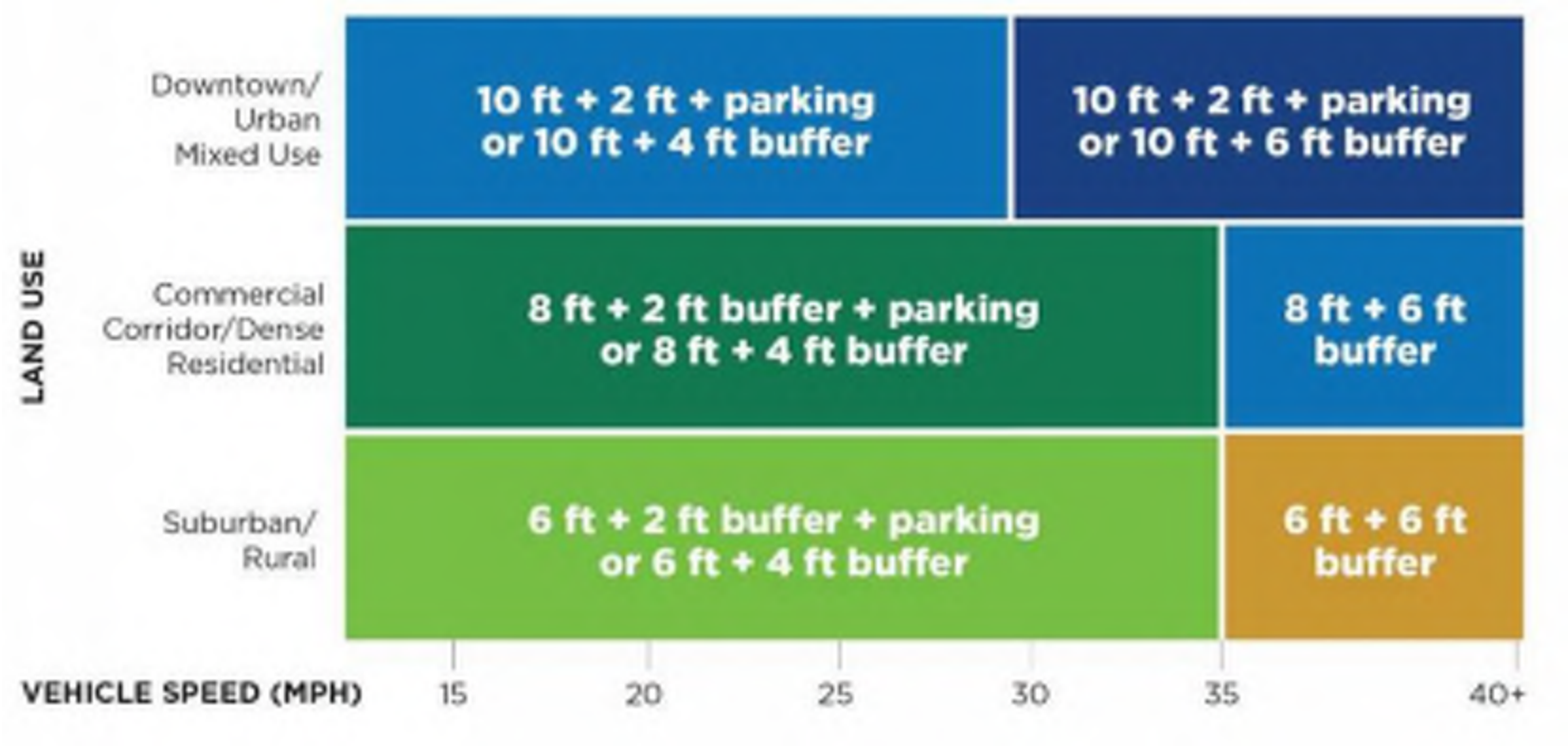
A NEW DECISION-MAKING FRAMEWORK



RAISING THE FLOOR ON TRANSPORTATION SAFETY

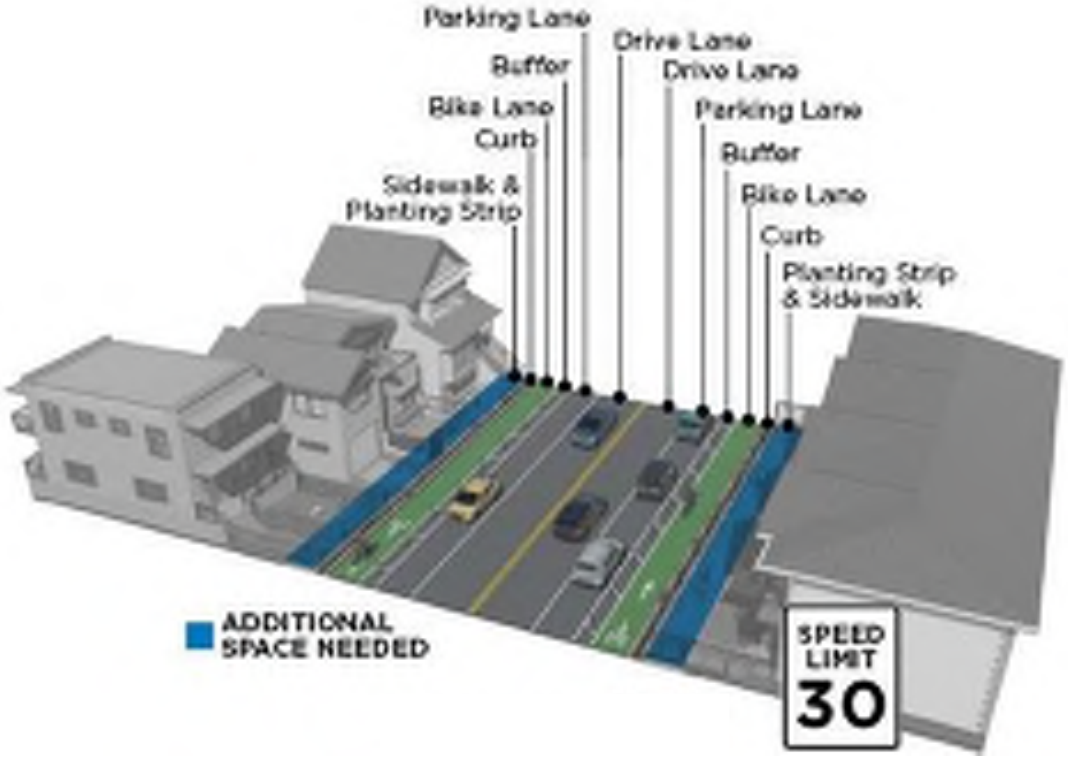
RAISING THE FLOOR ON TRANSPORTATION SAFETY

RAISING THE FLOOR ON TRANSPORTATION SAFETY

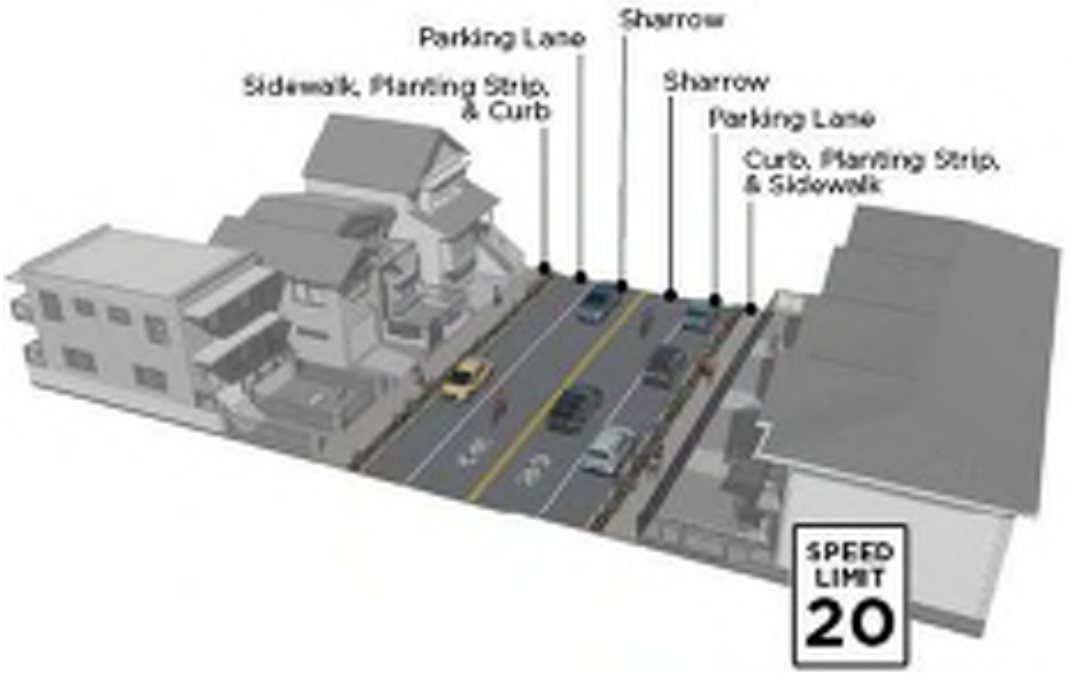


Overcome the physical barriers to safe road design.

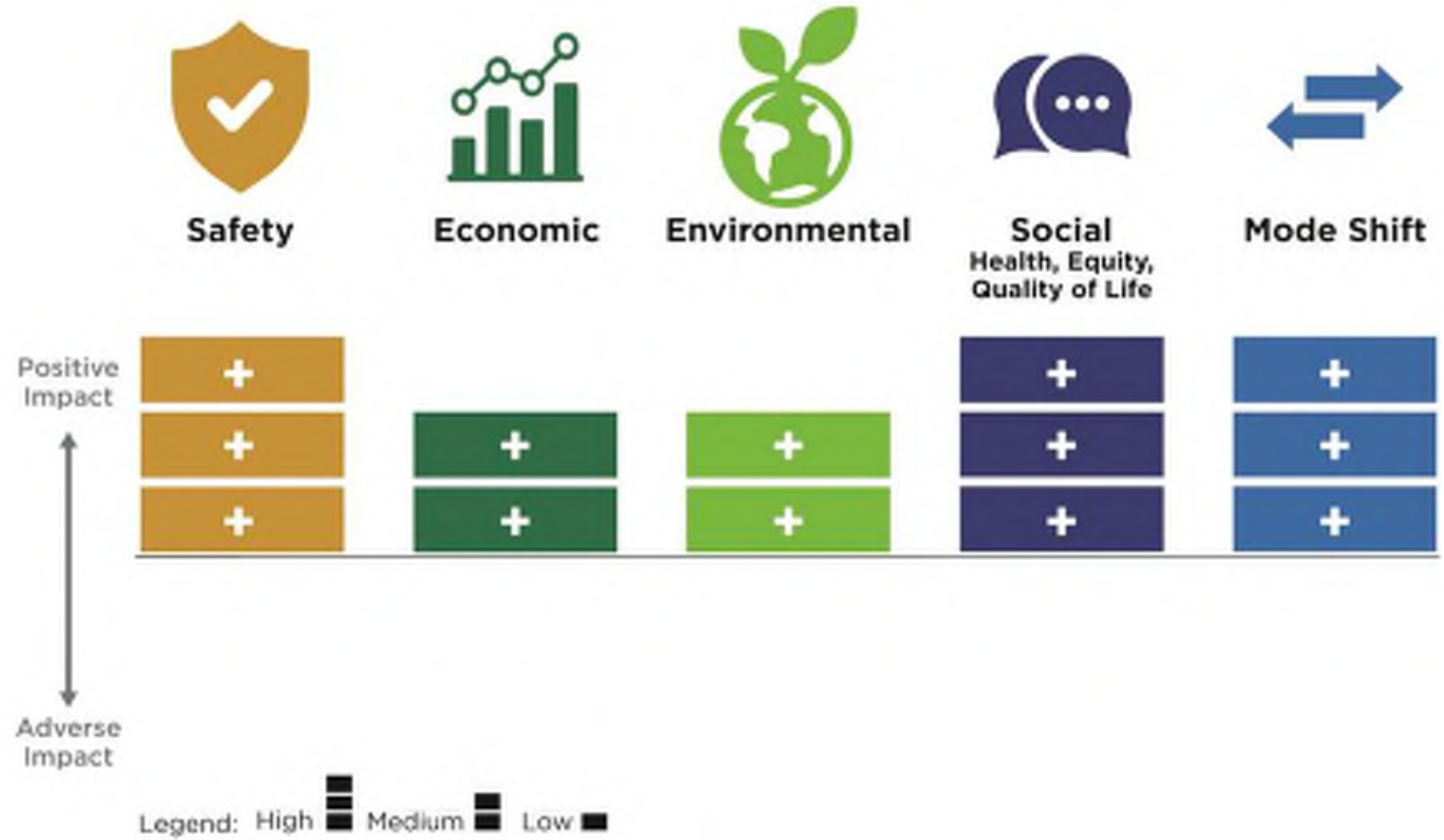
Lower Speeds



~35+ mph design speed



~20 mph design speed



Outcomes of adding bicycle lanes

“That won’t work.”

Traditional Guidance/Practice

"Capacity and other traffic analyses typically focus on the peak-hour traffic volume because it represents the most critical period for operations and has the highest capacity requirements."

- Source: HCM 7th Edition Chapter 3

"Customary practice in the United States is to base rural highway design on the 30th highest hour of the year. There are few hours with higher volumes than this hour, while there are many hours with volumes not much lower. In urban areas, there is usually little difference between the 30th and the 200th highest hour of the year, because of the recurring morning and afternoon commute patterns."

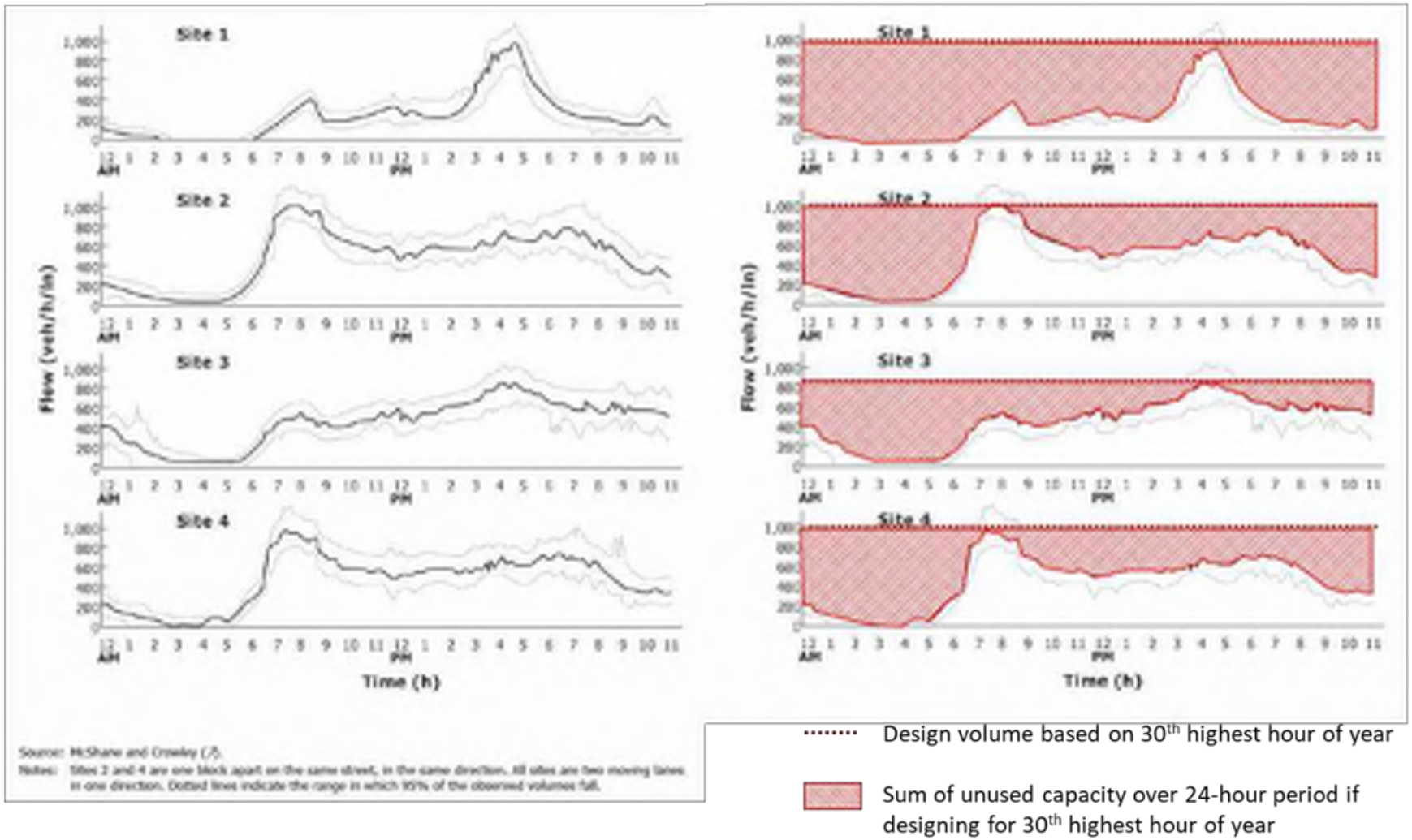
- Source: HCM 7th Edition Chapter 3

"The design hourly volume (DHV) for rural area highways, therefore, should generally be the 30 HV of the future year chosen for design."

"Therefore, in urban area design, the 30th highest hourly volume can be a reasonable representation of daily peak hours during the year."

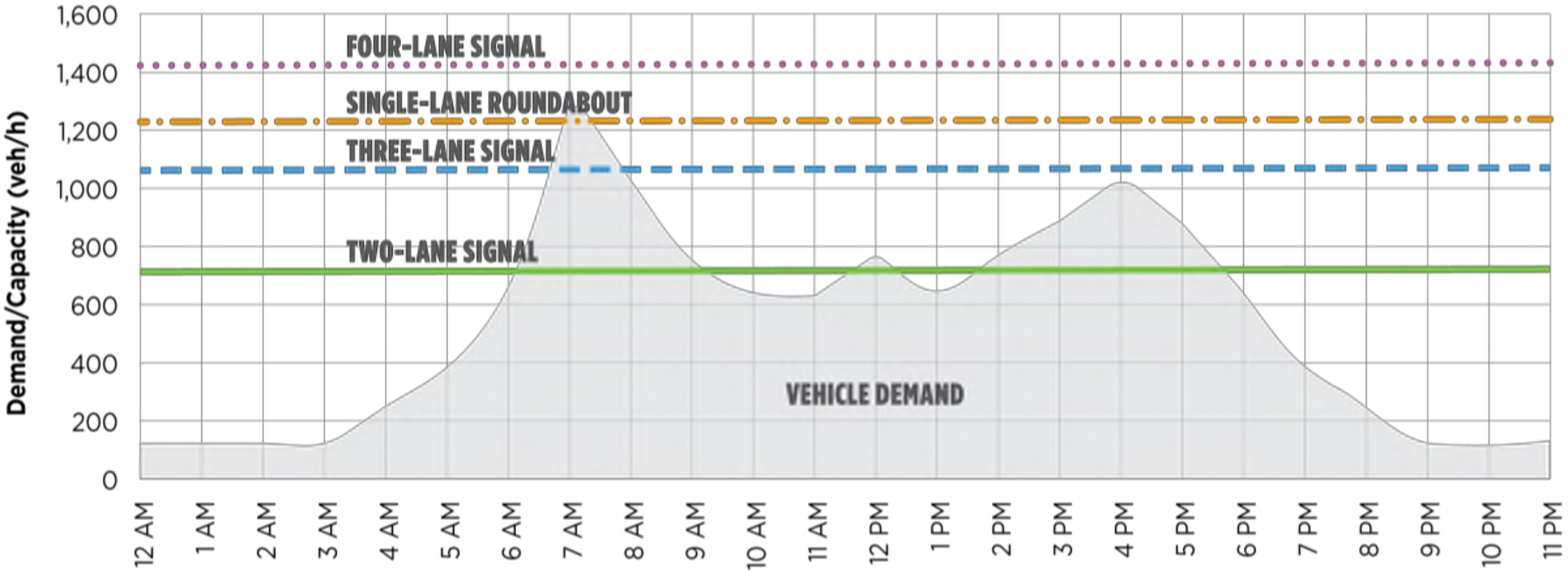
- Source: AASHTO 2018 Green Book

Designing for peak-hour capacity and the 30th highest hourly volume results in unused capacity for most of the day!



Source: Adapted from HCM 7th Edition Chapter 3

ALL-DAY INTERSECTION ASSESSMENT
Illustrative Example



7AM

NOON

7PM

4 LANE

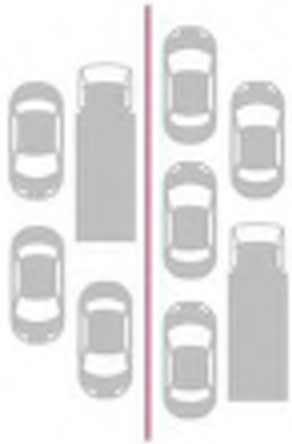
WHAT'S WRONG WITH UNUSED CAPACITY?

UNDER CAPACITY = HIGHER SPEEDS

WHICH ARE ASSOCIATED WITH INCREASED AND MORE SEVERE CRASHES

OVERDESIGNING FACILITIES

FOR CARS MAKES THEM LESS SAFE FOR PEOPLE WALKING AND BIKING



THE MORE TRAVEL LANES, THE

LONGER WAIT TIMES

FOR ALL MODES

STREETS MAKE UP MORE THAN

OF PUBLIC SPACES IN CITIES AND TOWNS

THE 24-HOUR CAPACITY FRAMEWORK

HOURLY DEMAND-TO-CAPACITY (D/C) RATIO

allows practitioners to assess whether demand exceeds capacity at any time during the day and, if so, for how long

16hr EFFICIENCY

The percentage of the hours between 5:00 a.m. and 9:00 p.m. the street utilizes at least 60% of its potential capacity

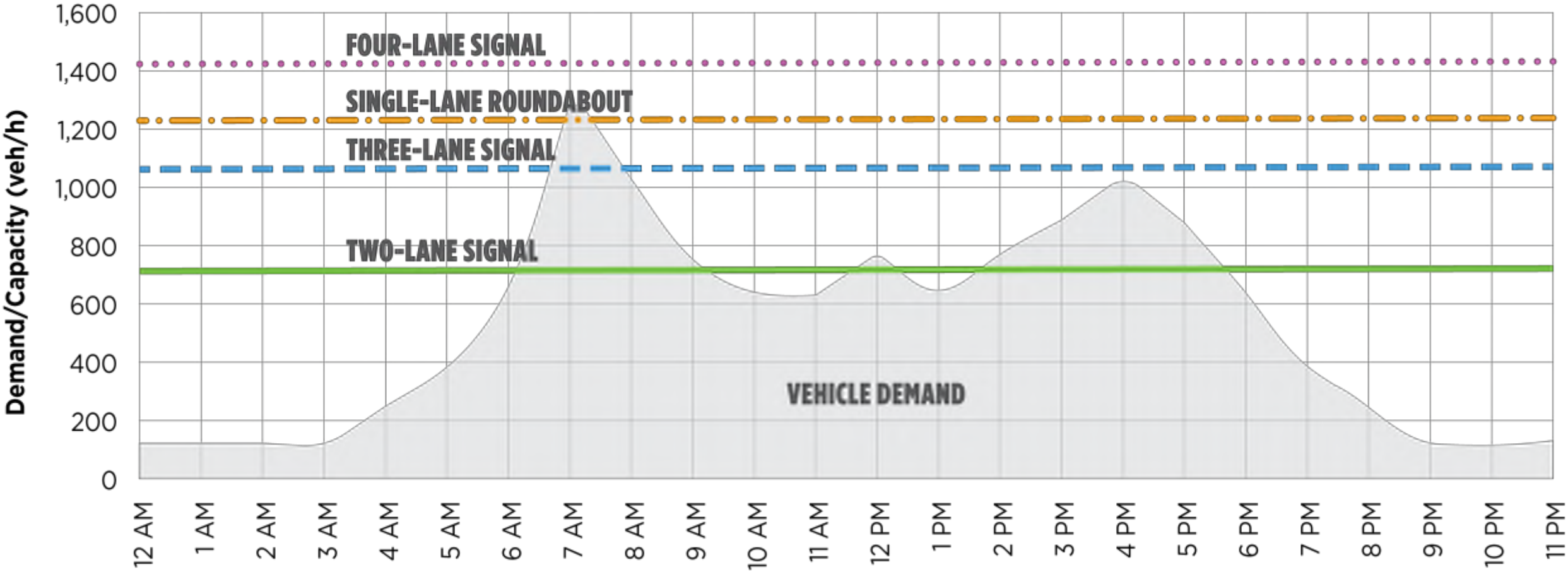
16hr EXCESS LANE-CAPACITY

The lane-capacity provided for but unused during that 16-hour period

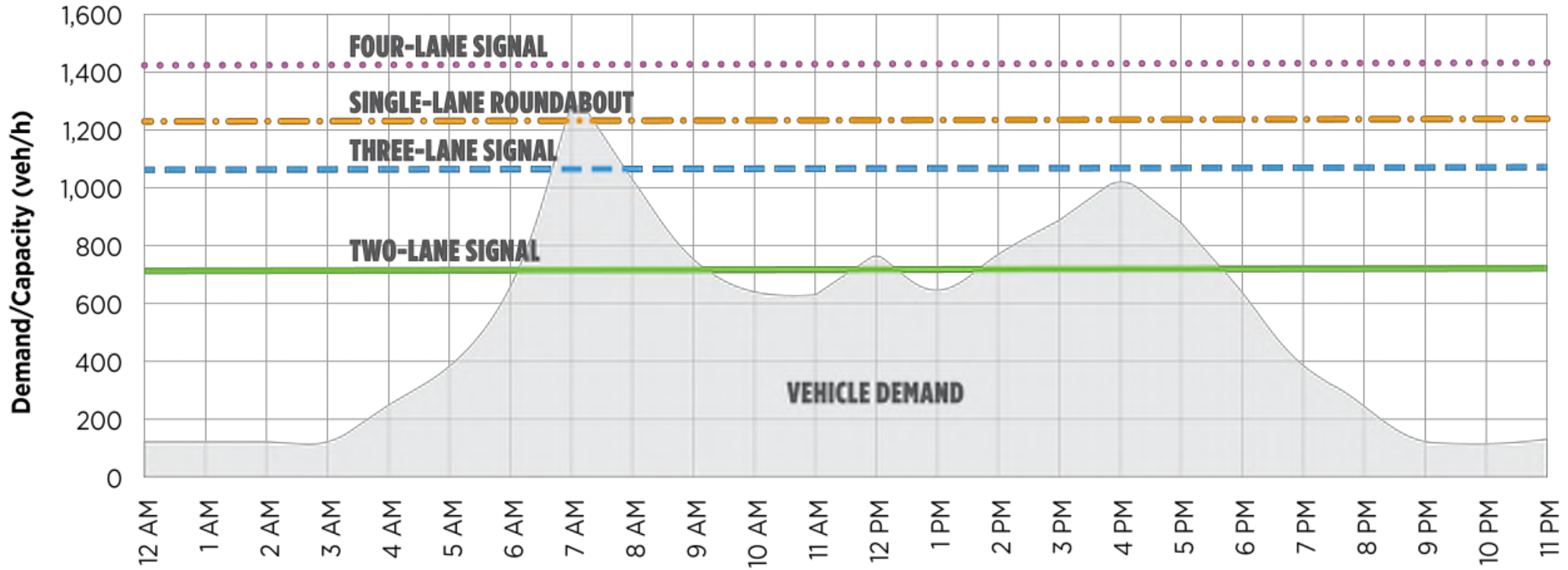
TOTAL HOURS BELOW CAPACITY

The number of hours (out of 24) during which the street is operating below capacity

ALL-DAY INTERSECTION ASSESSMENT



ALL-DAY INTERSECTION ASSESSMENT

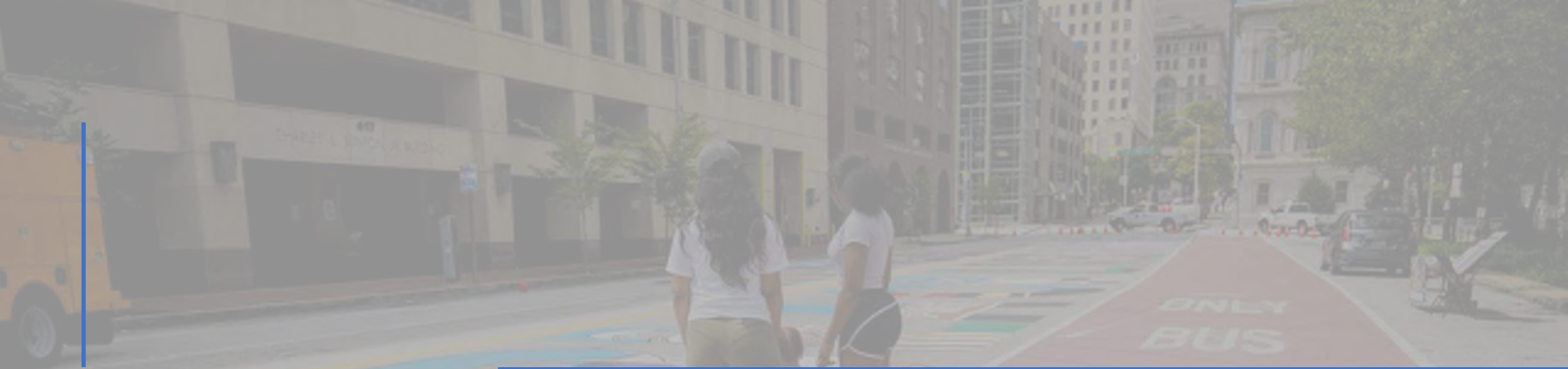


Intersection Control	Max Demand-to-Capacity Ratio (d/c)	16-Hour Efficiency	16-Hour Excess Capacity (Lane Hours)	Total Hours Below Capacity
FOUR-LANE SIGNAL	0.89	31.3%	15.9	24
THREE-LANE SIGNAL	1.18	50.0%	8.2	23
TWO-LANE SIGNAL	1.77	81.3%	2.2	16
SINGLE-LANE ROUNDABOUT	1.02	50.0%	6.7	23

	7AM	NOON	7PM
4 LANE			
3 LANE			

How could you use this research?

- How could you see yourself applying this approach?
- What about this approach is exciting? What about it makes you feel queasy?
- What challenges/opportunities do you expect when balancing traffic operations with other goals?



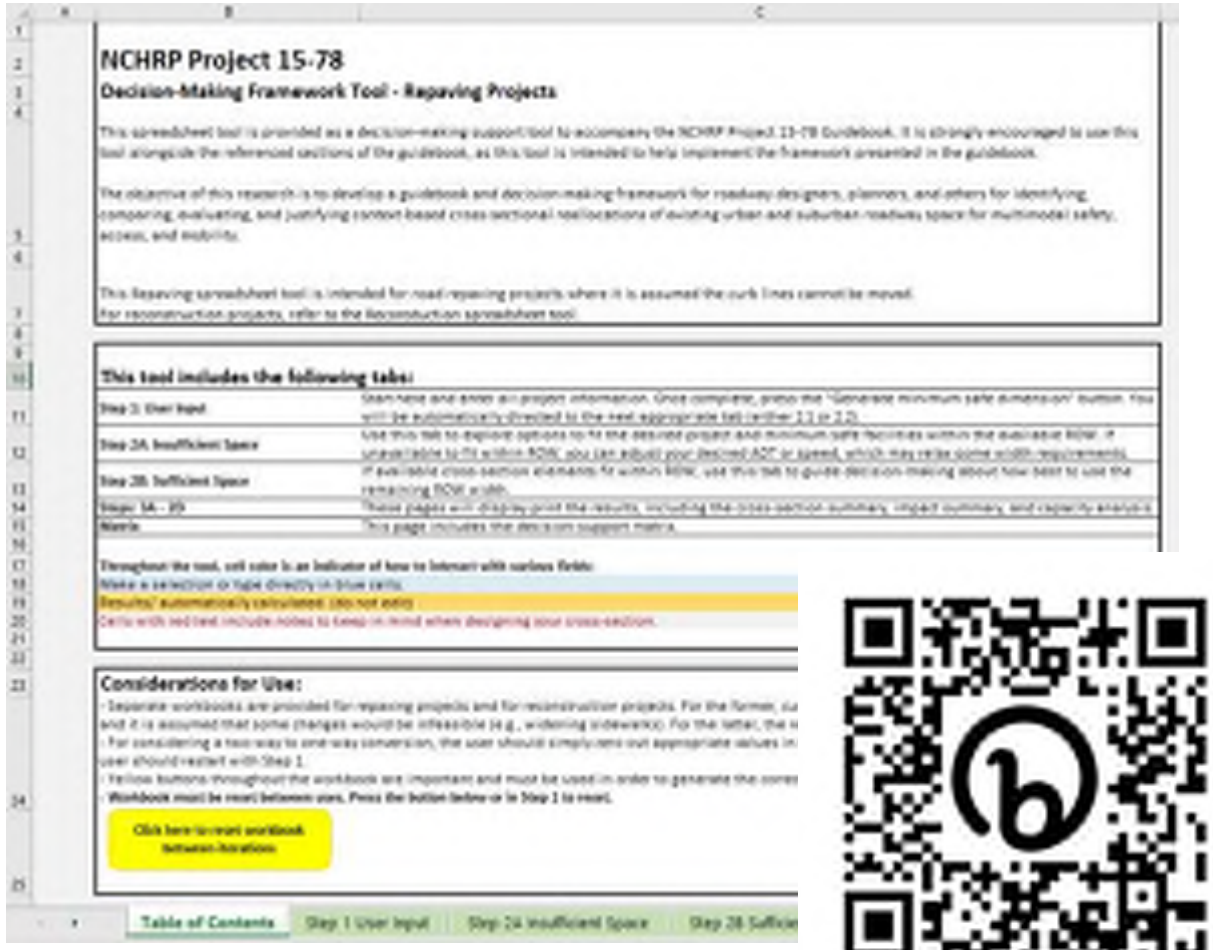
THANK YOU!

Chris Tiesler, PE, PTOE
ctiesler@kittelson.com

Meredyth Sanders
msanders@kittelson.com

DECISION-MAKING TOOL

- bit.ly/NCHRP1036_Guide
- bit.ly/NCHRP1036_RepavingTool
- bit.ly/NCHRP1036_Reconstruction Tool



1 Define your limits and set your goals.

How much space do you have to work with?

What purpose does the road serve?

What are your community's priorities?

2 Consider the context through a safety lens.

Determine the **minimum safe travel space** for people walking, bicycling, riding transit, and driving.

4 Overcome the physical barriers to safe road design.

Reduce dimension needed for driving

Reduce dimension needed for bicycling/walking

Lower speed

Reduce vehicle volumes

Safe parallel facility

Convert

Close street to traffic

Convert to shared street (woonerf)

5 Develop design options: what happens when you change your cross section?

Choose a few suitable alternatives to evaluate. The community priorities from Step 1 may make some options more desirable.

Wider Sidewalk

Bus-Only Lanes

On-street parking

Add Traffic Lanes

Wider Bike Lanes

Medians

6 Evaluate and choose the cross section to serve your vision and needs.

Compare the likely outcomes of the alternatives you developed in Step 5.