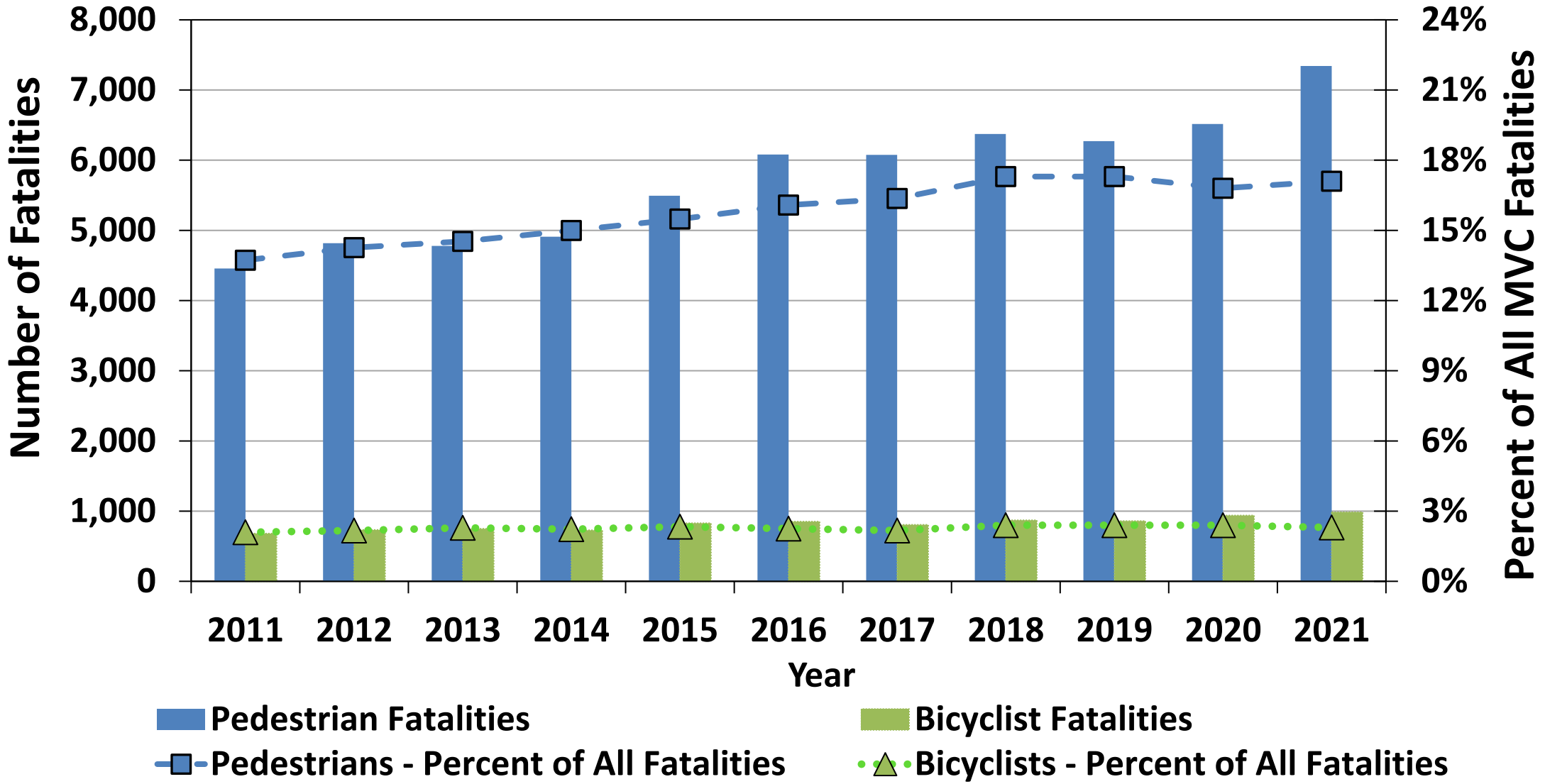
NHTSA

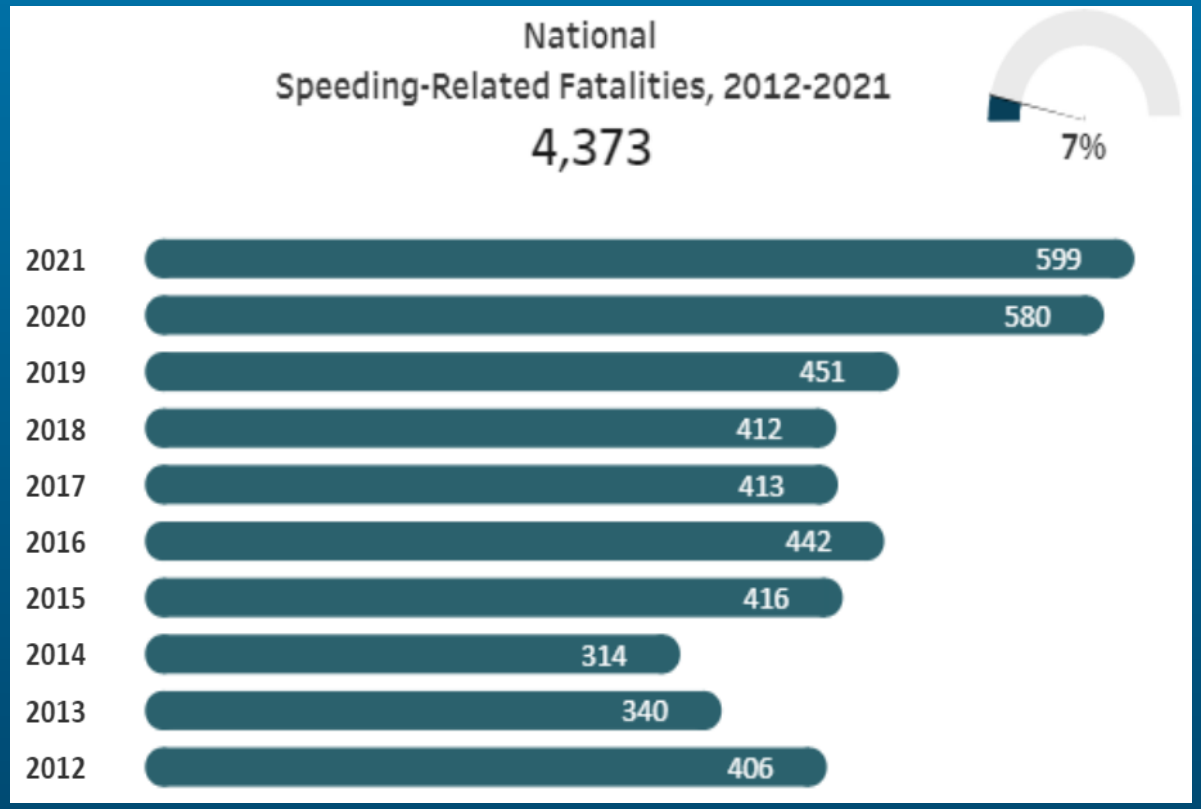
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

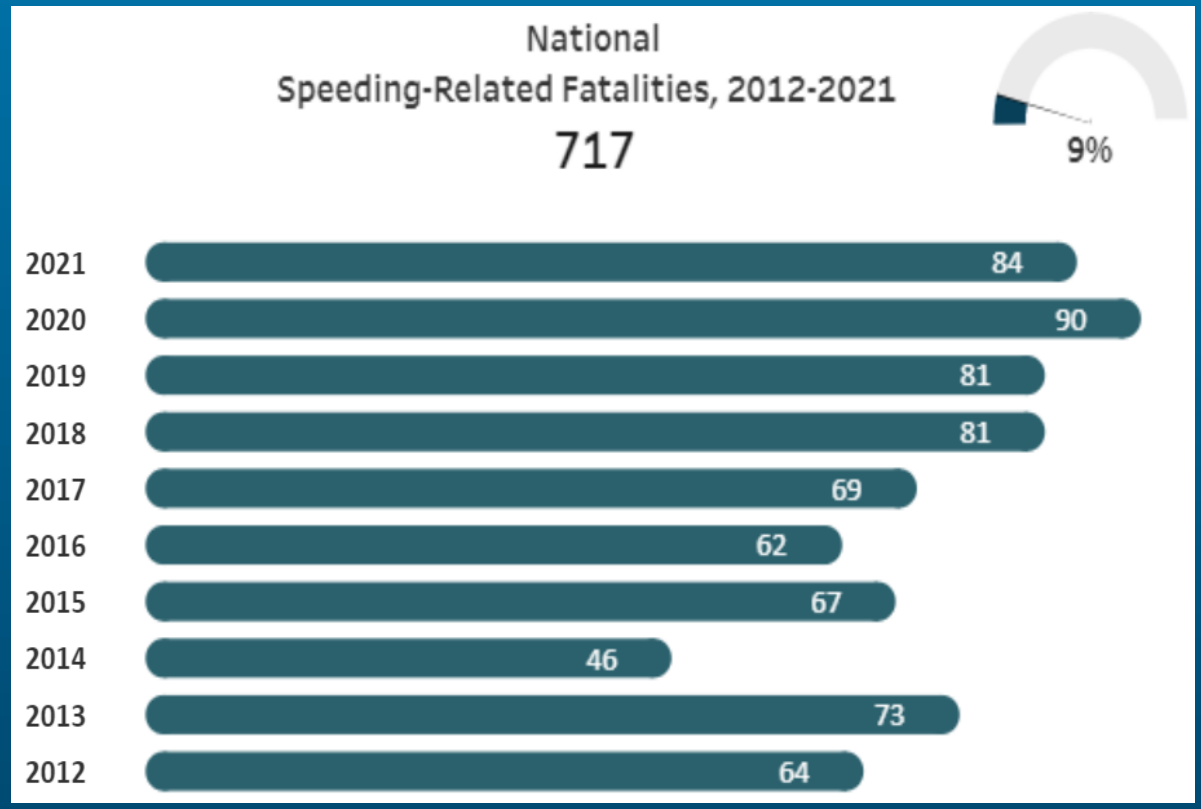
Impact of Select Speed Reducing Countermeasures on Pedestrian and Bicyclist Safety

Kristie Johnson, PhD
Office of Behavioral Safety Research
Washington, DC
October 11, 2023

Pedestrian & Bicyclist Fatalities

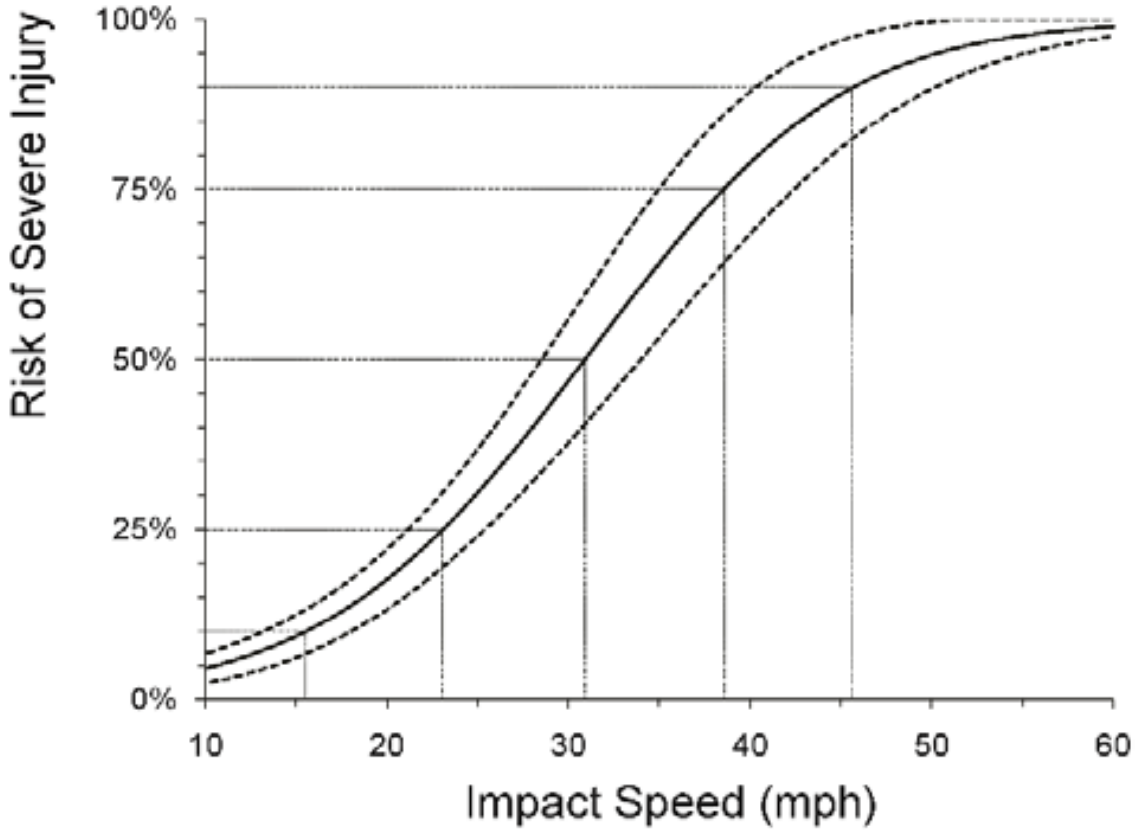


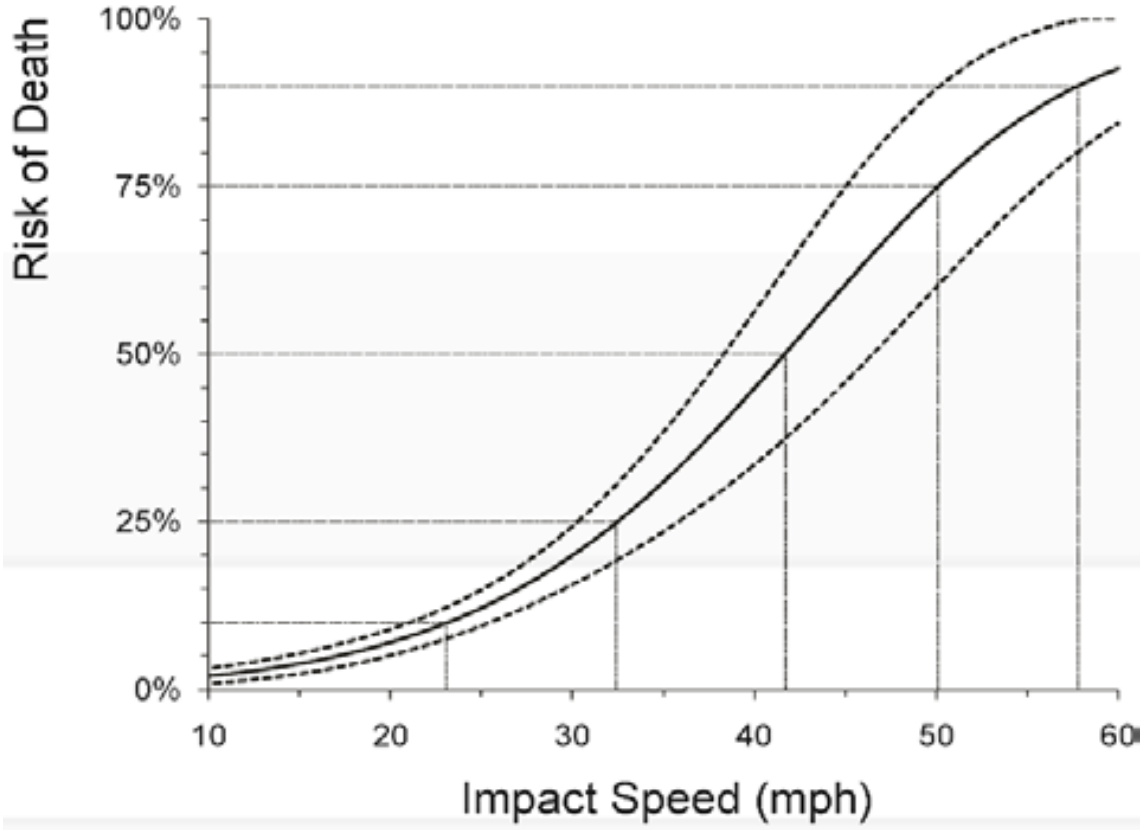




NCSA's Data Visualization Tool: https://cdan.dot.gov/DataVisualization/DataVisualization.htm

Risk of Injury Increases with Impact Speed
(Pedestrian Risk Shown)





Source: Tefft (2011)

Research Questions & Project Overview

- What measures are localities implementing to reduce vehicle speed?
- How do these measures benefit pedestrians and bicyclists through reducing serious and fatal crashes?

Phase 1

- Scan of localities implementing speed-reducing treatments
- Evaluation of speed reduction countermeasures for pedestrian and bicyclist safety benefits

Phase 2

- Scan for localities with temporary road conversions in response to COVID-19
- Case studies of each implementation with evaluation of available crash data

Program Scan

- Developed list of potential countermeasures
- Identified candidate localities
  - Open call for information through NHTSA and FHWA
  - IIHS database of speed safety cameras
  - NACTO staff members
  - Online searches for work by localities
- Contacted representatives from 63 localities
- Ongoing contact to develop short list of candidates for evaluation

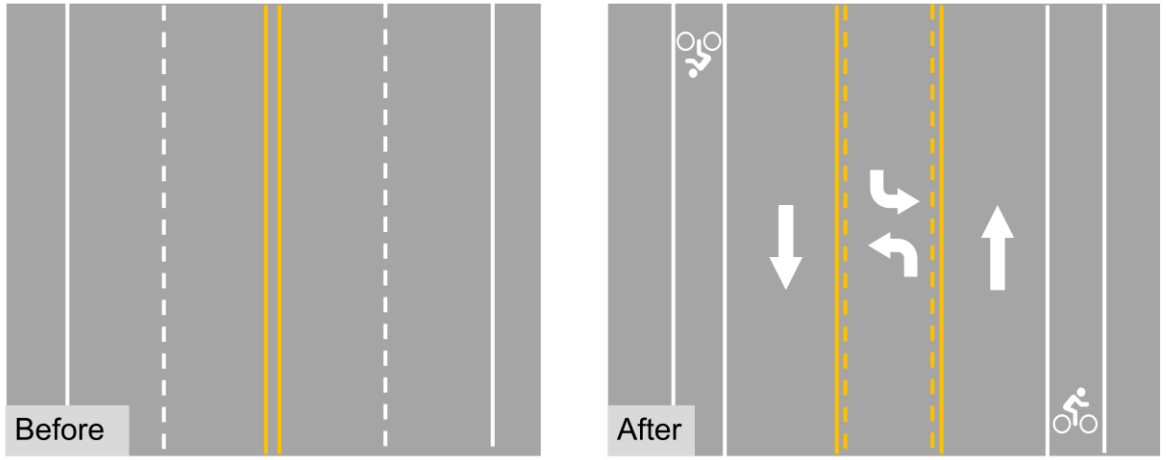
Program Scan Results

- Speed Safety Cameras (SSC)
  - Boulder, CO; Seattle, WA; Washington, DC; Chicago, IL; Scottsdale, AZ
- High-Visibility Enforcement
  - San Francisco, CA; Boston, MA
- Speed Limit Reductions
  - Portland, OR; New York City, NY; Seattle, WA; Boston, MA; North Carolina
- Road Conversions
  - Seattle, WA; Minneapolis, MN
- Traffic Calming
  - Washington, DC

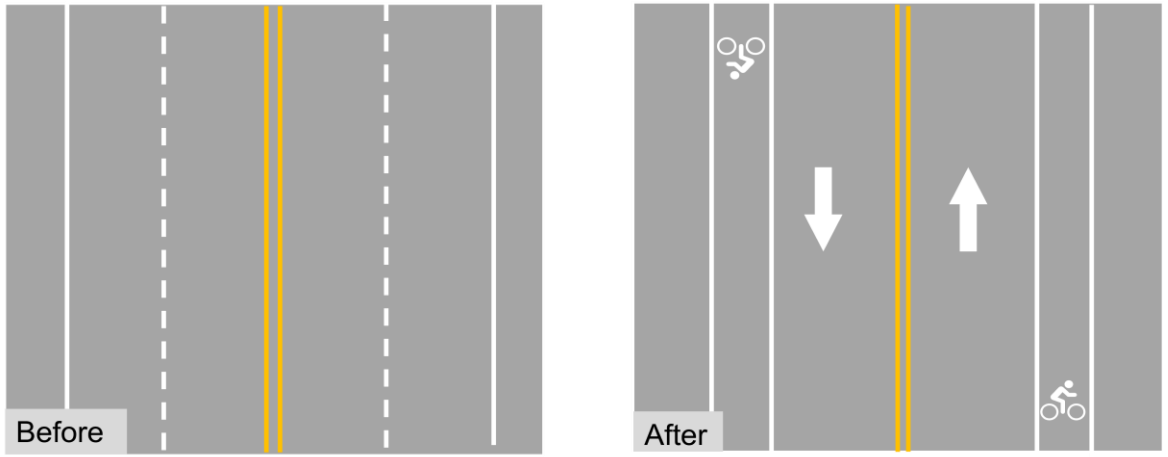
Program Scan – Final List Of Road Conversions

Location	Countermeasure details	Data available	Years for evaluation
Minneapolis, MN	3-lane to 2-lane; Lane width narrowing without lane removal; Addition of bike lanes (22 sites)	Street characteristics; Crash data; Vehicle, bicycle, and pedestrian volumes	2007 to 2017
San Francisco, CA	4-lane to 2-lane with and without center left turn lanes; 3-lane to 2-lane (60 sites)	Street characteristics; Crash data	2008 to 2018
Seattle, WA	4-lane to 2-lane with center left turn lanes (31 sites)	Street characteristics; Crash data; Vehicle, bicycle, and pedestrian volumes	2009 to 2018

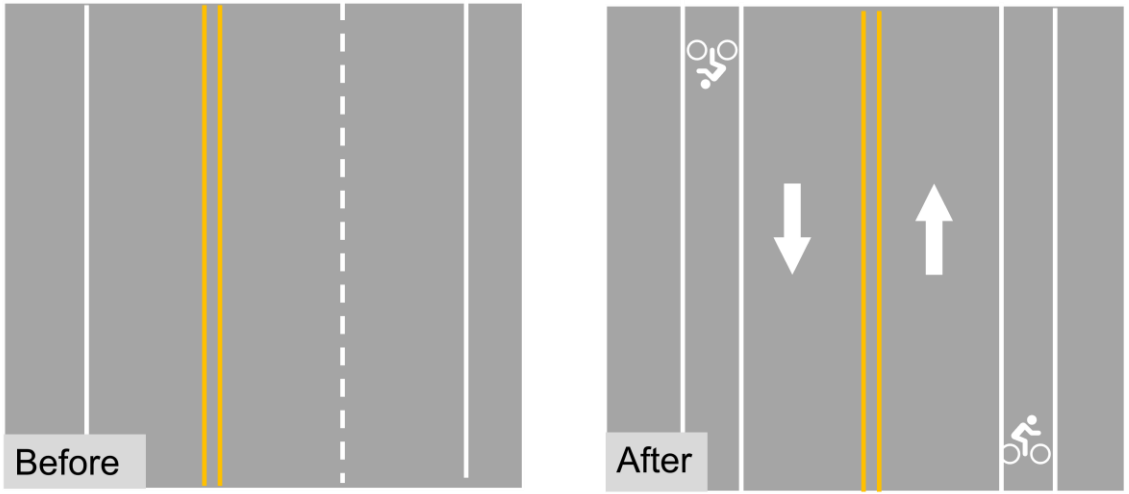
Road Conversion Types



4-lane to 2-lane



3-lane to 2-lane

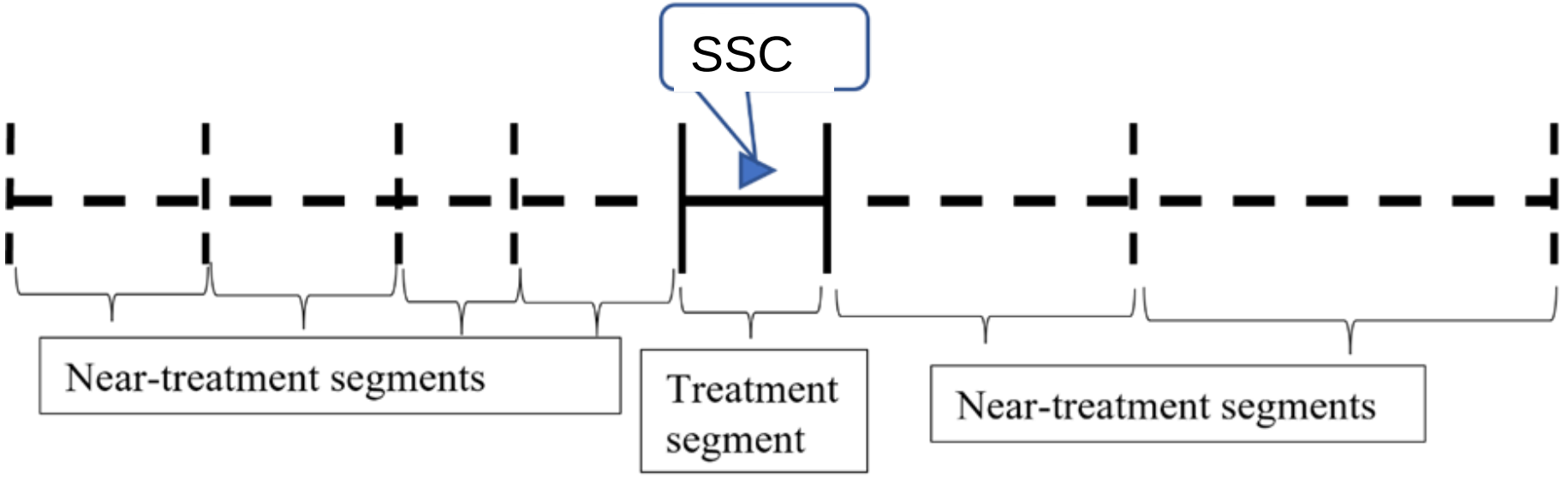


Program Scan – Final List Of SSC

Location	Countermeasure details	Data available	Years for evaluation
Boulder, CO	Mobile vans (45 sites)	Van deployment times/locations; Street characteristics; Crash data; Vehicle, pedestrian, and bicycle volumes	2009 to 2018
Seattle, WA	School zone cameras (17 sites)	Street characteristics; Crash data; Vehicle, bicycle, and pedestrian volumes	2009 to 2018
Washington, DC	General, fixed camera deployment (65 sites)	Street characteristics; Crash data; Vehicle volumes	2008 to 2018 (Total crashes) 2012 to 2018 (Pedestrian/ bicyclist crashes)

Data Collection & Analysis

- Treatment, reference, and near-treatment SSC segments



Results – Road Conversions

- 4-lane to 2-lane conversions – San Francisco and Seattle

Crash Type	Actual Before	Actual After	Expected Before	Expected After	CMF	SE of CMF
Total injury crashes	593	503	590.12	530.30	0.95	0.06
Pedestrian/bicyclist injury crashes	97	122	98.05	132.79	0.90	0.14

- 3-lane to 2-lane conversions – Minneapolis and San Francisco

Crash Type	Actual Before	Actual After	Expected Before	Expected After	CMF	SE of CMF
Total injury crashes	350	188	348.27	147.63	1.26	0.17
Pedestrian/bicyclist injury crashes	73	50	71.49	59.88	0.81	0.18

Results – Speed Safety Cameras

Seattle

Segment type	Crash type	Observed crashes before	Observed crashes after	Expected crashes before	Expected crashes after	CMF	SE of CMF
Treatment	Total injury crashes	83	68	84.08	50.93	1.32	0.21
	Pedestrian/bicyclist injury crashes	19	11	18.92	12.95	0.82	0.28
Near treatment	Total injury crashes	333	208	331.46	199.76	1.04	0.09
	Pedestrian/bicyclist injury crashes	61	34	61.36	35.47	0.95	0.18

DC

Segment type	Crash type	Observed crashes before	Observed crashes after	Expected crashes before	Expected crashes after	CMF	SE of CMF
Treatment	Total injury crashes	111	169	121.81	151.19	1.37	0.17
Near treatment	Total injury crashes	515	568	496.65	517.62	1.14	0.07

Phase 1 Discussion

Road Conversions

- Evidence of crash reduction
  - 10% pedestrian/bicyclist injury crash reduction (4-lane to 2-lane)
  - 19% pedestrian/bicyclist injury crash reduction (3-lane to 2-lane)
    - With 26% increase in overall injury crashes

Speed Safety Cameras

- Pedestrian/bicycle injury crash reduction in Seattle
  - Treatment sites: 18% reduction; Near-treatment sites: 5% reduction
- Crash increase in Washington, DC
  - Overall injury crashes: 37% for treatment, 14% for near-treatment (not ped/bike crashes)

Limited Understanding of Underlying Mechanism

- Lack of speed data for road conversions
- Insufficient volume data
- Need for more pedestrian and bicyclist exposure data (crashes and volumes)

Phase 2 Background & Overview

- COVID-19 pandemic led to…
  - Reduced traffic volume
  - Higher speeds
  - Increase in fatalities
- Response by cities
  - Creating places for safer walking and biking
  - Acknowledge need for distancing
  - Reallocation of sidewalk space and roadway space
- Our steps - program scan, locality selection, contact with localities, data collection, and evaluation of available data

Atlanta

- Lee St. SW on-street multiuse lane using plastic barriers
  - Converted from 3 lanes northbound to 2 lanes with the pop-up lane
- Access to MARTA station
- Planned to slow traffic on a wide road
- Planned for one week installation, remained in place for ~10 months

Image credit: ATLDOT

Atlanta

Lee Street SW, Atlanta - Lane Reallocation (2,150 ft segment length)		
	Before installation (278 days)	After installation (300 days)
Speed limit (mph)	30	30
Average travel speed (mph)	19.5	22.4
Average daily vehicle volume	13,100	13,800
Average daily pedestrian volume	3,500	2,750
Average daily bicycle volume	100	70
Total crashes	14	12
Killed/Serious injury crashes	1	0

Chapel Hill

- Franklin Street temporary multiuse lanes, installed August 2020
- Path for pedestrians and bicyclists to allow sidewalk space for restaurants; temporary paint to shift parking lane
- Plastic barriers and flexible bollards
- Removed in Spring 2022 before a permanent road conversion

Image credit: Town of Chapel Hill

Chapel Hill

Franklin Street, Chapel Hill - Lane Reallocation (3,950 ft segment length)		
	Before installation (1 year)	After installation (1 year)
Average daily vehicle volume	13,500	10,750
Total crashes	62	46
Pedestrian crashes	1	0
Bicyclist crashes	2	2

Los Angeles

- Avalon Blvd road conversion: 4 lanes to 2 lanes with a center turn lane
- High crash area: 65 fatal or serious injury pedestrian/ bicyclist crashes from 2009 to 2017
- Part of larger project of planned safety improvements

Image credit: LADOT

Los Angeles

Avalon Blvd, Los Angeles - Lane Reallocation (6 mi segment length)		
	Before installation (1 year)	After installation (1 year)
Speed limit (mph)	35	30 to 35
Average travel speed (mph)	38.5	34.1
Average daily vehicle volume	22,824	15,467
Total crashes	318	125
Killed/Serious injury crashes	221	91
Bicyclist/Pedestrian crashes	53	30

Phase 2 Takeaways

- Quick-build projects show some reduction in crashes
  - Limited time frame for data
  - Need for more data collection when installing temporary designs
- Temporary installations remained for longer term
- Quick build projects have potential to influence more permanent designs
- Newly implemented road diet in LA shows benefit in the short term

Discussion & Conclusions

- Managing speed is important for safety in general and especially for pedestrians and bicyclists.
- Locations around the country are employing diverse measures to manage speed.
- Road conversions show potential to reduce serious and fatal crashes for pedestrians and bicyclists.
- SSC can be beneficial in certain circumstances.
- Quick-build projects have short-term impacts that could translate into longer-term impacts.
- Need to understand more of the underlying factors, including more complete speed and exposure data.

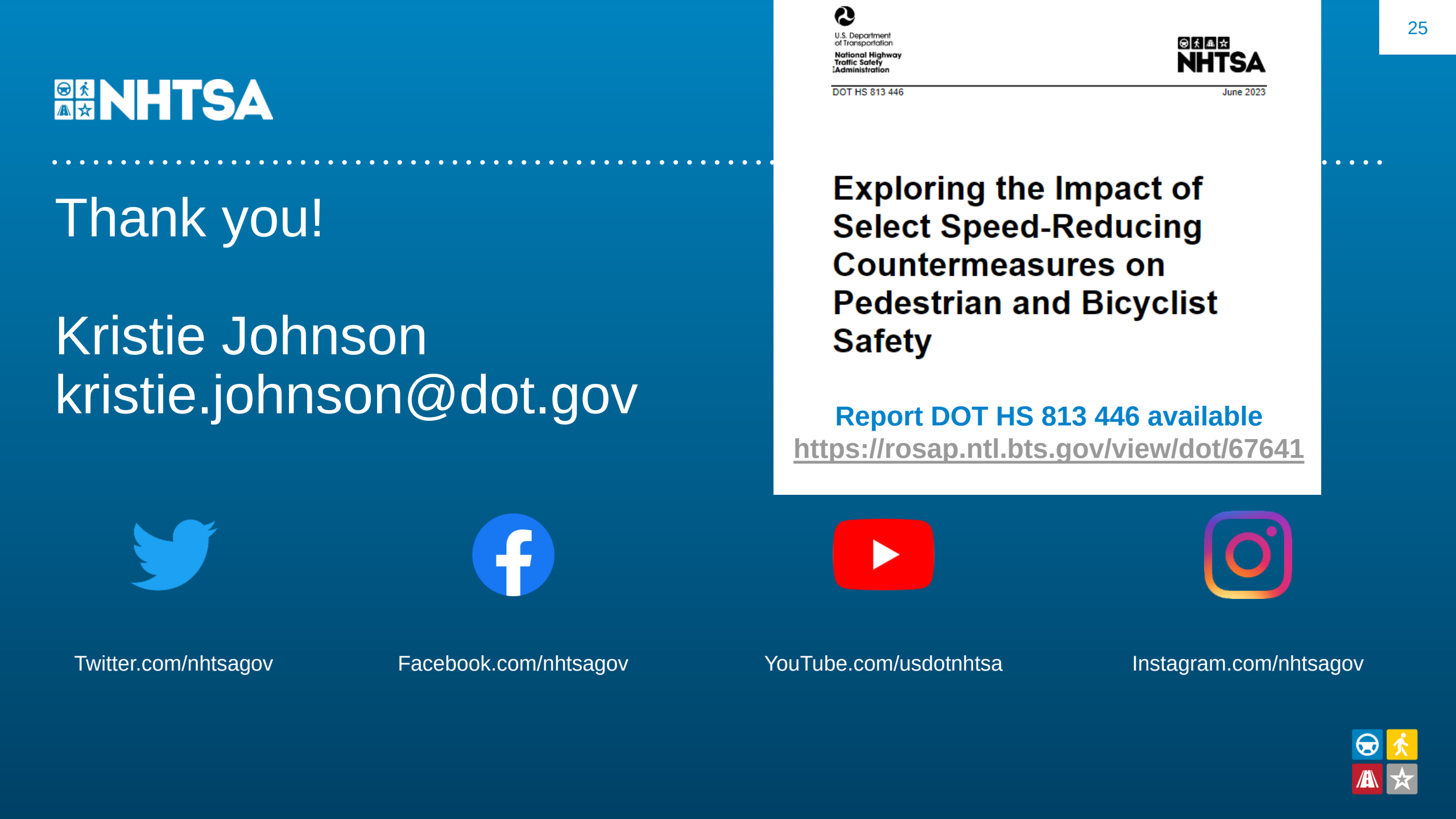
Additional Resources

- Countermeasures That Work 10th Edition pdf
  - Interactive web version
- NHTSA
- Office of Behavioral Safety Research Reports
- NCSA Motor Vehicle Traffic Crash Data Resources
- Traffic Safety Marketing
- NHTSA YouTube Playlists
- NHTSA Image Library
- U.S. Department of Transportation

NHTSA

Thank you!

Kristie Johnson
kristie.johnson@dot.gov



Report DOT HS 813 446 available
https://rosap.ntl.bts.gov/view/dot/67641

Twitter.com/nhtsagov

Facebook.com/nhtsagov

YouTube.com/usdotnhtsa

Instagram.com/nhtsagov