ZERO IS OUR GOAL

A SAFE SYSTEM IS HOW WE GET THERE

Safe System Approach and Speed Management

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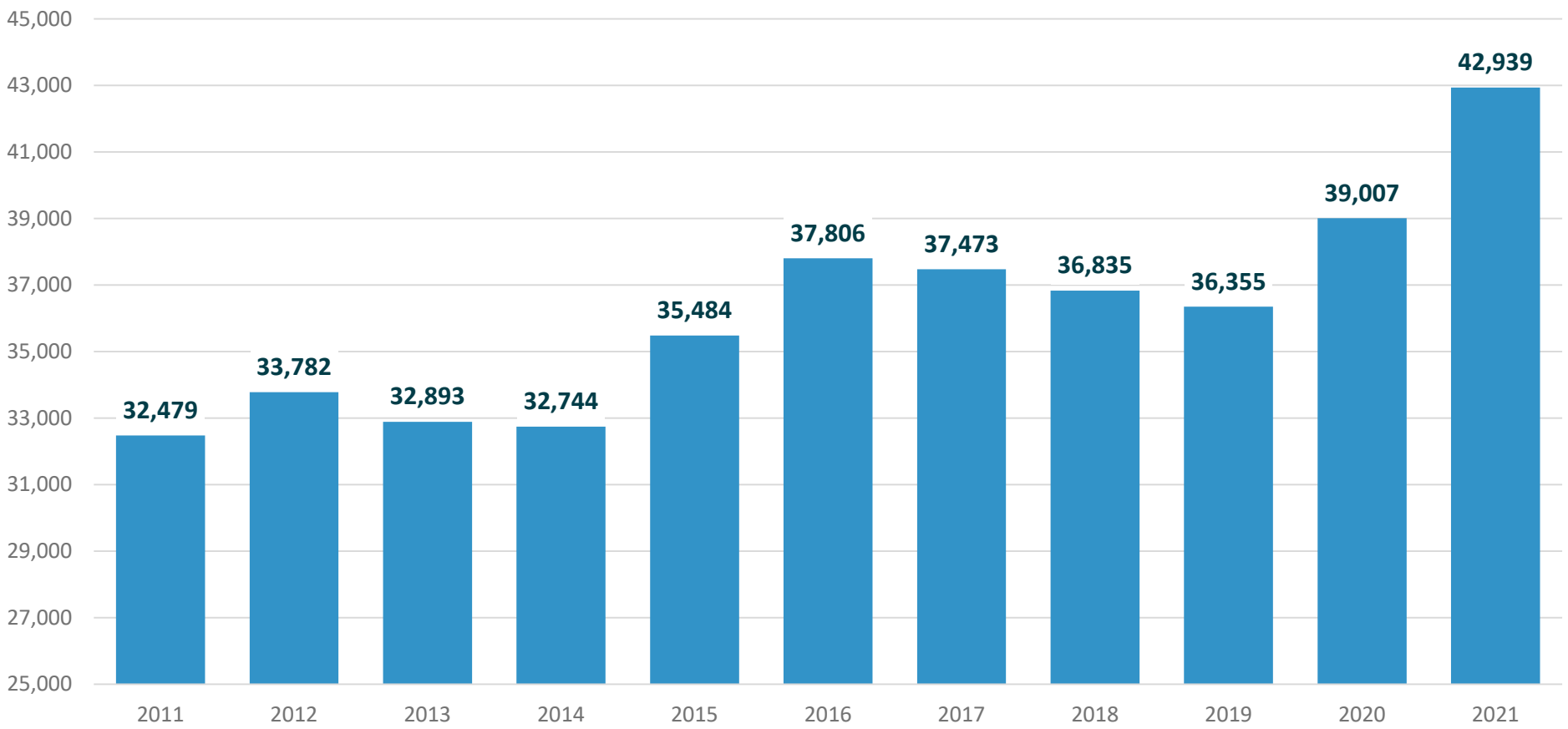
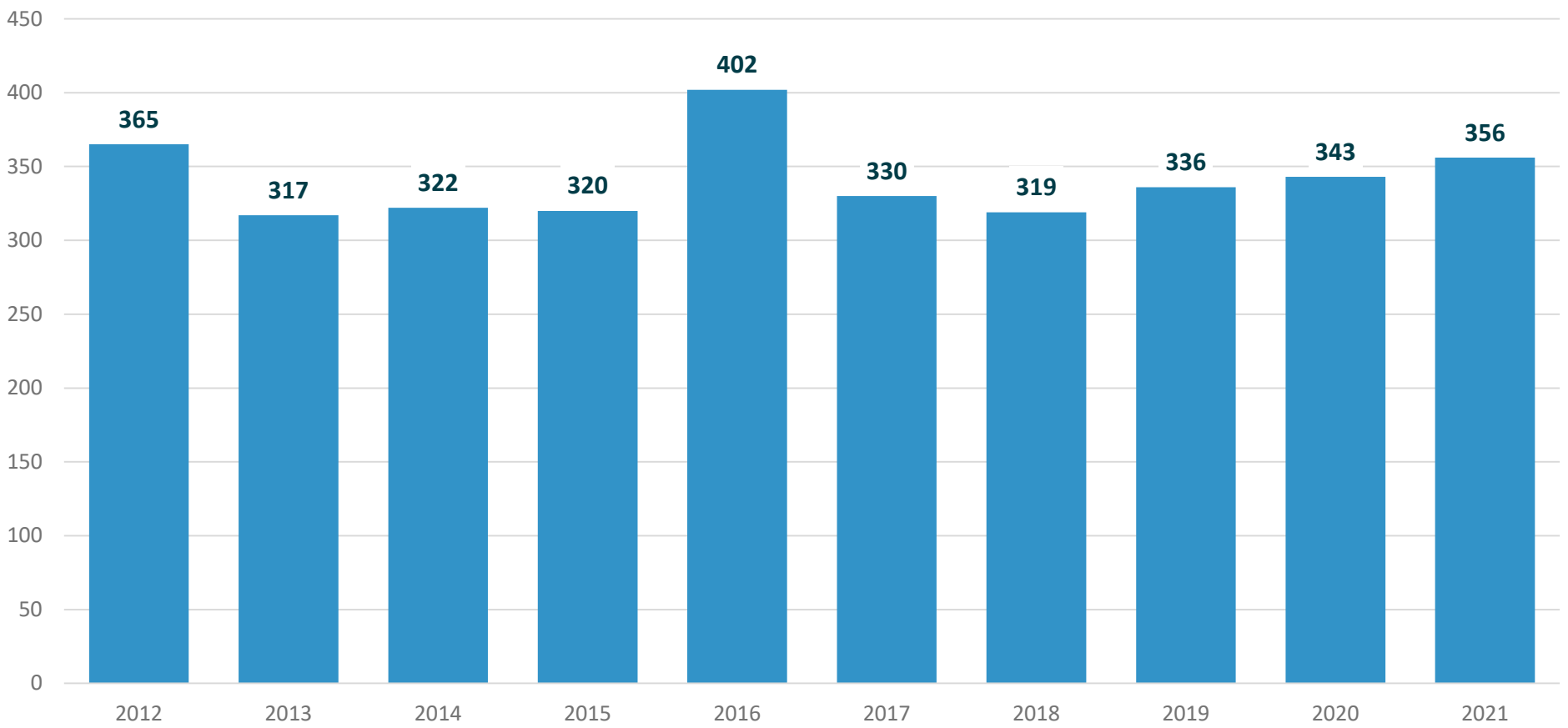
Note: Unless otherwise indicated, FHWA is the source for all images in the presentation.

Thousands of lives are lost each year



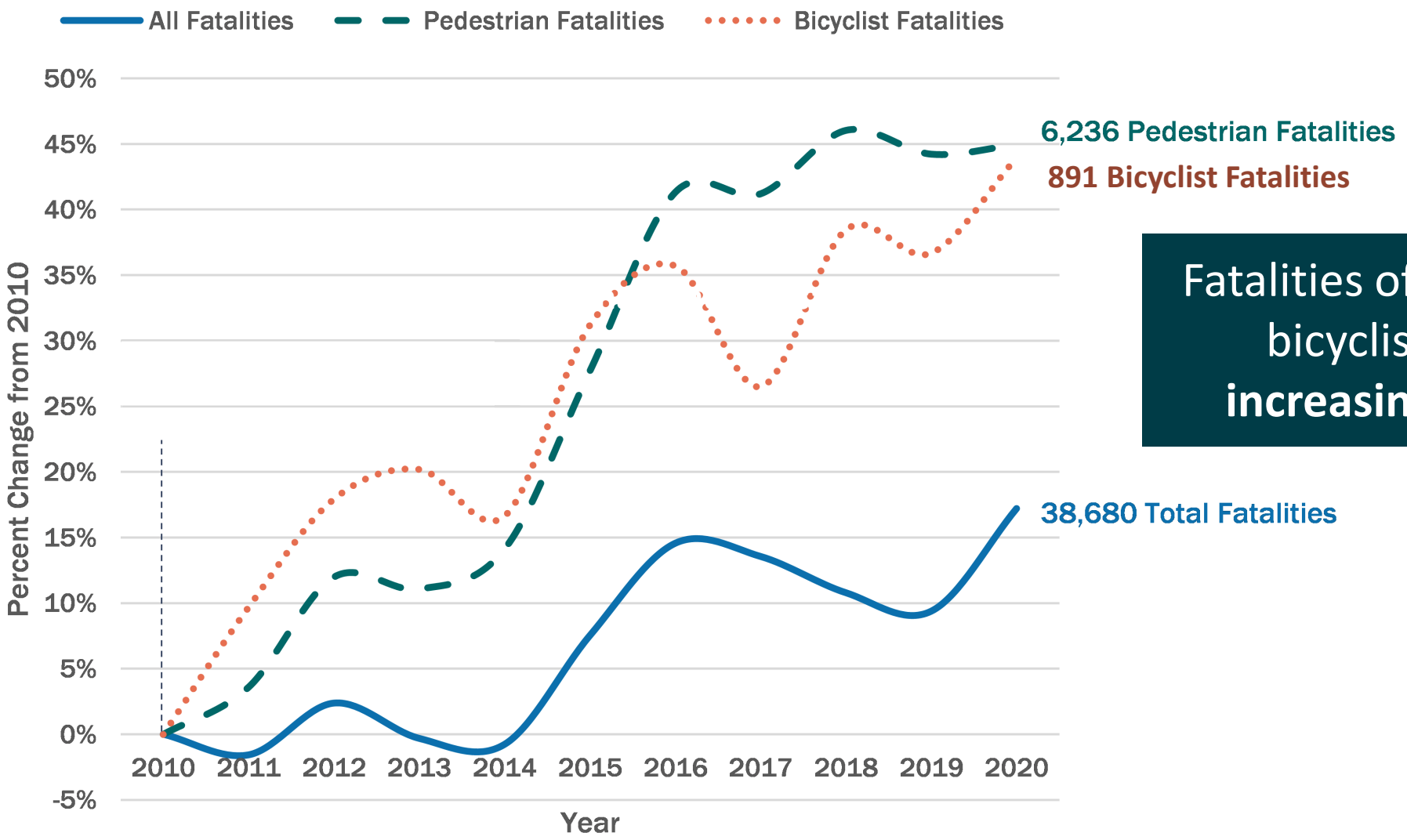
Total US Traffic Fatalities
2012-2021

Thousands of lives are lost each year



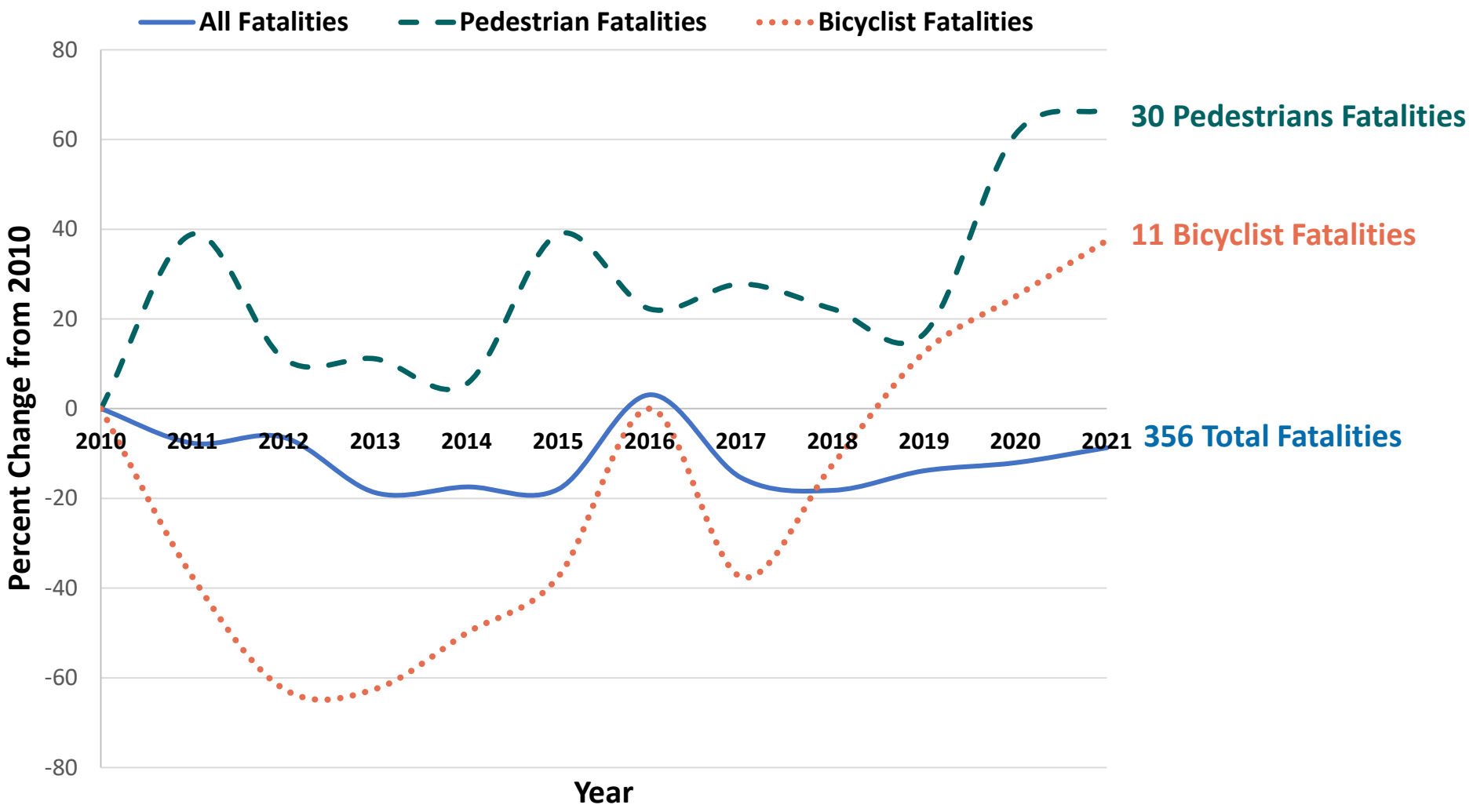
Total Iowa Traffic Fatalities
2012-2021

We have a national roadway safety problem



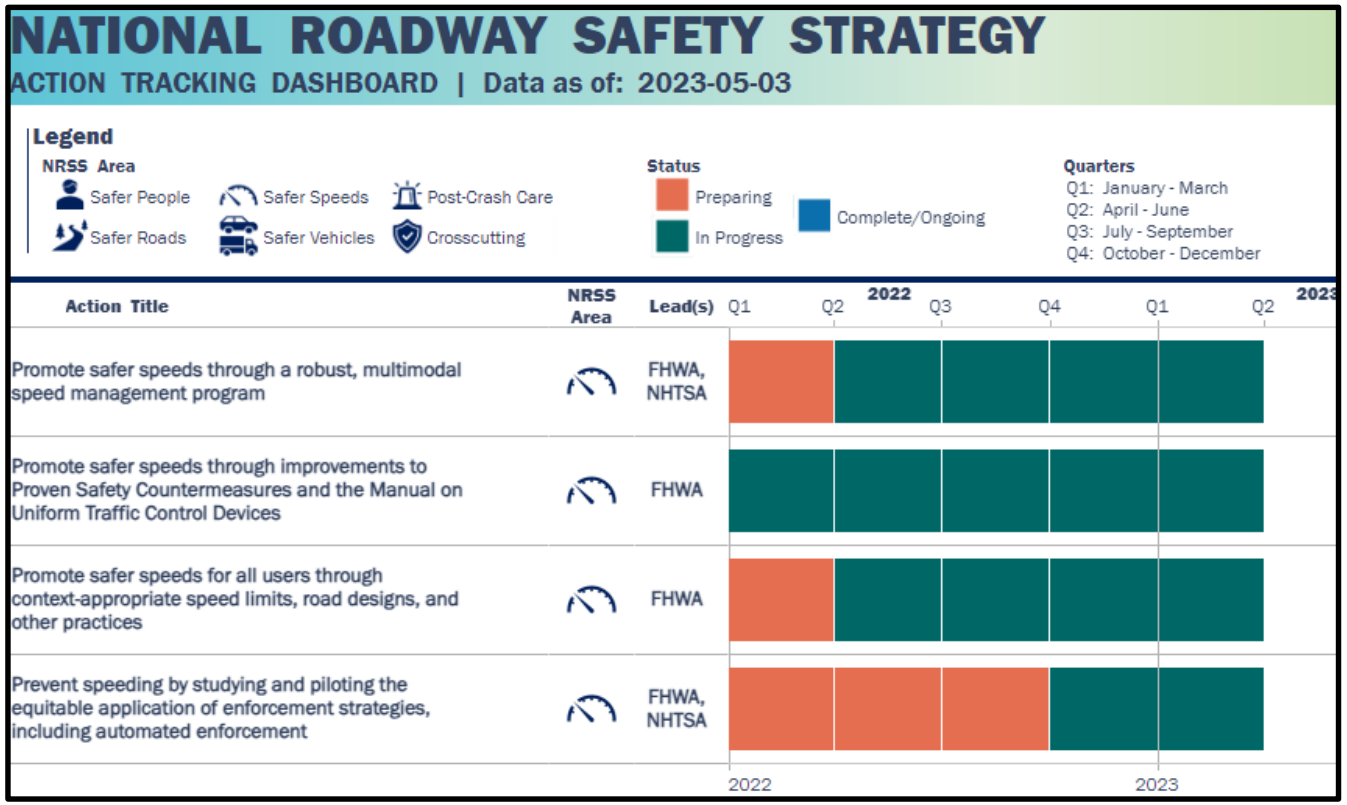
Fatalities of pedestrians and bicyclists have been **increasing even greater**

We have an Iowa roadway safety problem



Background

- ✓ Speeding-related traffic crashes killed 12,330 people in 2021 and was a contributing factor in 29 percent of all traffic fatalities.
- ✓ Higher speeds result in greater impact at the time of a crash, which leads to more severe injuries and fatalities. This is especially concerning for vulnerable road users (VRUs).
- ✓ The FHWA has adopted the Safe System Approach, with Safe Speeds as one of its fundamental pillars.
- ✓ Safer Speeds is a major component in USDOT's new National Roadway Safety Strategy (NRSS).



Source: FHWA

A new paradigm

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

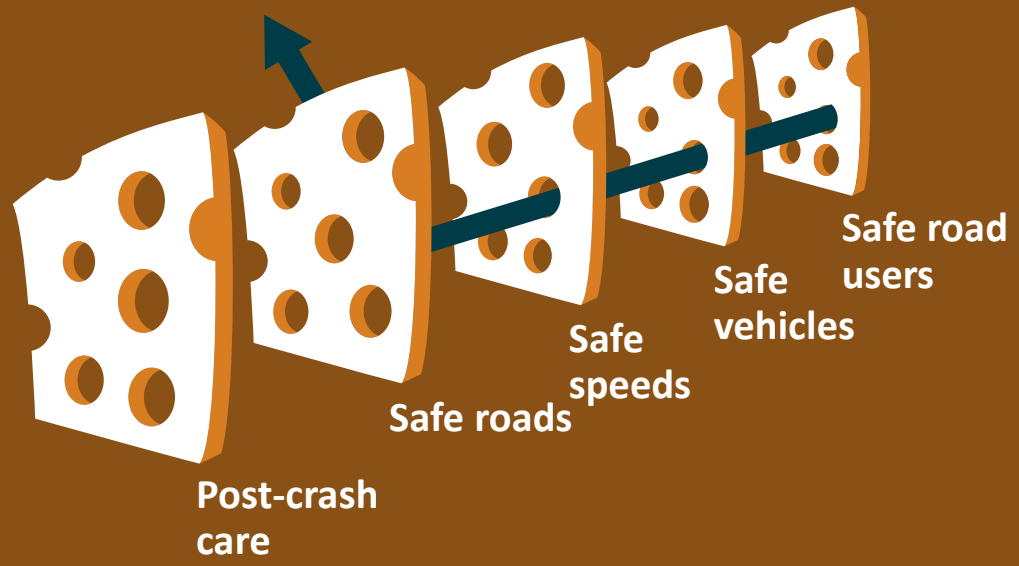
Safe System Approach

The Safe System Approach is a paradigm shift in how we approach safe mobility

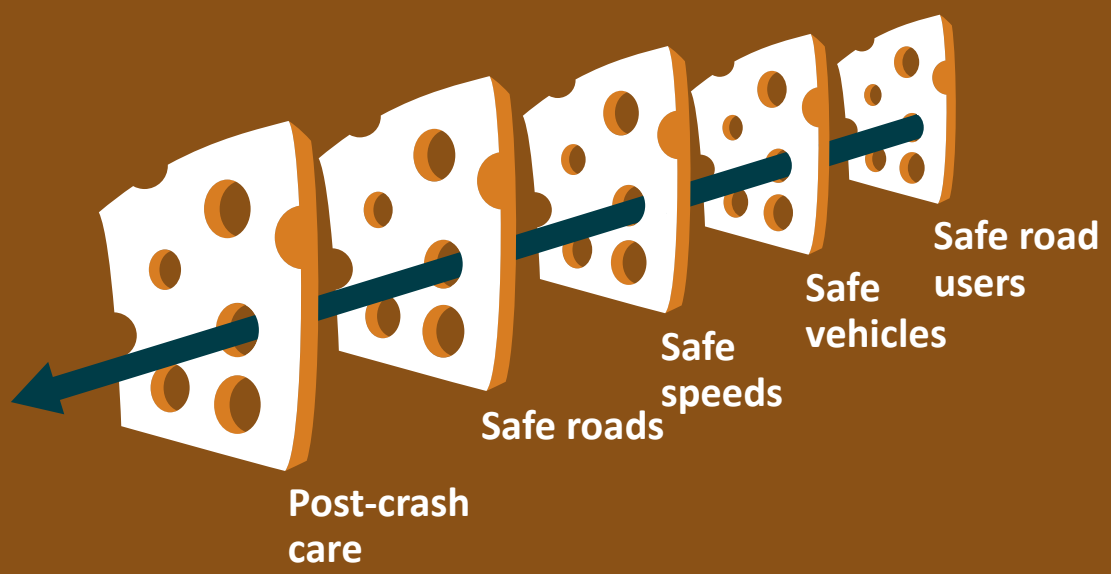
Source: FHWA

The 5 safe system elements create redundancy

The “Swiss Cheese Model” of redundancy creates layers of protection



Death and serious injuries only happen when all layers fail

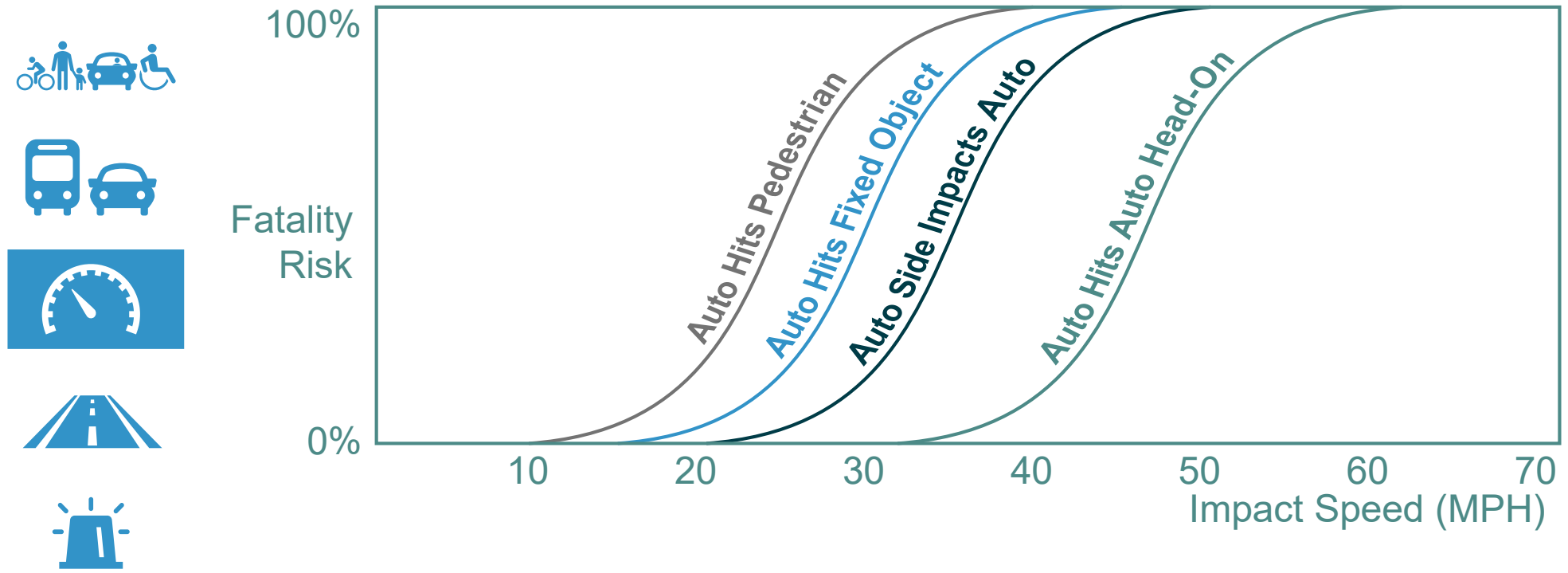


Safe Speeds: Fatality Risks

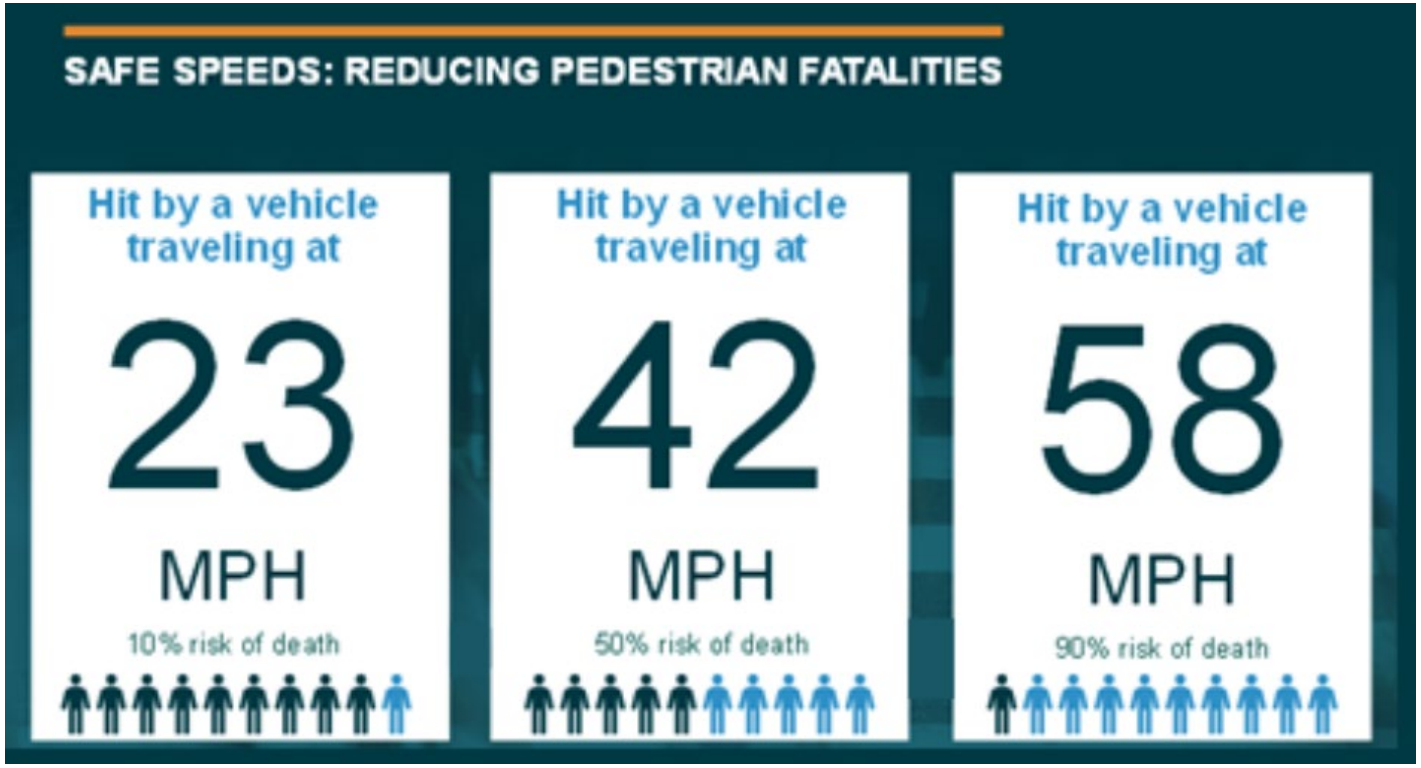
v $\frac{1}{2}mv^2$

✓Speed → Kinetic Energy → Crash Outcome

✓Speed directly affects a driver's ability to react.



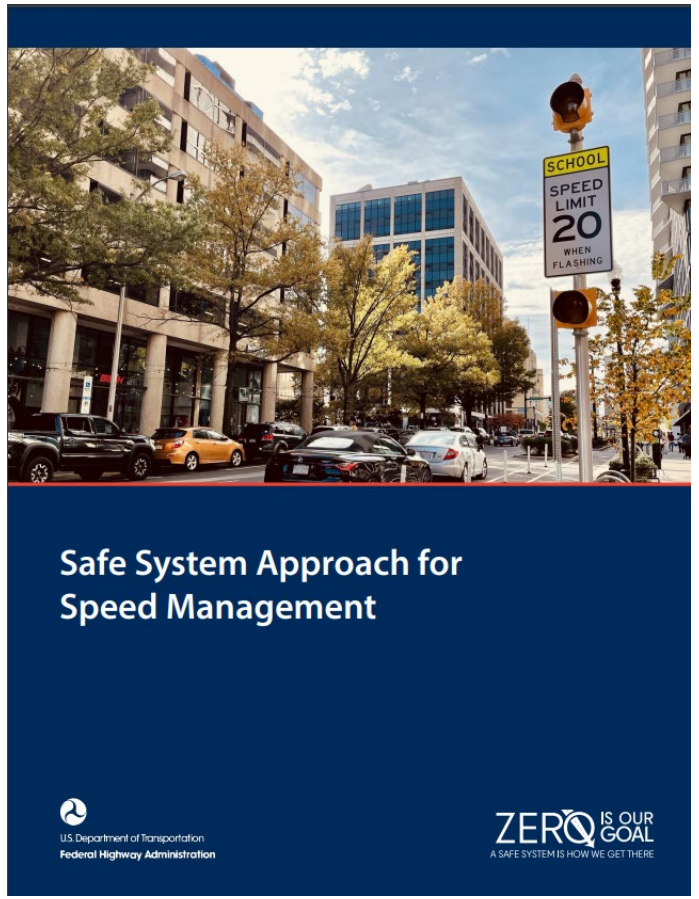
Safe Speeds: Fatality Risks for Pedestrians



Source: Image by FHWA based on AAA Study
"AAA Foundation for Traffic Safety, Impact Speed and a Pedestrian's Risk of Severe Injury or Death (Washington, DC: 2011)"

Safe System Approach to Speed Management

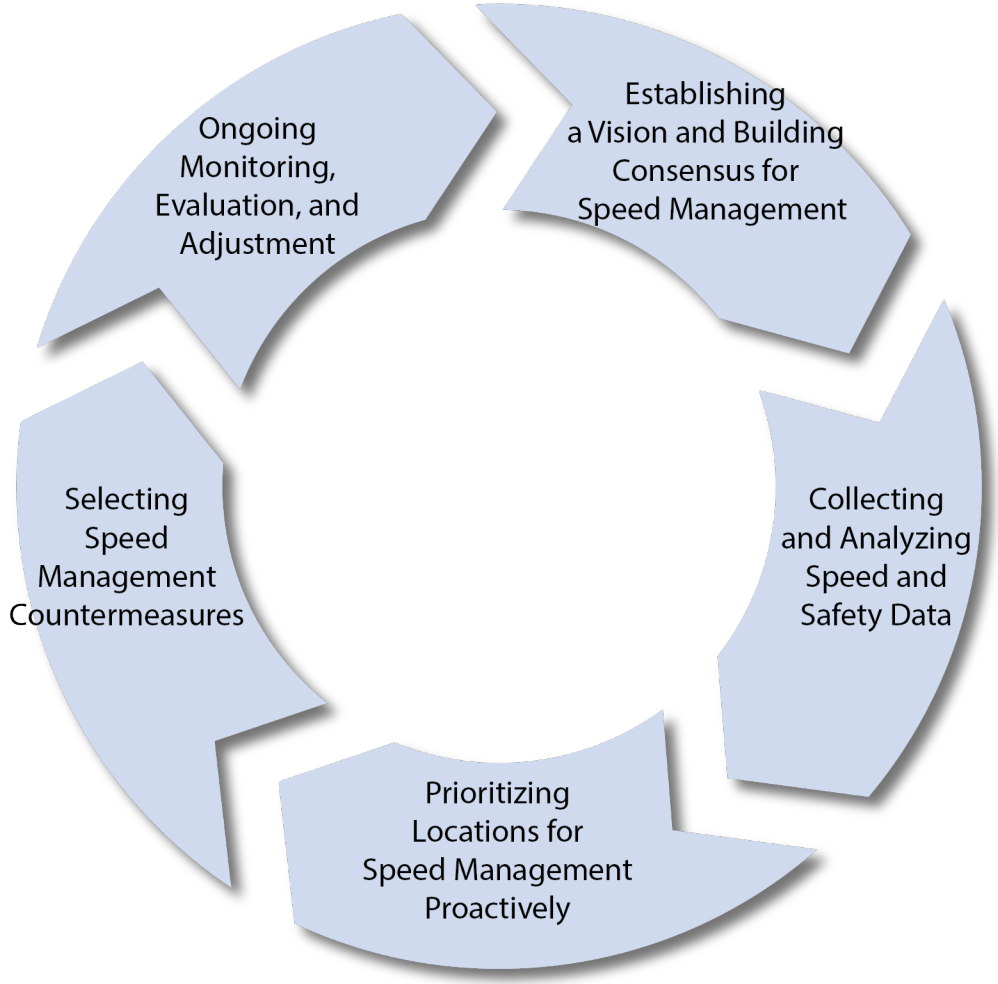
- ✓A comprehensive resource for practitioners interested in implementing a Speed Management program using the Safe System Approach.
- ✓Helps practitioners understand the impacts of speed on traffic safety and explore linkages between speed management and the Safe System Approach.
- ✓Introduces a five-tiered Safe System Approach for Speed Management Framework.
- ✓Includes noteworthy practices to highlight successful deployments.



Source: FHWA

Safe System Approach for Speed Management

- ✓ High-level framework constructed from
  - ➢ a range of different case studies
  - ➢ informed by the research literature
- ✓ Applicable to State and local agencies
  - ➢ Acknowledges differences in roles/responsibilities
- ✓ Specific Case Studies have been highlighted for each stage
- ✓ Agencies may be at different stages of implementation and may need to revisit earlier or later stages of the process as they evaluate their speed and safety outcomes



Source: FHWA

Establishing a Vision and Building Consensus for Speed Management

Transportation agencies seeking to establish a new Safe System aligned speed management program need to:

- Identify potential policy/legislative/institutional barriers in place
- Leverage community support; building consensus
- Determine scope of speed management activities
- Embed Safe System Approach into organizational policies
- Adopt a strategic framework

Source: City of Fremont

Collecting and Analyzing Speed and Safety Data

A Safe System aligned speed management program should be data-informed:

- ✓Dispel myths and negative perceptions
- ✓Gain public buy-in/Public education campaigns
- ✓Provide concrete benefits of speed management
- ✓Noted limitations with crash reports
- ✓Collect data for entire network including speed data

CRASH DATA

SPEED DATA

Proactively Prioritizing Locations for Speed Management

- Safety analysis should be **proactive**
- **Systemic** network screening and diagnosis of speeding related crashes
- **Prioritization** can be based on
  - Equity
  - Desired activity/placemaking
  - Modal hierarchy

Selecting Speed Management Countermeasures

- Objective to set speed limits that are consistent with the roadway context and safe for all users
  - Determine appropriate speeds to match target speeds
  - Inform the public about speed management benefits
  - Identify and implement roadway redesign or behavioral treatments to support speed limit changes
- Numerous Speed Management Resources
  - USLIMITS2, NACTO City Limits, NCHRP Report 966, FHWA Road Diet Guide, FHWA Self-Enforcing Roadways Report, FHWA Speed Safety Cameras, etc.

Street and limits:	Street								
Advisory		Statutory							
Speed	10 mph	≤15	≤20	≤25	≤30	≤35	≤40	≤45	≤50
PED	Shared roadway			5′ sidewalk 100% one side	Sidewalk both sides; curb or swale; 8′ separation	>8′ separation both sides NCHRP 562 crossings: 20/Hr.	>12′ separation both sides	Impermeable separation barrier	
BIKE	Shared roadway			≤ 5′ bike lane	6′ – 7′ bike lane	Minimum 2′ separation from autos	Permeable barrier	Impermeable separation barrier	
AUTO	Gravel roadway	≤ 9′ travel lanes	10′ travel lanes, greenway	10′ travel lanes		≤ 11′ travel lanes; Angle crash mitigations	Permeable center barrier; Roadside object setback or shielding		Impermeable center barrier

PBOT Decision Matrix

Source: PBOT

Table 5. Probability of fatality or serious injury corresponding to different crash types.

Crash Type	Driver Speeds Corresponding to 10% Fatal Injury Risk and 10% Serious Injury Risk
Pedestrian/vehicle crash[i]	20 mph for fatality 10 mph for serious injury
Side impact vehicle/vehicle crash (typically at intersections)[i]	30 mph for fatality 20 mph for serious injury
Head-on vehicle/vehicle crash (typically without median barriers)[i]	30–45 mph for fatality 20 mph for serious injury
Rear-end vehicle/vehicle crash[i]	35–70 mph for fatality 35 mph for serious injury
Motorcycle crash[ii]	19 mph for fatality

i = synthesized by Washington Injury Minimization and Speed Management Policy and Guidelines Workgroup, 2020.

ii = reported as biomechanical tolerance in Gaca and Pazdan 2017; see also Fildes, Langford, Andrea, and Scully 2005.

Table 6. FDOT Design Manual target speeds and speed management techniques.

Area Type	Context Classification	Target Speed (mph)	Strategies
Rural	C1-Natural (natural or wilderness lands)	55–70	N/A: Speed Management Strategies are not used on high-speed roadways
Rural	C2-Rural sparsely settled)	55–70	N/A: Speed Management Strategies are not used on high-speed roadways
Rural	C2T-Rural Town (small concentrations of developed areas surround by natural areas)	40–45	Roundabout, Lane Narrowing, Horizontal Deflection, Speed Feedback Signs, Rectangular Rapid Flashing Beacons (RRFB) and Pedestrian Hybrid Beacons (PHB)
		35	Techniques for 40–45 mph, plus On- street Parking, Street Trees, Short Blocks, Islands at Crossings, Road Diet, Bulb-outs,Terminated Vista
		30	Techniques for 35–45 mph, plus Chicanes, Islands in curved sections
		≤ 25	Techniques for 30–45 mph, plus Vertical Deflection
Suburban	C3R-Suburban (mostly residential within large blocks), C3C-Suburban Commercial (mostly non-residential	50–55	Project-specific
		40–45	Roundabout, Lane Narrowing, Horizontal Deflection, Speed Feedback Signs, RRFB and PHB

Source: FDOT. (2022). FDOT Design Manual: Development and Processes. Tallahassee, FL: Florida Department of Transportation

Safe Speed: Treatments that Minimize Injuries

Speed Management Related Proven Safety Countermeasures

Speed Management

Appropriate Speed Limits for All Road Users

Speed Safety Cameras

Variable Speed Limits

Road Diets (Roadway Configuration)

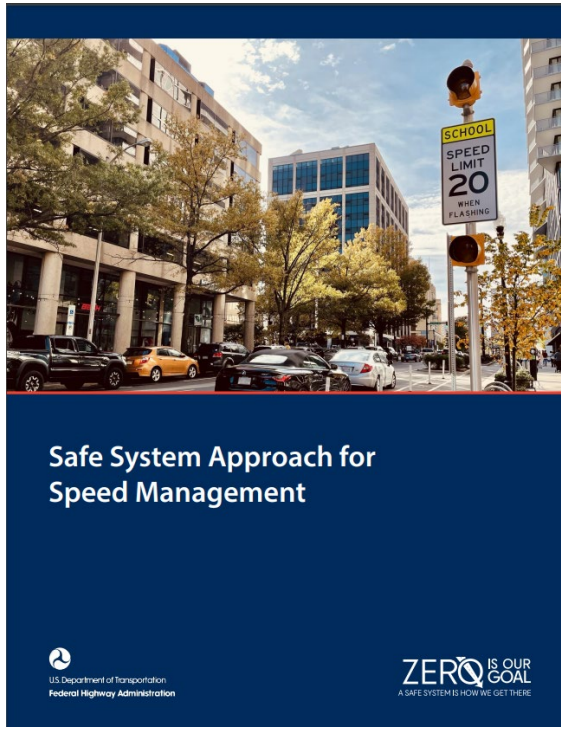
Enhanced Delineation for Horizontal Curves

Ongoing Monitoring, Evaluation, and Adjustment

- Cyclical nature of proposed framework requires continued monitoring and improvement.
- Monitor outcomes of implemented projects; safety performance can change over time; speeding patterns may also migrate.
- Measure progress against long range safety plans (SHSPs).
- Plans should be iterative and may be incremental in nature (especially for high-cost infrastructure plans).
- Speed enforcement is often vital to establishing driver compliance with target speeds.

Want to Learn More

FHWA Safe Systems Approach for Speed Management

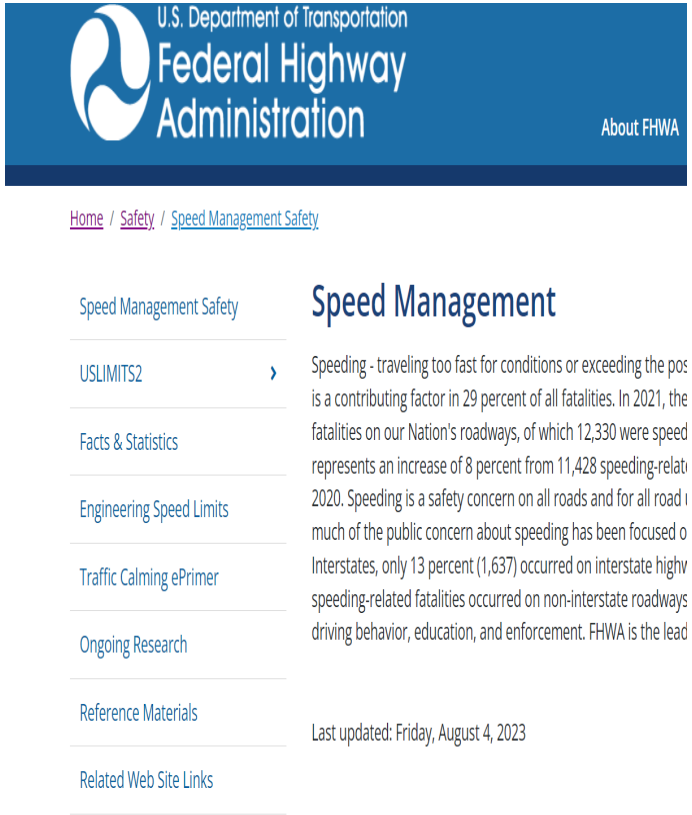


https://highways.dot.gov/sites/fhwa.dot.gov/files/Safe_System_Approach_for_Speed_Management.pdf

Free NHI Designing and Operating Roadways for Safe Speeds

https://www.nhi.fhwa.dot.gov/course-search?tab=0&key=designing%20and%20operating&sf=0&course_no=380128

FHWA Speed Management Website



https://highways.dot.gov/safety/speed-management

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