



National  
Center  
for  
Rural  
Road  
Safety

## Improving Rural Road Safety with the Safe System Approach



## A 6-part Webinar Series

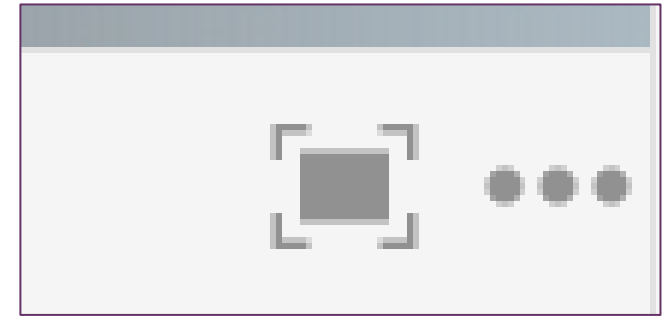
## Part 4: Safe Speeds

Presented by:

- Kay Fitzpatrick, Senior Research Engineer, TTI
- Darren Torbic, Research Scientist, TTI



# Webinar Logistics



- Duration is 11:00 AM - 12:30 PM Mountain
- Webinar – recorded and archived on website. For quality of recording, phone will be muted during presentation
- If listening on the phone, please mute your computer
- To maximize the presentation on your screen, click the “window box” in the top right of the presentation
- At the end of each section, there will be time for Q&A
- There is a handout pod at the bottom of the screen
- Please complete follow-up surveys; they are vital to assessing the webinar quality



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Survey Link –

<https://lp.constantcontactpages.com/sv/hyCDCiF>

- Survey closes 2 weeks after webinar
- Expect certificate/CEU form approx. 4-6 weeks after webinar
- Return CEU form to [ContinuingEd@montana.edu](mailto:ContinuingEd@montana.edu) **NOT** Rural Safety Center
- Request a verification of completion form





# Today's Presenters



Kay Fitzpatrick  
Sr Research Engineer  
TTI



Darren Torbic  
Research Scientist  
TTI



# Goals of this Webinar

Once you have completed this webinar, you will have:

an understanding of the Safe Speed element in the Safe System Approach through the lens of actions agencies can take.



# Learning Outcomes

To achieve the webinar goal, you will learn to:

Explain the steps for setting a posted speed limit.

Name the key elements to consider when setting a posted speed limit.

List design treatments for rural high-speed to low-speed transition zones.



# National Safety Efforts: Intertwining Concepts

## Foundation



## Framework



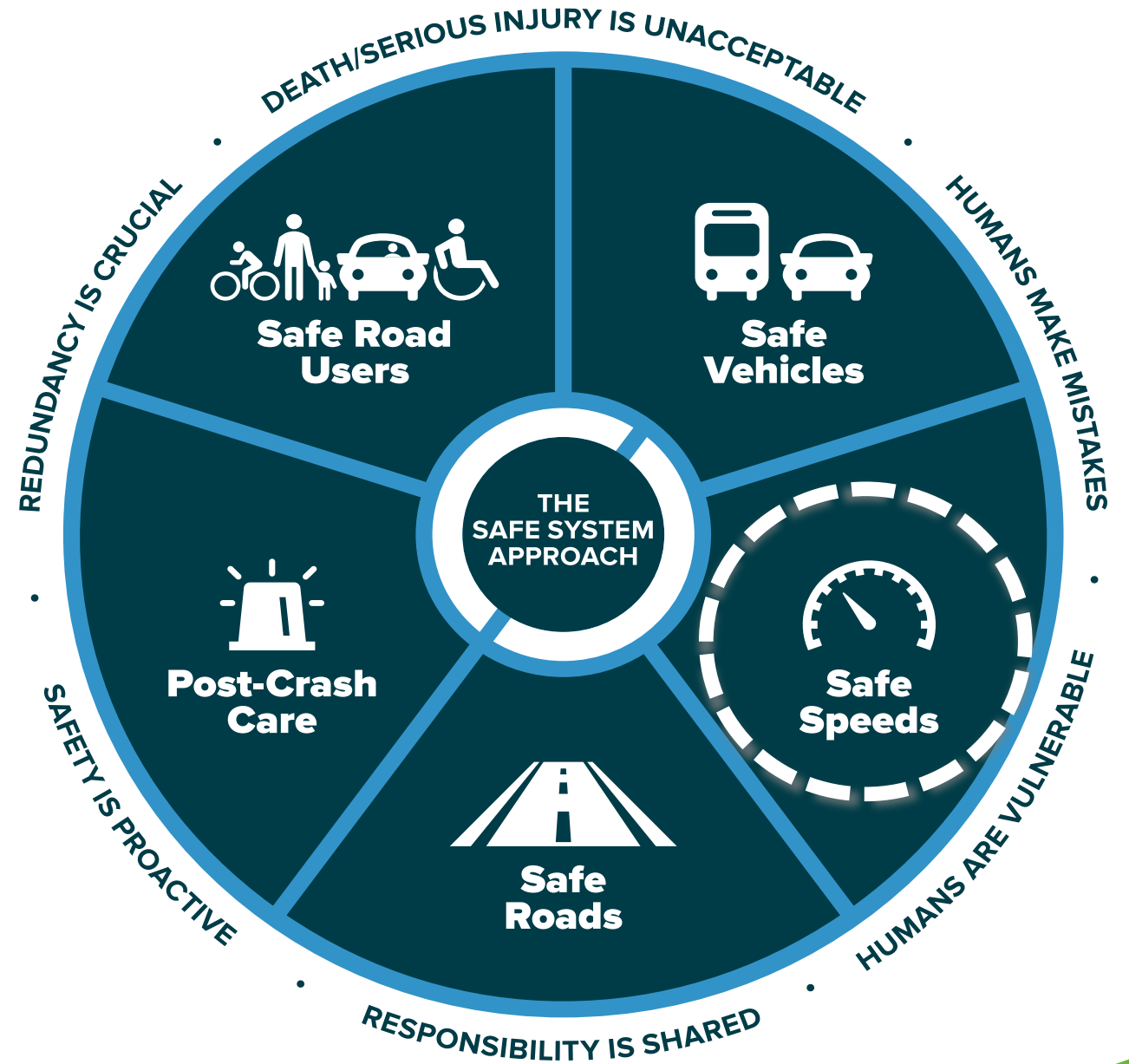
## Goal





## Safe System:

- Holistic Approach
- Aims to eliminate fatal and serious injuries for all road users
- 5 Elements
- 6 Principles







# Safe Speeds

Direct link between safe speeds and ability to survive a crash

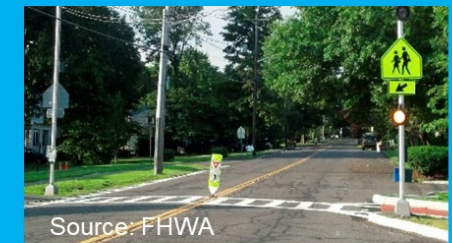
- Reducing speed accommodates human injury tolerance by:
  - Reducing impact forces
  - Providing additional time for drivers to stop
  - Improving visibility

The Safe System approach is not about universally reducing speeds

- Matching speed appropriate to the road conditions that exist
- Designing to meet user expectancies
  - Self-explaining roads
  - Self-enforcing roads



Some roads are engineered to accommodate higher speeds ...



... and others not.



Kay Fitzpatrick  
Sr Research Engineer  
TTI



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Explain the steps for setting a posted speed limit.

Name the key elements to consider when setting a posted speed limit.

List design treatments for rural high-speed to low-speed transition zones.

# NCHRP 17-76: Guidance for the Setting of Speed Limits

Kay Fitzpatrick, Texas A&M Transportation Institute

Tim Gates, Michigan State University

Subasish Das, Texas A&M Transportation Institute

Eun Sug Park, Texas A&M Transportation Institute

Mike Pratt, Texas A&M Transportation Institute

Karen Dixon, Texas A&M Transportation Institute

**Rural Safety Center, October 27, 2021**



# NCHRP 17-76 Objectives

- Objective:
  - Identify and describe factors that influence operating speed
    - Research report = *NCHRP Web-Only Document 291: Development of a Posted Speed Limit Setting Procedure and Tool*
  - Provide guidance (**User Guide** and **Tool**) to make informed decisions related to establishing speed limits on roadways
    - User Guide / Tool = *NCHRP Research Report 966: User Guide for Posted Speed Limit Setting Procedure and Tool*

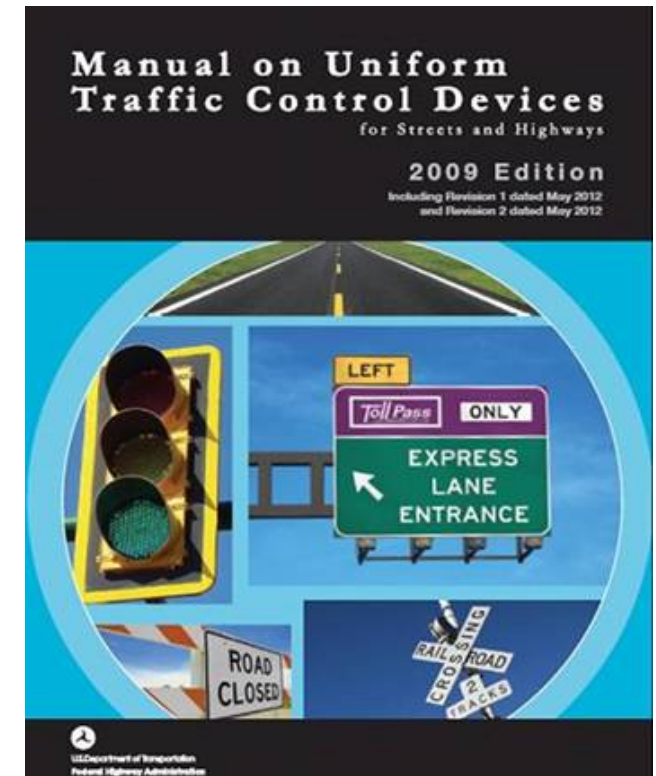
# Existing Guidance

- **MUTCD**

- Traffic study using 85<sup>th</sup> percentile speed of free-flowing traffic along with consideration of other factors

- Several **other resources** available

- FHWA website and reports, USLIMITS2, ITE website, state documents, NACTO, etc.



# Other Publications & Activities

## (After NCHRP 17-76 Started)

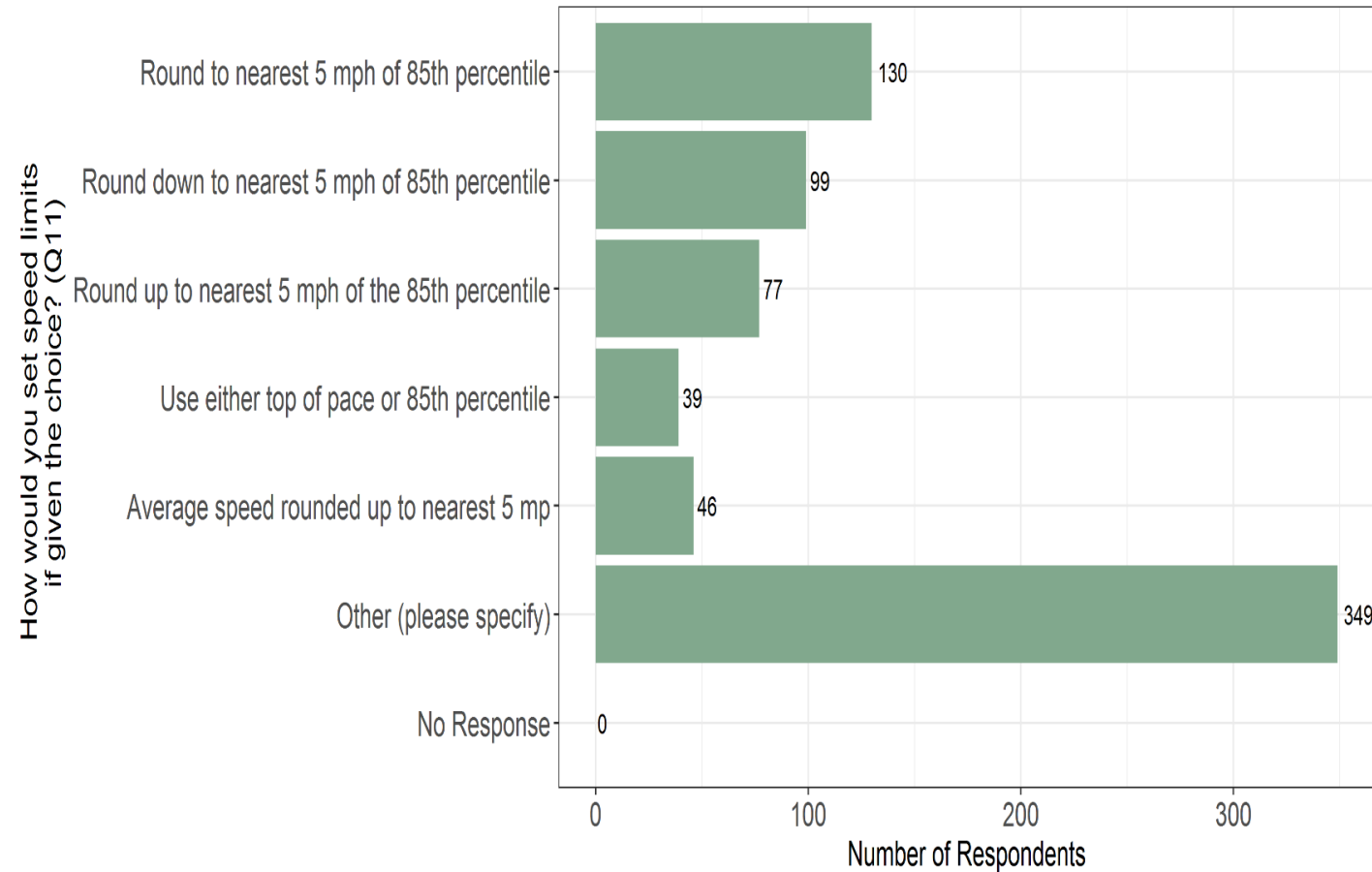
- **NACTO 2017** policy: “State rules or laws that set speed limits at the 85th percentile speed should be repealed”
- **National Transportation Safety Board 2017** (*Reducing Speeding-Related Crashes Involving Passenger Vehicles*) provides specific recommendations, such as removing guidance in MUTCD that speed limits should be within 5 mph of the 85th percentile speed
- Several **state initiatives**
- **City-wide** speed limits
- **NACTO 2020** report: *City Limits, Setting Safe Speed Limits on Urban Streets*



# NCUTCD Task Force on Speed Limits

- Task Force addressing recommendations from NTSB
- Key direction / suggested changes to MUTCD:
  - Keep MUTCD general (detailed procedure => guides)
  - Emphasize that other factors have a role in setting speed limits (in addition to 85<sup>th</sup>) / reorganized list of factors
  - Retain reference to 85<sup>th</sup> percentile, particularly for freeways, expressways, and rural areas

**Q11: How would you set speed limits if given the choice?**





# NCHRP 17-76 User Guide and Tool

## Guiding Principles

- Easy to explain (relatively)
- Consistent results – use of decision rules
- Defendable – demonstrate sources of decision rules
- Avoid “black box” feel
- Flexible so future knowledge can update decision rules

# Developing Guide and Tool

## Guiding Principles (Continued)

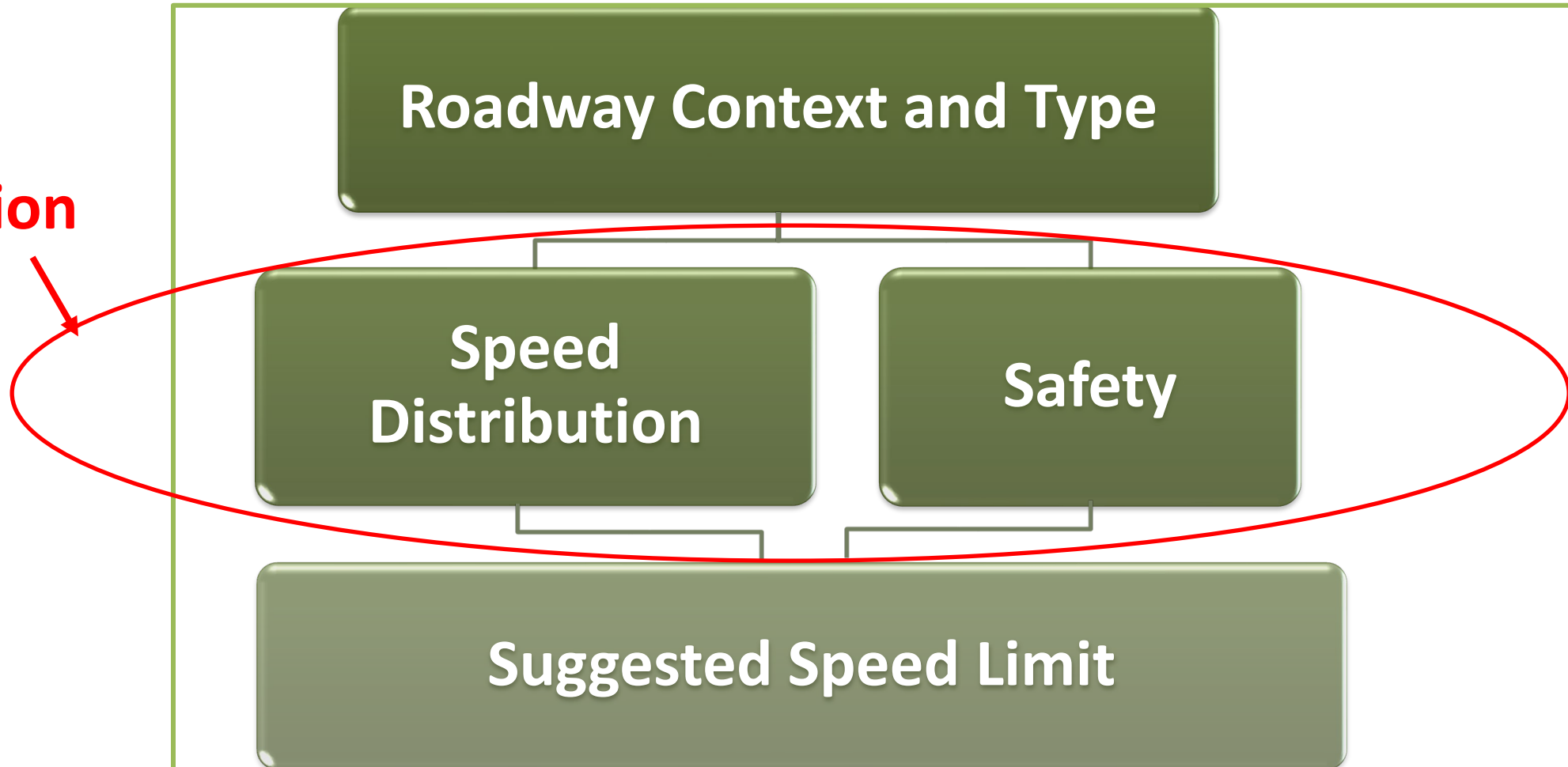
- Can be used for all roadway types / contexts
- Group similar roadway types / contexts
- Different set of decision rules for each roadway type / context groups

# Speed Limit Setting Groups

Context Type	Rural	Rural Town	Suburban	Urban	Urban Core
Freeways	Limited Access	Limited Access	Limited Access	Limited Access	Limited Access
Principal Arterial	Undeveloped	Developed	Developed	Developed	Full Access
Minor Arterial	Undeveloped	Developed	Developed	Developed	Full Access
Collector	Undeveloped	Full Access	Developed	Full Access	Full Access
Local	Undeveloped	Full Access	Full Access	Full Access	Full Access

# Speed Limit Setting Procedure

**Decision  
Rules**

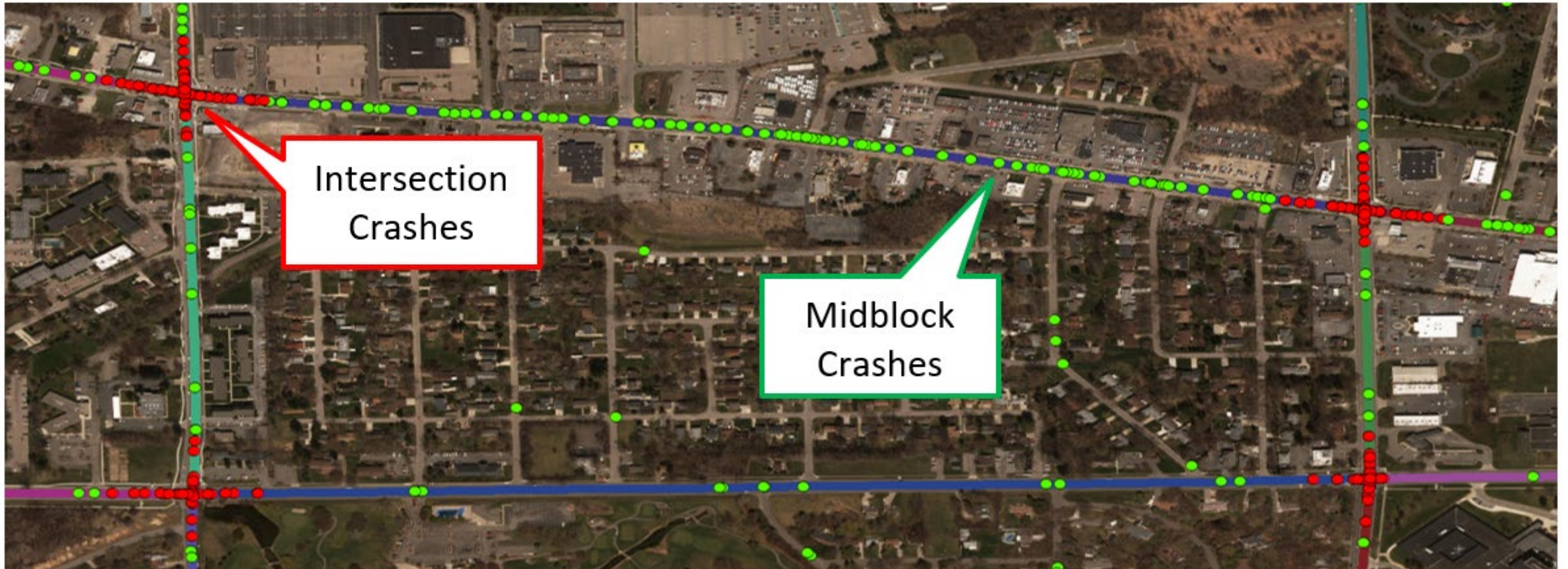


# Developing Decision Rules in 17-76

- Findings from the **literature**
- Guidance from **key reference documents** such as the *Green Book* and the *Highway Safety Manual*
- Research efforts in 17-76 using data from **Austin, TX and Washtenaw County, MI**
- **Research Team** expert opinions
- Feedback from **experts**, including the **project panel**

# 17-76 Research Efforts

## Crash Data – Non-Intersection

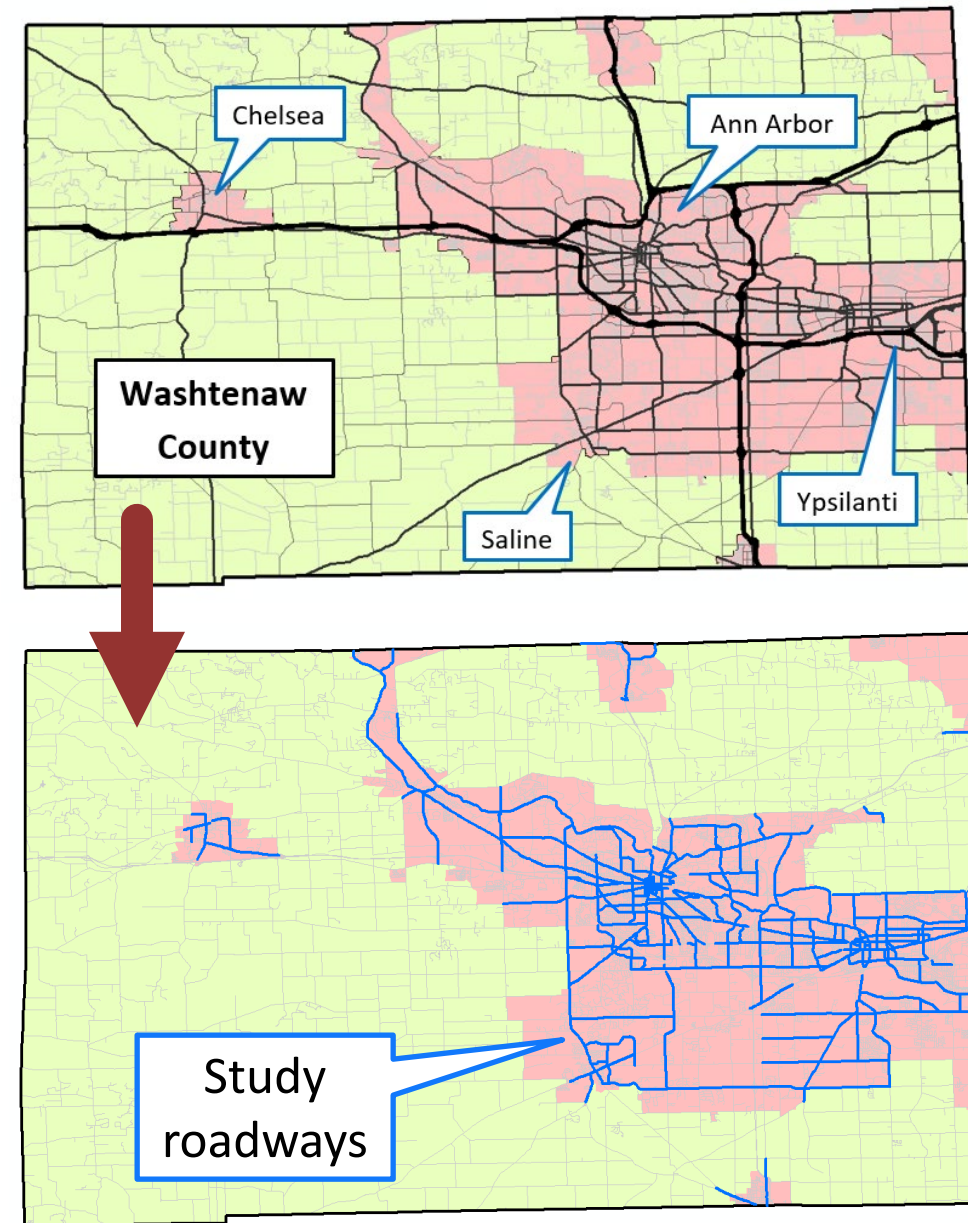




# Washtenaw County Michigan Roadway Inventory Data

- Approximately **313 miles** out of ~3,000 miles of public roadway selected for safety analysis which **met criteria for inclusion**

Characteristic	Criteria
Posted Speed Limit	25 to 50 miles per hour
National Functional Class	Includes Other Principal Arterial, Minor Arterial, Major Collector, Minor Collector Excludes Interstates, Other Freeways, and Local
Historical Traffic Volume	Must include recent AADT estimate
Urban Boundary	Includes roadways which fall within or extend from urban census boundary



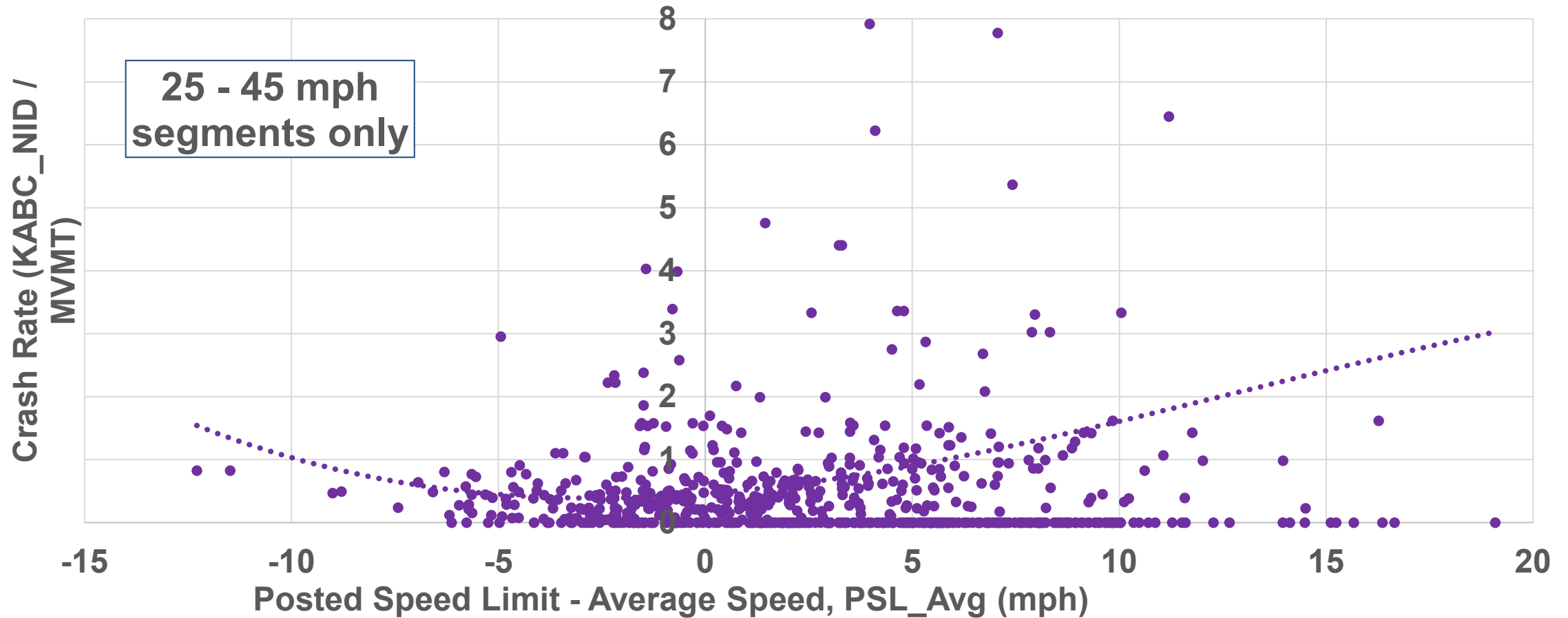
# Austin, Texas Speed Data

- City of Austin traffic count data
  - 2016 and 2017 data
  - Most on 2-lane streets (residential or collectors)
- Sites collected as part of NCHRP 17-76
  - 2018 data
  - Arterials, typically 4 lanes

Posted Speed Limit (mph)	# Segments	Length (mi)
25	169	52
30	318	138
35	68	36
40	51	37
45	43	28
50	12	13
55	2	2
<b>Grand Total</b>	<b>663</b>	<b>305</b>



# Crash Rate and PSL-Average Speed



# Impacts on Decision Rules

- Data support the inclusion of two variables which were previously included in USLIMITS2:
  - Traffic signal density
  - Access point density (with break points of 40 and 60 per mile)
- Also provides evidence for including median type and on-street parking
- Speed / crash / geometric relationship provides justification for using 50% percentile

# Developing Speed Limit Setting Tool (SLS-Tool)

## Guiding Principles for Spreadsheet

- Most or all data on one screen
- Colors to indicate what user should **enter** / what is being **calculated**, also **warning** / **advisory** notes
- Data input organized by type (e.g., site description, speed data, site characteristics, and crashes)
- Only show needed site characteristics for the particular speed limit setting group

# Example 1: Limited Access - Spreadsheet

## NCHRP 17-76 Speed Limit Setting Tool

### Site Description Data

Rural	Roadway context	Clear all data
Freeway	Roadway type	
Yes	Are crash data available?	Enter default data
MP	Analyst	
12/17/2019	Date	Test macros
SH 23	Roadway name	
	Description	
65	Current speed limit (mph)	
	Notes	

### Color-Coding Legend

Aqua = basic input cell
Denim = basic input cell with drop-down menu
Orange = optional input cell (not needed for calculations)
Green = optional input cell (use if data are available, leave blank other
Rose = intermediate calculations
Purple = final analysis results
Yellow = field data or agency policy value — <i>adjust with caution and jus</i>

Note: The "Test macros" button provides a message to verify proper

### Analysis Results

Limited-access	Speed limit setting group
70	<b>Suggested speed limit (mph)</b>

### Advisory, Calculated, or Warning Messages

This value is determined by speed data & site characteristics.

The basis for the suggested speed limit decision is noted here

# Example 1: Limited Access - Spreadsheet

Variables that influence the calculated suggested speed limit are noted with advisory or calculated messages

2	Grade (%)	
10	Outside shoulder width (ft)	
2	Inside shoulder width (ft)	
No	Adverse alignment present?	
		<b>Rounded-Down 85th</b>
<b>Crash Data</b>		<b>Advisory, Calculated, or Warning Messages</b>
3	Number of years of crash data	
25,000	Average AADT for crash data period (veh/d)	
16	All (KABCO) crashes for crash data period	
4	Fatal & injury (KABC) crashes for crash data period	
	Average KABCO crash rate (crashes / 100 MVMT)	Observed KABCO crash rate = 8.99 crashes / 100 MVMT
	Average KABC crash rate (crashes / 100 MVMT)	Observed KABC crash rate = 2.25 crashes / 100 MVMT
103.7	1.3 x average KABCO crash rate (crashes / 100 MVM	HSIS average KABCO crash rate = 79.8 crashes / 100 MVMT
27.6	1.3 x average KABC crash rate (crashes / 100 MVMT)	HSIS average KABC crash rate = 21.24 crashes / 100 MVMT
91.1	Critical KABCO crash rate (crashes / 100 MVMT)	
27.2	Critical KABC crash rate (crashes / 100 MVMT)	
Welcome		Analysis
Support Tables		(+)

# Research Needs

- Relationship(s) among operating speed, roadway characteristics, posted speed limit, crashes
  - More is needed
- Specific criteria for ped / bike volume, bike lane type, sidewalk characteristics
- Alternative speed limit approaches for city streets
- Speed management techniques

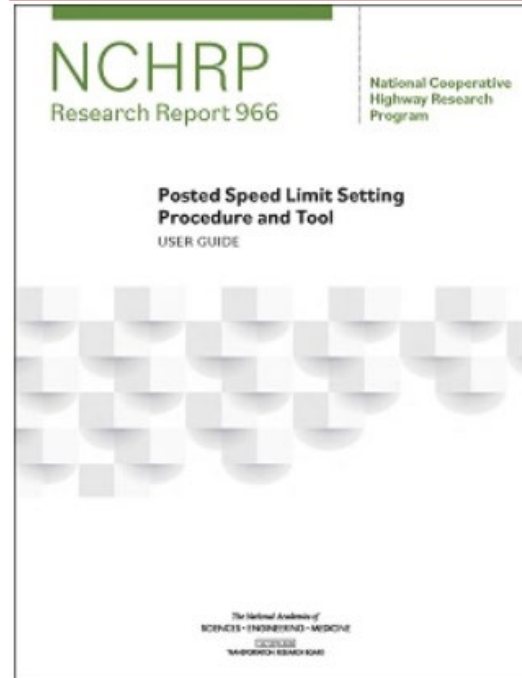
# NCHRP 17-76 Deliverables

<http://www.trb.org/main/blurbs/182038.aspx>

## Research Report



## User Guide and Tool



### Posted Speed Limit Setting Procedure and Tool: User Guide

Several factors are considered within engineering studies when determining the posted speed limit to minimize crashes.

The TRB National Cooperative Highway Research Program's *NCHRP Research Report 966: Posted Speed Limit Setting Procedure and Tool* includes both driver speed choice and safety associated with the roadway. This report also provides

- [N17-76 SLS-Tool \(with macros\)](#) and
- [N17-76 SLS-Tool \(without macros\)](#).

The “without macros” version is made available for users who are not able to use macro codes on their computers.

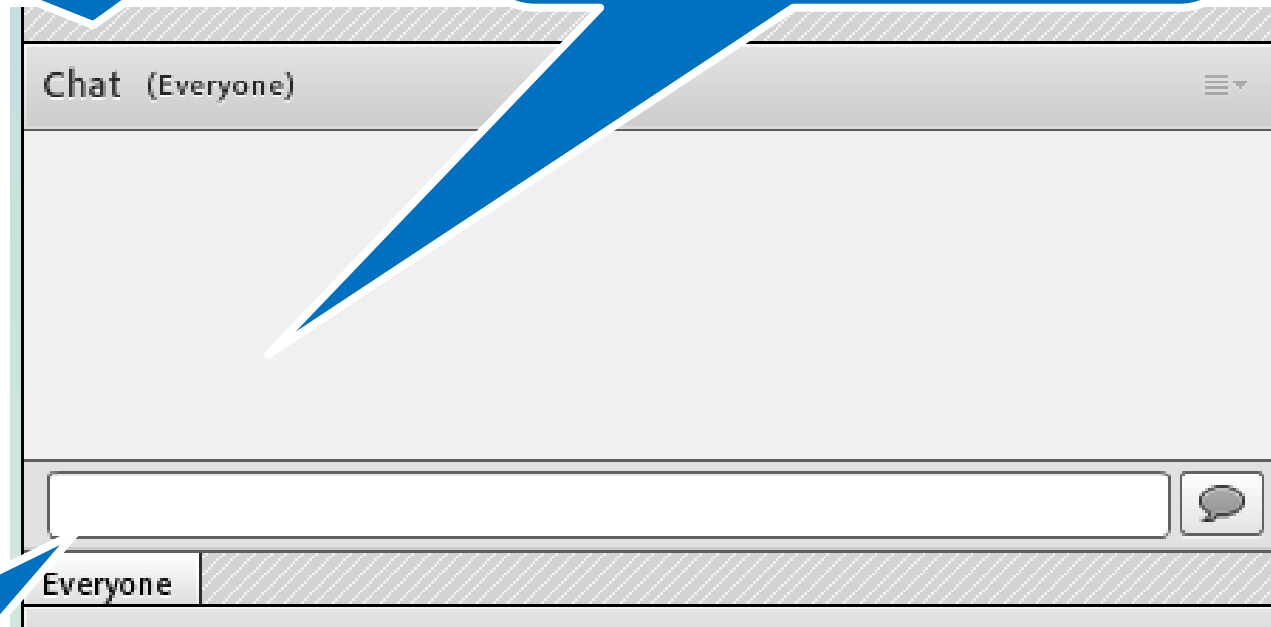


## Directing Your Questions via the Chat Pod

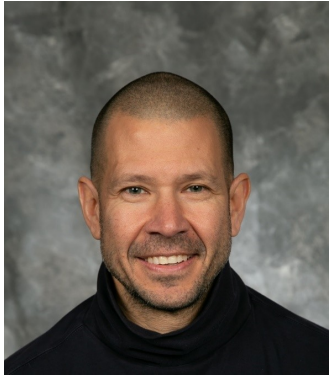
1. Chat pod is on left side of screen between attendees pod & closed caption pod

3. Answers will appear here unless addressed verbally

2. Type your question or comment here







Darren Torbic  
Research Scientist  
TTI



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Explain the steps for setting a posted speed limit.

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# NCHRP Project 15-40

# Design Guidance for High- to Low-Speed Transition Zones for Rural Highways

Webinar Series:

Improving Rural Road Safety with the Safety System Approach

Part 4: Safe Speeds

October 27, 2021



# Outline

- Objective and scope
- Key findings from NCHRP Synthesis Report 412
- Field studies
- Design guidance
- Relationships to Safe System Approach

# Objective

- Quantify the effectiveness of treatments to reduce driver speeds in high-to-low speed transition zones
- Develop design guidance for selecting effective treatments for transitioning from high-to-low speed roadways, particularly rural highways entering communities

# Scope

- Focus on high-to-low speed transition zones, but consideration also given to vehicles traveling through low-speed environment
- Focus on engineering treatments
  - Did not address other speed management components
    - Driver education, enforcement programs, etc.
- Build upon results published in NCHRP Synthesis Report 412 (*Speed Reduction Techniques for Rural High-to-Low Speed Transitions*)



# Key Findings from *NCHRP Synthesis Report 412*

- More extensive and aggressive treatments tend to produce greater reductions in speed and crash occurrence than less extensive and passive treatments
- A distinct relationship between a community speed limit and a change in the roadway character is needed to affect driver behavior
- No particular treatment is appropriate for all situations
  - Each community must be assessed and treated based on its own characteristics
- It is necessary to provide additional measures through the community to maintain a speed reduction downstream of the transition zone

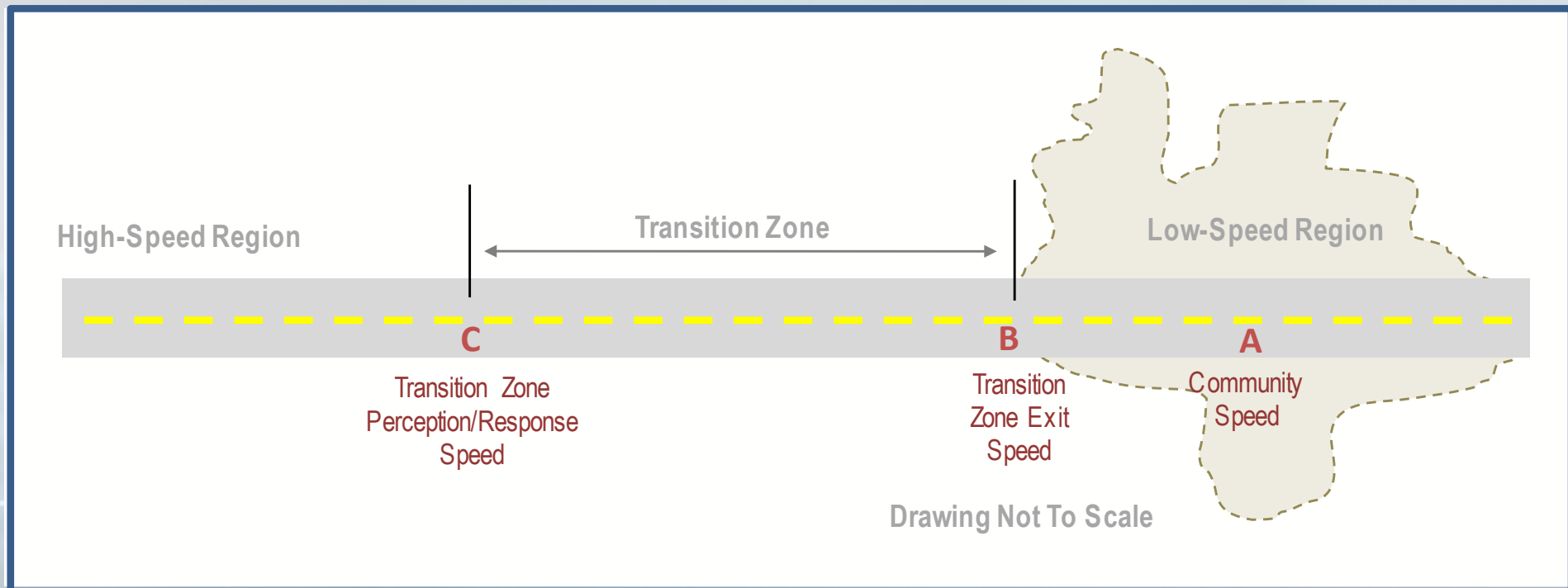
# Field Studies

- Evaluated effectiveness of 3 treatments in reducing speeds through the transition zone and community
  - Roundabouts
  - Transverse pavement markings (TPMs)
  - Welcome signs at community entrances
- Crash analysis



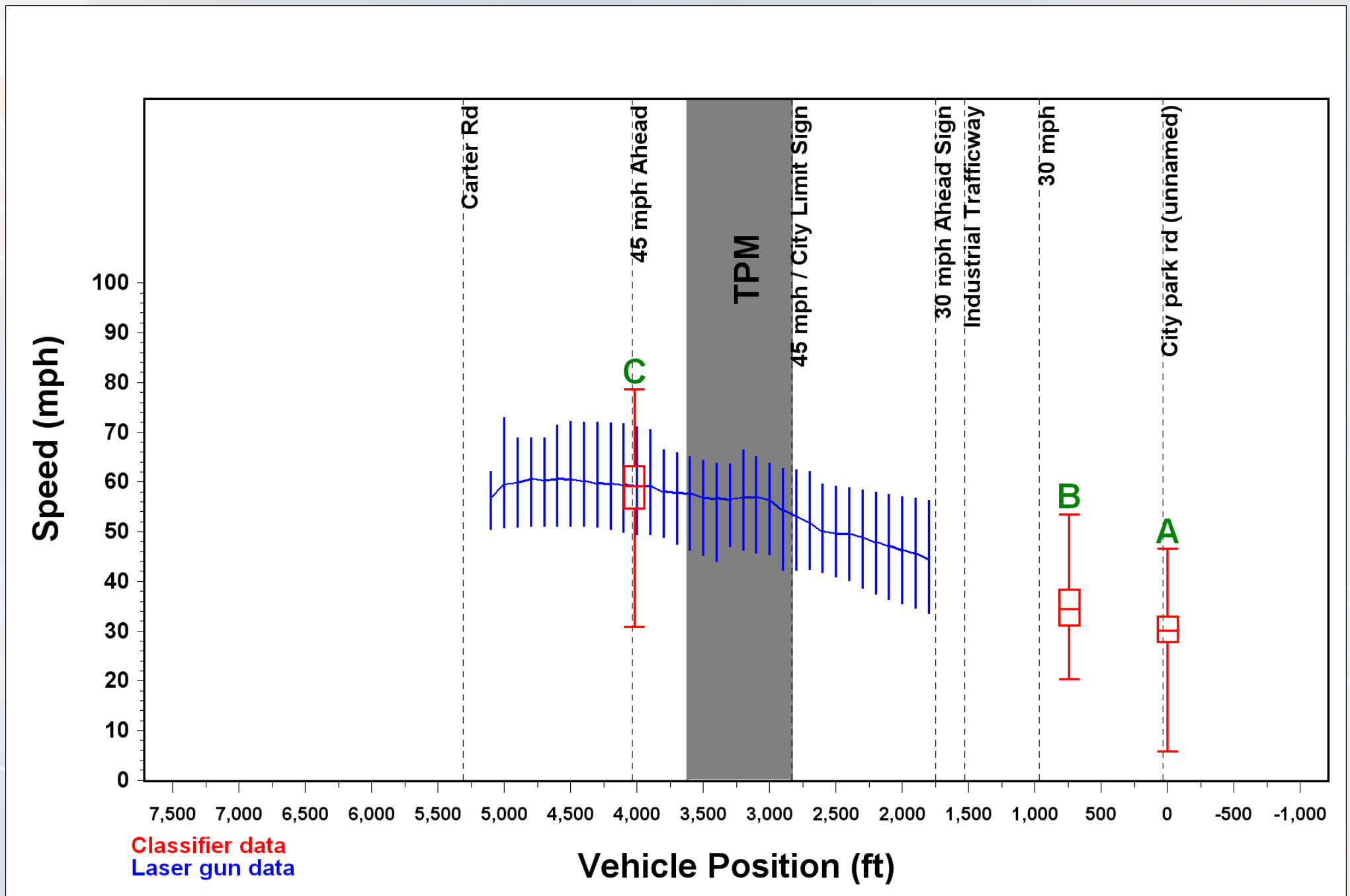
# Speed Studies

- Collected data at 22 treatment and nontreatment locations





# Vehicle Speed Profiles



# Primary Measures of Interest

- **Transition zone exit speed**
  - Percentage of vehicles in compliance with speed limits at end of transition zone and percentage of vehicles exceeding speed limits by 5 mph
- **Transition zone speed reduction**
  - Difference in mean speeds upstream and downstream of transition zone
- **Community speed**
  - Percentage of vehicles in compliance with posted speed limits or speed limits plus 5 mph within community

# Analysis Approach

- Used logistic regression models to compare effects of treatments versus nontreatment
  - Accounted for difference in posted speed limits at each location
  - Accounted for site characteristics
    - On-street parking
    - Presence of sidewalks and curbs
    - Horizontal alignment

# Primary Results

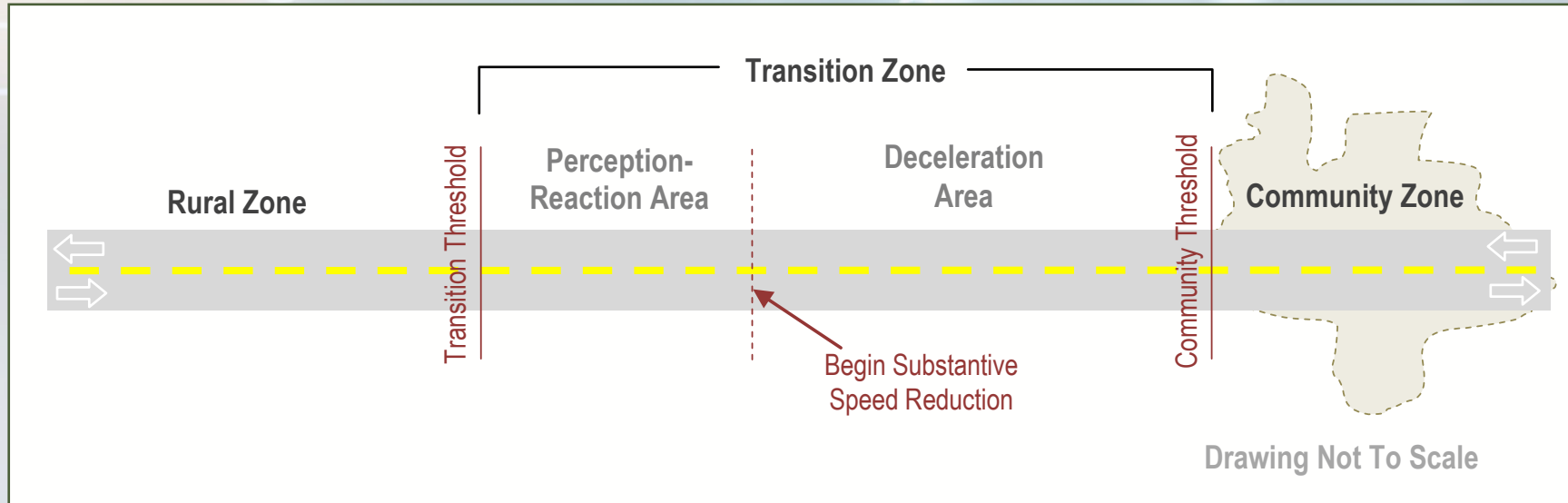
- Roundabouts and TPMs increase rate of compliance of vehicles traveling at or below the speed limit at the end of a transition zone by 15 and 20%, respectively, compared to no treatment.
- Roundabouts increase rate of compliance of vehicles traveling within 5 mph of the speed limit at the end of a transition zone by 11%, compared to no treatment.
- Findings support the need to provide additional measures through the community to maintain a speed reduction downstream of the transition zone through the community.
- No evidence that any of the treatments either improved or negatively impacted safety.

# Design Guidance

- Developed design guidelines for selecting appropriate treatments for transitioning from high-to-low-speed roadways on rural highways
  - Definitions of the transition zone study area
  - Method to assess the need for one or more transition zone treatments
  - Guiding principles for transition zone design
  - Catalog of transition zone treatments



# Definition of Transition Zone Study Area



## Perception Reaction Area

- Drivers made aware of impending need to change speed and behavior
- Physical and operational characteristics similar to rural zone
- Some deceleration may occur

## Deceleration Area

- Drivers expected to decelerate to safe speed for entering community
- Roadway and roadside characteristics, land-use, and access generally change
- May include physical measures to reinforce needed speed transition

# Transition Zone Assessment

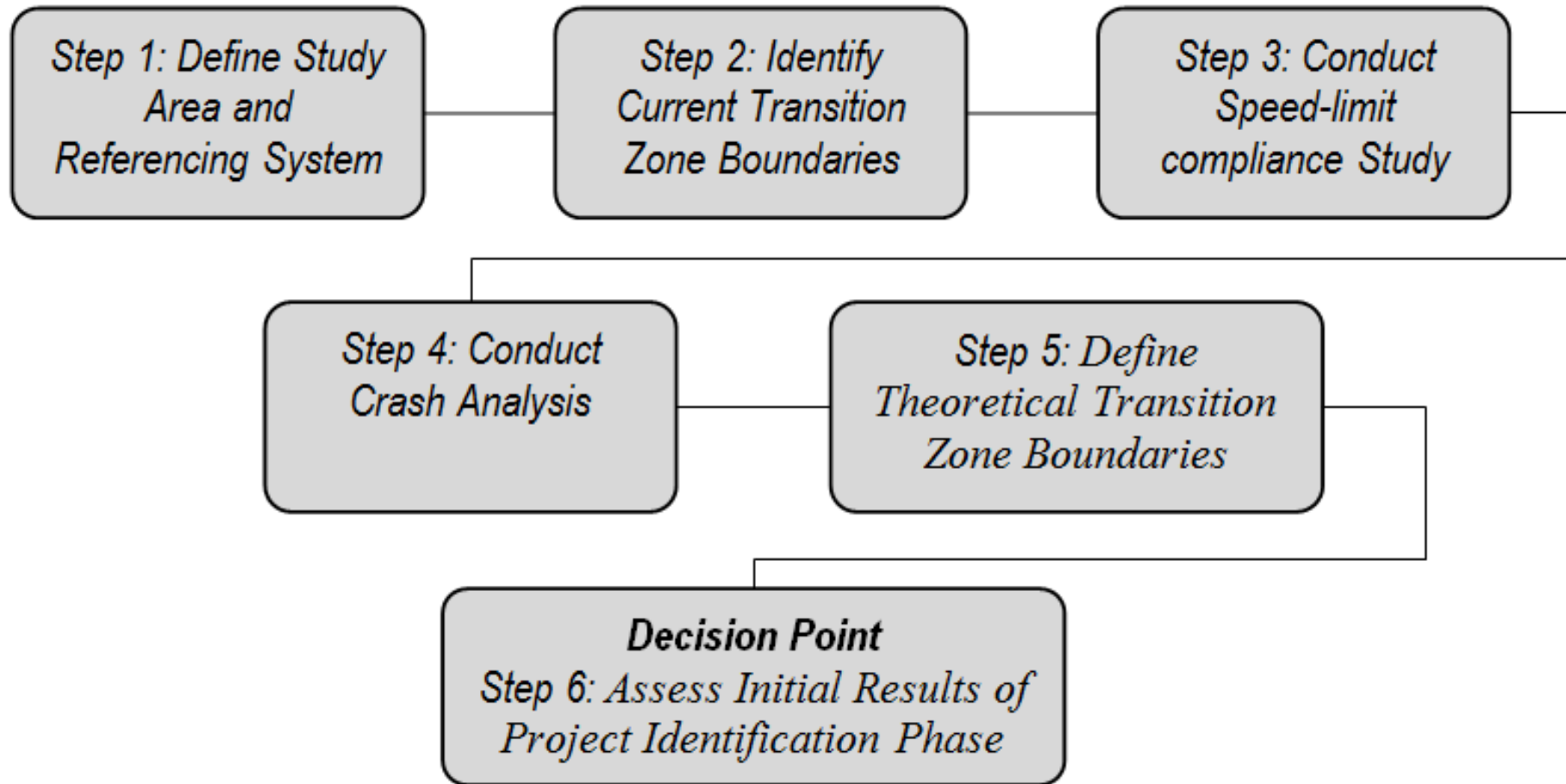
- Transition zones unique compared to other portions of roadway
  - Typically design continuity is important and abrupt changes in design are avoided
  - In transition zones, roadway design necessarily changes
- Drivers expected to change behavior to match new conditions



# Transition Zone Assessment

- Speeds: posted, design, and actual speed profiles
- Crashes: frequency/rate, location, type, and severity
- Access points: location and density
- Land-use and zoning: current and future
- Roadway alignment: vertical and horizontal (and lines of sight)
- Traffic volumes: daily and peak hour
- Vehicle types: cars, trucks, agricultural, and emergency response vehicles
- Non-motorized transportation: pedestrians and bicyclists
- Transit design or operational features
- Signs, striping, and traffic control
- Intersection geometry
- Roadway design elements: cross-section elements and widths, etc.
- Roadside design elements: sidewalks, landscape, streetscape, etc.
- Parking
- Current transition zone treatments

# Transition Zone Assessment



# Transition Zone Assessment Steps

## **Step 1: Define Study Area and Reference System**

- Define geographic extents of study area
- Should extend from rural zone to within community
- Select reference point for all measurements

## **Step 2: Identify Current Transition Zone Boundaries**

- Identify current transition zone based on locations of speed limit signs and advance warning signs
- Boundaries can be set based on when signs become visible

# Transition Zone Assessment Steps

## **Step 3: Conduct Speed-Limit Compliance Study**

- Obtain speed data at key locations and create speed profile
- Compute mean and 85<sup>th</sup> percentile operating speeds
- Compare to posted speed limits (and other metrics)

## **Step 4: Conduct Crash Analysis**

- Collect most recent 3 to 5 years of available crash data
- Analyze qualitatively to determine if speed is contributing factor
- Conduct quantitative analyses using methods prescribed in HSM
- Check correlation between crash analysis and speed studies

# Transition Zone Assessment Steps

## **Step 5: Define Theoretical Transition Zone Boundaries**

- Define theoretical transition zone boundaries based on community and roadway characteristics and deceleration distances appropriate for the speed change
- Compare transition zone boundaries from Step 2 to theoretical transition zone boundaries

## **Step 6: Assess Initial Results**

- Results of speed study and crash analysis will yield indication of whether speed reduction treatments are needed
- Additional data can be incorporated into analysis to support selection of one or more potential transition zone treatments



# Straight-Line Diagram Tool

Speed (mph)

Crashes

Crash Rate

Access Points

Land Use

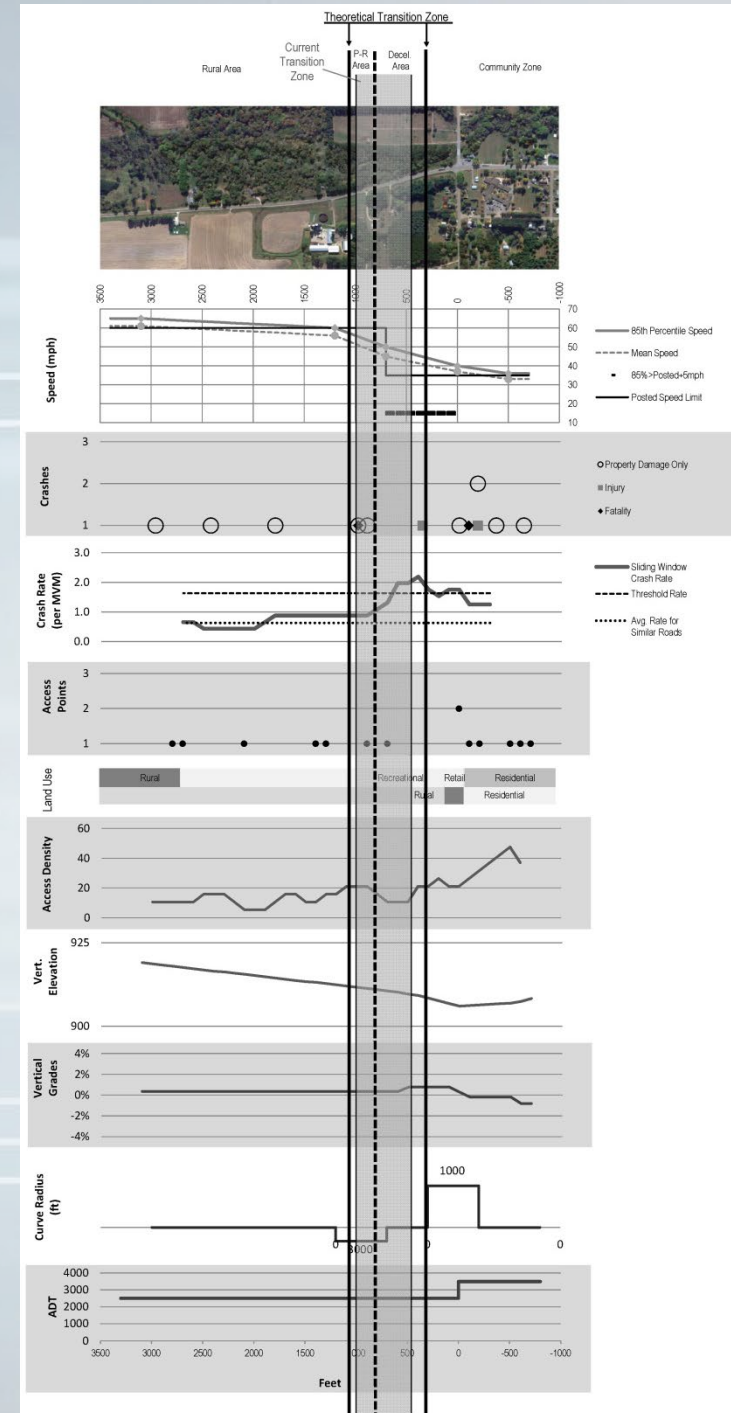
Access Density

Vertical Elevation

Vertical Grade

Curve Radius

Traffic Volume (ADT)



# Guiding Principles for Transition Zone Design

- More extensive and aggressive treatments tend to produce greater reductions in speed and crash occurrence than less extensive and passive treatments.
- There needs to be a distinct relationship between the community speed limit and a change in the roadway character.
  - Emphasizing a change in environment increases awareness.
- Physical changes to the roadway and roadside are favored treatments because they have permanent and lasting effects.
  - Impacts of enforcement and education programs are more transient and less effective.
- Each transition zone and community has its own unique characteristics.
  - No particular treatment is appropriate for all situations.
  - Each transition zone and community must be assessed on a case by case basis before selecting a treatment or combinations of treatments for a given context.



# Guiding Principles for Transition Zone Design (continued)

- Before selecting a treatment, consideration should be given to the two areas that make up the transition zone.
  - Perception-reaction area: warning and/or psychological treatments are appropriate.
  - Deceleration area: physical treatments should be installed.
- Combinations of treatments are more effective at reducing speeds and improving safety within a transition zone and through a community than a single treatment.
- To maintain a reduction in speed downstream of the transition zone, it is necessary to provide additional treatments within the community.
  - Otherwise, speeds may increase downstream of the community threshold.

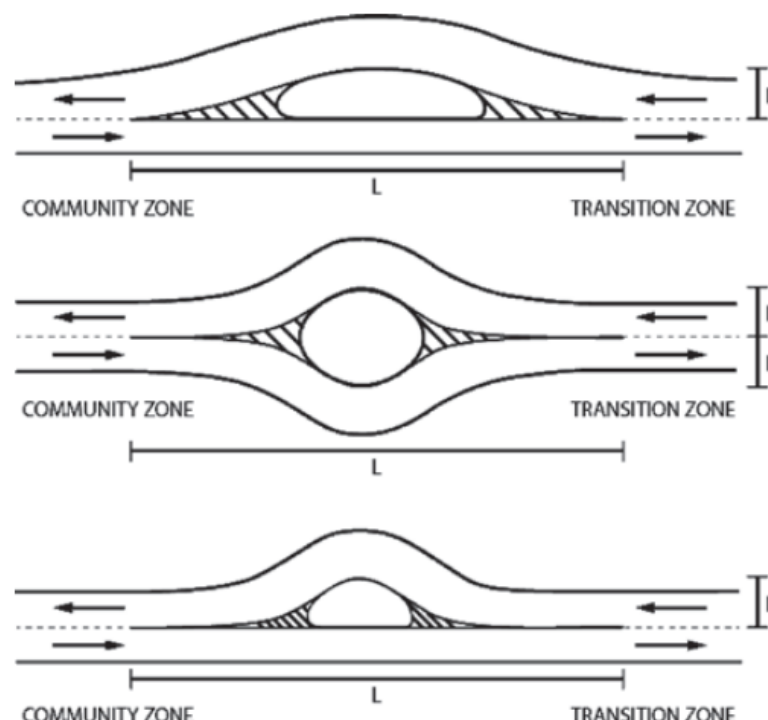
# Guiding Principles for Transition Zone Design (continued)

- Appropriate use of landscaping elements such as grass, shrubs, and trees which change in composition and degree of formality along the length of the transition zone can reinforce the changing characteristics of the environments.
- Consideration should be given to prohibiting passing within the transition zone.

# Catalog of Transition Zone Treatments

- Includes treatments that appear most practical and/or effective for use in high- to low-speed transition zones
  - Geometric design elements
  - Traffic control devices
  - Pavement surface treatments
  - Roadside treatments
- Not meant to be an exhaustive list

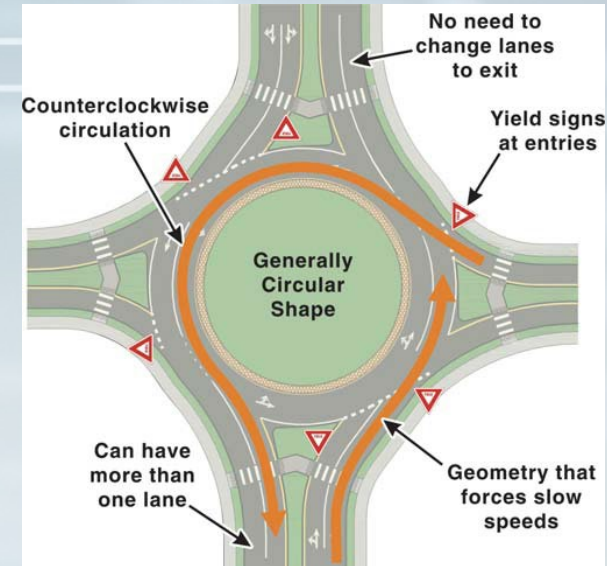
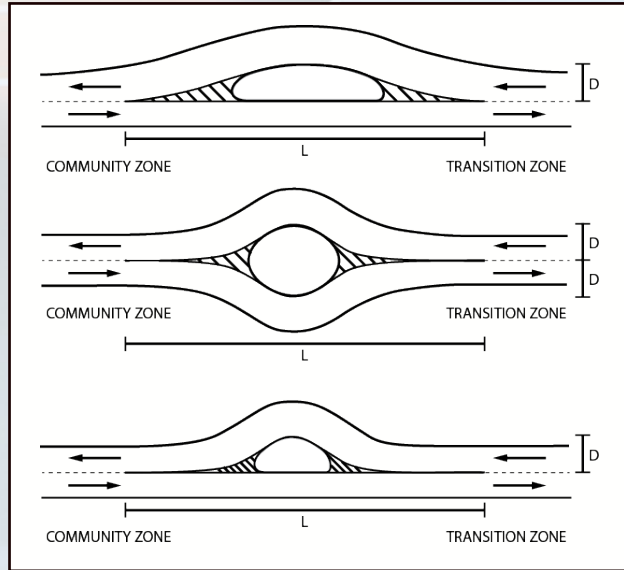
# Catalog of Transition Zone Treatments: Sample Information

<p><b>Treatment:</b> Center island/raised median</p> <p><b>Description:</b> A channelizing island that creates separation between the two opposing directions of travel. Center islands/raised medians can create shifts or deflections in the travel paths of vehicles and often reduce the effective widths of the roadways. Center islands/raised medians can be created through a combination of pavement markings, raised curbs, planting strips, etc.</p> <p><b>Effectiveness:</b> Berger and Linauer (1998) developed speed prediction models for center islands. The models can be used to calculate the mean and 85th percentile speeds as vehicles travel past the island. ★★</p> $V_{85} = 9.194 \ln(L/2d) + 12.290$ $V_m = 8.020 \ln(L/2d) + 11.031$ <p>where: <math>V_{85}</math> = 85th percentile speed (mph) <math>V_m</math> = mean speed (mph) <math>L</math> = length of island + length of both tapers (ft) <math>d</math> = lateral deflection of lane (ft)</p> <p>In general, installation of a center island or raised median could be expected to reduce mean speeds by 3 to 10 mph and 85th percentile speeds by 5 to 10 mph (Dixon et al., 2008). ★</p>	<p><b>Category:</b> Geometric Design</p>  <p>2012.044R_1</p> <p><b>Source:</b> Adapted from Berger and Linauer (1998)</p>	
<p><b>Cost:</b> Moderate to high for raised center islands. Low for painted islands. The need to acquire right of way will increase the cost.</p>	<p><b>Contraindications:</b> A raised center island may increase the potential for single-vehicle crashes.</p>	<p><b>Installation Location:</b> Downstream end of deceleration area within the transition zone and/or in conjunction with a gateway treatment.</p>



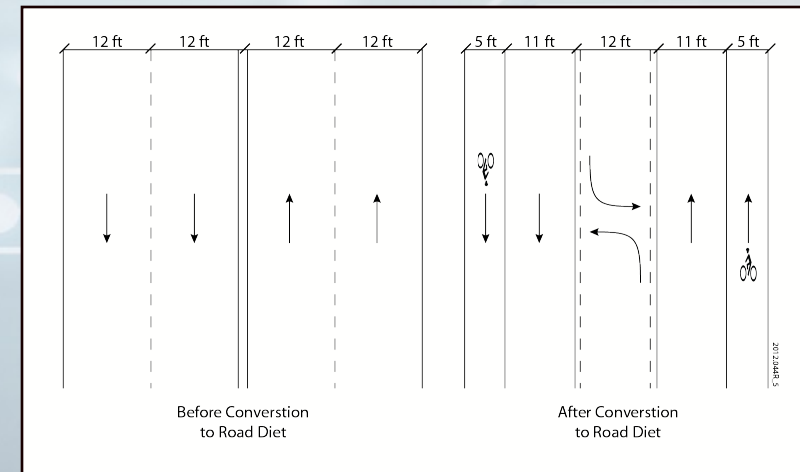
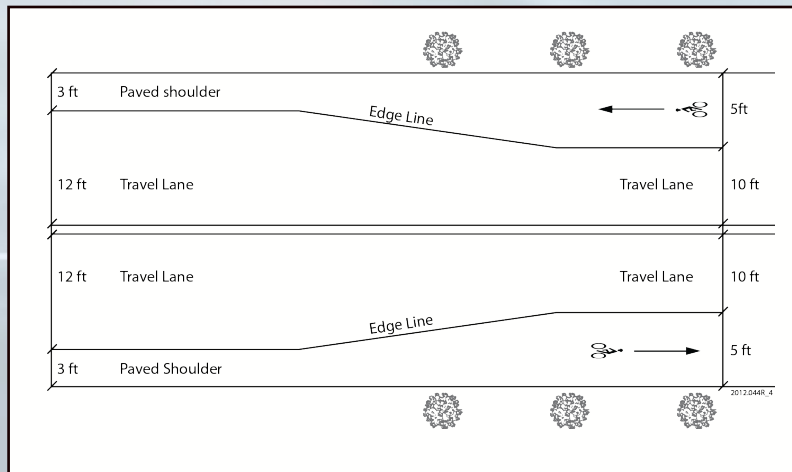
# Catalog of Transition Zone Treatments: Geometric Design Elements

Center island /  
Raised island



Roundabout

Roadway  
narrowing



Road diet

# Catalog of Transition Zone Treatments: Traffic Control Devices

Transverse pavement markings



Speed-activated feedback signs





# Catalog of Transition Zone Treatments: Surface Treatments

Transverse rumble strips



Colored pavement



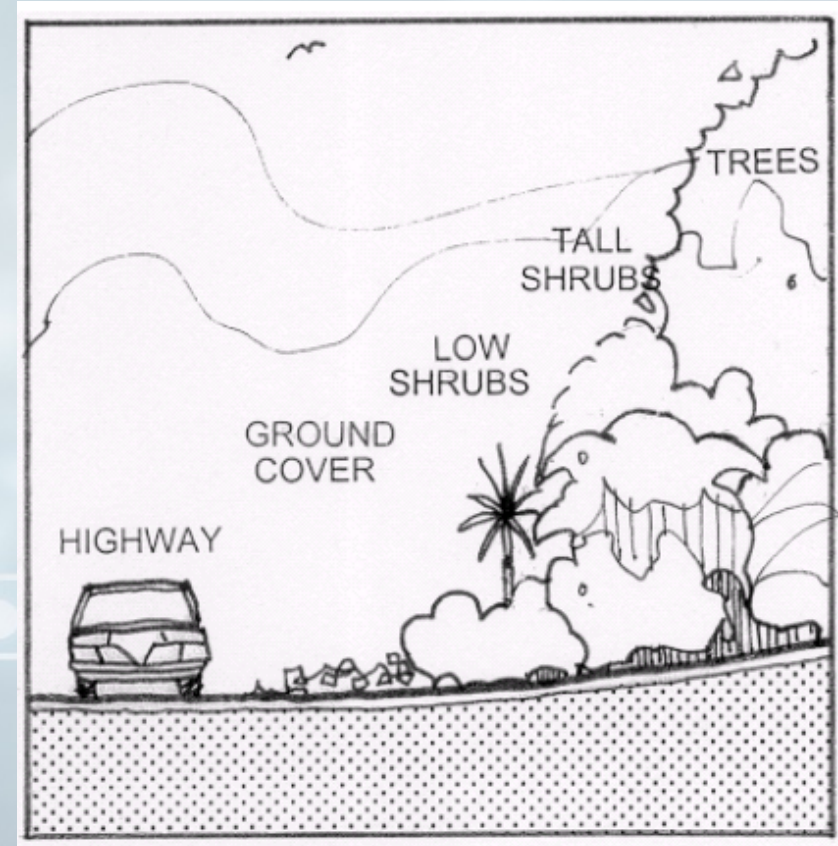


# Catalog of Transition Zone Treatments: Roadside Treatments

Welcome signs



Layered landscaping



# Relationship to Safe System Approach

## SAFE SYSTEM PRINCIPLES



### Death/Serious Injury is Unacceptable

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.



### Responsibility is Shared

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.



### Humans Make Mistakes

People will inevitably make mistakes that can lead to crashes, but the transportation system can be designed and operated to accommodate human mistakes and injury tolerances and avoid death and serious injuries.



### Safety is Proactive

Proactive tools should be used to identify and mitigate latent risks in the transportation system, rather than waiting for crashes to occur and reacting afterwards.



### Humans Are Vulnerable

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.



### Redundancy is Crucial

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

- Guidance is consistent with Safe System Principles
  - Safety is proactive
    - Use defined methodology to identify the need for transition zone treatments before crashes occur
  - Redundancy is crucial
    - Combinations of treatments are more effective



# Relationship to Safe System Approach

## SAFE SYSTEM PRINCIPLES



### Death/Serious Injury is Unacceptable

While no crashes are desirable, the Safe System approach prioritizes crashes that result in death and serious injuries, since no one should experience either when using the transportation system.



### Humans Make Mistakes

People will inevitably make mistakes that can lead to crashes, but the transportation system can be designed and operated to accommodate human mistakes and injury tolerances and avoid death and serious injuries.



### Humans Are Vulnerable

People have limits for tolerating crash forces before death and serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates human vulnerabilities.



### Responsibility is Shared

All stakeholders (transportation system users and managers, vehicle manufacturers, etc.) must ensure that crashes don't lead to fatal or serious injuries.



### Safety is Proactive

Proactive tools should be used to identify and mitigate latent risks in the transportation system, rather than waiting for crashes to occur and reacting afterwards.



### Redundancy is Crucial

Reducing risks requires that all parts of the transportation system are strengthened, so that if one part fails, the other parts still protect people.

- Guidance is consistent with Safe System Principles
  - Safety is proactive
    - Use defined methodology to identify the need for transition zone treatments before crashes occur
  - Redundancy is crucial
    - Combinations of treatments are more effective

# Relationship to Safe System Approach

## SAFE SYSTEM ELEMENTS

**Making a commitment to zero deaths means addressing every aspect of crash risks through the five elements of a Safe System, shown below.** These layers of protection and shared responsibility promote a holistic approach to safety across the entire transportation system. The key focus of the Safe System approach is to reduce death and serious injuries through design that accommodates human mistakes and injury tolerances.



### Safe Road Users

The Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes.



### Safe Vehicles

Vehicles are designed and regulated to minimize the occurrence and severity of collisions using safety measures that incorporate the latest technology.



### Safe Speeds

Humans are unlikely to survive high-speed crashes. Reducing speeds can accommodate human injury tolerances in three ways: reducing impact forces, providing additional time for drivers to stop, and improving visibility.



### Safe Roads

Designing to accommodate human mistakes and injury tolerances can greatly reduce the severity of crashes that do occur. Examples include physically separating people traveling at different speeds, providing dedicated times for different users to move through a space, and alerting users to hazards and other road users.



### Post-Crash Care

When a person is injured in a collision, they rely on emergency first responders to quickly locate them, stabilize their injury, and transport them to medical facilities. Post-crash care also includes forensic analysis at the crash site, traffic incident management, and other activities.

- Guidance is consistent with Safe System Elements
  - Safe speeds
    - Overall goal is to reduce speeds through the transition zone and community
  - Safe roads
    - Properly designed transition zone alerts drivers of the approaching conditions and other road users in the community

# Relationship to Safe System Approach

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**Darren Torbic, Ph.D.**  
Research Scientist  
Texas A&M Transportation Institute  
[d-torbic@tti.tamu.edu](mailto:d-torbic@tti.tamu.edu)  
814-574-9194

# NCHRP

REPORT 737

NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM

## **Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways**

TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES



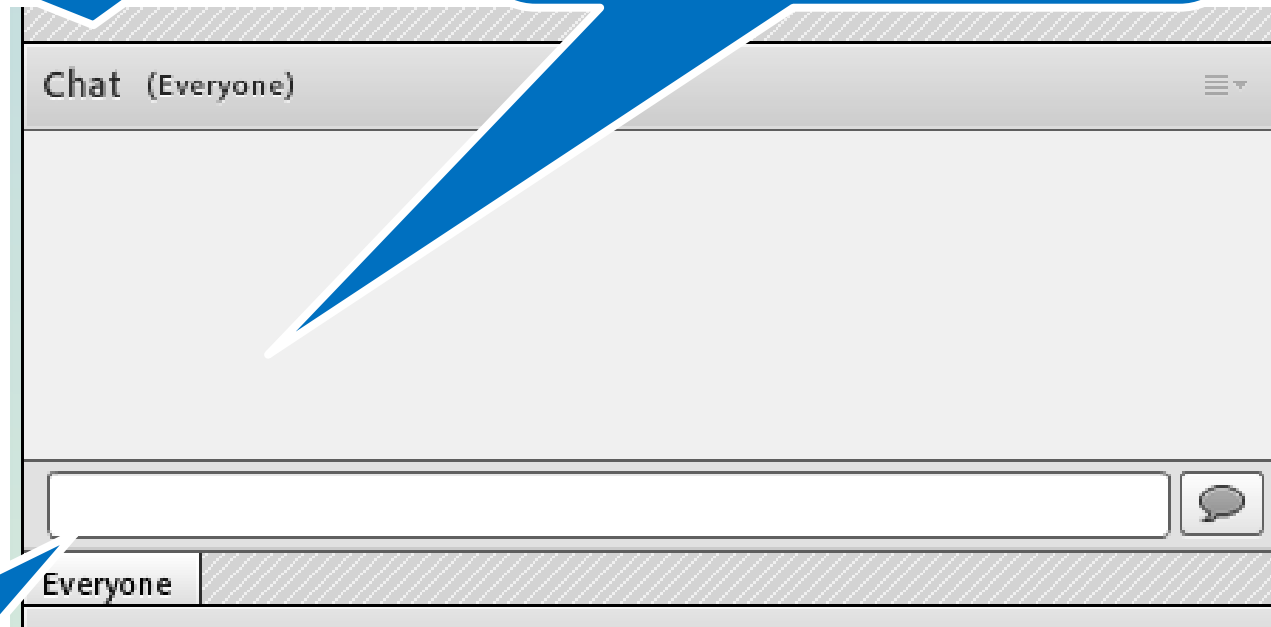


## Directing Your Questions via the Chat Pod

1. Chat pod is on left side of screen between attendees pod & closed caption pod

3. Answers will appear here unless addressed verbally

2. Type your question or comment here





# Learning Outcomes

To achieve the webinar goal, you have learned to:

Explain the steps for setting a posted speed limit.

Name the key elements to consider when setting a posted speed limit.

List design treatments for rural high-speed to low-speed transition zones.



# Speed Resources

- **NCHRP 17-76 Research Report, User Guide, and Tool**

<http://www.trb.org/main/blurbs/182038.aspx>

- **NCHRP Report 737: Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways**

<https://www.trb.org/Publications/Blurbs/168309.aspx>

- **Noteworthy Speed Management Practices**

<https://www.ite.org/pub/?id=BCD0260A-BF52-D7D0-44BD-1C3CBE531AE8>

- **New Zealand Speed Management Guide**

<https://www.nzta.govt.nz/assets/Safety/docs/speed-management-resources/speed-management-guide-first-edition-201611.pdf>

- **Speed Management: A Manual for Local and Rural Road Owners**

[https://safety.fhwa.dot.gov/local\\_rural/training/fhwasa010413spmgmt/](https://safety.fhwa.dot.gov/local_rural/training/fhwasa010413spmgmt/)



# Speed Resources (cont.)

- **FHWA's Speed Management Resources**

[https://safety.fhwa.dot.gov/speedmgt/ref\\_mats/](https://safety.fhwa.dot.gov/speedmgt/ref_mats/)

- **RTZ's Doubling Down on What Works (Speed Management Topic)**

<https://www.nsc.org/road/resources/road-to-zero/doubling-down-on-what-works>

- **ITE's Speed Management for Safety Resources**

<https://www.ite.org/technical-resources/topics/speed-management-for-safety/>

- **Teens and Speeding: Breaking the Deadly Cycle**

<https://www.ghsa.org/resources/Teens-and-Speeding-Report21>

- **GHSA Webinar, Speeding: Diverse Approaches to Achieving Culture Change**

<https://www.ghsa.org/events/Annual-Meetings/2020>



# New Safety Resources

- **FHWA's 3 Approaches to Safety Video: Site-Specific, Systematic, Systemic**

<https://www.youtube.com/watch?v=1Gtz0qjPx0M>

- **FHWA and ITE's Safe System Strategic Plan**

[https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA-SA-21-088 Safe System Strategic Plan.pdf](https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA-SA-21-088%20Safe%20System%20Strategic%20Plan.pdf)

- **NHTSA's Countermeasures that Work 10<sup>th</sup> Edition**

<https://rosap.nhtl.bts.gov/view/dot/57466>



# Upcoming 2021 Webinars

- **Safe System for Rural Areas Webinar Series**
  - Part 5: Safe Roads (November)
  - Part 6: Post-Crash Care (December)





# Contact Information

***If you have any questions related to this presentation, please contact:***

Kay Fitzpatrick – [K-Fitzpatrick@tti.tamu.edu](mailto:K-Fitzpatrick@tti.tamu.edu)

Darren Torbic - [D-Torbic@tti.tamu.edu](mailto:D-Torbic@tti.tamu.edu)

***Or contact the National Center for Rural Road Safety Help Desk at:***

(406) 994-7368 or [info@ruralsafetycenter.org](mailto:info@ruralsafetycenter.org)

<http://ruralsafetycenter.org/>

