

# Focused, Proven Safety that Counts

**Rick O. Drumm, P.E.**

**FHWA – Highway Safety Engineer**

**Road School**

**March 6, 2019**

# FHWA Safety Initiatives

Focused \_\_\_\_\_  
Proven Safety \_\_\_\_\_  
that  
\_\_\_\_\_ Counts  
(and Others)

# FHWA Safety Initiatives

Focused Approach to Safety  
Proven Safety Countermeasures  
that  
Every Day Counts  
(and Others)

# Focused, Proven Safety that Counts

- “Highway Safety is a great thing!”
- Focused Approach to Safety
- Proven Safety Countermeasures
- Every Day Counts
- Others
  - Systemic Safety
  - LRSP (Local Road Safety Plans)
  - Data
  - Speed
- The Future
- The Challenge – Your Part

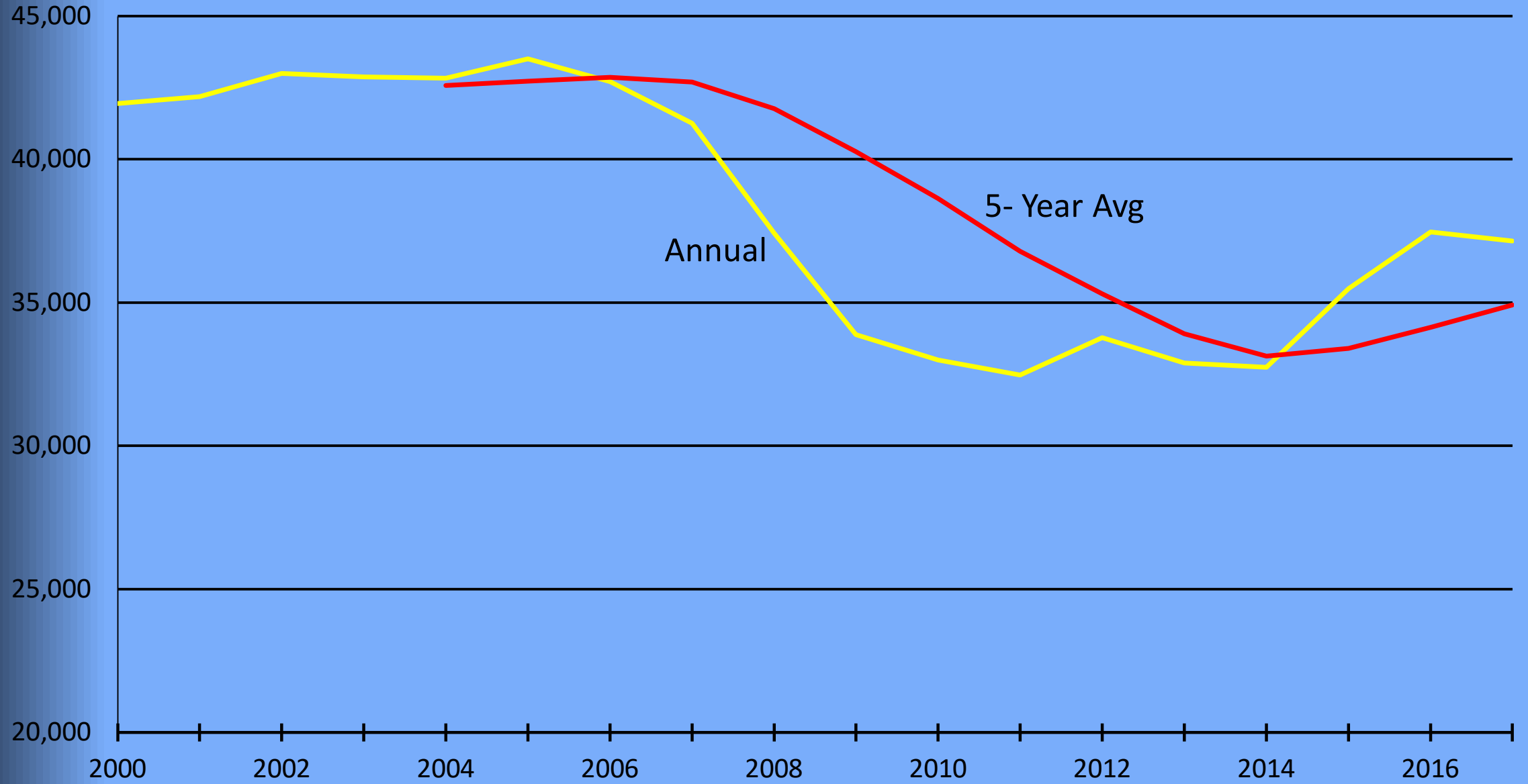
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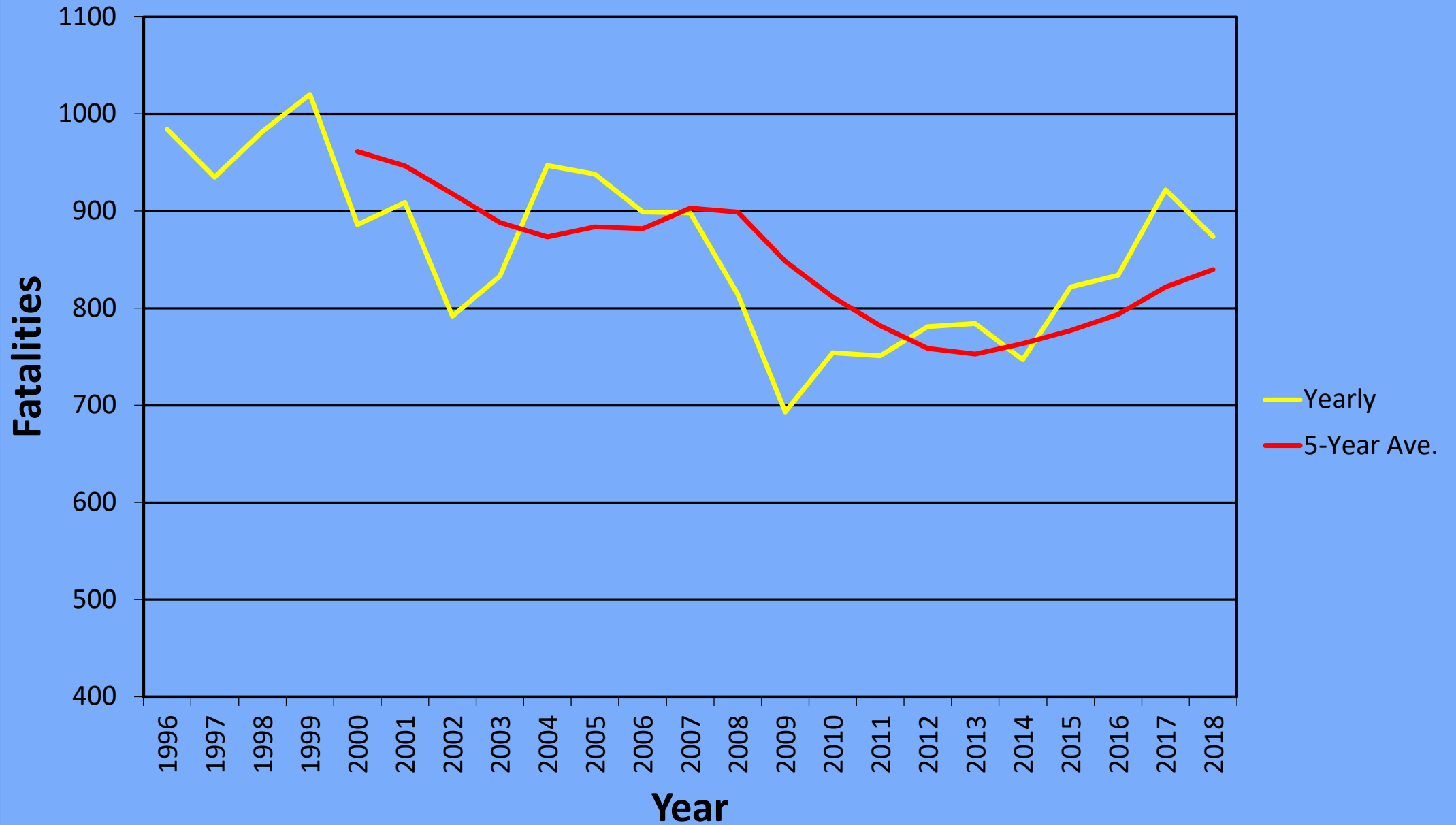
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# All Highway Fatalities in US



# Indiana Highway Fatalities





# National Safety Council on Preventable Injuries

Preventable Cause of Death	Lifetime Odds of Death
Suicide	1 in 88
Opioid Overdose	1 in 96
Motor Vehicle Crash	1 in 103
Falls	1 in 114

“Highway Safety is a great thing!”

- Rick O. Drumm

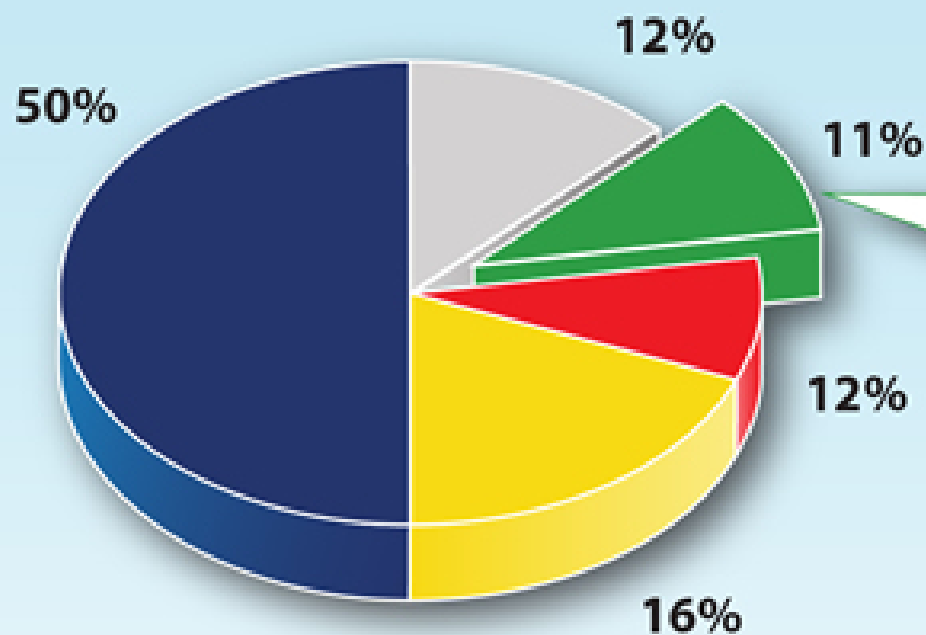
# Focused Approach to Safety

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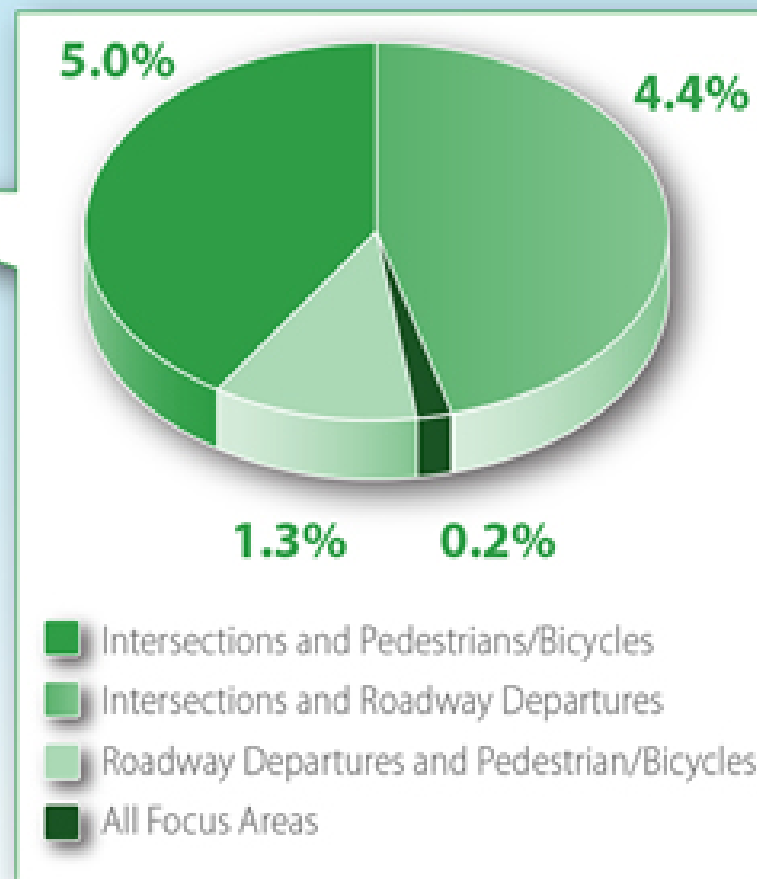
- Began in 2004
- Several iterations, most recently 2015
- Three (consistent) Focus Areas
  - Roadway Departure ----- States
  - Intersection ----- States
  - Pedestrian and Bicycle ----- Cities and associated States

# United States Fatalities by FHWA Focus Area

Average 2011-2013



- Roadway Departure Only Crashes
- Intersection Only Crashes
- Pedestrian/Bicycle Only Crashes
- Multiple Focus Areas
- Crashes not involving a Focus Area



NOTE: Totals in the main and secondary pie charts do not add up to 100% and 11%, respectively, due to rounding.

# Focused Approach to Safety

How Focus City designation is determined:

- Using 2011-2013 Fatality Data
- Take 50 cities with largest number of ped/bike fatalities (approx.  $\geq 10$ /year)
- Two ways a City can be “chosen”:
  - Top 20 for number of ped/bike fatalities
  - Ped/bike fatality rate (per pop.) is greater than the average of top 50 cities

Indianapolis selected as Focus City for Pedestrian and Bicycle  
(Indiana a Focus State)

PEDESTRIAN/BICYCLIST Involved Fatalities for the Top 50 Cities (2011-2013)

Rank	City	Average Annual Total Number of Pedestrian-Bicyclist Involved Fatalities 2011-2013	Average Annual Pedestrian-Bicyclist Involved Fatality Rate (per 100,000 population) 2011-2013
1	NEW YORK ,NEW YORK CITY	170.00	2.04
2	CALIFORNIA ,LOS ANGELES	100.00	2.60
3	ARIZONA ,PHOENIX	52.33	3.52
4	TEXAS ,HOUSTON	51.67	2.39
5	ILLINOIS ,CHICAGO	44.00	1.62
6	TEXAS ,SAN ANTONIO	42.33	3.06
7	TEXAS ,DALLAS	37.00	2.99
8	MICHIGAN ,DETROIT	36.67	5.26
9	PENNSYLVANIA ,PHILADELPHIA	36.00	2.33
10	FLORIDA ,JACKSONVILLE	33.33	3.99
11	CALIFORNIA ,SAN DIEGO	29.67	2.22
12	TEXAS ,AUSTIN	24.33	2.82
13	INDIANA ,INDIANAPOLIS	22.00	2.63
14	CALIFORNIA ,SAN JOSE	21.33	2.17
15	FLORIDA ,MIAMI-DADE	21.33	5.15
16	ARIZONA ,TUCSON	20.00	3.81
17	NORTH CAROLINA ,CHARLOTTE	20.00	2.58
18	CALIFORNIA ,SAN FRANCISCO	19.00	2.30
19	TEXAS ,FORT WORTH	18.67	2.40
20	CALIFORNIA ,FRESNO	18.33	3.63
21	TENNESSEE ,MEMPHIS	18.33	2.81
22	NEW MEXICO ,ALBUQUERQUE	16.67	3.01
23	TEXAS ,EL PASO	16.67	2.48
24	OKLAHOMA ,OKLAHOMA CITY	16.00	2.67
25	NEW YORK ,HEMPSTEAD	15.67	2.05
26	PUERTO RICO ,SAN JUAN	15.33	4.03
27	COLORADO ,DENVER	15.33	2.42
28	KENTUCKY ,LOUISVILLE	14.33	2.37
29	CALIFORNIA ,SACRAMENTO	13.67	2.87
30	GEORGIA ,ATLANTA	13.33	3.02
31	MISSOURI ,KANSAS CITY	13.33	2.87
32	NEW YORK ,BROOKHAVEN	13.00	2.66
33	OHIO ,COLUMBUS	13.00	1.60
34	TENNESSEE ,NASHVILLE	13.00	2.08
35	FLORIDA ,TAMPA	12.67	3.62
36	OREGON ,PORTLAND	12.67	2.10
37	MISSOURI ,ST. LOUIS	12.33	3.87
38	CALIFORNIA ,BAKERSFIELD	12.00	3.35
39	LOUISIANA ,NEW ORLEANS	12.00	3.25
40	NEVADA ,LAS VEGAS	11.67	1.96
41	LOUISIANA ,BATON ROUGE	11.00	4.79
42	MARYLAND ,BALTIMORE	11.00	1.77
43	WISCONSIN ,MILWAUKEE	11.00	1.84
44	CALIFORNIA ,OAKLAND	10.67	2.66
45	CALIFORNIA ,LONG BEACH	10.33	2.21
46	OKLAHOMA ,TULSA	10.33	2.62
47	ARIZONA ,MESA	10.00	4.27
48	CALIFORNIA ,SANTA ANA	10.00	3.02
49	FLORIDA ,ST. PETERSBURG	10.00	4.04
50	FLORIDA ,FORT LAUDERDALE	9.67	5.67
51	FLORIDA ,ORLANDO	9.67	3.87
52	NEW JERSEY ,NEWARK	9.67	3.48
	<b>TOP 50-CITY AVERAGE</b>	<b>23.51</b>	<b>2.98</b>



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INDIANA ,INDIANAPOLIS 22.00 2.63



# Focused Approach to Safety

- Benefits of being a Focus City/State (other than the sheer honor of it)

## Access to resources

- Training
- Workshops
- Peer Exchanges

- Indy Major Activities

- Pedestrian Crash Data Analysis
- RSAs in Zones of Ped Safety Need
- PSAP (Pedestrian Safety Action Plan)

# Google FHWA Focused Approach to Safety

Search Engine  
~~Google~~

FHWA Focused Approach  
to Safety

# Proven Safety Countermeasures

# PSCs – The History

- 2008 –
  - PSCs initiated
  - 9 PSCs
- 2012
  - 9 PSCs
  - Some new, some revised, some kept
- 2017
  - 6 New PSCs
  - Kept all previous ones
  - Result – **20 (yes, 20!) Proven Safety Countermeasures**

# FHWA Proven Safety Countermeasures



Roadside Design Improvement at Curves



Reduced Left-Turn Conflict Intersections



Systemic Application of Multiple Low Cost Countermeasures at Stop-Controlled Intersections



Leading Pedestrian Interval



Local Road Safety Plan



USLIMITS2



Enhanced Delineation and Friction for Horizontal Curves



Longitudinal Rumble Strips and Stripes on Two-Lane Roads



Median Barrier



Safety Edges<sup>SM</sup>



Backplates with Retroreflective Borders



Corridor Access Management



Dedicated Left- and Right-Turn Lanes at Intersections



Roundabouts



Yellow Change Intervals



Medians and Pedestrian Crossing Islands in Urban and Suburban Areas



Pedestrian Hybrid Beacon



Road Diet



Walkways



Road Safety Audit

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# Leading Pedestrian Interval

- Increased visibility of crossing pedestrians
- Reduced conflicts between pedestrians and vehicles
- Increased likelihood of motorists yielding to pedestrians
- Enhanced safety for pedestrians who may be slower to start into the intersection



LPIs are beneficial at intersections with high left-turning volumes.

Source: pedbikeimages.org / Burden



**Leading  
Pedestrian  
Intervals**

SAFETY BENEFIT:

**60%**

Reduction in pedestrian-vehicle  
crashes at intersections





# Enhanced Delineation and Friction for Horizontal Curves

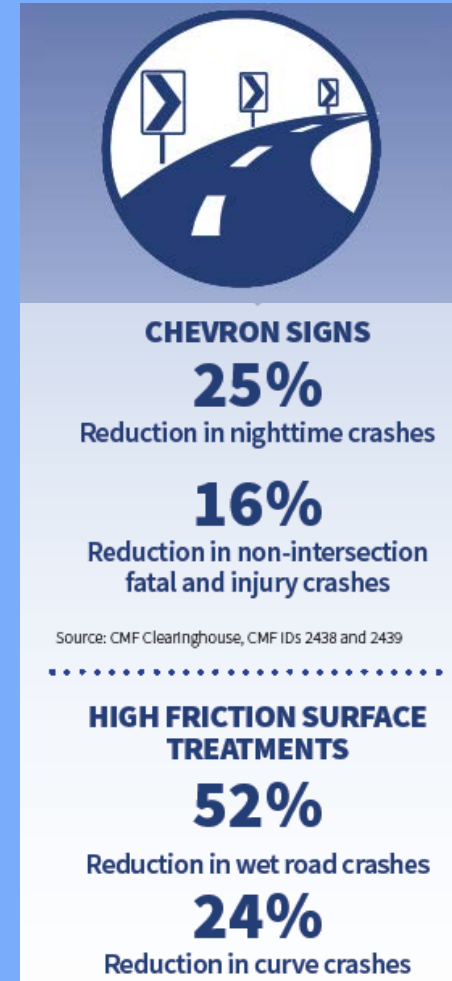
## Enhanced Delineation

- Pavement Markings
- Post-mounted delineators
- Brighter/larger signs
- Dynamic curve warning signs



## Increased Pavement Friction

- Sharp Curves
- Wet Conditions
- Polished Surfaces
- Excessive Speeds



# Longitudinal Rumble Strips and Stripes

Rumble strips and stripes are designed to address these crashes caused by distracted, drowsy, or otherwise inattentive drivers who drift from their lane.



Example of an edge line rumble stripe.

Source: Missouri DOT



Shoulder rumble strips and center line rumble stripes are installed on this roadway.

Source: FHWA

SAFETY BENEFITS:



**CENTER LINE RUMBLE STRIPS**

**44-64%**

Head-on, opposite-direction,  
and sideswipe fatal and  
injury crashes

**SHOULDER RUMBLE STRIPS**

**13-51%**

Single vehicle, run-off-road  
fatal and injury crashes



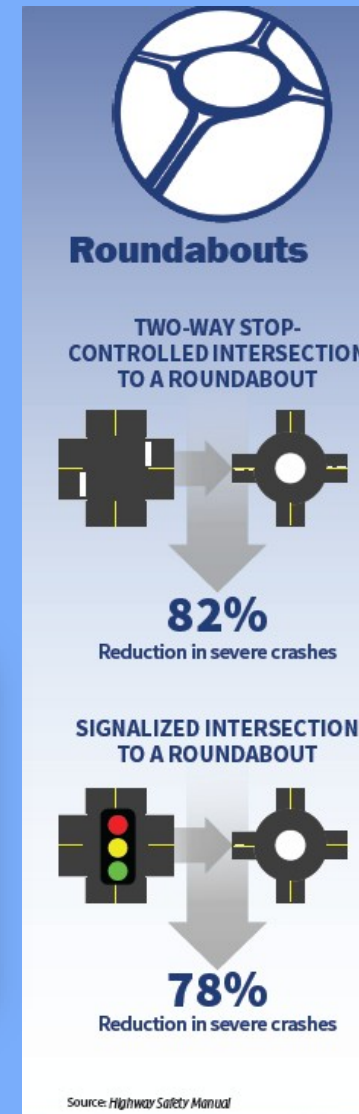
# Systemic Application of Multiple Low-Cost Countermeasures at Stop Controlled Intersections

- (1) analyze systemwide data to identify a problem
- (2) look for similar risk factors present in severe crashes
- (3) deploy on a large scale low-cost countermeasures that address the risk factors contributing to crashes



# Roundabouts

- Slow speeds for all users
- Reduced conflict points
- Less severe crashes



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Road Safety Audit

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FHWA Proven Safety  
Countermeasures

Every Day Counts

# Every Day Counts

- Every 2 years, starting in 2011
- Presently in 5<sup>th</sup> cycle. EDC-5
- Ready to implement or innovative technology for all areas of roads.
- For Safety:
  - EDC-4
    - DDSA (Data-Driven Safety Analysis)
    - STEP (Safe Transportation for Every Pedestrian)
  - EDC-5
    - STEP
    - Reducing Rural Roadway Departure



# EDC-4

- Focus on uncontrolled crossings and unsignalized intersections
  - Road Diets
  - Pedestrian Hybrid Beacons
  - Pedestrian Refuge Islands
  - Raised Crosswalks
  - Crosswalk Visibility Enhancements
- For Indiana:
  - Develop an action plan to move pedestrian and bicycle safety forward.
  - Provide better guidance and direction to designers.

# FORRRRWD

*Focus on Reducing Rural Roadway Departures*

Search Engine

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FHWA Every Day Counts

Other Initiatives:

**Systemic Safety**

# Systemic Safety: Definition

The term "systemic safety improvement" means an improvement that is widely implemented based on high-risk roadway features that are correlated with particular crash types, rather than crash frequency.

-- 23 USC 148 (a)(12) *Systemic safety improvement*

# Terminology

- Site-specific “Hot-Spot” approach (aka high crash location):
  - *deploying site-specific improvements at locations with the highest frequency of crashes*
- Systematic Approach (aka systemwide):
  - *deploy countermeasures at all locations*
- Systemic approach:
  - *deploy low-cost countermeasures at locations with the greatest risk*

# Systemic Safety Analysis

- Assessing the potential for a specific type of severe crash to occur at a specific location because of the location's characteristics or features (roadway factors).

Rx

# How Healthy is Your Road System?

Find out with systemic analysis

*Systemic analysis* is like a health screening for your road system. Just as your doctor identifies risk factors for illness, systemic analysis identifies locations that are at highest risk for severe crashes. Practitioners can then prioritize projects based on risk and apply low-cost safety treatments to reduce severe crashes across the whole at-risk system.



CURVE COUNTY - X RAY RESULTS

## Symptoms

Severe roadway departure crashes on curves.

### Possible Risk Factors:

- Avg. Daily Traffic > 1,000 vehicles
- Curve Radius < 1,000 feet
- Intersection within Curve
- Visual Trap within Curve
- Severe Crash within Curve

## Treatment

Prioritize highest risk sites and treat with low-cost countermeasures such as chevron signs or rumble strips.

## Follow-Up

Track and evaluate safety improvements. Further remediation can be implemented as needed.

## Diagnosis

11% of all curves have 3 or more risk factors.

### Lab Results:

- Curve A
- Curve B
- Curve C
- Curve D
- Curve E

## Systemic vs. Systemwide

Systemic does not mean treating all locations. It allows agencies to treat the highest-risk sites within limited budgets.



# Systemic Approach

- Particularly applicable when a significant number of severe crashes happen over a wide area:

- *Rural Roadways*

- *Local Roadways*

- *May focus on specific crash types*

- Curve
- Pedestrian
- Intersections



Photo Source: FHWA

May include treating locations that haven't experienced severe crashes (yet)

# INDOT Systemic Safety for Local Agencies

- Conduct inventory of traffic signs and upgrade warning and regulatory signs to meet MUTCD retroreflectivity requirements
- Improve the visibility of curves by upgrading curve warning signs and markings
- Improve visibility of unsignalized intersections by installing upgraded/new warning devices
- Install vehicle activated advanced warning systems at rural, unsignalized intersections
- Install new pedestrian crosswalk warning signs, flashing beacons or special pavement markings
- Install or upgrade pedestrian curb ramps and refuge areas at areas of high conflict between pedestrians and vehicular traffic
- Install pedestrian push button Countdown And Audible (APS) heads on traffic signals
- Make changes to yellow interval traffic signal timing or signal interconnect to improve safety
- Upgrade traffic signals to a minimum of one signal head per travel lane
- Install black backing plates with reflective border on all traffic signal heads
- Install UPS battery backup (emergency power) systems at traffic signal locations for continuous use during power outages
- Install emergency vehicle pre-emption systems at traffic signal locations to reduce response times and increase safety as the emergency vehicles pass through intersections
- Improve visibility of intersections by providing lighting
- Improve sight distance at intersections by installing slotted left turn lanes
- Install or upgrade passive or new active warning devices at railroad crossings
- Install railroad pre-emption systems at signalized intersections that are within the influence area of crossing railroad trains
- Install new centerline or edge line pavement markings on unmarked roadways
- Install raised medians for access control at intersections and roadway segments
- Add centerline and/or edge line rumble stripes (pavement markings over the rumble) to rural roads
- Complete road diet projects at locations that can be accomplished through the use of signs and pavement markings (Not Applicable to pavement reconstruction or geometric modifications)
- Add FHWA recommended High Friction Surface Treatments (HFST) to spot locations
- Upgrade guardrail end treatments to current standards
- Install guardrails or median barriers at locations where none existed previously
- Install median cable barrier systems on divided roads with grass medians
- Remove or shield permanent roadside safety obstructions

Search Engine

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INDOT Local Road Safety

Other Initiatives:

**LRSP**

Local Road Safety Plans

# LOCAL ROAD SAFETY PLANS:

Your Map to Safer Roadways

No matter what your resources, a Local Road Safety Plan will guide you to data-driven solutions and safer roads.

[https://safety.fhwa.dot.gov/provencountermeasures/local\\_road/](https://safety.fhwa.dot.gov/provencountermeasures/local_road/)

Chevron signs reduce nighttime crashes by 25%.

In 2017, over 50% of fatalities occurred on rural roads, but just 19% of Americans live in rural areas.

More than 75% of all roads are maintained by local agencies.

Help Get People Home Safely

### Identify Stakeholders

- Law Enforcement
- Public Health
- EMS
- Elected Officials

### Choose Proven Solutions

- Chevrons
- Roundabouts
- Targeted Enforcement
- Crosswalks

### Use Safety Data

- Crashes
- Maintenance Logs
- Safety Audits
- Traffic Violations

### Implement Solutions

- Education & Enforcement
- Capital Projects
- Maintenance Work

### LOCAL ROAD SAFETY PLANS

Help Get People Home Safely

# Why Local Road Safety Plans?

More than **75%** of all roads are maintained by local agencies

Approximately **40-60%** of fatalities occur on locally owned roadways

Minnesota saw a **25%** reduction in county road fatalities after LRSP implementation



## Local Road Safety Plans

Local roads experience  
**3x the fatality rate**  
of the  
**Interstate Highway System.**

Source: FARS and FHWA Highway Statistics Series (2014)



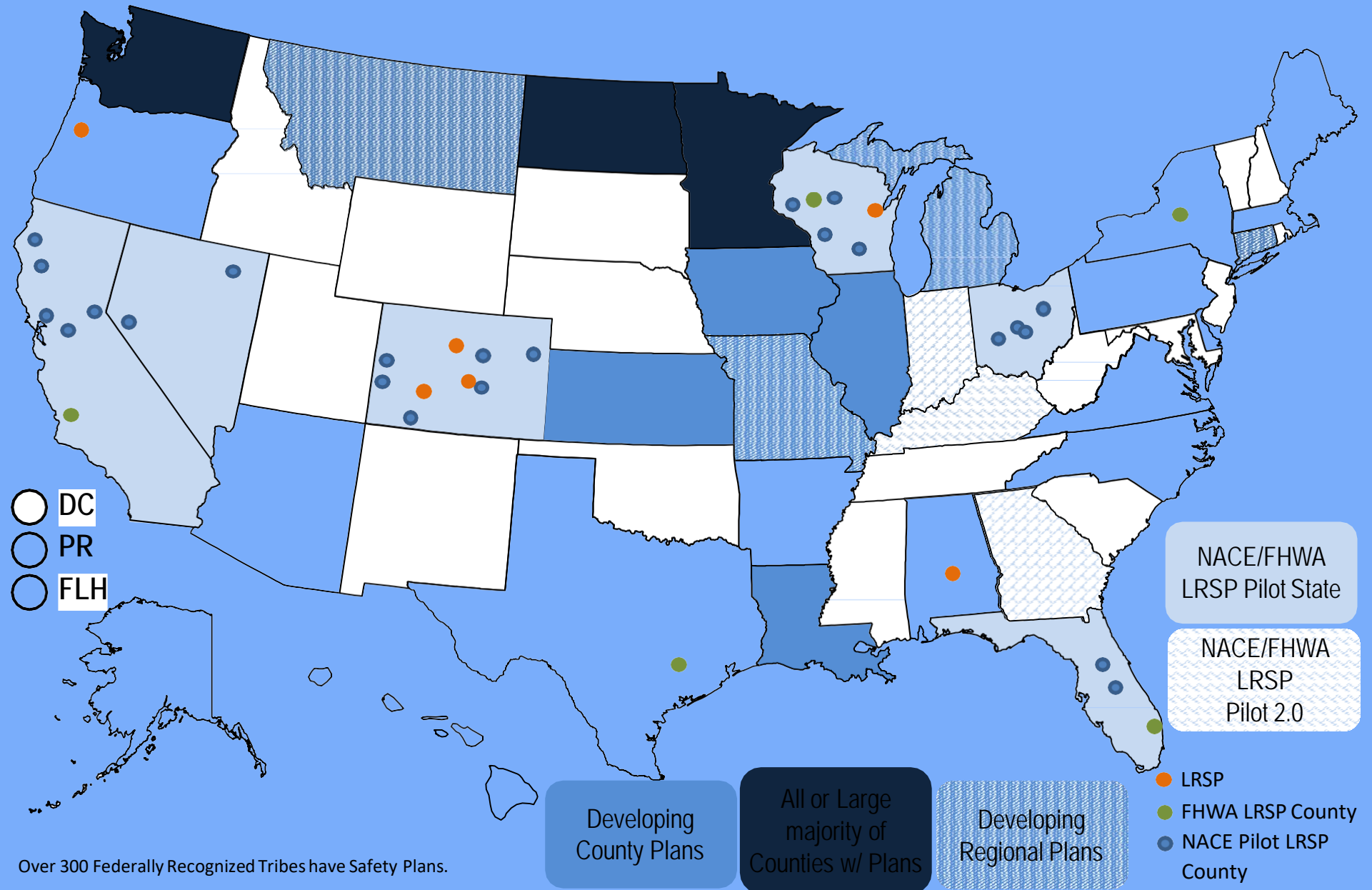
Safety improvements on local roads can be determined through the LRSP process.

Source: Delaware Valley Regional Planning Commission

First there was Harrison County

- Stay Tuned!

# Local Road Safety Plans – Status '18





# Participating Counties

- **Georgia** – Athens-Clarke, Augusta-Richmond, Chatham, Cobb, Meriwether, Lowndes, Rockdale, Whitfield
- **Indiana** – Boone, Lake, Monroe, Montgomery, Steuben, *NIRCC*
- **Kentucky** – Boone, Boyle, Crittenden



# Steps in the LRSP Development

- Step 1: Establish Leadership
- Step 2: Analyze the Safety Data
- Step 3: Determine Emphasis Areas
- Step 4: Identify Strategies
- Step 5: Prioritize and Incorporate Strategies
- Step 6: Evaluate and Update the LRSP



*“Do what you can, with what you have, where you are.”*

*– Theodore Roosevelt*

Other Initiatives:

Speed

# Speeding....

- Is exceeding the posted speed limit OR driving too fast for conditions

<b>Speeding-Related Fatalities</b>	
2016	10,111 (27%)
2015	9,723 (27%)
2014	9,283 (28%)
2013	9,696 (29%)
2012	10,329 (31%)

# Speeding....

- Is a cross cutting safety issue impacts priority safety programs
  - 32% 15- to 20- year-old male drivers
  - 37% alcohol-impaired driving
  - 41% of run off road fatalities
  - 22% of intersection fatalities
  - 9 percent of pedestrian fatalities



# Setting Appropriate Speed Limits

- USLIMITS2
  - – a web based tool for recommended speed limits  
[safety.fhwa.dot.gov/uslimits](https://safety.fhwa.dot.gov/uslimits)
  - –NTSB speeding crash study recommendation H-17-27
- –FHWA Proven Safety Countermeasures

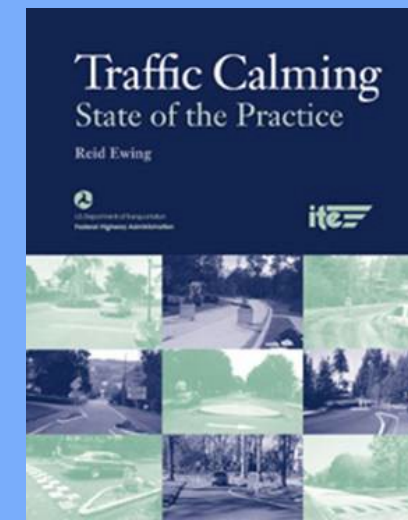


Right Design  
Invites  
Right Use



# Speeding....

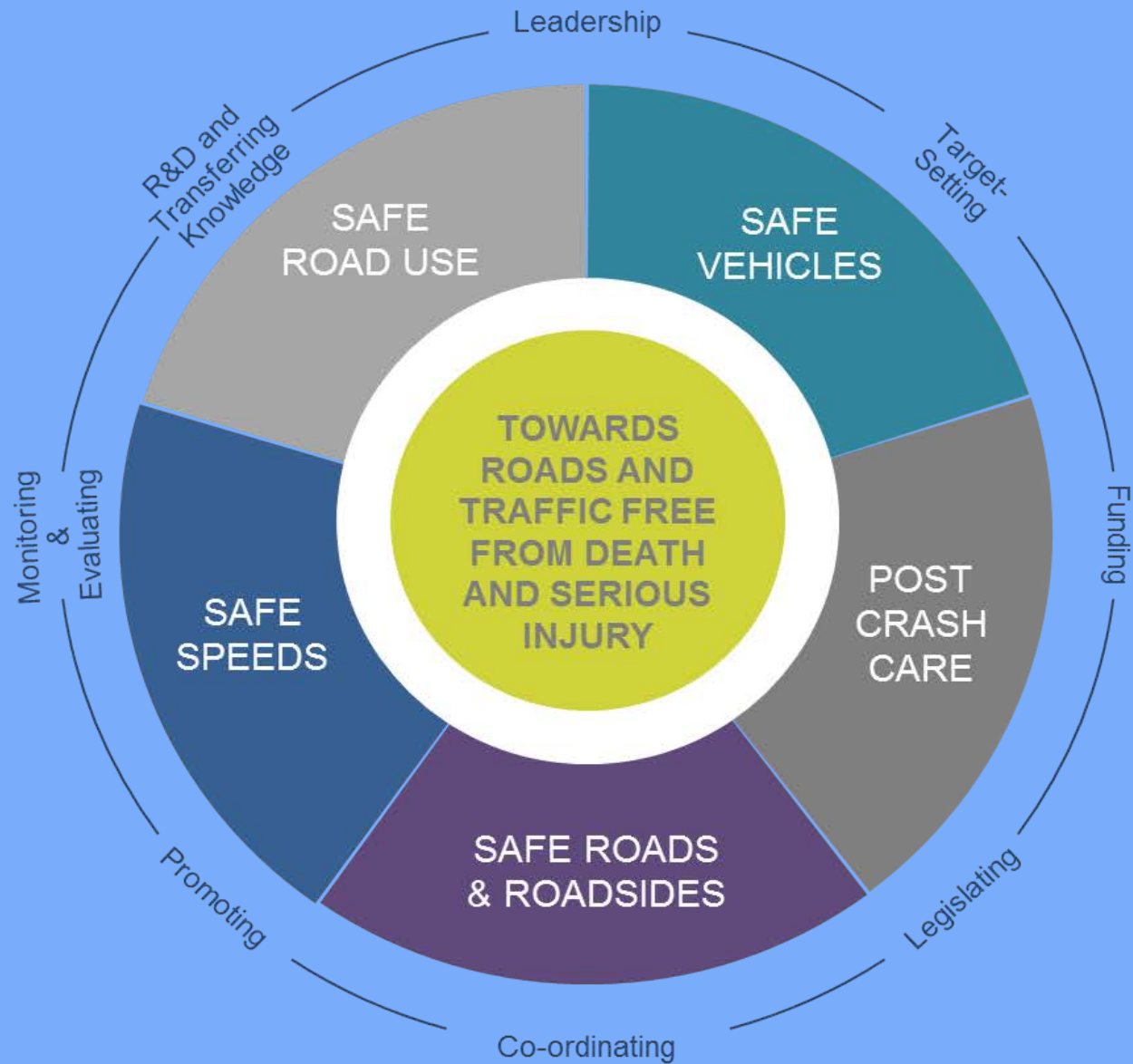
- Is a complex problem
  - public attitudes
  - driver behavior
  - vehicle performance
  - roadway characteristics
  - enforcement strategies
  - court sanctions
  - speed zoning



# The Future of Highway Safety

- Continue emphasis on data
- Continue emphasis on Performance Measures
- And...

Safe Systems



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# Your Turn

Go to

[padlet.com/rick\\_drumm/roadschool](https://padlet.com/rick_drumm/roadschool)

Write down and submit one action:

- Location
- Data Collection
- Data Analysis
- RSA
- LRSP
- Countermeasure
- Systemic

Go to: [padlet.com/rick\\_drumm/roadschool](https://padlet.com/rick_drumm/roadschool)



# Big Picture

- Data Collection
- Data Analysis
- Consider/Select Countermeasures
- Prioritize
- ACT



# Final Thoughts

- We can make a difference.
- Cause Safety – ACT.
- Do not grow weary.

DO NOT BE AFRAID  
OF WORK

THAT HAS NO END

-AVOT DE RABBI NATAN