



# Developing Local Roadway Safety Plans for Missouri Counties

National Rural ITS Conference

Matt Myers and Jennifer Atkinson



# Road map

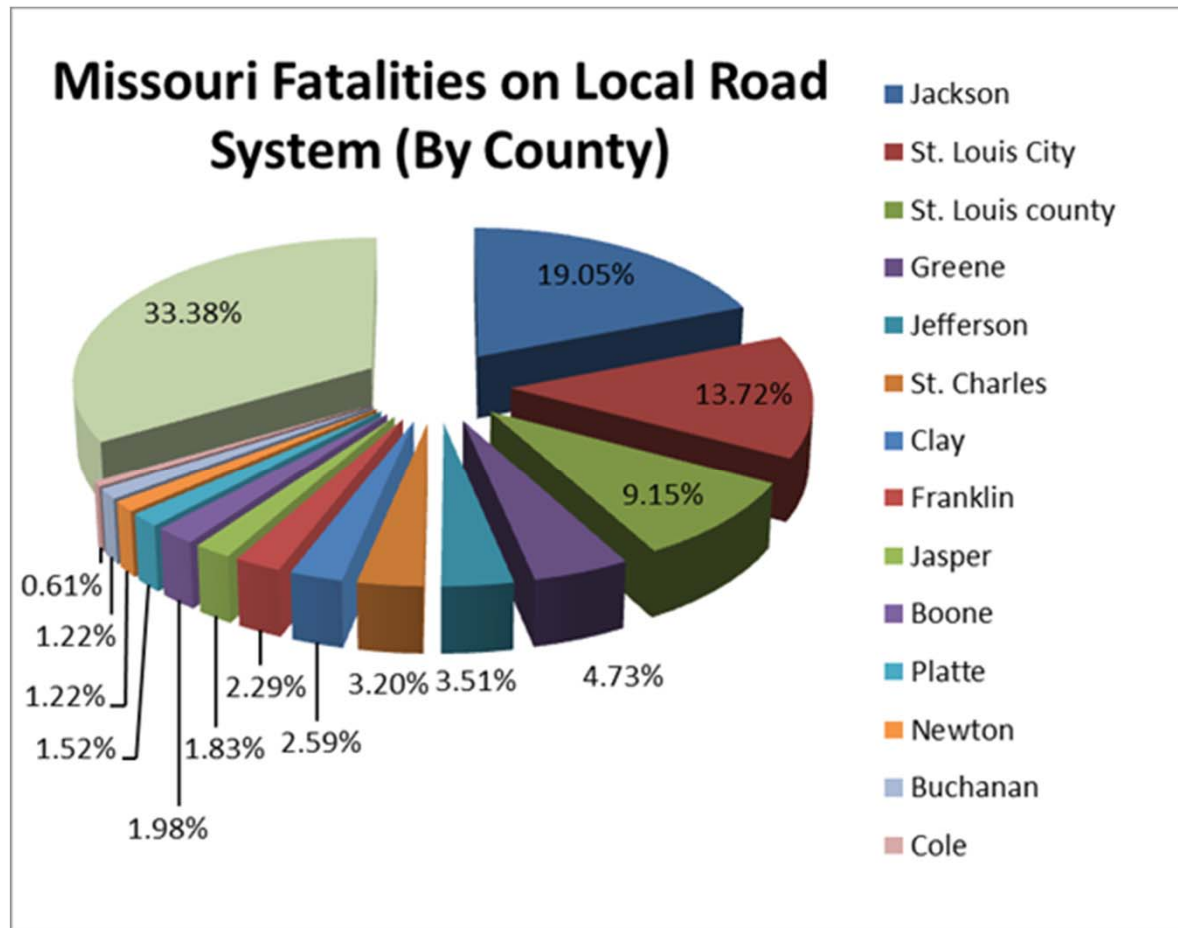
- ▶ Why these counties? And why now
- ▶ Key Takeaways and Objective
- ▶ At the end, now what?



Four-way STOP, Salt Lake City, Utah, source: Matt Myers

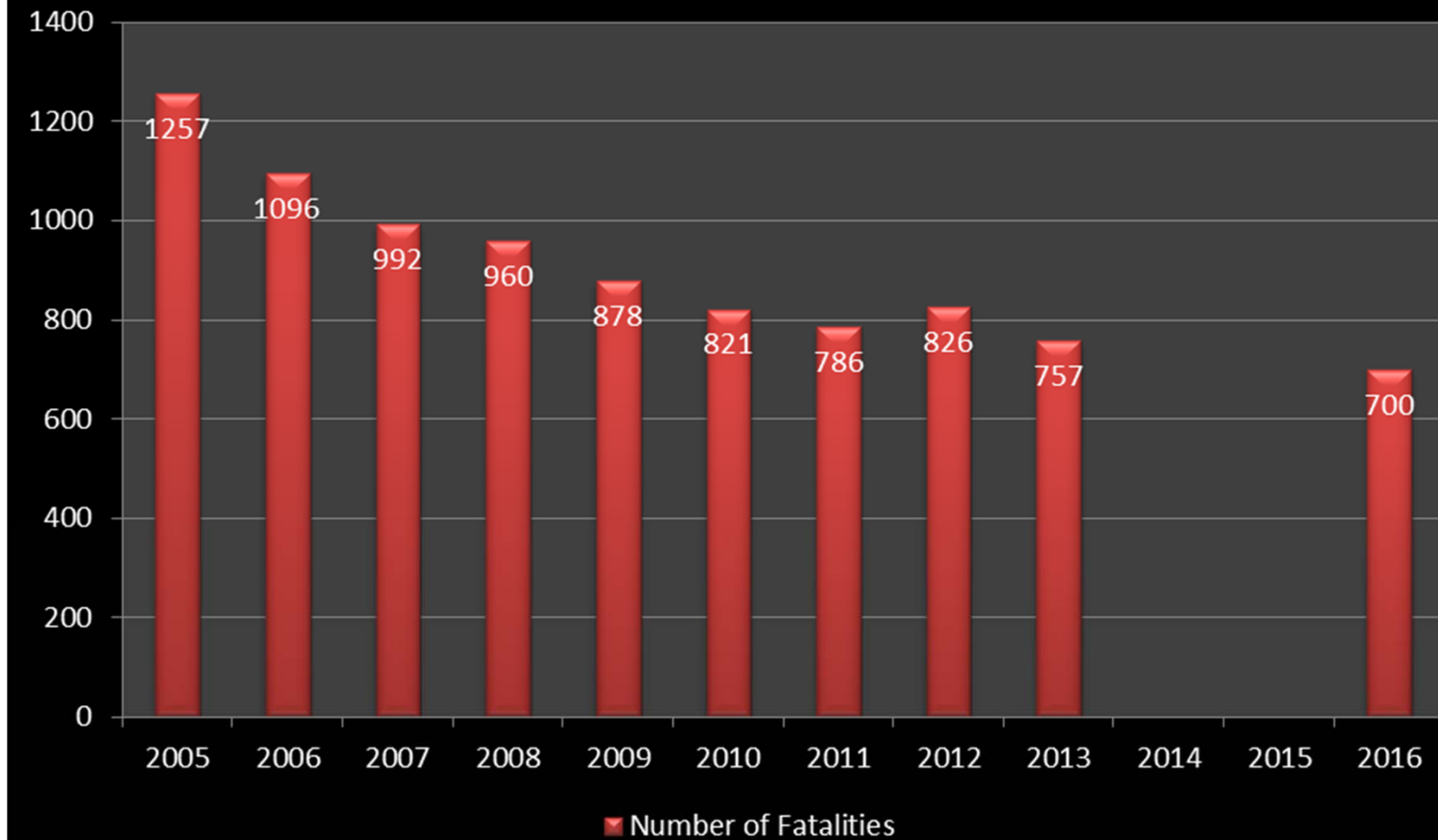


# Why These Counties?



## Why Now?

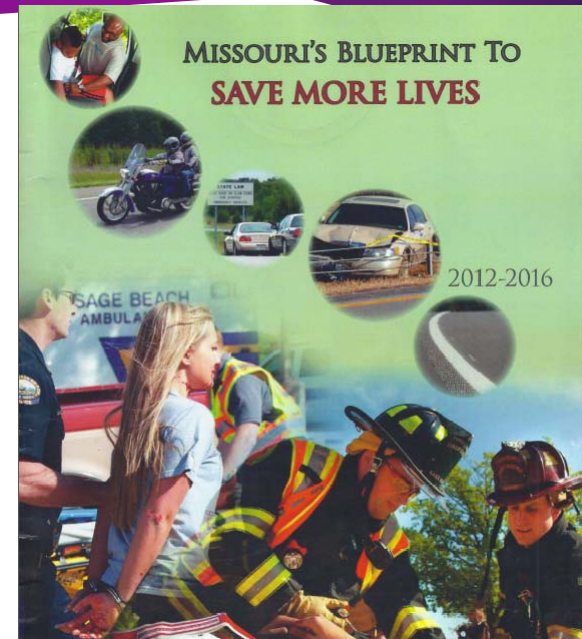
### Number of Roadway Fatalities Missouri Coalition for Roadway Safety





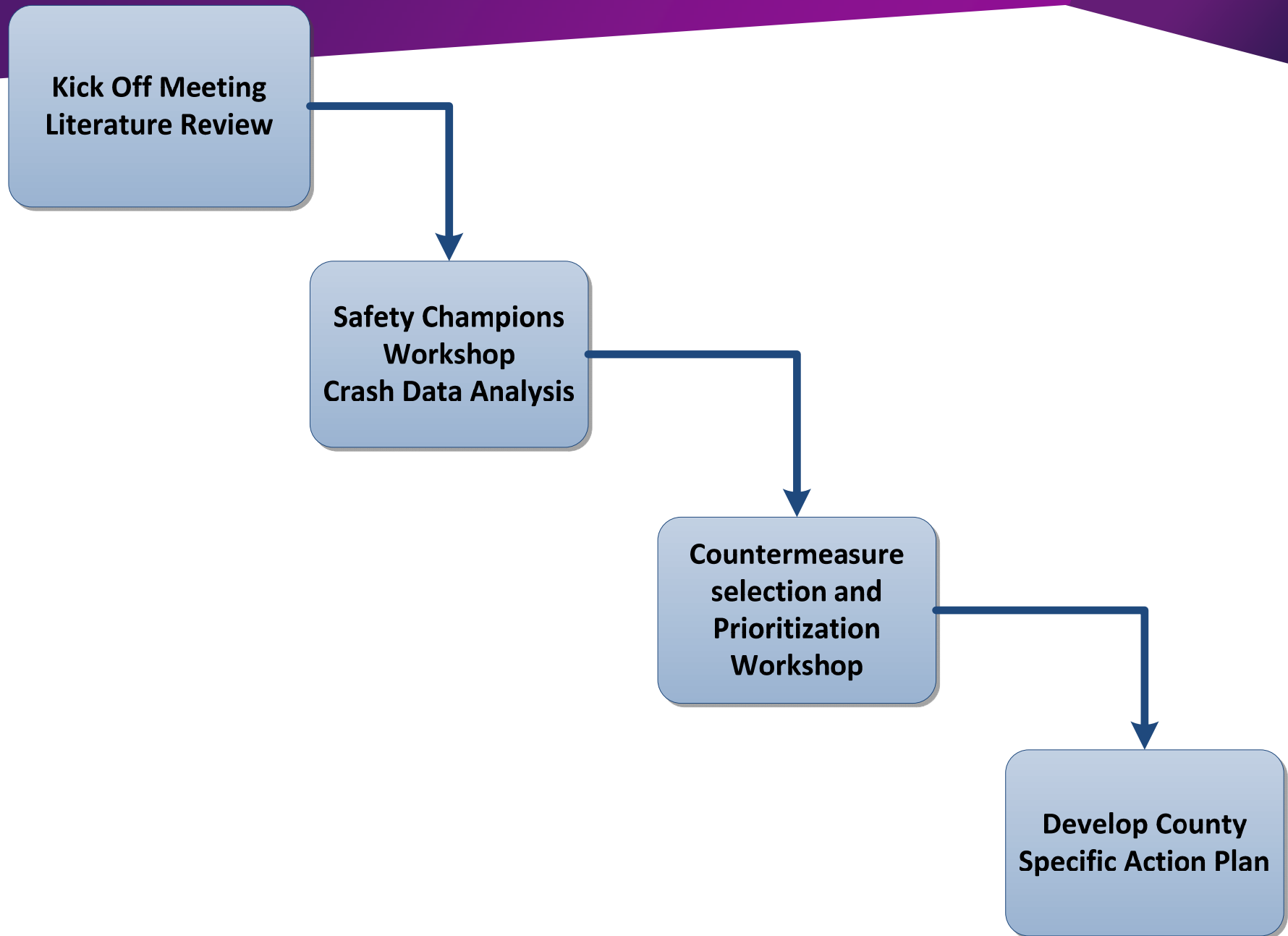
# Key Takeaways

- ▶ Process and products delivered
  - ▶ Build direct tie to Missouri's *Blueprint to Save More Lives (SHSP)*
  - ▶ Develop **reasonable** action plan
  - ▶ Lessons Learned
  - ▶ What is next?
- 
- ▶ Key Objective is to **build consensus** within the areas



W Division Street at N Glenn Ave



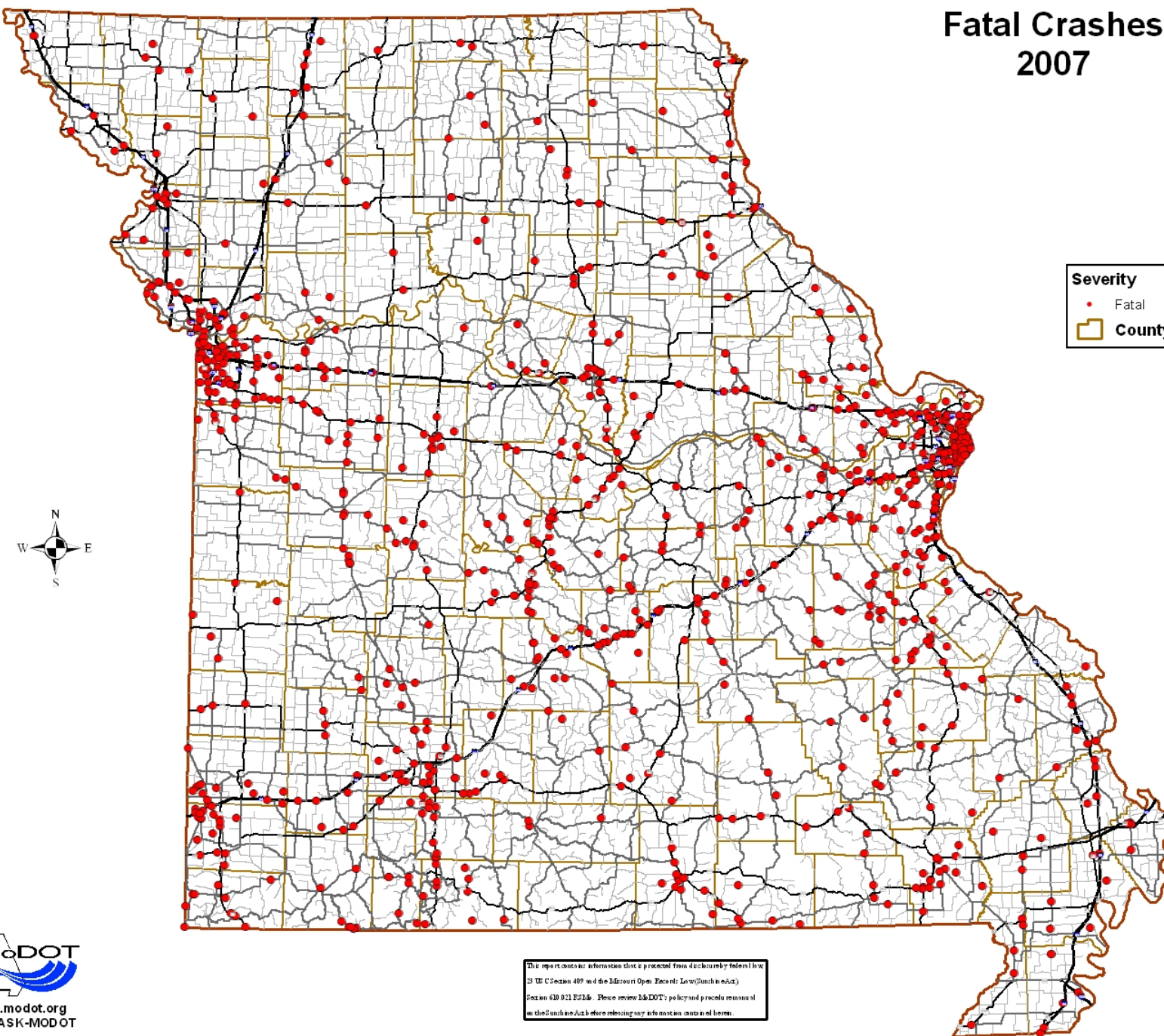


## Directly Tied to Missouri's SHSP?

- ▶ Traditional (Hot Spot)
  - ▶ Advantages: easy
  - ▶ Disadvantages: limited approach and does not target severity well.
- ▶ Systemic
  - ▶ Advantages: easy to apply even with limited roadway data
  - ▶ Disadvantages: results occur over time
- ▶ Comprehensive
  - ▶ Enforcement and education
- ▶ Policy
  - ▶ Continuous improvement



# Fatal Crashes 2007



**Severity**  
• Fatal  
□ County Boundary





# Fatal Crash Types

## 2003

Unbelted

Run Off Road

Impaired

## 2004

Unbelted

Run Off Road

Impaired

## 2005

Unbelted

Run Off Road

Impaired

## 2006

Unbelted

Run Off Road

Impaired

## 2007

Unbelted

Run Off Road

Impaired

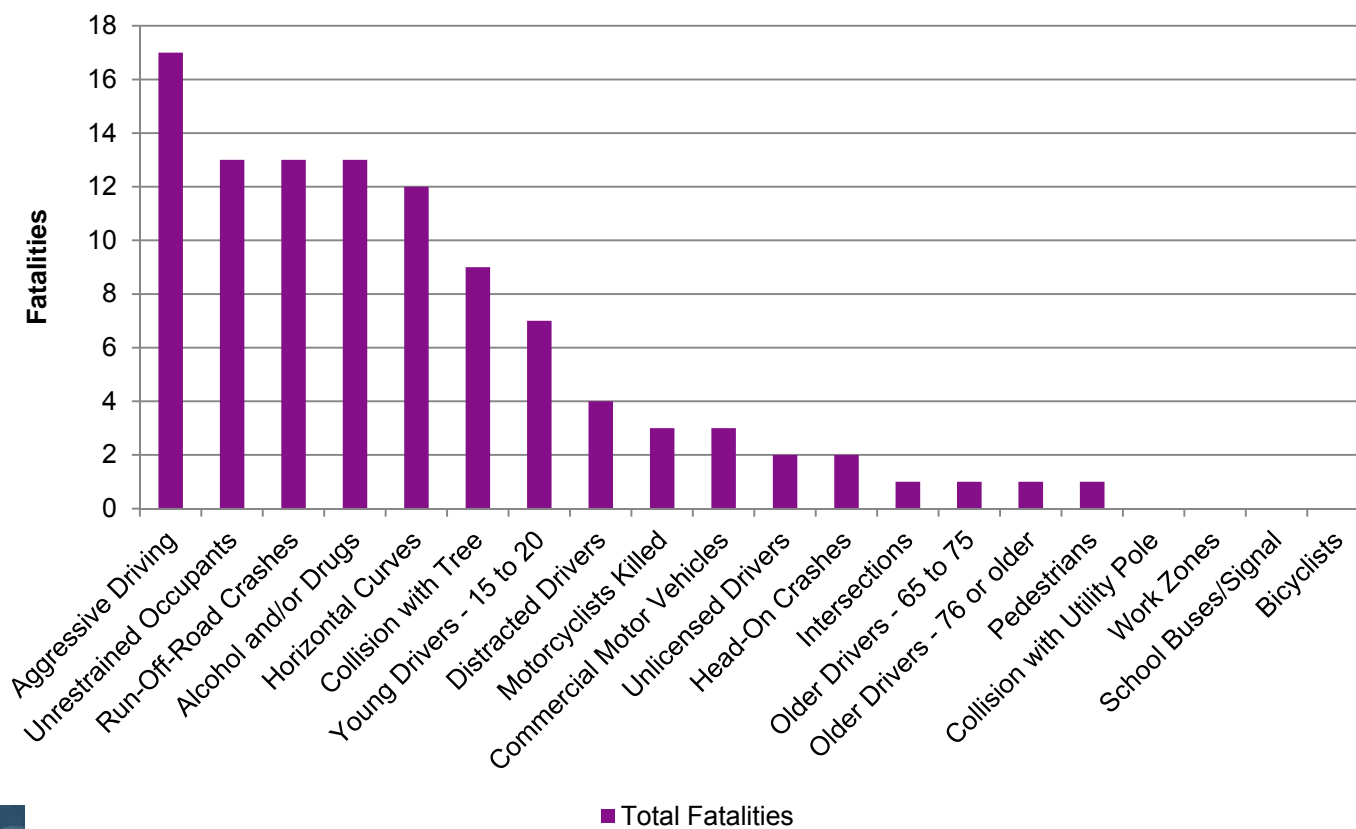


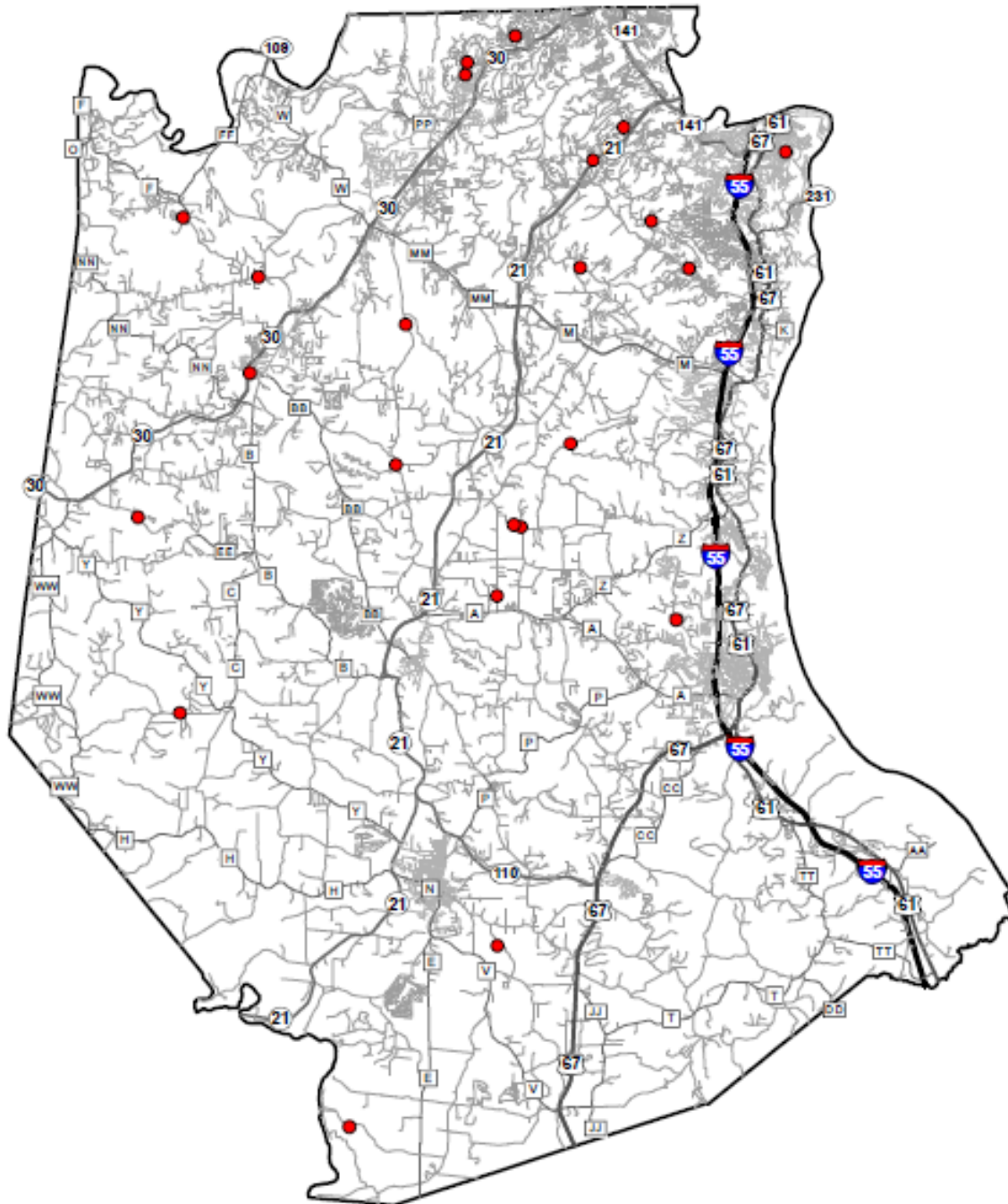
Source: MNDOT/SEH/TAPCO project for Rural ITS Safety Solution Systems



# Fatalities by Crash Type – Local Roads Only

Total Fatalities  
Years 2009-2011



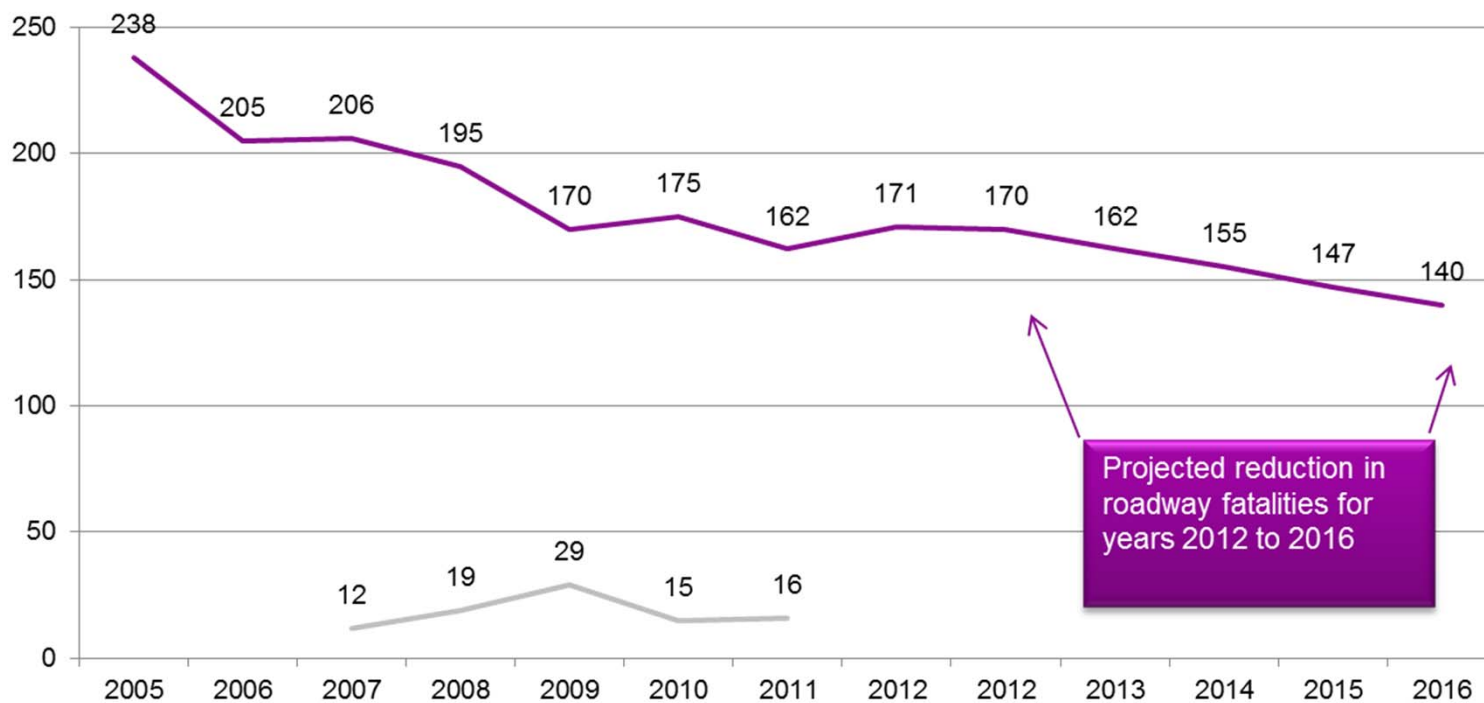


## County- Local Roads Only

- ▶ Fatalities Only
- ▶ Years 2009 to 2011

# What are you trying to accomplish?

## Missouri Coalition for Roadway Safety Fatality Reduction Goals for State and Local Roads Comparison of local roads in a Region to all routes



# How do you drive down these crashes?

- ▶ Match solutions to common crash types occurring
  - Comprehensive: enforcement, education, engineering, everyone
- ▶ Sources of noteworthy, time proven solutions
  - NHTSA, AASHTO
  - FHWA Office of Safety
    - <http://safety.fhwa.dot.gov/fas/toolkit.cfm>
  - Crash Modifications Factor Clearinghouse
    - <http://www.cmfclearinghouse.org/>
  - Peer reviewed research
    - Transportation Research Board (TRB)
    - State sponsored

The screenshot shows the homepage of the Crash Modification Factors Clearinghouse. At the top, there is a navigation bar with links: "Go to main content | Site Map | Notice | Sign Up for our e-newsletter | Home". Below this is a secondary navigation bar with links: "About CMFs | Submit CMFs | Resources | Contact". The main content area is divided into two columns. The left column has a search section titled "Search for:" with a text input field labeled "enter search term(s)", a dropdown menu labeled "in" with "Countermeasure Name" selected, a "Need Help?" link, and a "Search CMFs" button. The right column features a section titled "Get training on applying CMFs" with a sub-header "Find out about two CMF-related trainings offered through the National Highway Institute, Application of Crash Modification Factors and Science of Crash Modification Factors" and an image of hands holding a document. Below the search section, there is a paragraph explaining the purpose of the clearinghouse. To the right of this paragraph is a section titled "Recently Added CMFs" which lists three entries in a table-like format.

Install shoulder rumble strips	Install chevron signs on horizontal curves	Replace TWLTL with raised median
CMF: 0.74	CMF: 0.84	CMF: 0.81
CRF: 26.1	CRF: 16	CRF: 19
Crash type: Run off road	Crash type: Non-intersection	Crash type: Rear end
Crash severity: All	Crash severity: Fatal, Serious injury, Minor injury	Crash severity: All





# Balance all E's

- ▶ Curves: Basic Signing 30% reduction
  - Oversize warning signs
    - Focus States 15% reduction
  - Chevrons
    - Focus States 32% reduction
    - Highway Safety Manual 29% reduction
  - Fluorescent Sheeting
    - Highway Safety Manual 24% reduction
  - Curve Feedback Signs
    - 50% reduction
    - \$13,000 per installation

- ▶ Impairment
  - CDC review of 11 studies
  - 20% reduction of fatality, injury, and total crashes
  - NHTSA based evaluations
  - 7 States under demonstration program
  - Reduce alcohol-related fatalities by 11 to 20%
  - Key observation
  - Paid education with enforcement



# Example Approach

Curve Crashes - Local Roads - 2008-2012 - Summary

NUMBER OF CRASHES PER CURVE	NUMBER OF CURVES	CUMULATIVE		CUMULATIVE	
		CURVES	PERCENT	CRASHES	PERCENT
133	1	1	0.17%	133	6.47%
75	1	2	0.35%	208	10.11%
62	1	3	0.52%	270	13.13%
58	1	4	0.70%	328	15.95%
52	1	5	0.87%	380	18.47%
46	1	6	1.05%	426	20.71%
43	1	7	1.22%	469	22.80%
41	2	9	1.57%	551	26.79%
37	1	10	1.75%	588	28.59%
30	2	12	2.10%	648	31.50%
29	1	13	2.27%	677	32.91%
28	1	14	2.45%	705	34.27%
27	1	15	2.62%	732	35.59%
25	1	16	2.80%	757	36.80%
23	2	18	3.15%	803	39.04%
20	1	19	3.32%	823	40.01%
19	3	22	3.85%	880	42.78%
17	1	23	4.02%	897	43.61%
16	3	26	4.55%	945	45.94%
15	1	27	4.72%	960	46.67%
14	2	29	5.07%	988	48.03%
13	1	30	5.24%	1,001	48.66%
12	1	31	5.42%	1,013	49.25%
11	1	32	5.59%	1,024	49.78%
10	4	36	6.29%	1,064	51.73%
9	4	40	6.99%	1,100	53.48%
8	7	47	8.22%	1,156	56.20%
7	11	58	10.14%	1,233	59.94%
6	8	66	11.54%	1,281	62.28%
5	12	78	13.64%	1,341	65.19%
4	22	100	17.48%	1,429	69.47%
3	42	142	24.83%	1,555	75.60%
2	72	214	37.41%	1,699	82.60%
1	358	572	100.00%	2,057	100.00%
Total	572	572	100.00%	2,057	100.00%

## ► “Systemic” approach

### Keys to Success

- Low-cost treatments
- Widespread implementation
- Treating total crashes helps capture fatalities
- Deal with lack of exact roadway data



## Enforcement: Speeding - \$1.80M; 34 locations

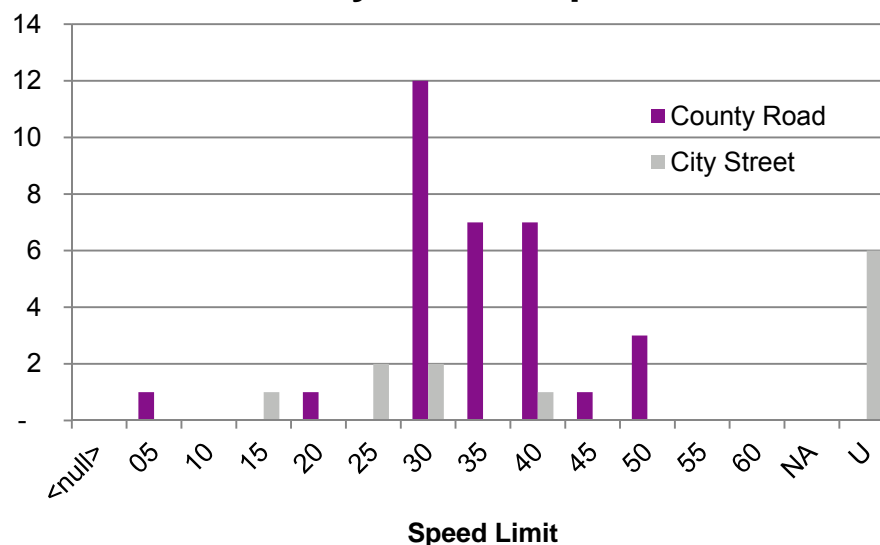
- ▶ 3 out of 4 fatalities involved speeding
- ▶ **Save 1 Life and reduce 8 serious injuries over 5 years**

Implementation should include expenditures for outreach initiatives

### ▶ Fatalities/Injuries

- 0/10
- 15/42
- 14/211

Fatalities by Posted Speed Limit



# Enforcement: Speeding- \$1.80M; 34 locations

Route Total Speed- Related Crashes <sup>1</sup> (‘07-‘11)	Patrol Area			Potential Checkpoint Locations (Log-points; crashes)	Details/Notes
	Section Begin Log Point	Section End Log Point	Section Crashes (‘07-‘11)		
92	1.1	2.5	31	• 1.1-1.3; 13 crashes	Best enforcement time periods: • Weekday afternoons during rush hour (3-6 pm) • Fri, 3-9pm • Sat, 3-9pm
	3.0	4.6	20	• 3.2-4.1; 11 crashes	
	8.0	11.1	11	• 8.0-8.3; 4 crashes	
	Un-located crashes along this corridor		23		
56	0.0	1.9	8	• 0.6-0.9; 5 crashes	See previous Jefferson County enforcement times.
	4.0	6.0	8	•	
	6.2	8.9	20	• 7.1-7.6; 5 crashes • 8.3-8.9; 9 crashes	
	Un-located crashes along this corridor		20		
51	0.0	2.0	10		See previous Jefferson County enforcement times.
	6.0	7.1	8	• 7.0-7.1; 5 crashes	
	Un-located crashes along this corridor		18		



# Sample Strategy Matrix

Countermeasure	Approach	Estimated Number of Improvements <sup>1</sup>	Associated Costs (\$ Million) <sup>2</sup>	Annual Targeted Crash Reduction <sup>3</sup>	Annual Estimated Serious Injury Crash Reduction	Annual Estimated Fatality Reduction	Prevent/Reduce One Annual Serious Injury	\$ (million) Required to Save One Annual Life
<b>Local Roads</b>								
Enhanced Curve Signing and Marking	Systemic	18	\$ 0.05	31.92	0.90	0.17	0.06	0.32
Raised Thermoplastic Edge Line Rumble Stripes or Milled-In Edge Line Rumble Stripes	Systemic	40	\$ 2.00	24.80	0.97	0.20	2.07	10.15
Tree Removal or Clear Zone Improvements	Systemic	2	\$ 0.01	1.76	0.12	0.07	0.06	0.10
Utility Pole Relocation/Delineation	Systemic	-	\$ -	0.00	0.00	0.00	0.00	0.00
Enforcement and Education: Alcohol Related	Comprehensive	20	\$ 2.04	10.92	0.47	0.16	4.30	12.38
Enforcement and Education: Unrestrained Crashes	Comprehensive	58	\$ 5.96	28.99	2.44	0.54	2.44	11.03
Education and Enforcement: Speeding Related Crashes	Comprehensive	63	\$ 6.45	27.84	1.26	0.41	5.11	15.64
Signalized Intersection less than 45mph	Traditional	3	\$ 0.10	112.23	1.43	0.18	0.07	0.55
Signalized Intersections greater than 45mph	Traditional	1	\$ 0.05	1.46	0.02	0.00	2.34	0.00
Stop-Controlled Intersection less than 45mph	Traditional	8	\$ 0.16	40.07	0.70	0.09	0.23	1.91
Stop-Controlled Intersections greater than 45mph	Traditional	1	\$ 0.05	1.34	0.03	0.02	1.63	3.26
Licensure Enforcement of Young Drivers	Comprehensive	10	\$ 1.06	73.78	0.98	0.08	1.08	12.63
<b>Total Cost and Benefit (Local Roads)</b>								
<b>Total Cost (\$Million)</b>			<b>\$ 17.92</b>	-	-	-	-	-
<b>Annual Cost (\$ Million) for 5 years; Annual Benefit</b>			<b>\$ 3.58</b>	<b>355</b>	<b>9.33</b>	<b>1.92</b>	-	-





## Lessons Learned?

- ▶ People
- ▶ Clear understanding of the objectives
- ▶ Crash data and how it is used
- ▶ Watch your language
- ▶ ITS deployments
- ▶ Have the right people at the table
- ▶ Customized action plan with additional analysis
- ▶ Questions about accuracy need to be addressed; location base map used
- ▶ Action plans represent the area;
- ▶ Difficult

What is next?



## First, what is the current status?

- ▶ Completed: Jackson and Jefferson county
- ▶ Action plan submitted with Greene county
- ▶ Action Plan submitted for St. Louis City
- ▶ Countermeasure workshop for St. Louis county
- ▶ Next fiscal year
  - St. Charles and Franklin county
  - 3<sup>rd</sup> to be determined
- ▶ Last year?



High Friction Surface



# Funding?

- ▶ Culture
- ▶ Are the plans being used?
- ▶ What is one improvement which should be considered?
- ▶ Are they really customized?
- ▶ What about the other 2 E's?



# Contact Information

- ▶ Missouri DOT
  - John Miller
  - John.P.Miller@modot.mo.gov
  - 573-526-1759

- ▶ Leidos
  - Matt Myers
    - Matthew.c.myers@leidos.com
    - 573-418-2944
  - Jennifer Atkinson
    - Jennifer.e.atkinson@leidos.com
    - (417) 362-9017







# Developing Local Roadway Safety Plans for Missouri Counties

National Rural ITS Conference

Matt Myers and Jennifer Atkinson

