

Jefferson County Vision Zero



Safety Bowl

- Mike Vaughn
 - Kentucky's 2019 Safety Bowl National Champion



Mini Safety Bowl

■ How Many Highway Fatalities did KY Experience in 2018?

A. 724

B. 782

C. 834



Mini Safety Bowl

■ How Many Highway Fatalities did KY Experience in 2018?

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Mini Safety Bowl

- How Many Highway Fatalities did Jefferson County Experience in 2018?
 - A. 63
 - B. 77
 - C. 94



Mini Safety Bowl

- How Many Highway Fatalities did Jefferson County Experience in 2018?
 - A. 63
 - B. 77
 - C. 94



Mini Safety Bowl

■ How Many More Crashes Occur in Louisville in the PM Peak Than The AM Peak?

■ 57%

■ 144%

■ 261%



Mini Safety Bowl

■ How Many More Crashes Occur in Louisville in the PM Peak Than The AM Peak?

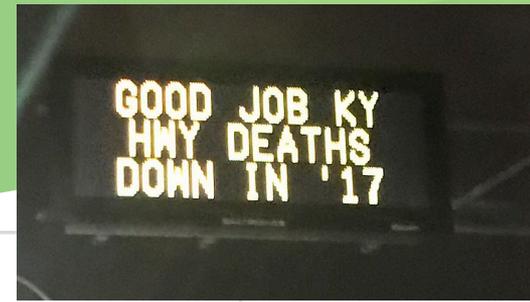
■ 57%

■ 144%

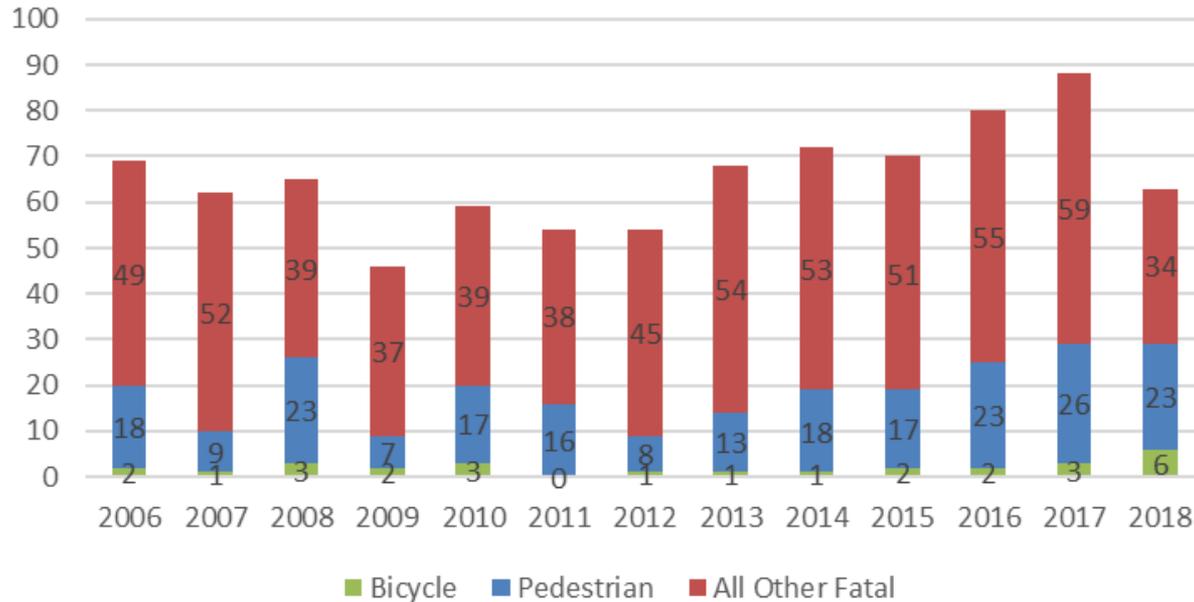
■ 261%



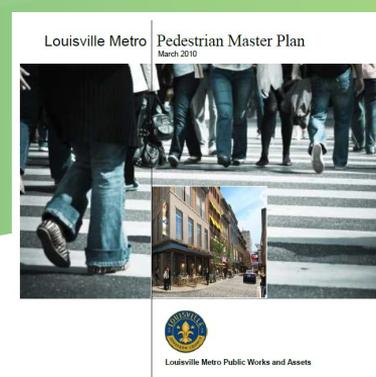
Fatality Trends



Jefferson County Roadway Fatalities
(Non-Interstate)



Pedestrian Master Plan 2010



- Vision: For Louisville to become the safest and most appealing community for pedestrians!
- Mission: Create a community wide culture that supports pedestrians through physical improvements, policies and pedestrian programs by increasing the pedestrian system network while simultaneously reducing the rate of pedestrian crashes.

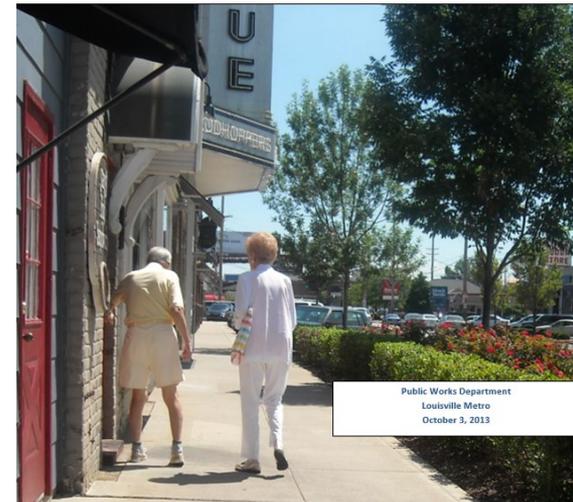


Understanding Pedestrian Crashes

- 23% of fatalities occurring on Metro roadways were pedestrian fatalities.
- Louisville conducted a 5-year pedestrian crash analysis to identify:
 - Trends
 - High risk populations
 - High crash locations



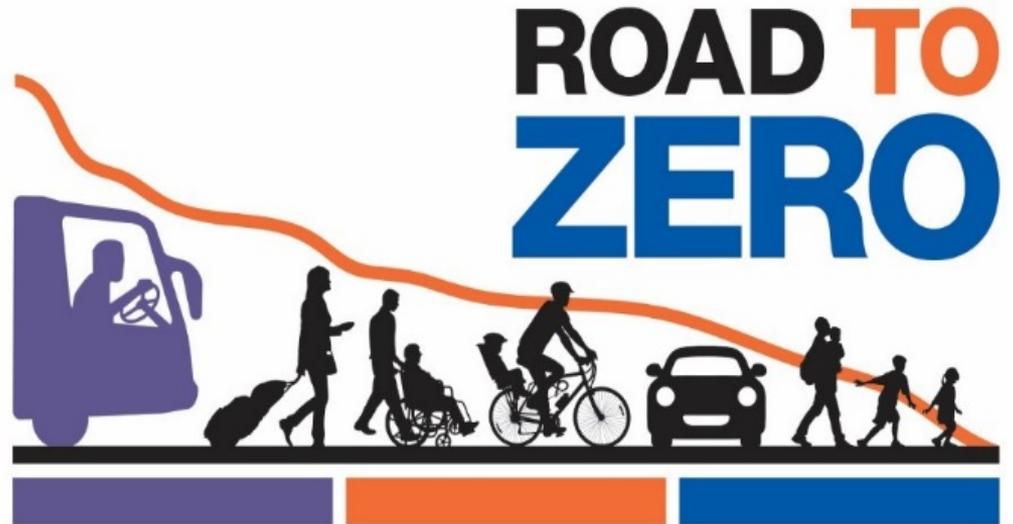
Understanding Pedestrian Crashes in Louisville, KY 2006 – 2010



Road to Zero 2017

Interdisciplinary, Intradepartmental Team

- Advocates
- Educators
- Engineers
- Health
- Planners
- Transit



Vision Zero

- aka: Safe Systems Approach
- Principles:
 - People make mistakes
 - Crashes are going to happen
 - The human body can only tolerate a certain amount of crash force



Vision Zero

- Why?

- Average Crash Costs in KY:

 - Fatal Crash = \$9,281,571

 - Serious Injury = \$537,913

- Societal Costs:

 - US: \$433.7 Billion (Source: National Safety Council)

 - KY: \$8.9 Billion



Vision Zero

- Paradigm Shift:
 - Let's not focus on eliminating crashes
 - Let's focus on eliminating fatalities and serious injuries

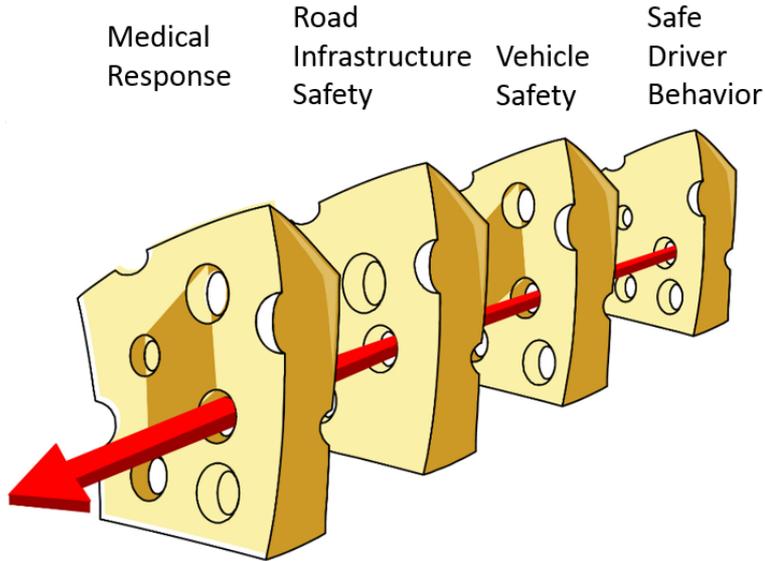


Vision Zero

- How?
- Other elements of the Safety Systems approach:
 - We can't continue to blame the driver
 - Shared responsibility
 - Proven solutions
 - Proactive approach (treat the risk factors)



Shared Responsibility?



The Swiss Cheese Model was originally put forward by Dante Orlandella and James T. Reason of the University of Manchester

■ The Swiss Cheese Model:

- Layered security measures are represented as slices of swiss cheese with the holes being weaknesses in the parts of the system
- A “failure” only results when a hole in each slice momentarily aligns, permitting a hazard to pass through all of the slices

Vision Zero

- “Safe Systems” Goal:
 - ensure redundancy in the system so that when a crash does happen, the crash forces released are within the boundaries of human tolerance and that no fatalities should occur and serious injuries are reduced

Source: Roads and Traffic Authority of New South Wales



Vision Zero

- Treat the risk factors?
 - Improve the roadway features with high correlation to fatal & serious injury crashes
- How are risk factors determined?
 - In-depth Safety Diagnosis
(aka Analysis of Crash & Roadway data)
 - Engineering Judgement

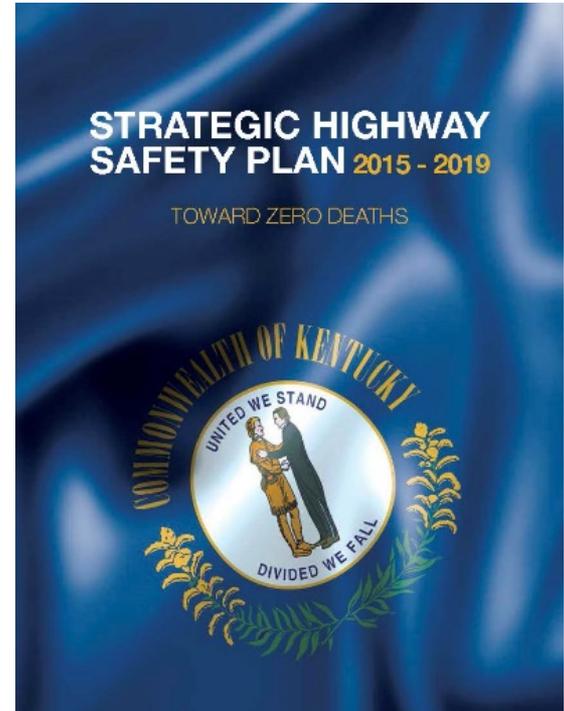


Vision Zero

■ Kentucky Strategic Highway Safety Plan

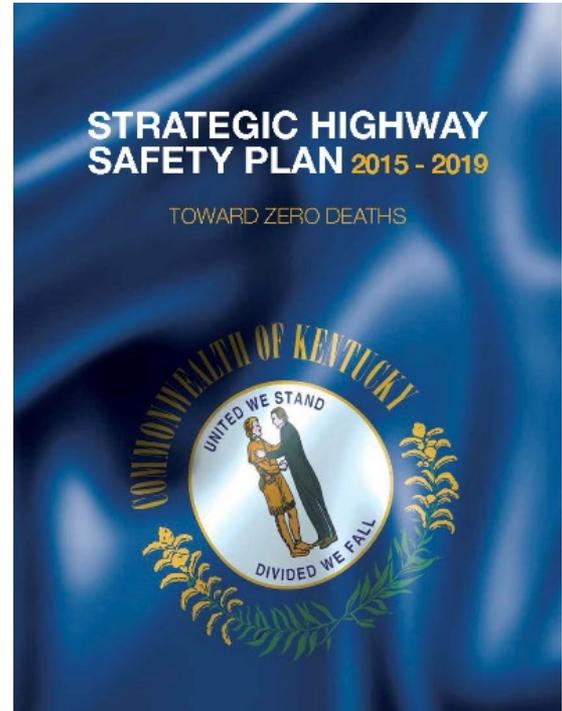
■ The Four E's

- 🚧 Engineering
- 👮 Enforcement
- 🎓 Education
- 🚑 Emergency Services



Vision Zero

- Kentucky Strategic Highway Safety Plan
 - Emphasis Areas
 - Roadway Departures
 - Intersections
 - Framework for HSIP Initiatives

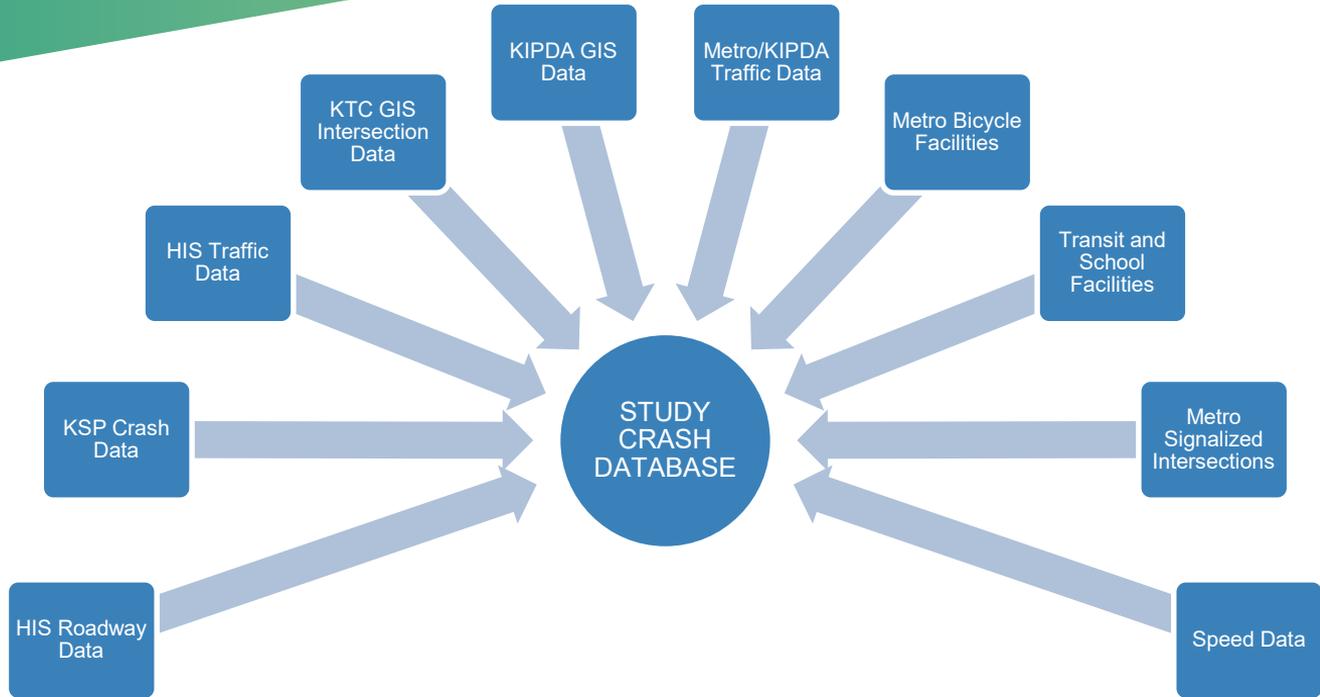


Jefferson County Vision Zero

- Why a Separate Louisville Safety Plan?
- Louisville is Different than Kentucky
 - Crash Types
 - More Peds and Bicycles
 - More Intersections
 - Less Roadway Departures



Jefferson County Vision Zero



Jefferson County Vision Zero

■ KABCP Definitions

■ **K** = Fatal crash (**K**illed)

■ **A** = Suspected Serious Injury crash (**A**mbulance)

■ **B** = Suspected Minor Injury crash (**B**ruised/**B**loody)

■ **C** = Possible Injury (**C**omplaining)

■ **P** = **P**roperty Damage Only crash



Jefferson County Vision Zero

■ KY Comprehensive Crash Costs (2017)

■ **K** = \$9,281,571

■ **A** = \$537,913

■ **B** = \$162,885

■ **C** = \$102,957

■ **P** = \$9,689



Jefferson County Vision Zero

■ Crash Study Database

- Crash Period: 2013-2017
- Jefferson County: 157,160
- Crashes On Interstates: **26,475**
- Spatial Deficiency Crashes: **3,511 (2%)**
- Study Crash Database:

Crashes - Severity		
K	357	<1%
A	2,144	2%
B	7,741	6%
C	11,696	9%
P	105,236	83%
Total	127,174	

127,174 Crashes



Jefferson County Vision Zero

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Total	127,174	

\$ 7.95 Billion



Jefferson County Vision Zero

■ Limitations of Available Data

■ Spatial Deficiencies

■ ADT/VMT (Local Streets)

■ Number of Lanes (13% Unknown)

■ Lane Widths

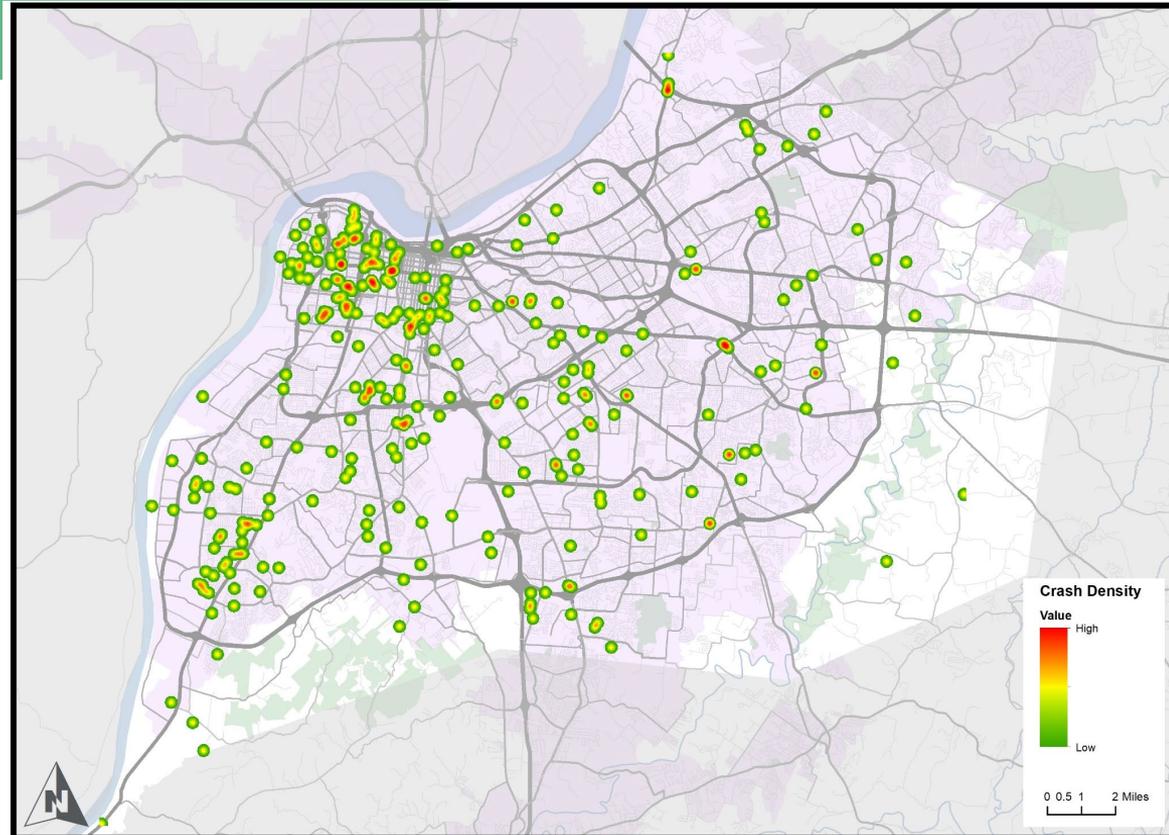
■ Lighting Conditions

■ Driver Detail



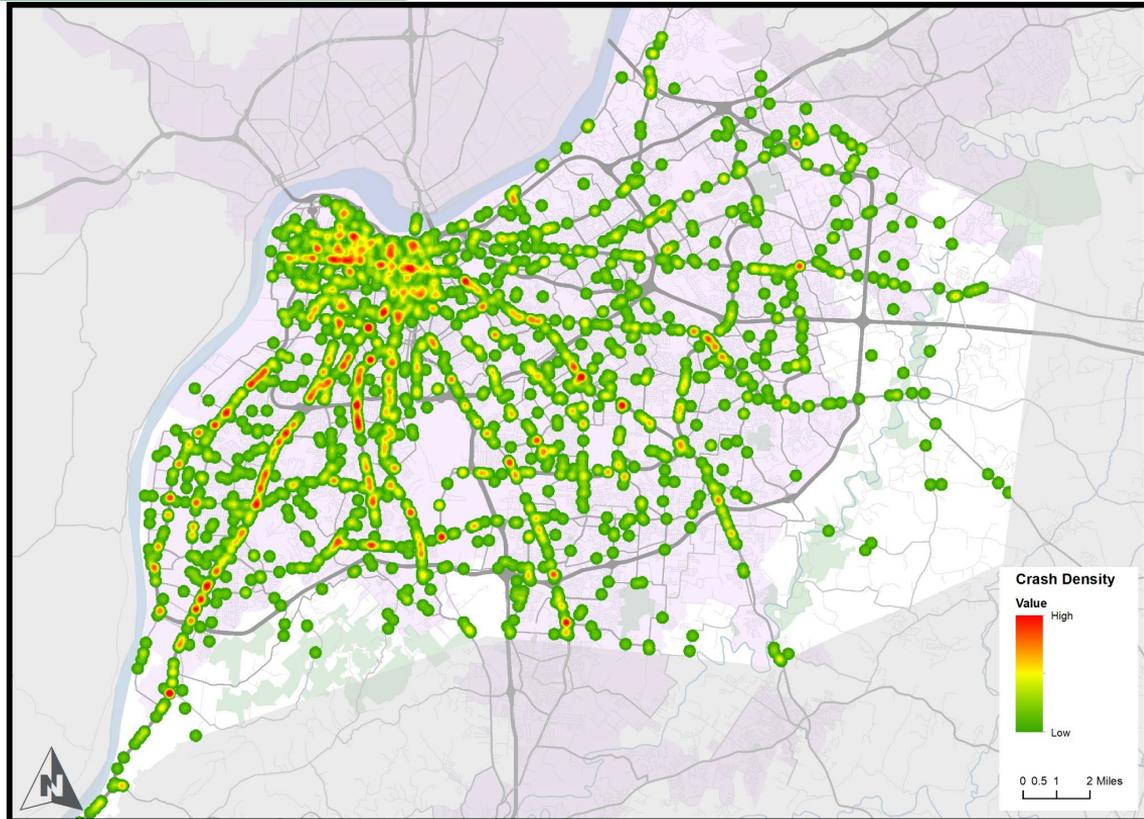
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■ K and A Crashes
with No Roadway
Data



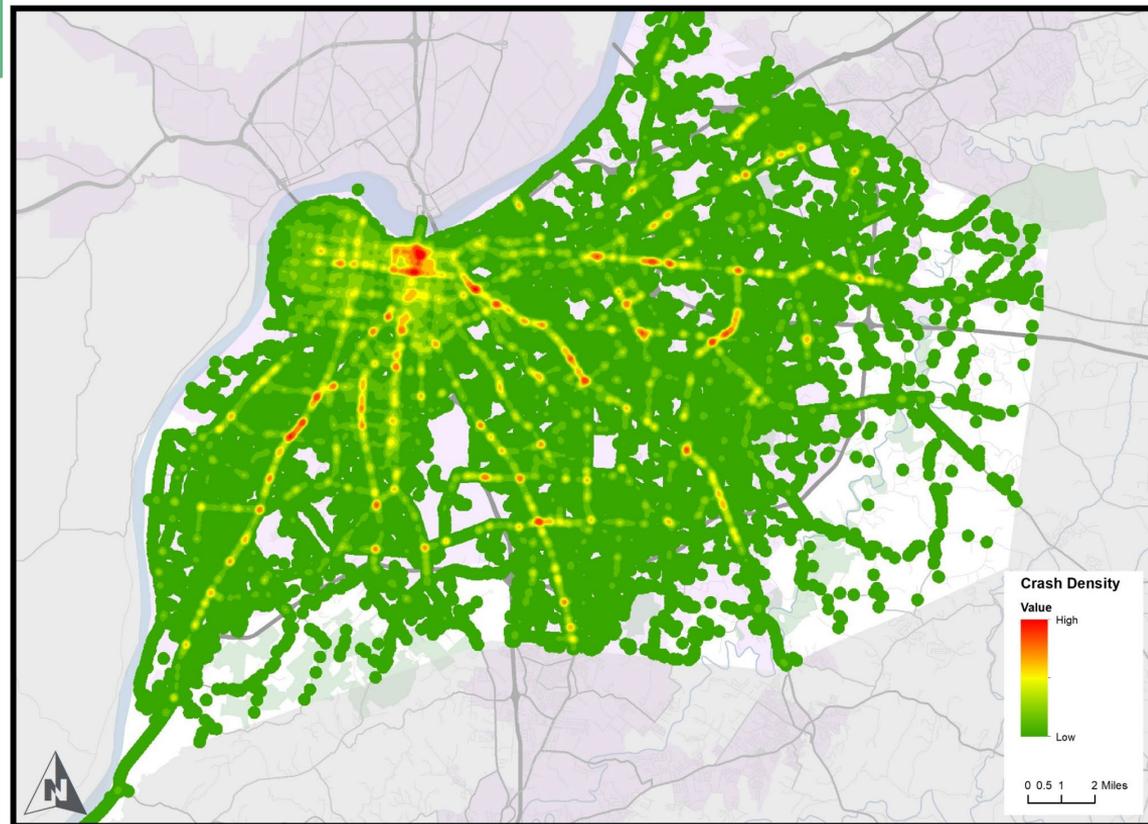
Jefferson County Vision Zero

■ K and A Crashes



Jefferson County Vision Zero

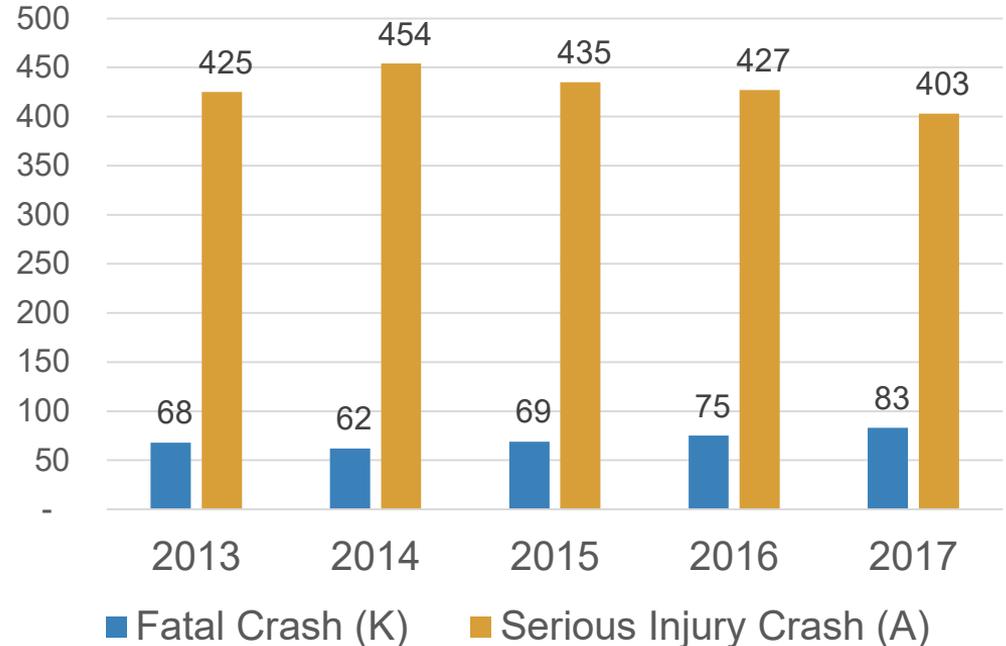
■ All Crashes



Jefferson County Vision Zero

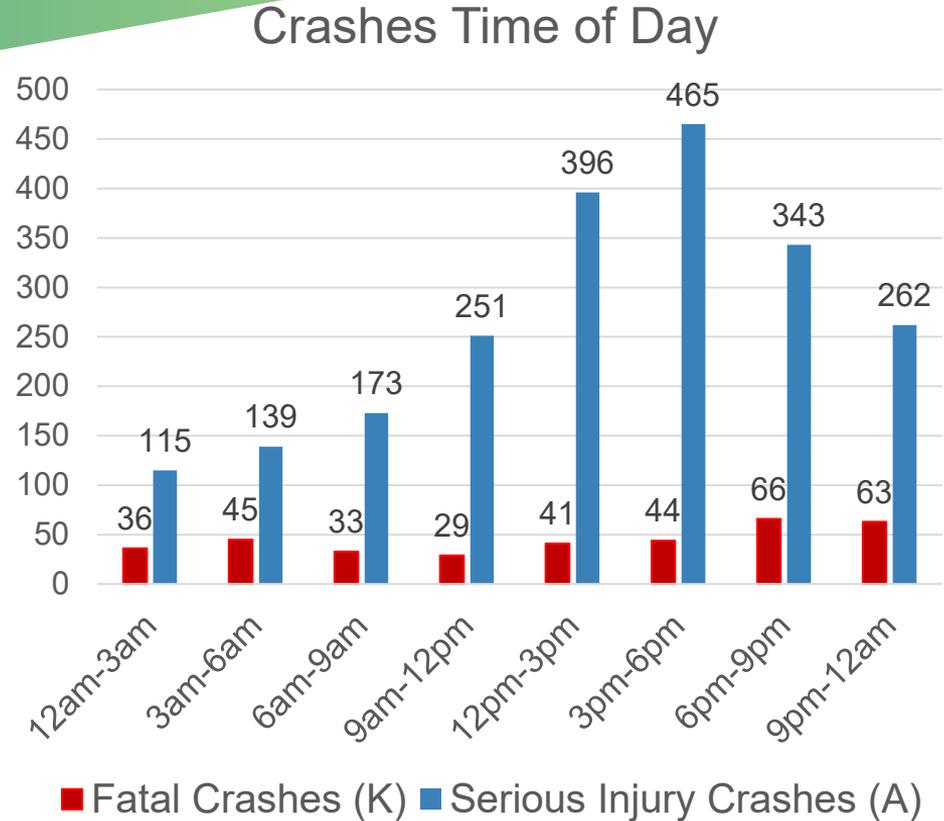
■ K and A Over Time

All Crashes – Fatal (K) & Serious Injury (A)



Jefferson County Vision Zero

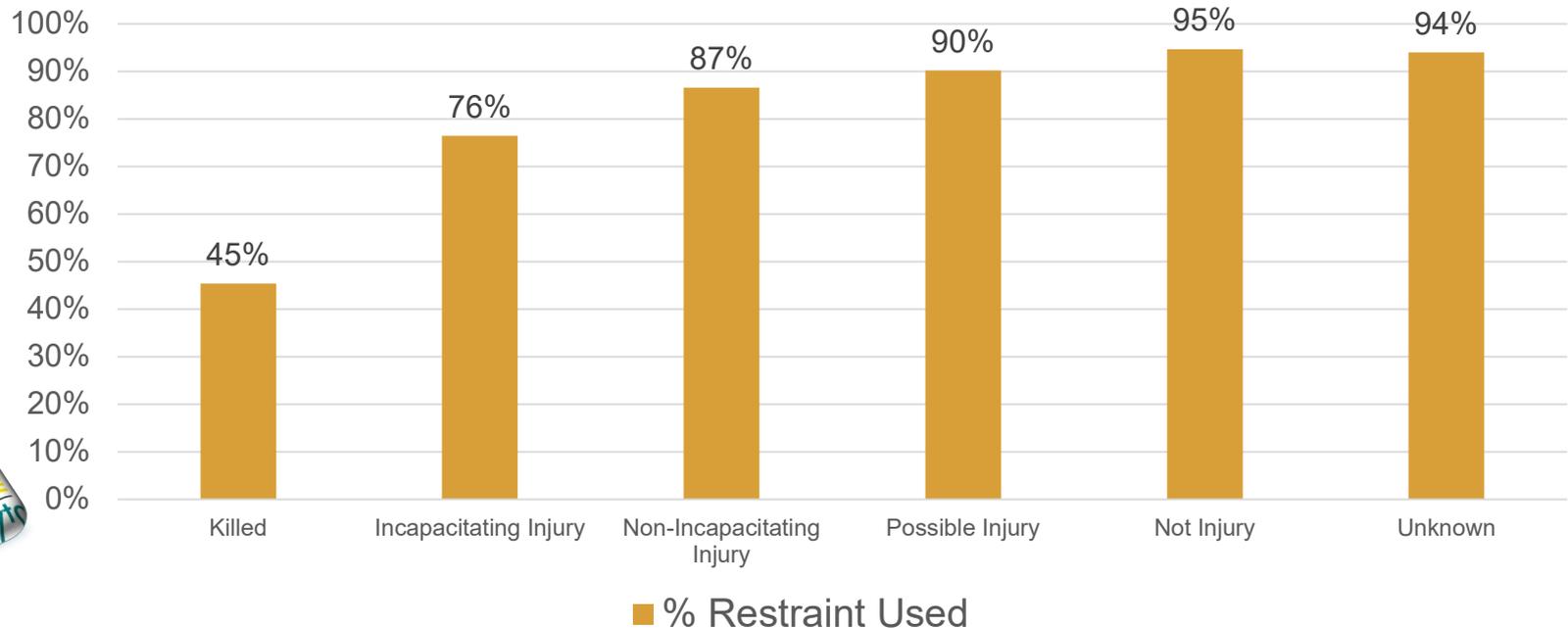
■ K and A Time of Day



Jefferson County Vision Zero



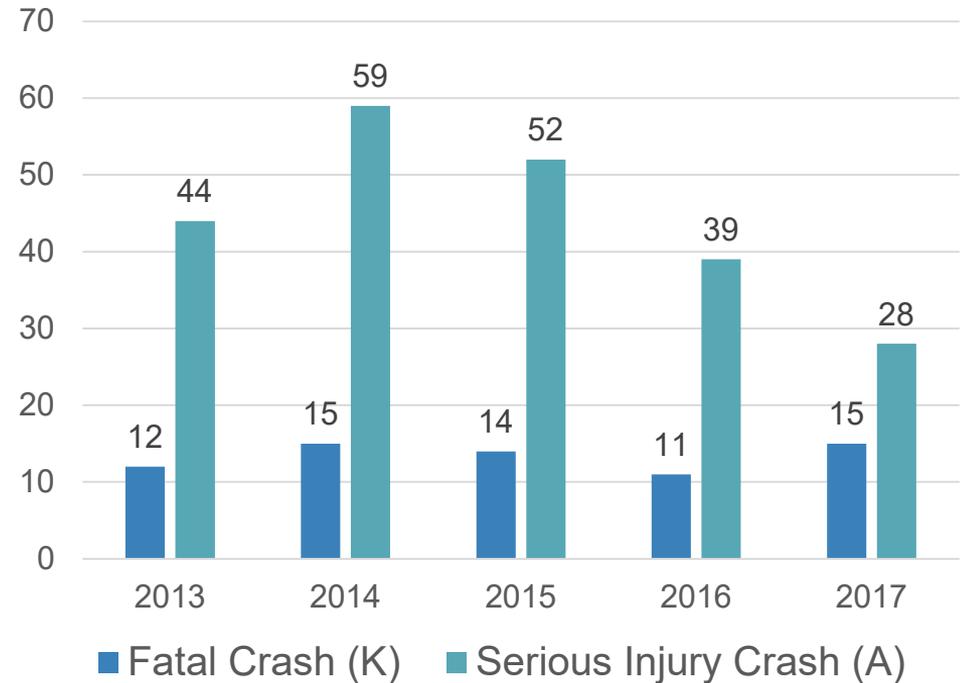
Restraint Used in Crashes



Jefferson County Vision Zero

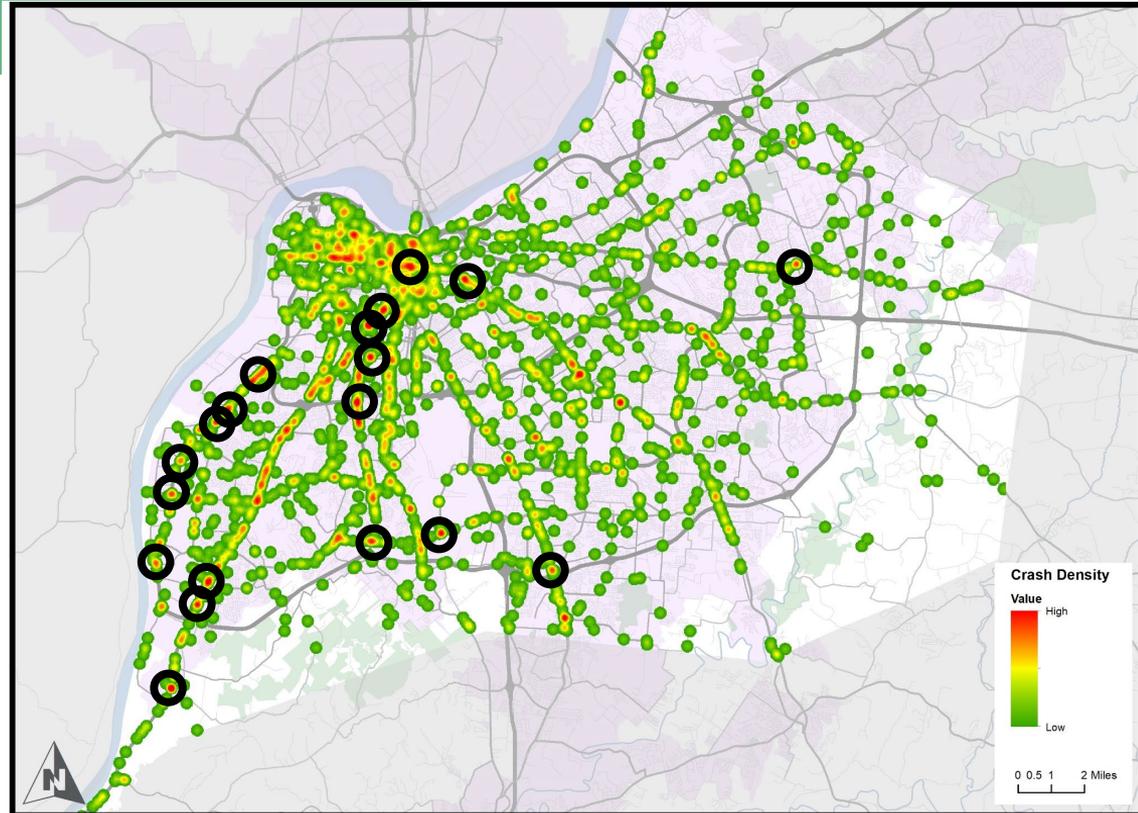
- Impaired Crashes
 - 19% of Fatal
 - 46% of Impaired KA Crashes between 10:00 PM and 5:00 AM

Impaired Crashes



Jefferson County Vision Zero

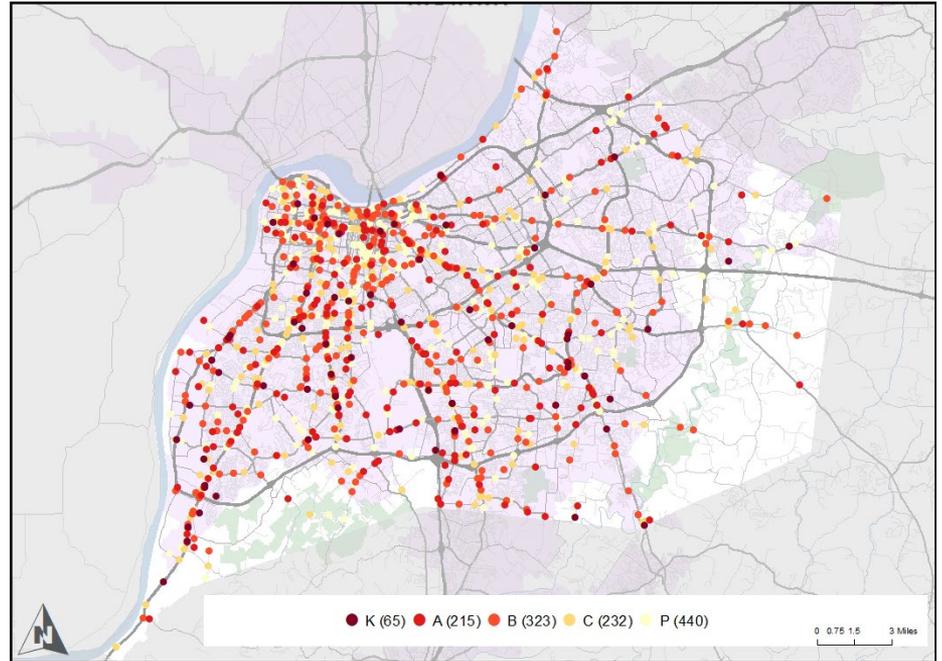
- Intersections
- 5 or More KA Crashes



Jefferson County Vision Zero



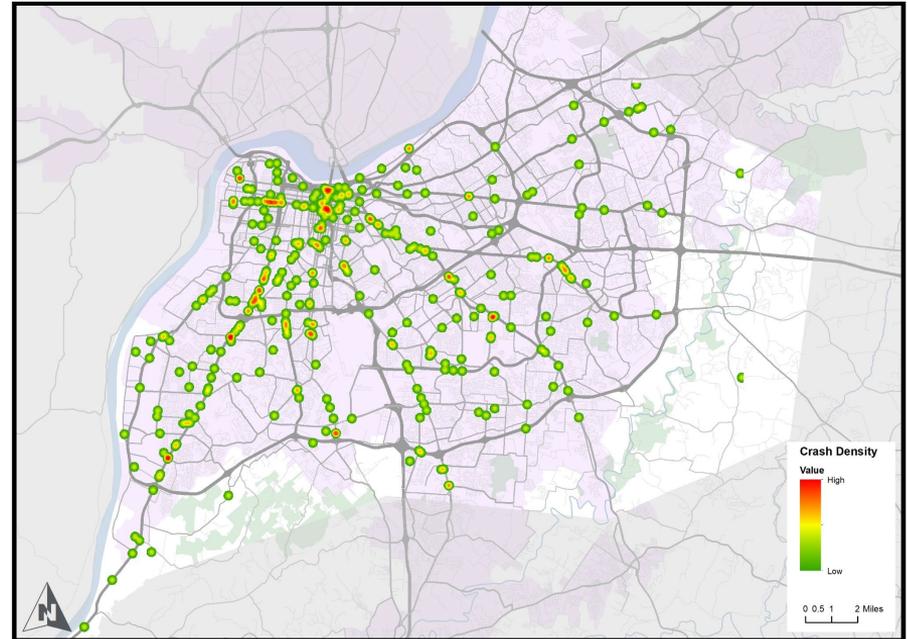
- Motorcycles
- 65 FataIs
- 215 Serious Injuries



Jefferson County Vision Zero

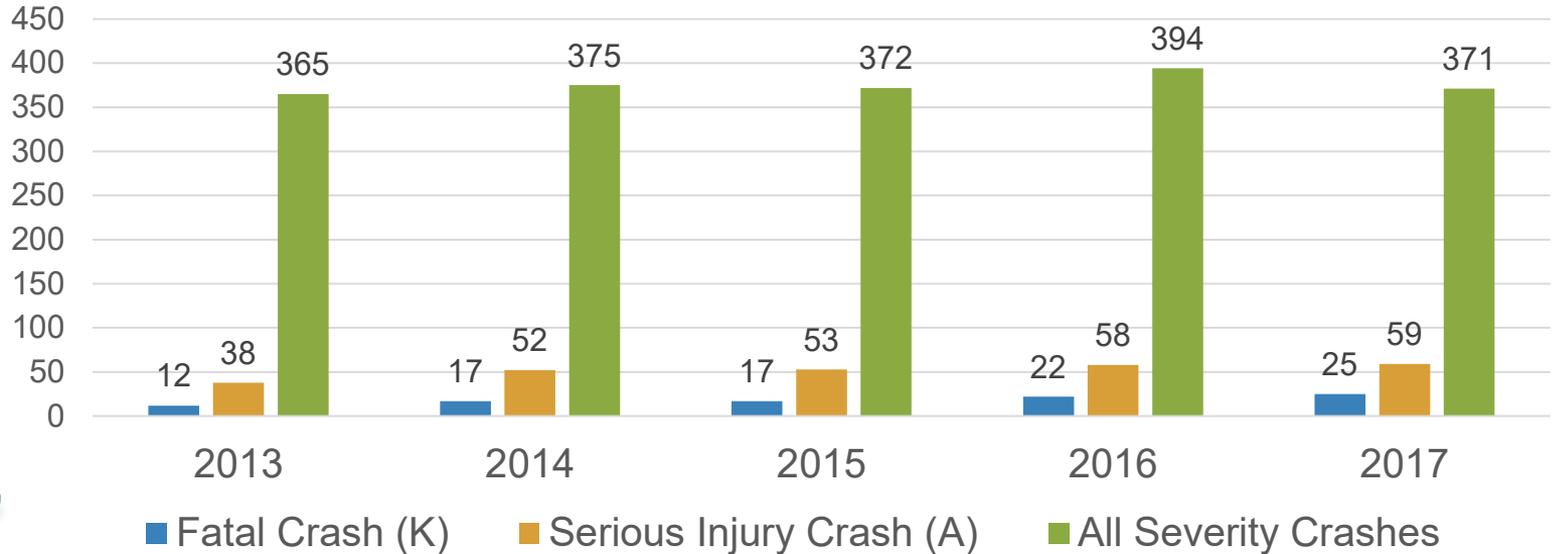


- Non-Motorized
- 102 Fatals
- 29% of Fatalas
- 10% Statewide



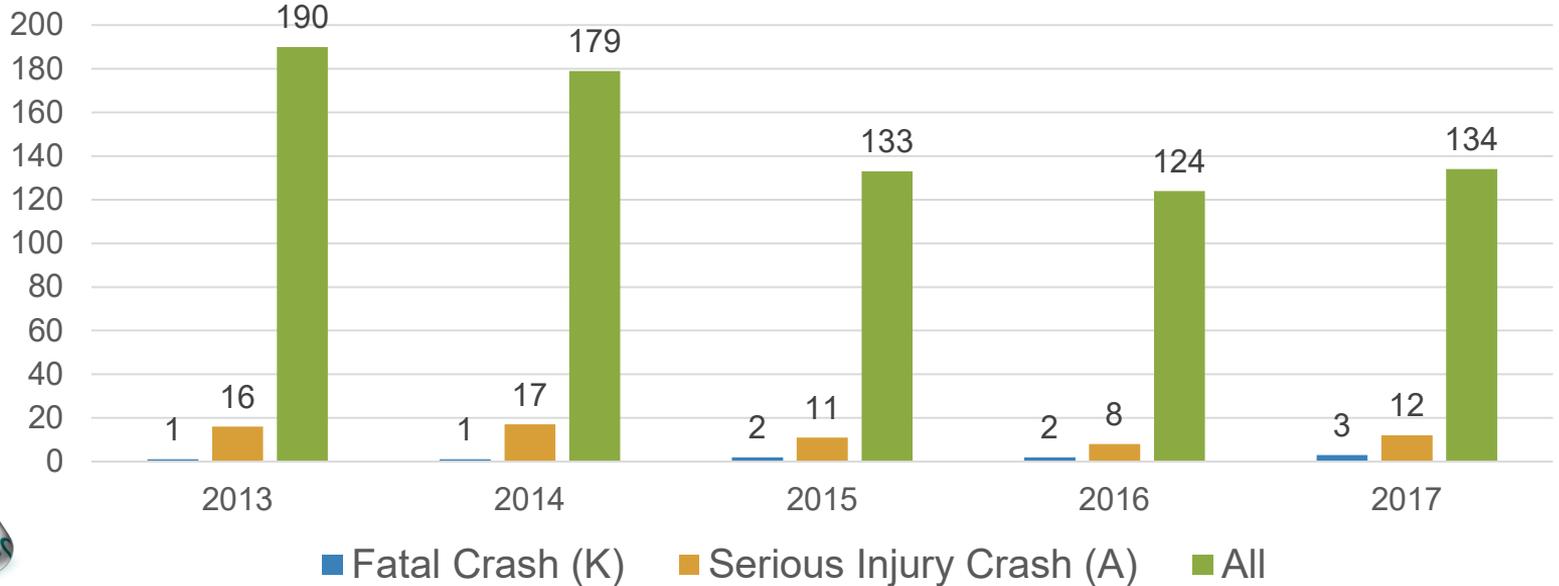
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Pedestrian Crashes by Year



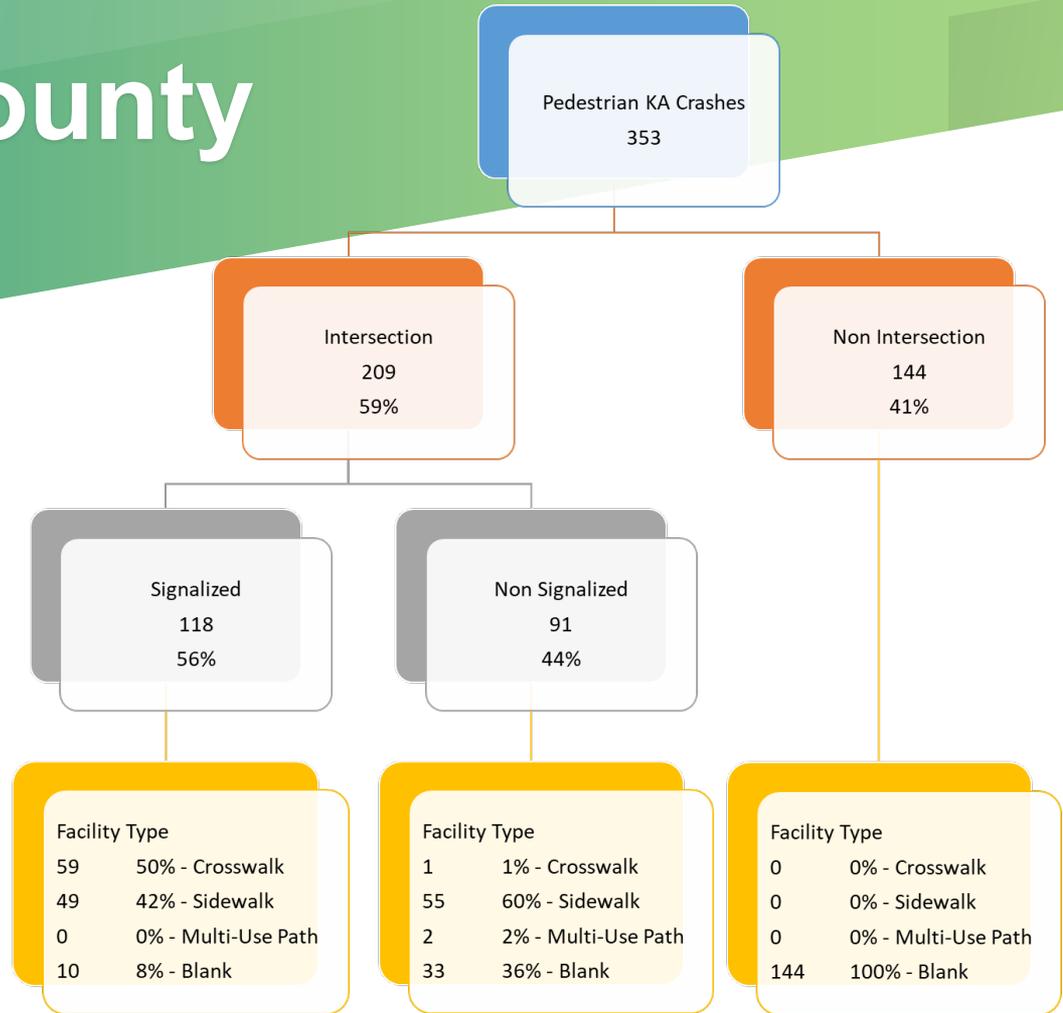
Jefferson County Vision Zero

Bicycle Crashes by Year



Jefferson County Vision Zero

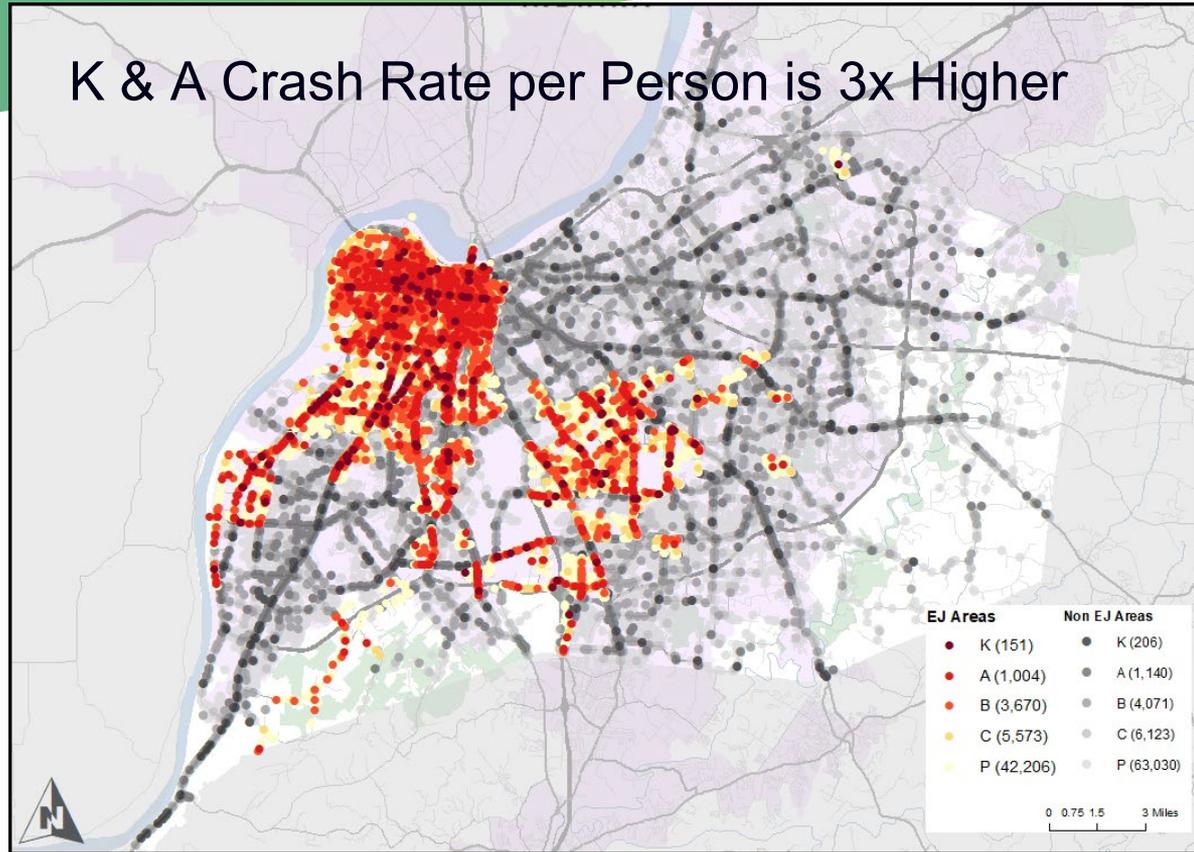
- Crash Trees
- Help Identify Risk Factors



Jefferson County Vision Zero

	EJ Crashes	Crash Rate per Population (x1000)	Non EJ Crashes	Crash Rate per Population (x1000)
K	151	0.71	206	0.27
A	1,004	4.71	1,140	1.51
B	3,670	17.22	4,071	5.39
C	5,573	26.16	6,123	8.10
P	42,206	198.09	63,030	83.39
ALL	52,604	246.89	74,570	98.66

K & A Crash Rate per Person is 3x Higher



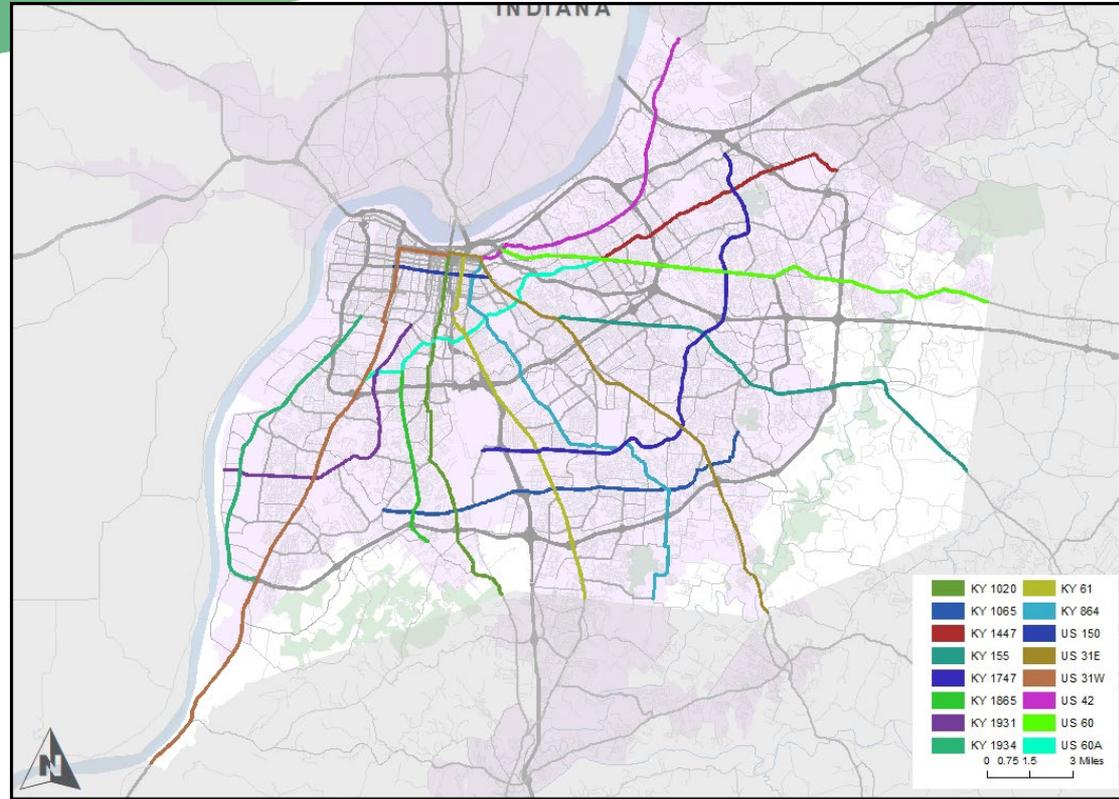
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53% (1,320) of KA crashes occur on 16 routes

US 31W - 229 (9%) KA

US 31E - 117 (5%) KA

KY 1934 - 107 (4%) KA



Jefferson County Vision Zero

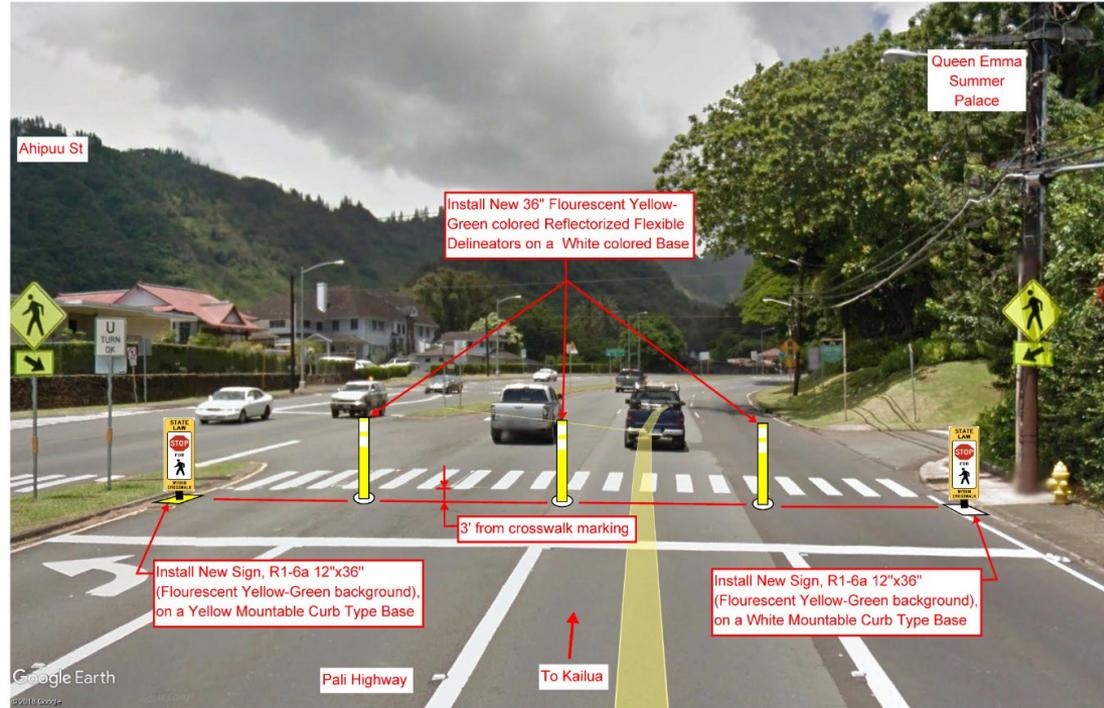
Identifies
Emphasis
Areas

		Crashes		Serious Injury (A)		Fatal		KY SHSP (2014) % of Fatal
		Number	% of Total	Number	% of Serious Crashes	Number	% of Fatal Total	
	Jefferson County Total	127,174		2,144		357		
Behavior Modifications	Aggressive Driving	35,208	28%	778	36%	103	29%	32%
	Distracted Driving	59,535	47%	700	33%	66	18%	25%
	Impaired Driving	4,092	3%	222	10%	67	19%	21%
Design and Operations	Intersections	80,157	63%	1,394	65%	195	55%	18%
	Roadway Departures	4,670	4%	168	8%	48	13%	67%
System Management	Commercial Motor Vehicle	2,989	2%	49	2%	26	7%	10%
Vulnerable Roadway Users	High-Risk Drivers	38,056	30%	595	28%	94	26%	33%
	Motorcycles	1,275	1%	215	10%	65	18%	12%
	Non-Motorized Users	2,633	2%	324	15%	102	29%	10%
Other Potential Emphasis Areas	Environmental Justice Areas	52,604	41%	1,004	47%	151	42%	---
	PM Peak Period	34,573	27%	465	22%	44	12%	---
	Dark (No Lighting)	7,968	6%	225	10%	102	29%	---
	Specific Corridors / Areas	--	--	--	--	--	--	--



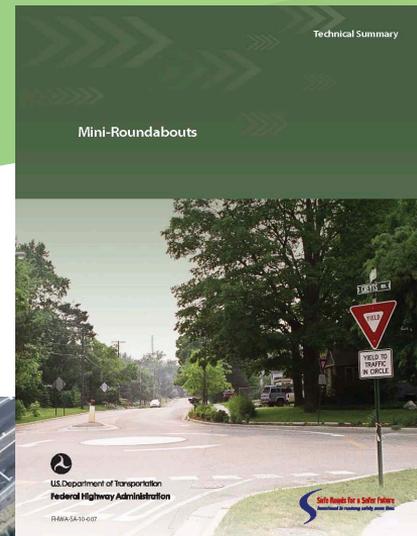
Potential Countermeasures

Gateway Crosswalks



Potential Countermeasures

Mini-Roundabouts



Potential Countermeasures

- R-Cut
Intersections



Knox County US25E



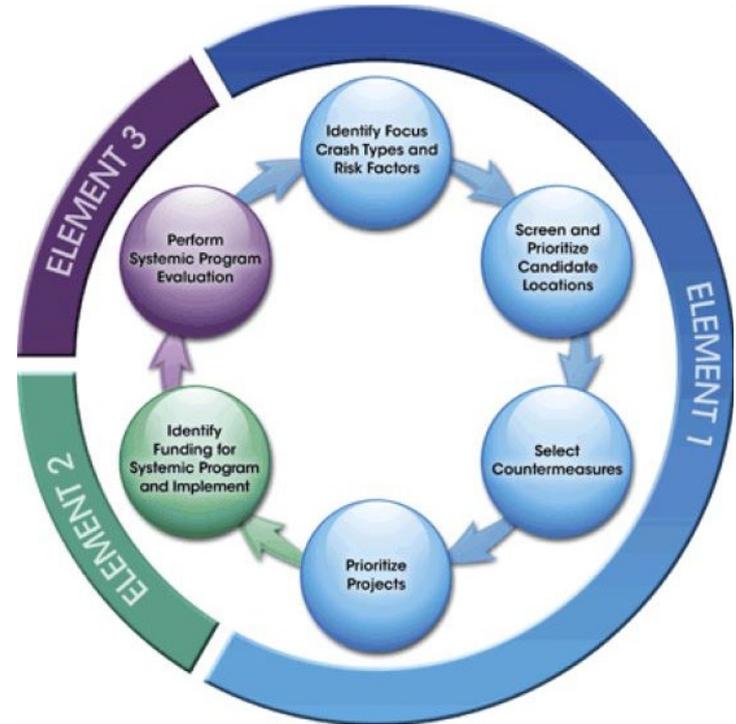
Systemic Approach to Safety

- Systemic Approach
 - Focus on Risk Factors
 - Predicts Likely Locations
 - Effective for Vulnerable Users
(Bicycles, Motorcycles, Pedestrians)



Systemic Approach to Safety

- Element 1 – Select Locations and Countermeasures
- Element 2 – Achieve Balance between Traditional and Systemic Approaches
- Element 3 – Evaluate Effectiveness of Systemic Approach



Intersection Elements

- Traffic Control (signal, stop, none, etc.)
- Speed
- Divided
- Bus Stops
- Retail Area



Intersection Elements

- Traffic Volume
- Skew
- Number of Lanes
- Lane Widths
- Turn Lanes



Potential Countermeasures

Systemic

- Retroreflective Backplates
- Lighting
- Signing
- Striping
- Signal Revisions



Funding Initiatives

Funding Area Goals

- Intersections (\$18M)
- Non-Motorized (\$6M)
- Roadway Departures (\$4.5M)
- Other (\$1.5M)

	\$30-40 Million	K+A	K	A	Expenditure Goal
Intersections	- 64%	55%	65%	60%	→ \$18M
Non-motorized	- 17%	29%	15%	20%	→ \$6M
Roadway Departure	- 13%	20%	12%	15%	→ \$4.5M
Other				5%	→ \$1.5M

Category	Expenditure Goal
RD	\$4.5-5.0M
Reactive RD Corridors	\$3.5-4.0M
Enhanced Striping	
Signage	
Runoff Strips	
Ditching & Shoulders	
Pipe Extensions	
Clear Zone	
HFS	\$0.5-1.0M

Category	Expenditure Goal
Intersections	\$24-30M
RCUTs (stand-alone locations)	\$20-30M
Address Previously Warranted Signals (not at all cost)	
Mini-Roundabouts	\$80-\$5.0M
Positive Offset Left Turn Lanes/Adding Turn Lanes	\$20-30M
Systemic Corridors (based on Intersection Counts)	\$10-70M
Retroreflective Backplates	
Improved Striping/Marking	
Ensure MUTCD compliant signing	
Narrowing of Lane Widths (traffic calming)	
Lighting	\$4.0-\$5.0M
specific intersections	
intersection corridors	
Reactive Corridors (deploy primarily low cost early)	\$80-70M
(could have down stream consistent do further study)	
Improved Striping/Marking	
Signage	
Backplates	
Higher cost solutions (down stream corridors)	
to RCUT Corridors	
(a couple 3 corridors)	
Consider prioritizing two lists	
1) All intersections/corridors at a time	
2) ES and intersection/corridors only	

Category	Expenditure Goal
Non-motorized	\$6.0-8.0M
Road Diets	
combination of two solutions:	
1) safety zone used to convert	\$15-20M
2) prepare striping plan & implement with next resurfacing project	
LPIs (no cost to implement)	
Left Lane Striping/Green Conflict Point	\$05-10M
Reactive/Hot Spot List (mainly red crashes)	\$10-15M
Tier 1 - Enhanced Crosswalk Markings/Signage	
Tier 2 - Raised Crosswalk (acts like a speed bump too)	
Tier 3 - Rapid Flashing Beacons/Mid-block/HAWK	
Urban Bulb-outs	\$15-\$20M
to primarily along stream of parking	
Sidewalks	\$15-20M
Lighting (primarily lighting communities)	

Category	Expenditure Goal
Other	\$1.5M
Converting One-lanes to Two-lanes	
Installing Cameras to collect data concerning Red Light Running	



Jefferson County Vision Zero

		Crashes		Serious Injury (A)		Fatal		KY SHSP (2014) % of Fatal
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Funding Initiatives

Funding Area Goals

■ Intersections (\$18M)	64% K+A	60% Funding
■ Non-Motorized (\$ 6M)	17% K+A	20% Funding
■ Roadway Departures (\$4.5M)	13% K+A	15% Funding
■ Other (\$1.5M)	6% K+A	5% Funding



Funding Initiatives

Intersections

- R-Cuts \$2M
- Previously Unwarranted Signals (ex. Mini-Roundabouts) \$4M
- Offset or Add Turn Lanes \$2M
- Systemic Corridors \$6M
- Lighting \$4M
- Reactive Corridors and Locations \$6M



Intersections - \$24-30M

- RCTs (stand-alone locations) - \$2.0-3.0M
- * □ Address Previously Warranted Signals (potential no-cost)
 - Mini-Roundabouts - \$4.0-\$5.0M
- Positive Offset Left Turn Lanes / Adding Turn Lanes \$2.0-3.0M
- * □ Systemic Corridors (based on Intersection Crashes) - \$6.0-7.0M
 - Retroreflective Backplates
 - Improved Striping/Marking
 - Ensure MUTCD compliant signing
 - Narrowing of Lane Widths (traffic calming)
- * □ Lighting - \$4.0-\$5.0M
 - specific intersections
 - intersection corridors
- Reactive Corridors (deploy primarily low cost early) - \$6.0-7.0M
(could have downstream consultant do further study)
 - Improved Striping/Markings
 - Signing
 - Backplates
 - Higher cost solutions (downstream consultant)
 - ↳ RCT Corridors (2, maybe 3 corridors)

- * Consider producing two
 - 1) All intersections/cor
 - 2) EJ area intersections

Funding Initiatives

Non-Motorized

- Road Diets \$1.5M
- Bike Lane Striping/Green Conflict Points \$0.5M
- Reactive Hot Spots \$1M
- Curb Bulb-Outs \$1.5M
- Sidewalks \$1.5M
- Lighting
- Leading Pedestrian Indicators



- Non-motorized - \$6.0 - 8.0M
- * □ Road Diets
 - ↳ combination of two solutions:
 - 1) safety funds used to convert - \$1.5 - 2.0M
 - 2) prepare striping plans & implement with next resurface project
 - LPIs (no cost to implement)
 - Bike Lane Striping/Green Conflict Points - \$0.5 - 1.0M
 - * □ Reactive/Hot Spot List (mainly Ped crashes) - \$1.0 - 1.5M
 - Tier 1 - Enhanced Crosswalk Markings & Signing
 - Tier 2 - Raised Crosswalk (acts like a speed hump too)
 - Tier 3 - Rapid Flashing Beacons/Mid-block/HAWK
 - * □ Curb Bulb-outs - \$1.5 - \$2.0M
 - ↳ primarily along streets w/parking
 - * □ Sidewalks - \$1.5 - 2.0M
 - Lighting (primarily lighting crosswalks)
- P
• C
□ HFS

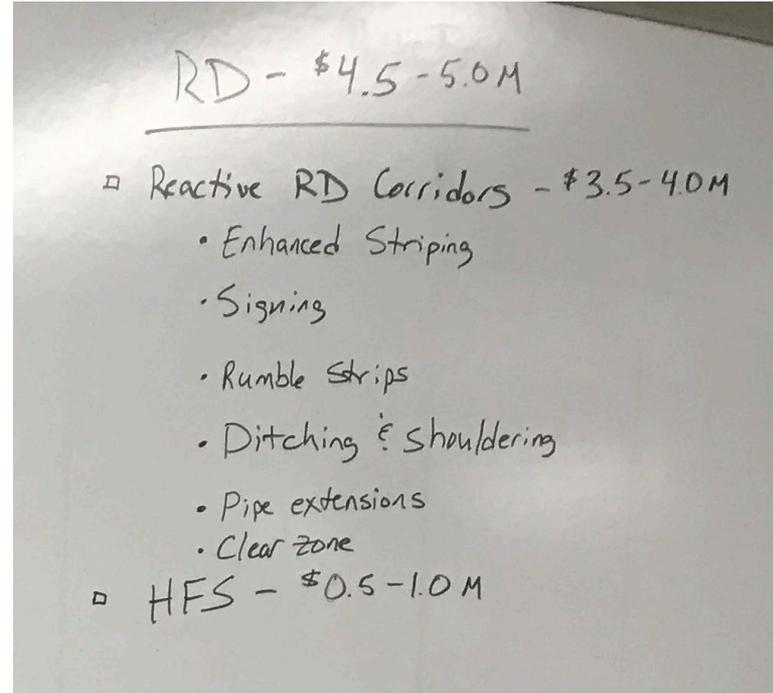
Funding Initiatives

■ Roadway Departures

- Reactive Corridors \$3.5M
- High Friction Surface \$0.5M

■ Other

- Converting One-Way to Two-Way
- Installing Cameras for Red Light Running Data Collection
- Lists of EJ Emphasis Areas



Questions?

