Jefferson County Vision Zero
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
How Many Highway Fatalities did KY Experience in 2018?

A. 724
B. 782
C. 834
How Many Highway Fatalities did Jefferson County Experience in 2018?

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

A. 63

B. 77

C. 94
How Many More Crashes Occur in Louisville in the PM Peak Than The AM Peak?

- 57%
- 144%
- 261%
How Many More Crashes Occur in Louisville in the PM Peak Than The AM Peak?

- 57%
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Fatality Trends

Jefferson County Roadway Fatalities
(Non-Interstate)

- **2006**: 18 Bicycle, 9 Pedestrian, 39 All Other Fatal
- **2007**: 2 Bicycle, 1 Pedestrian, 52 All Other Fatal
- **2008**: 3 Bicycle, 23 Pedestrian, 39 All Other Fatal
- **2009**: 7 Bicycle, 17 Pedestrian, 37 All Other Fatal
- **2010**: 2 Bicycle, 3 Pedestrian, 38 All Other Fatal
- **2011**: 16 Bicycle, 0 Pedestrian, 45 All Other Fatal
- **2012**: 8 Bicycle, 1 Pedestrian, 45 All Other Fatal
- **2013**: 13 Bicycle, 1 Pedestrian, 54 All Other Fatal
- **2014**: 18 Bicycle, 1 Pedestrian, 53 All Other Fatal
- **2015**: 17 Bicycle, 2 Pedestrian, 51 All Other Fatal
- **2016**: 23 Bicycle, 2 Pedestrian, 55 All Other Fatal
- **2017**: 26 Bicycle, 3 Pedestrian, 59 All Other Fatal
- **2018**: 23 Bicycle, 6 Pedestrian, 34 All Other Fatal

Categories:
- Bicycle
- Pedestrian
- All Other Fatal
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
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
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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
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Paradigm Shift:
- Let’s not focus on eliminating crashes
- Let’s focus on eliminating fatalities and serious injuries
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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:

- 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.

The Swiss Cheese Model was originally put forward by Dante Orlandella and James T. Reason of the University of Manchester.
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“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
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- 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
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Kentucky Strategic Highway Safety Plan

The Four E’s
- Engineering
- Enforcement
- Education
- Emergency Services
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- Kentucky Strategic Highway Safety Plan
  - Emphasis Areas
    - Roadway Departures
    - Intersections
  - Framework for HSIP Initiatives
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Why a Separate Louisville Safety Plan?

Louisville is Different than Kentucky

Crash Types

- More Peds and Bicycles
- More Intersections
- Less Roadway Departures
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The study includes:

- KTC GIS Data
- KIPDA GIS Data
- Metro/KIPDA Traffic Data
- HIS Traffic Data
- Metro Bicycle Facilities
- Transit and School Facilities
- Metro Signalized Intersections
- Speed Data
- HIS Roadway Data
- KSP Crash Data

Study Crash Database

Metro/KIPDA Traffic Data

KTC GIS Data

KIPDA GIS Data

HIS Traffic Data

Metro Bicycle Facilities

Transit and School Facilities

Metro Signalized Intersections

Speed Data

HIS Roadway Data

KSP Crash Data
KABCP Definitions

- **K** = Fatal crash (**Killed**)
- **A** = Suspected Serious Injury crash (**Ambulance**)
- **B** = Suspected Minor Injury crash (**Bruised/Bloody**)
- **C** = Possible Injury (**Complaining**)
- **P** = Property Damage Only crash
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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:

<table>
<thead>
<tr>
<th>Severity</th>
<th>Crashes</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>K</td>
<td>357</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>A</td>
<td>2,144</td>
<td>2%</td>
</tr>
<tr>
<td>B</td>
<td>7,741</td>
<td>6%</td>
</tr>
<tr>
<td>C</td>
<td>11,696</td>
<td>9%</td>
</tr>
<tr>
<td>P</td>
<td>105,236</td>
<td>83%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>127,174</strong></td>
<td><strong>83%</strong></td>
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127,174 Crashes
Jefferson County Vision Zero

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$ 7.95 Billion
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- 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
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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)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal Crash (K)</th>
<th>Serious Injury Crash (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>68</td>
<td>425</td>
</tr>
<tr>
<td>2014</td>
<td>62</td>
<td>454</td>
</tr>
<tr>
<td>2015</td>
<td>69</td>
<td>435</td>
</tr>
<tr>
<td>2016</td>
<td>75</td>
<td>427</td>
</tr>
<tr>
<td>2017</td>
<td>83</td>
<td>403</td>
</tr>
</tbody>
</table>
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K and A Time of Day

Crashes Time of Day

- Fatal Crashes (K)
- Serious Injury Crashes (A)
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Restraint Used in Crashes

- Killed: 45%
- Incapacitating Injury: 76%
- Non-Incapacitating Injury: 87%
- Possible Injury: 90%
- Not Injury: 95%
- Unknown: 94%

% Restraint Used
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- Impaired Crashes
  - 19% of Fatals
  - 46% of Impaired KA

Crashes between 10:00 PM and 5:00 AM

2013: 12 Fatal, 15 Serious
2014: 44 Fatal, 15 Serious
2015: 52 Fatal, 14 Serious
2016: 39 Fatal, 11 Serious
2017: 28 Fatal, 15 Serious
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Intersections
5 or More KA Crashes
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- Motorcycles
- 65 Fatals
- 215 Serious Injuries
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- Non-Motorized
- 102 Fatals
- 29% of Fatals
- 10% Statewide
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Pedestrian Crashes by Year

- **Fatal Crash (K)**
- **Serious Injury Crash (A)**
- **All Severity Crashes**

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal Crash (K)</th>
<th>Serious Injury Crash (A)</th>
<th>All Severity Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>12</td>
<td>38</td>
<td>365</td>
</tr>
<tr>
<td>2014</td>
<td>17</td>
<td>52</td>
<td>375</td>
</tr>
<tr>
<td>2015</td>
<td>17</td>
<td>53</td>
<td>372</td>
</tr>
<tr>
<td>2016</td>
<td>22</td>
<td>58</td>
<td>394</td>
</tr>
<tr>
<td>2017</td>
<td>25</td>
<td>59</td>
<td>371</td>
</tr>
</tbody>
</table>
Jefferson County
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Bicycle Crashes by Year

- 2013: 190 crashes (1 Fatal, 16 Serious Injury, 1 All)
- 2014: 179 crashes (1 Fatal, 17 Serious Injury, 1 All)
- 2015: 133 crashes (2 Fatal, 11 Serious Injury, 1 All)
- 2016: 124 crashes (2 Fatal, 8 Serious Injury, 1 All)
- 2017: 134 crashes (3 Fatal, 12 Serious Injury, 1 All)

Legend:
- Blue: Fatal Crash (K)
- Orange: Serious Injury Crash (A)
- Green: All
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- Crash Trees
- Help Identify Risk Factors

Pedestrian KA Crashes 353

Intersection 209 59%
Non Intersection 144 41%

Signalized 118 56%
Non Signalized 91 44%

Facility Type
59 50% - Crosswalk
49 42% - Sidewalk
0 0% - Multi-Use Path
10 8% - Blank

Facility Type
1 1% - Crosswalk
55 60% - Sidewalk
2 2% - Multi-Use Path
33 36% - Blank

Facility Type
0 0% - Crosswalk
0 0% - Sidewalk
0 0% - Multi-Use Path
144 100% - Blank
<table>
<thead>
<tr>
<th>EJ Crashes</th>
<th>Crash Rate per Population (x1000)</th>
<th>Non EJ Crashes</th>
<th>Crash Rate per Population (x1000)</th>
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<tbody>
<tr>
<td>K</td>
<td>151</td>
<td>206</td>
<td>0.71</td>
</tr>
<tr>
<td>A</td>
<td>1,004</td>
<td>1,140</td>
<td>4.71</td>
</tr>
<tr>
<td>B</td>
<td>3,670</td>
<td>4,071</td>
<td>17.22</td>
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<tr>
<td>C</td>
<td>5,573</td>
<td>6,123</td>
<td>26.16</td>
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<td>P</td>
<td>42,206</td>
<td>63,030</td>
<td>198.09</td>
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<tr>
<td>ALL</td>
<td>52,604</td>
<td>74,570</td>
<td>246.89</td>
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</table>

**K & A Crash Rate per Person is 3x Higher**
Jefferson County Vision Zero

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

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

<table>
<thead>
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<th>Behaviors</th>
<th>% of Fatal</th>
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<td>42%</td>
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*Percentage data calculated based on total crashes, serious injuries, and fatalities.*
Potential Countermeasures

- Gateway Crosswalks

Install New Sign, R1-6a 12"x36" (Flourescent Yellow-Green background) on a Yellow Mountable Curb Type Base

Install New Sign, R1-6a 12"x36" (Flourescent Yellow-Green background) on a White Mountable Curb Type Base

3' from crosswalk marking
Potential Countermeasures

Mini-Roundabouts
Potential Countermeasures

- R-Cut Intersections
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)
Jefferson County Vision Zero

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Jefferson County Total 127,174 2,144 357
## Funding Area Goals

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<th>Category</th>
<th>K+A Percentage</th>
<th>Funding Percentage</th>
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<tr>
<td>Intersections ($18M)</td>
<td>64%</td>
<td>60%</td>
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<tr>
<td>Non-Motorized ($6M)</td>
<td>17%</td>
<td>20%</td>
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<td>Roadway Departures ($4.5M)</td>
<td>13%</td>
<td>15%</td>
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<td>6%</td>
<td>5%</td>
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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
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
- Road Diets
  - $6.0-8.0M
  - Combination of two solutions:
    1. Safety funds used to convert - $1.5-2.0M
    2. Prepare striping plans & implement with next resurfacing project
- LPIs (no cost to implement)

Reactive Hot Spots
- $0.5-1.0M
- Reactive/Hot Spot List (mainly Ped crashes)
  - Tier 1: Enhanced Crosswalk Markings/Signage
  - Tier 2: Raised Crosswalk (acts like a speed bump 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)
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

- Reactive RD Corridors - $3.5-4.0M
  - Enhanced Striping
  - Signing
  - Rumble Strips
  - Ditching & Shouldering
  - Pipe extensions
  - Clear Zone

- HFS - $0.5-1.0M
Questions?