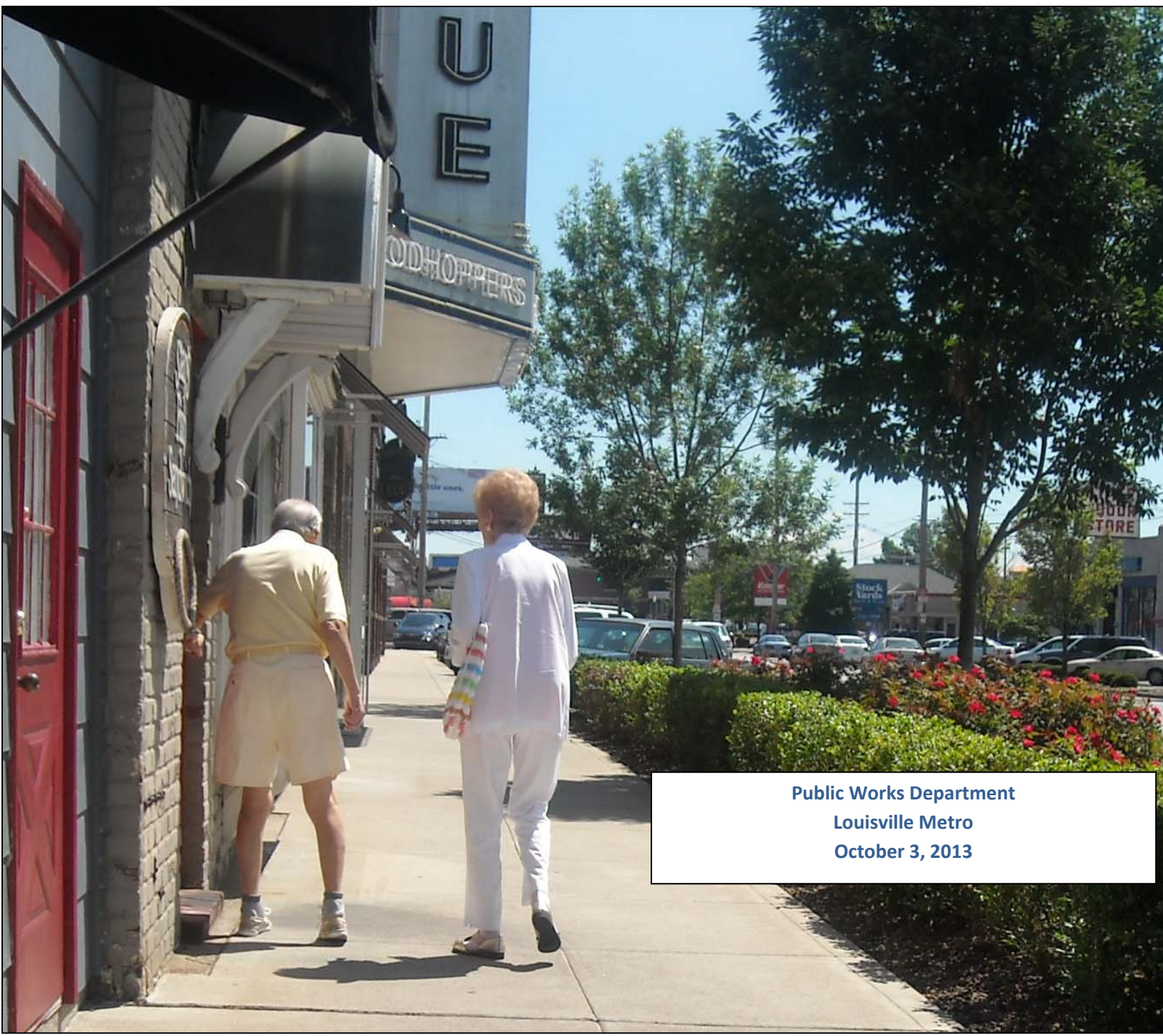
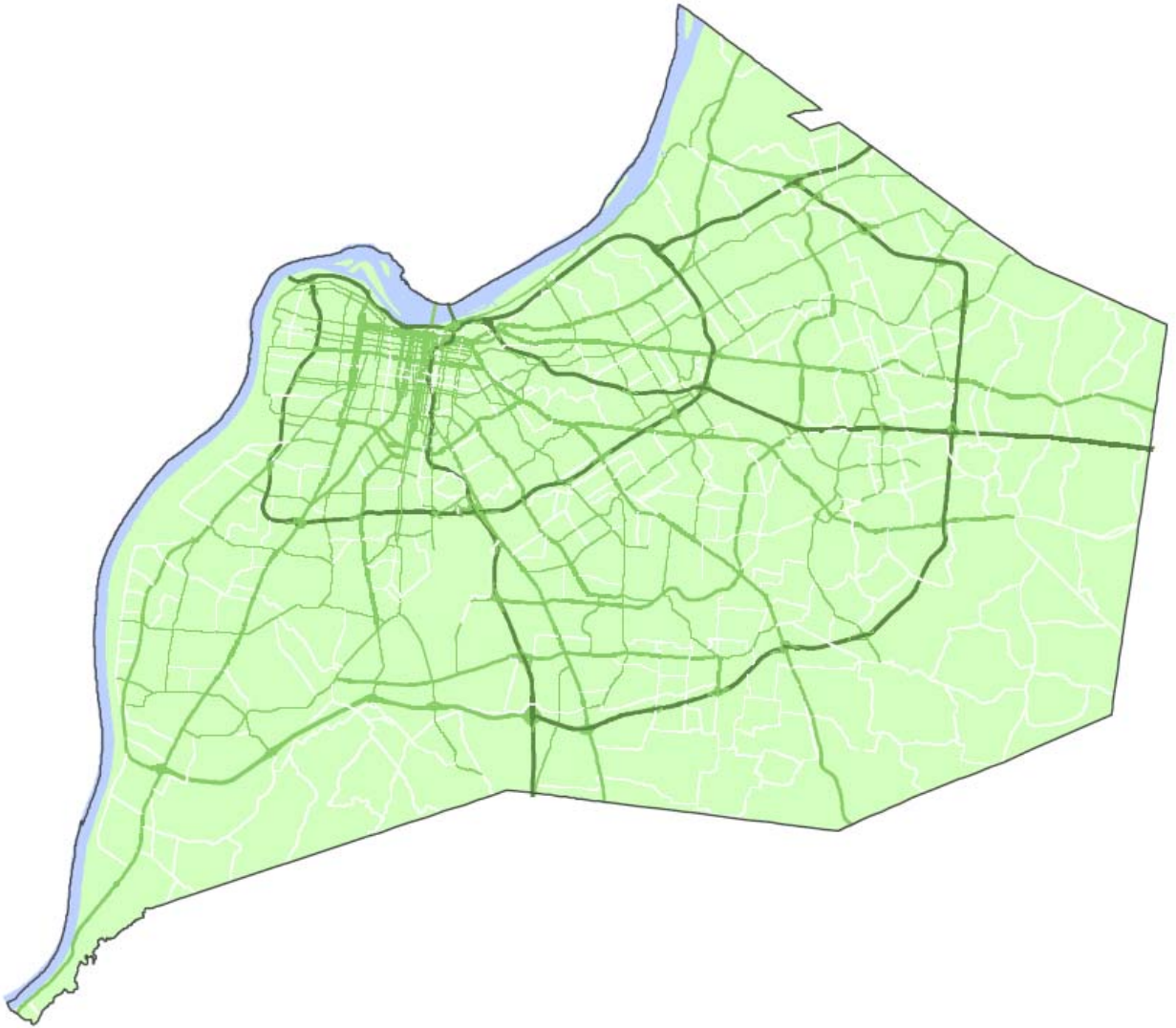


# Understanding Pedestrian Crashes in Louisville, KY 2006 – 2010



Public Works Department  
Louisville Metro  
October 3, 2013



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## EXECUTIVE SUMMARY

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The 2010 Louisville Pedestrian Master Plan has two primary goals: (1) to improve and expand current pedestrian deficiencies – by preparing a capital improvement process that enables Louisville to increase that pedestrian facility network through retrofitting and expanding current deficient sidewalk and pedestrian crossing locations between 2010 and 2030, and (2) to simultaneously reduce the rate of pedestrian crashes between 2010 and 2030. The findings in this report should be used to inform and influence the design of new pedestrian facilities, the redesign of existing roadways, the development of education programs and enforcement campaigns for pedestrians and motorists.

Overall traffic crashes; 2006 – 2010:	Accidents involving pedestrians; 2006 – 2010:
<ul style="list-style-type: none"> <li>➤ 2009 was the safest year on record in Louisville since 1993 with just 57 fatalities.</li> <li>➤ Traffic fatalities in 2005 were the highest since 1994 at 102.</li> <li>➤ Compared to peer cities with comparable populations, Louisville’s traffic fatality rate is only less than Oklahoma City’s in 2010.</li> <li>➤ 40% of arterial roadway fatalities occurred when vehicles were speeding.</li> <li>➤ 64% of fatalities occurred on roads with 35 mph limits.</li> <li>➤ Traffic crashes cost Louisville’s economy \$462.6 million annually.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Louisville recorded an average of 16 pedestrian fatalities a year over the 5-year period.</li> <li>➤ The Kentucky State Police database reports 2,018 crashes involving pedestrians over the 5-year period.</li> <li>➤ Left turning pedestrian crashes outnumbered right turning crashes 2.5 to 1.</li> <li>➤ 40% of pedestrian crashes and 75% of pedestrian fatalities took place outside of daylight conditions.</li> <li>➤ Serious pedestrian crashes involving unsafe speeds are twice as deadly as other such crashes.</li> </ul>

### Key Findings from 2006-2010:

#### *When crashes occur:*

- An average of 404 pedestrian-motorist crashes occurs annually in Louisville.
- Crashes are most prevalent in October (201 crashes), from Friday to Saturday (836 crashes) and during afternoon peak period from 3:00-6:00 p.m. (428 crashes).
- Crashes mostly occur when the road surface is dry (82.1 percent).

*Who is involved:*

- Pedestrian age is tracked for 2006-2010 data. The cohort aged 41-64 was the most prevalent – involved in 31.7 percent of crashes.

*Injuries and fatalities:*

- Pedestrians sustained an injury in 89.8 percent of crashes.
- There were 82 pedestrian fatalities from 2006-2010. The majority of fatalities occurred in 2008.

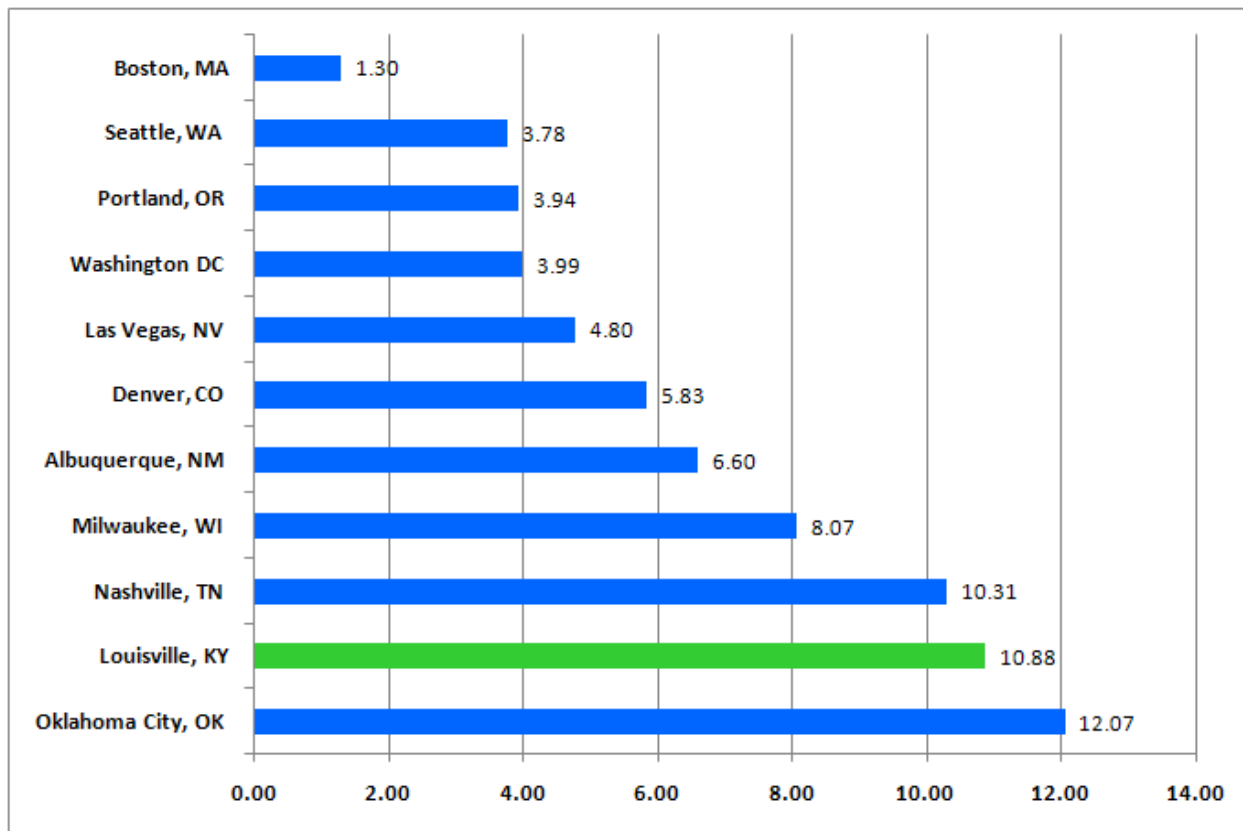
*Causes of crashes:*

- Most common pre-crash maneuver for motorist in 2006-2010 were vehicle going straight (54.2 percent), vehicle making a left turn (19.9 percent), vehicle making a right turn (8.0 percent), backing (3.9 percent) and vehicle starting in traffic (1.9 percent).
- Most common pedestrian conditions were darting into road (13.6 percent), walking in roadway (12.9 percent), crossing with signal (10 percent), not at intersection (9.2 percent) and in crosswalk (9.1 percent).
- Most common motorist conditions were inattention (22.1 percent), failed to yield right of way (8.8 percent), alcohol involvement (2.1 percent) and disregard traffic control (1.8 percent). There was no factor detected 47.1 percent of the time.

*Where crashes are occurring:*

- Crashes occur in all areas of Louisville, although there is a clear concentration within the Central Business District (CBD) and along principal arterials with high volumes of motor vehicles.
- The majority of crashes occur on local streets while the majority of fatalities occur on state streets.
- There is an even split between crashes occurring in intersections verse non-intersections.

## Louisville vs. US Peer Cities 2010



Fatalities per 100,000 Population (2010 data<sup>1,2</sup>)

Compared to peer cities with comparable populations, Louisville's traffic fatality rate is only less than Oklahoma City's.

### Summary

The analysis of pedestrian-motorist crashes found that crashes are complex events and there is no one factor that is contributing to crashes. However, four primary conclusions emerge from the data:

1. Most crashes occur on Local Streets.
2. Motorist are not seeing or yielding to pedestrians.
3. Pedestrians are darting or walking into roadway.
4. Motorist or pedestrian inattention.

<sup>1</sup> <http://2010.census.gov/2010census/popmap/>

<sup>2</sup> "Did You Know??" FARS Encyclopedia. Web. 18 July 2013. <<http://www-fars.nhtsa.dot.gov/>>.

## Recommendations

The recommendations aim to:

### *Education*

- Promote walking to school safely at a young age.
- Increase pedestrian and driver education.
- Provide Safe Streets for Seniors presentations at senior centers located near high-risk corridors and major arterial streets.
- Generate awareness about the dangers of texting and using cell phones while driving.
- Develop and implement a safety campaign aimed in part at pedestrians who are looking at their devices instead of where they're going.

### *Encouragement*

- Develop and implement a voluntary good driver program, allowing residents to set examples as good drivers.
- Distribute and encourage the use of reflectors to make pedestrians more visible, and lower the night time death and injury rate.

### *Enforcement*

- Step up enforcement of driver violations involving talking or texting on cell phones.
- Expand DUI enforcement crackdown to high pedestrian crash corridors.
- Introduce ticketing through a three-stage process, to first educate, then warn, then ticket drivers and pedestrians.

### *Engineering*

- Develop and implement intersection design policies for high pedestrian crash locations
- Develop and implement a Lead Pedestrian Interval policy based upon pedestrian volumes as well as turning movement volumes.
- Conduct pedestrian road safety audits at high crash intersections and corridors.

### *Evaluation*

- Analyze pedestrian automated counts.
- Evaluate pedestrian crash data.
- Create priority lists for improved facilities.

## Chapter 1 – Introduction

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### PURPOSE

Of all the fatalities occurring on Metro roadways, 23% are pedestrian fatalities. That is why Louisville has conducted a 5-year pedestrian crash analysis to identify trends, high risk populations and high crash locations to target efforts to reduce pedestrian injuries and fatalities.

**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.



The 2010 Louisville Pedestrian Master Plan has the goals of (1) to improve and expand current pedestrian deficiencies – by preparing a capital improvement process that enables Louisville to increase the pedestrian facility network through retrofitting and expanding current deficient sidewalk and pedestrian crossing locations between 2010 and 2030, and (2) to simultaneously reduce the rate of pedestrian crashes between 2010 and 2030. These goals

outline the steps Louisville will take in several areas to achieve the Vision.

### USING THIS REPORT

Because this is the first comprehensive crash analysis conducted by Louisville Metro, the data are presented in a comprehensive manner – thoroughly educating readers about crash data sources, the findings of the analysis and most importantly, how the data can inform countermeasures.

The report begins by providing crash data and reporting in Chapter 2. Chapter 3 discusses the approach and methodology used for this analysis. Chapter 4 is the results section – covering when, why and where crashes are occurring. Chapter 5 closes with a discussion about approaches to improve pedestrian safety and utilize the results to implement countermeasures. The Appendix includes supplemental data, a comparison of peer cities, additional maps, crash rates and corridor analysis.

Planners and engineers should refer to this document when designing new facilities to ensure pedestrian comfort is prioritized and prevalent crash types are considered in the design. Those educating road users should incorporate the findings into curriculum, safety campaigns and other media. Policy makers and enforcement officers should use the findings to affect behavior change that engineering or education cannot efficiently address. And lastly, Public Works staff can reference this report to determine methods for continued crash reporting and efficient evaluation of safety measures.



## Chapter 2 – Understanding the Data

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### HOW IS A CRASH REPORTED?

A traffic crash is an unfortunate and complex event. There are often multiple contributing factors, multiple parties involved and several layers of interpretation and reporting. In Kentucky, if a police officer is not immediately called to the scene, involved parties have up to ten days to notify authorities.<sup>3</sup>

Once a police officer collects the necessary information, he or she completes a Kentucky State Police accident report. Location, time, personal information, weather, roadway conditions, roadway surface, road character and other attributes are recorded using a standardized coding system. To supplement the codes, a crash narrative and diagram are also completed as part of the report.<sup>4</sup>

The Louisville Metro Public Works Department receives copies of accident reports from the Louisville Metro Police Department upon request. The reports are used to better understand the crash data and improve public outreach. Select information documented by Public Works and the crash reports are then destroyed.

### UNREPORTED CRASHES

This report examines data from *reported* traffic crashes. Crashes of all types go unreported, but it is estimated that bicycle and pedestrian crashes are overrepresented among unreported crashes. Reasons for not reporting a crash may be that no party was injured, property damage

was marginal, and individuals fled the scene or were not aware that they are required to report a crash. Crashes are mandatory to report if there is injury or death as well as property damage of \$500 or more occurs.

A possible method for determining the number of unreported crashes is to examine the Close Call Form. The close call form is another tool we use to assess potential conflict points and the frequency of near misses at these locations. The form asks: At the time of the incident were you a bicyclist, pedestrian or motorist? Did you have a close call with a bicyclist, pedestrian or motorist? Please let us know where you had your close call, intersection or specific address or landmark. Please let us know what time of day this incident occurred. The form concludes with a space for more detail on the close call. This [form](#) offers another way to address issues before they result in a crash.

### ACCIDENT REPORTS & DEFINITIONS

On a crash report, an array of information is compiled by the police officer assigned to the case. A series of standardized codes are used to efficiently categorize crash attributes. While all codes help explain the cause(s) and circumstance(s) of a crash, the two codes of particular interest are contributing factor and pre-crash maneuver.

*Pre-crash maneuvers* describe the actions of each party just prior to the collision. Common pre-crash maneuvers are going straight ahead, making a left turn and making a right turn. While other crash attributes are useful in determining cause, it is primarily pre-crash maneuvers that allow for the determination of crash causes and crash typing.

### INTERPRETATION & ASSUMPTIONS

<sup>3</sup> "Accident Guide in Kentucky." *DMV.org*. Web. 11 June 2013.

<sup>4</sup> "Civilian Traffic Collision Report." *Kentucky State Police*. Commonwealth of Kentucky, n. d. Web. 11 June 2013.



While accident reports are the most reliable source of pedestrian-motorist crash information, only the information available from the Kentucky Collision Analysis for the Public database was used for these evaluations due to the number of pedestrian collisions. This website is developed and maintained by the Kentucky State Police to give the public the ability to analyze data related to collisions occurring in the state of Kentucky. This repository contains information gathered from collision reports submitted by Kentucky law enforcement agencies.

The integrity of the data is dependent upon both the accuracy and frequency with which the data is entered and user's interpretation.

All pedestrian crashes, including crashes on private property are included in these analyses.

### WHAT IS NOT CAPTURED IN THE DATA?

A number of attributes are not collected on accident reports or analyzed as part of this research.

*Pedestrian position prior to the crash* – While some reports describe the pedestrian's position in detail, reporting is not consistent and the information is not recorded by the Louisville Metro Police Department.

No effort was made to determine if the collision was "preventable." A preventable collision is one in which the driver failed to do everything that they reasonably could have done to avoid it.

### NOTES ABOUT TERMINOLOGY

The terms "accident" and "crash" are used in this report, although not interchangeably. In the discussion of traffic safety, "crash" is becoming the accepted term when describing a collision. According to the National Highway Traffic Safety Administration, "Continued use of the word accident promotes the concept that these events are outside of human influence or control."<sup>5</sup>



<sup>5</sup> Amsden, Michael and Thomas Huber. *Bicycle Crash Analysis for Wisconsin using a Crash Typing Tool (PBCAT) and Geographic Information System (GIS)*. Wisconsin Department of Transportation. June 30, 2006

## Chapter 3 – Approach & Methodology

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### APPROACH

To yield patterns of statistical and spatial significance, planning was done to determine an appropriate sample size of pedestrian crash records.



Motivation for a larger time period was selected to avoid the possibility of false readings. A San Francisco study on corridor level analysis of bicyclist and pedestrian crashes found that, “Basing decisions on individual intersections and single year is of limited efficacy and will yield substantial numbers of... false positives and false negatives.”<sup>6</sup> The same study recommends a three year period as it, “provides a good balance between changes in the intersections over time.” Although, it is noted that five years is better for intersections with a relatively low number of crashes.

Public Works selected a sample period of 5 years because little was understood about local pedestrian safety and there was a desire to gain a broad understanding of crashes in Louisville.

### METHODOLOGY

As outlined in Chapter 2, Public Works evaluated select crash attributes from the Kentucky Collision Analysis for the Public database. The primary attributes available for each crash are:

#### Context, environment & injuries

- Date
- Time
- Environmental Conditions
- Roadway Condition
- Weather Condition
- Road Surface
- Light Conditions
- Injury Severity/Fatalities
- Roadway Type

#### Pedestrian information

- Pedestrian Age
- Pedestrian Condition
- Pedestrian Factors

#### Motorist information

- Motorist Pre-Crash Maneuver
- Directions Analysis
- Motorist Condition



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<sup>6</sup> Ragland, David, et. al. *Strategies for Reducing Pedestrian and Bicyclist Injury at the Corridor Level*. UC Berkeley Safe Transportation Research & Education Center. July 2011.

## Chapter 4 – Results

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### OVERVIEW

The analysis of pedestrian-motorist crashes found that crashes are complex events and there is no one factor that is contributing to crashes. That said, four primary conclusions emerge from the data:

1. Most crashes are occurring on major arterials
2. Motorist are not seeing or yielding to pedestrians.
3. Pedestrians are darting or walking into roadway.
4. Motorist or pedestrian inattention is a growing concern.

This chapter provides support for these conclusions and highlights other prevalent crash attributes.

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Topics presented in the chapter are:

#### *Background*

- When crashes occur
- Environmental conditions
- Pedestrian age
- Pedestrian condition
- Driver condition

#### *Causes of Crashes*

- Pre-crash maneuver

#### *Roadway Type*

#### *Injuries and Costs*

- Injury severity
- Fatalities
- Cost of Crashes

#### *Where Crashes are Occurring*

### WHEN ARE CRASHES OCCURRING?

#### *By Year*

Between 2006 and 2010, there was an average of 404.4 pedestrian-motorist crashes per year. The peak occurred during 2010 with 429 crashes and the low was in 2006 with 371 crashes.

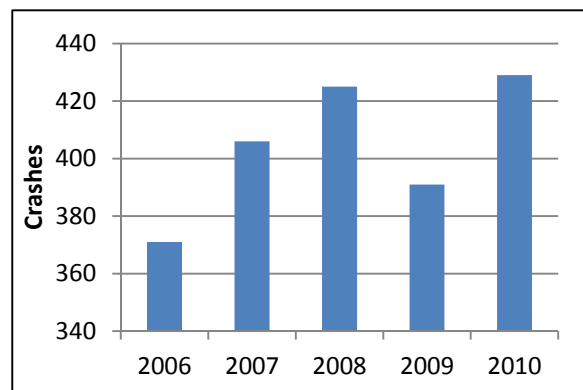


Figure 1 – Crashes by Year, 2006-2010

### By Month

Crashes are decrease in the winter and summer months then increase in the spring and fall. The most common month was October with 201 crashes and the least common was July with 139 crashes.

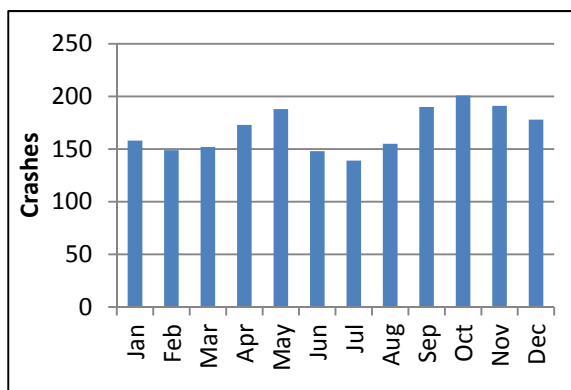


Figure 2 – Crashes by Month, 2006-2010

### By Day

Crashes are more prevalent on weekdays than weekends. The most common day is Friday with 358 crashes and the least common day is Sunday with 212 crashes. The lowest weekday is Tuesday with 261 crashes.

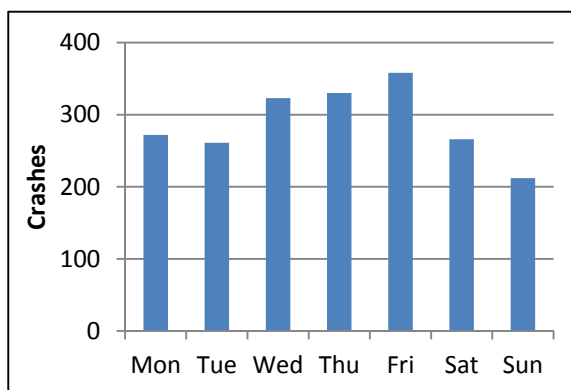


Figure 3 – Crashes by Day, 2006-2010

### By Time of Day

Most crashes occur during the afternoon peak period between 3:00-6:00 p.m. Crashes increase throughout the day, peak in the late afternoon and drop off into the evening. The lowest period of the day is from 3:00-6:00 a.m. These patterns adhere closely to pedestrian traffic patterns and traffic patterns for all modes in Louisville.

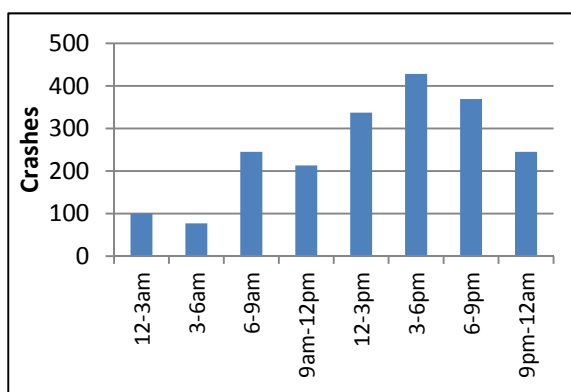


Figure 4 – Crashes by Time of Day, 2006-2010

## ENVIRONMENTAL CONDITIONS

### Road Condition

The road condition at the time of crashes was generally favorable. Conditions were dry 82.1 percent of the time and wet 16.3 percent of the time. Snow, slush and ice were present for 1.1 percent of the time.

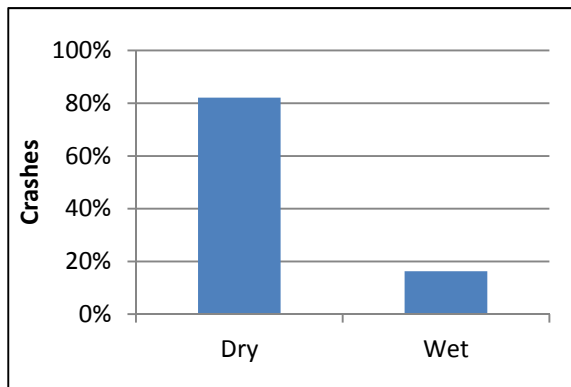


Figure 5 – Crashes by Road Condition, 2006-2010

### Light Condition

The light condition for crashes was generally favorable. Crashes occurred during daylight 59.9 percent of the time and dark-lighted roadway 22.8 percent of the time. Crashes occurred during dusk and dawn only 7.3 percent of the time.

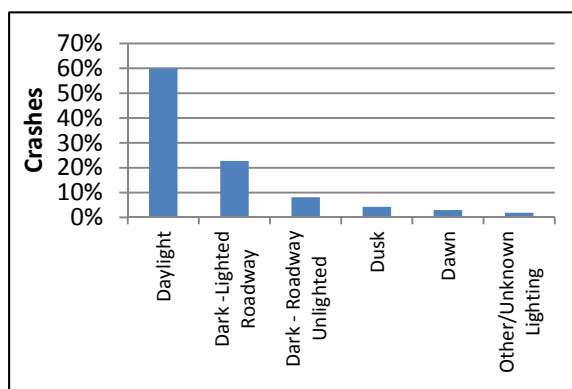


Figure 6 - Crashes by Light Condition, 2006-2010

## PEDESTRIAN AGE

Pedestrian age 51-64 is the most prevalent cohort representing 16.1% of pedestrians. The least common age groups were under 16 years of age.

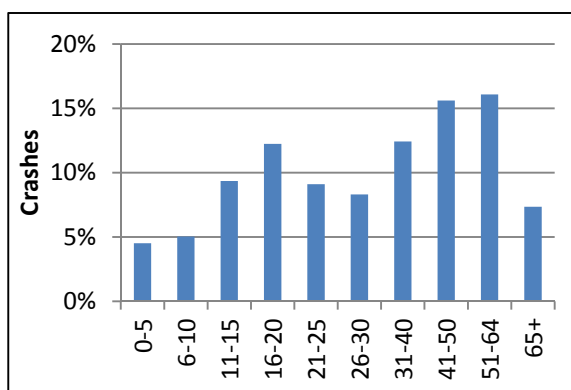


Figure 7 - Crashes by Pedestrian Age, 2006-2010

## PEDESTRIAN FACTORS

The top pedestrian factors for all crashes were darting into road (18.0 percent), walking in roadway (17.0 percent), crossing with signal (13.2 percent), not at intersection (12.2 percent) and in crosswalk (12.0 percent).

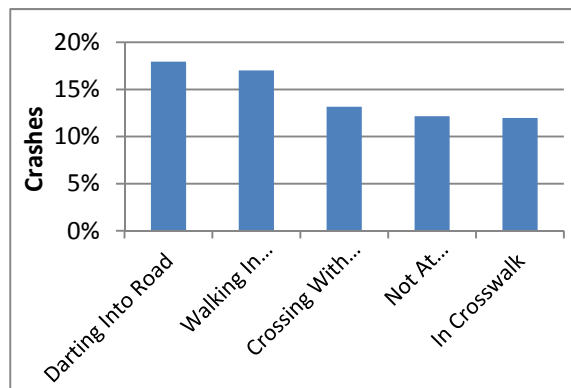


Figure 8 – Crashes by Pedestrian Condition, 2006-2010

## DRIVER CONDITION

### Top Motorist Condition

The top motorist factors for all crashes were inattention (22.1 percent), failed to yield right of way (8.8 percent), alcohol involvement (2.1 percent), distraction (1.9 percent), disregard traffic control (1.8 percent) and other (7.8 percent). No factor was provided 47.1 percent of the time.

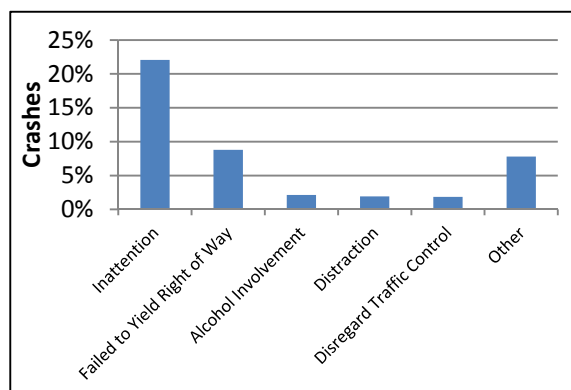


Figure 9 – Crashes by Motorist Condition, 2006-2010

### Top Motorist Condition – Intersection

The top motorist factors for crashes in intersection were inattention (26.5 percent), failed to yield right of way (14.2 percent), disregard traffic control (2.8 percent), distraction (2 percent) and other (6.2 percent). No factor was provided 38.7 percent of the time.

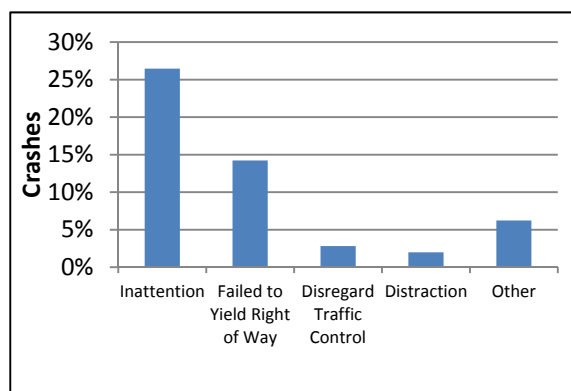


Figure 10 – Crashes by Motorist Condition in Intersection 2006-2010

**Top Motorist Condition – Non Intersection**

The top motorist factors for crashes not in intersection were inattention (17.8 percent), failed to yield right of way (3.5 percent), alcohol involvement (2.6 percent), distraction (1.8 percent), not under proper control (1.8 percent) and other (9.3 percent). No factor was detected 55.2 percent of the time.

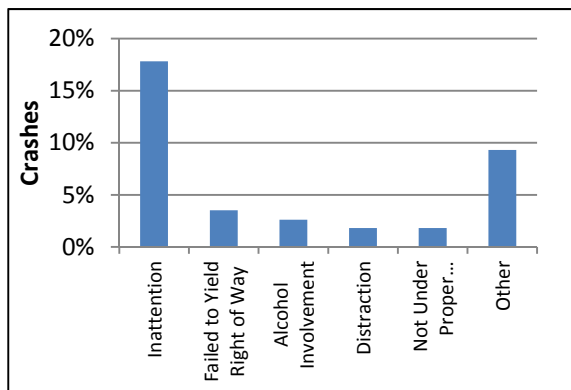


Figure 11 – Crashes by Motorist Condition not in Intersection 2006-2010

**WHAT IS CAUSING CRASHES?**

**Top Motorists Pre-Crash Maneuvers**

The top motorist pre-crash maneuvers were going straight ahead (54.2 percent), making left turn (19.9 percent), making right turn (8 percent), backing (3.9 percent), starting in traffic (1.9 percent) and unknown (2.9 percent).

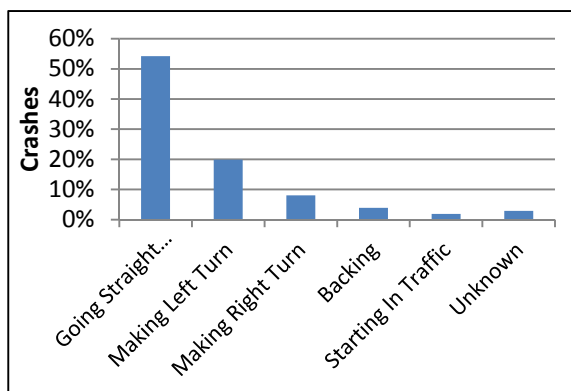


Figure 12 – Crashes by Motorist Pre-Crash Maneuvers 2006-2010

**Top Motorists Pre-Crash Maneuvers – Intersection**

The top motorist pre-crash maneuvers in an intersection were going straight ahead (39.3 percent), making left turn (32.5 percent), making right turn (13.6 percent), starting in traffic (2.5 percent) and unknown (3.2 percent).

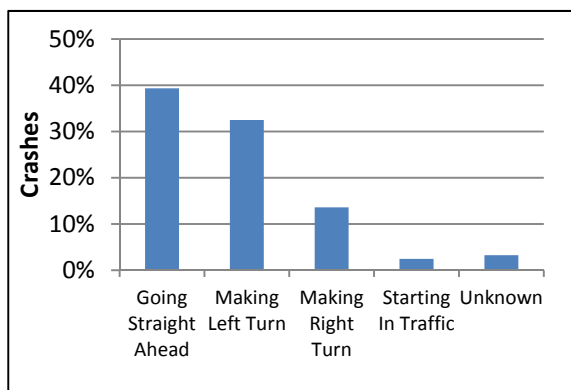


Figure 13 – Crashes by Motorist Pre-Crash Maneuvers in Intersection, 2006-2010



### Top Motorists Pre-Crash Maneuvers – Non Intersection

The top motorist pre-crash maneuvers not in an intersection were going straight ahead (67.7 percent), making left turn (8.5 percent), backing (6 percent), making right turn (3 percent) and unknown (2.6 percent).

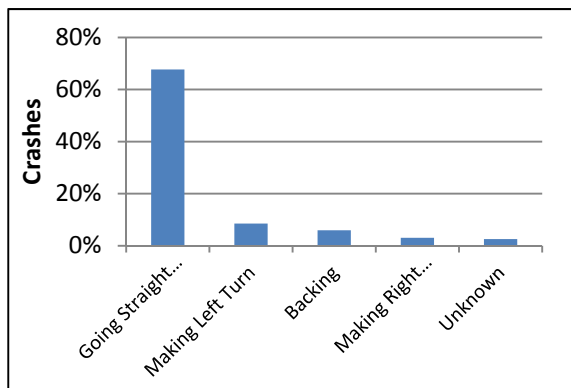


Figure 14 – Crashes by Motorist Pre-Crash Maneuvers not in Intersection, 2006-2010

### ROADWAY TYPE

Most crashes occurred on local streets with 793 crashes, or 40 percent of the time. The fewest crashes occurred on interstates with 35 crashes, or 1.8 percent of the time.

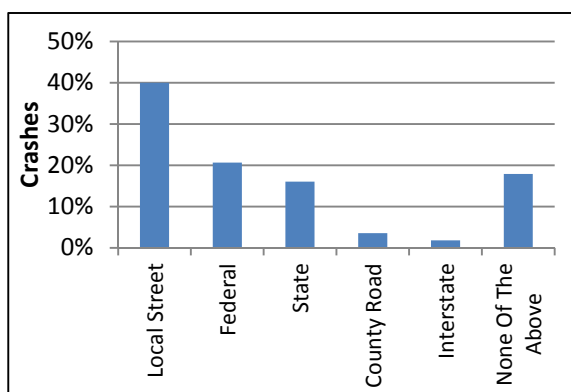


Figure 15 – Crashes by Roadway Type, 2006-2010

### INJURY SEVERITY/FATALITIES

#### Crash Severity

Detailed analysis of crash reports from 2006-2010 found that 89.8 percent of pedestrian crashes result in some level of injury. 37.1 percent of crashes resulted in possible injuries, 31.7 percent evident injuries, 16.2 percent disabling injuries and 0.7 percent of crashes were unknown injuries.

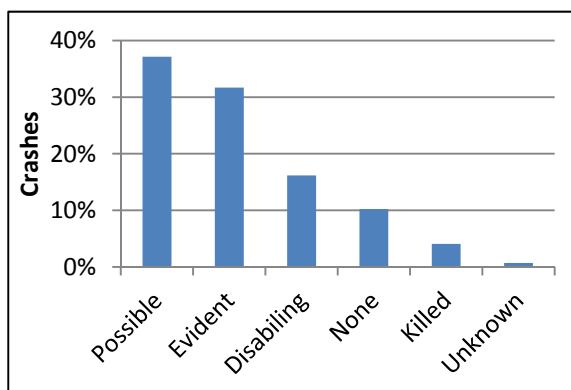


Figure 16 – Crashes by Injury Severity, 2006-2010

### By Year

There were 82 fatalities from 2006-2010, or an average of 16.4 fatalities per year. The most fatalities occurred in 2008 with 23. The fewest fatalities occurred in 2009 with 8.

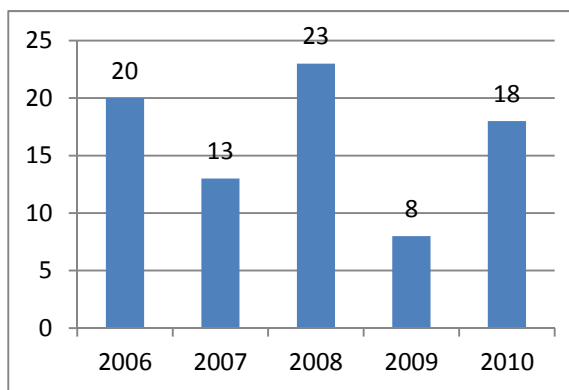


Figure 17 – Fatalities by Year, 2006-2010

### Top Pedestrian Factors – Fatalities

The top pedestrian factor for crashes resulting in fatalities was dark clothing/not visible (43.9 percent). Other top factors include not at intersection (35.4 percent), walking in roadway (20.7 percent), darting into road (18.3 percent), and drinking (17.1 percent).

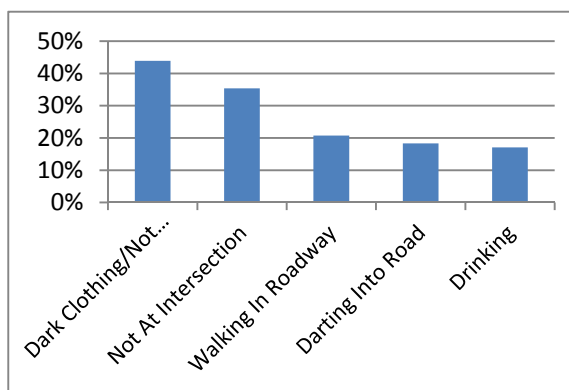


Figure 18 – Fatalities by Pedestrian Factor, 2006-2010

### Roadway Type – Fatalities

The majority of crashes resulting in fatalities occur on state roads (34.1 percent). The least amount of fatal crashes occurs on county roads (2.4 percent).

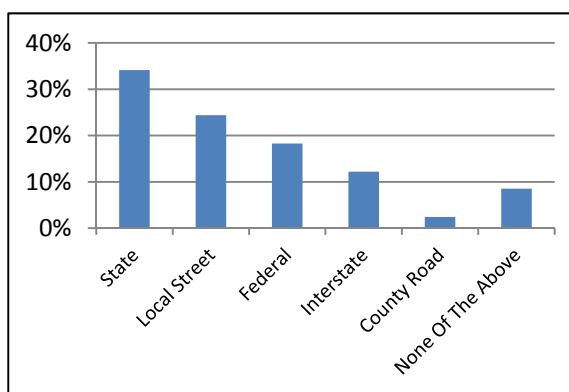


Figure 19 – Fatalities by Roadway Type, 2006-2010

## COST OF CRASHES

### Public Health

Following are the top five leading causes of death per 100,000 population of youth ages 5 to 25 years of age in Jefferson County for 2009:

- Unintentional injuries 53.2
- Assault (Homicide) 25.8
- Motor vehicle crash 21.2
- Suicide 14.6
- Cancer 7.7

Unintentional injuries were the leading cause of death in 2009 of children nationwide and in Metro Louisville. Though traffic deaths among the young are a small portion of the total, these crashes are a leading cause of death among people ages 5 to 24. Only unintentional injuries and homicide kill more people in this age group in Louisville Metro.

There are added social costs to fatalities in this age group as they are in their prime productive years and are likely to have dependent family members<sup>(7)</sup>.



Street and neighborhood design focused on pedestrian safety encourage children and families to incorporate walking into daily living. Research indicates that people who live in areas

with high quality sidewalks are more likely to be active and less likely to be overweight.<sup>8</sup>

### Economic

Since crashes often strike people in their prime productive years, are usually accompanied by property damage and cause extensive injury as well as death, the economic impacts of crashes are substantial.

The United States Department of Transportation (USDOT) estimates the national impact of crashes at \$230.6 billion, representing 2.3% of GDP in 2003. To put this in perspective, Medicare annual costs in 2008 were just above 3% of GDP.

USDOT also broke down the total costs for motor vehicle crashes by state. According to the National Transportation Research Group, motor vehicle crashes cost Kentucky \$3.1 billion per year, \$771 for each resident, in medical costs, lost productivity, travel delays, workplace costs, insurance costs and legal costs. State cost per capita varied due to differing state income levels and state medical, insurance and legal costs. Based on these state costs the annual cost of all traffic crashes in Louisville Metro are estimated at \$460 million dollars annually.

### Equity

Traffic fatalities and injuries do not impact all people equally. Certain demographic groups are threatened more by road safety problems than others, requiring solutions tailored to reach and protect specific populations. Seniors comprise 12% of the population whereas they make up over 17% of all traffic fatalities while 25-34 year

<sup>7</sup> "Did You Know??" *FARS Encyclopedia*. Web. 18 July 2013. <<http://www-fars.nhtsa.dot.gov/>>.

<sup>8</sup> Active Living Research. 2009. *Active Transportation: Making the Link from Transportation to Physical Activity and Obesity, Research Brief*. San Diego: San Diego State University

olds make up 14% of the population, but 18% of the total traffic fatalities.<sup>9</sup>

Moreover, national studies have shown that populations with low socioeconomic status (lowest income level, low educational attainment, blue-collar occupation) and unemployed status are at a higher risk for traffic



fatalities. Gender is also an indicator of risk. During 2009 in Louisville men died in crashes at more than twice the rate of women.

Access to care is also part of the equation: A study from Wisconsin found that the medically uninsured receive 20% less care when hospitalized after a serious crash. This disparity appears to lead to higher mortality rates, as the uninsured experienced a crash mortality rate 39% higher than the average.

Louisville's Center for Health Equity has a commitment to address issues of race and social justice, and the design and implementation of pedestrian projects are no exception. The Pedestrian Master Plan will provide for the needs of all of Louisville's neighborhoods, with the goal of improving the

walking environment for Louisville's diverse populations.

### *Sustainability*

Sustainable transport is about finding ways to move people, goods and information in ways that limit the impact on the environment, economy and society. Choosing to walk or bicycle rather than travel by automobile may help individuals get exercise, save money, interact with neighbors, and reduce tailpipe emissions. Yet, non-motorized transportation modes may require more time and physical effort, be less convenient for carrying packages and traveling in bad weather, and be perceived as having a higher risk of traffic crashes or street crime than driving. Safety risks, both real and perceived, are two factors that limit pedestrian trips, especially for children and seniors. Many of these trips are handled instead by less sustainable modes.

### *Quality of Life*

Street safety (and perceived safety) is a major quality of life concern, especially for families with children.

Guaranteeing street safety, like reducing crime, is a key factor in attracting and retaining a middle class population. Unsurprisingly, traffic calming



improvements that reduce speed and volume have been strongly linked to increased home values, a key factor in family location decisions.

<sup>9</sup> "Census Bureau Homepage." Census Bureau Homepage. Web. 18 July 2013. <http://www.census.gov/>.

## WHERE ARE CRASHES OCCURRING?

Pedestrian-motorist crashes are occurring in all parts of Louisville Metro, although crashes are most prevalent in the Central Business District (CBD). There is also a clear connection along principal arterials such as Bardstown Road, Baxter Avenue, Dixie Highway, Hikes Lane, New Cut Road, and Preston Highway .

To simplify the discussion and illustration of the results, crash locations are weighted by severity (fatal, disabled, injured, possible and none).

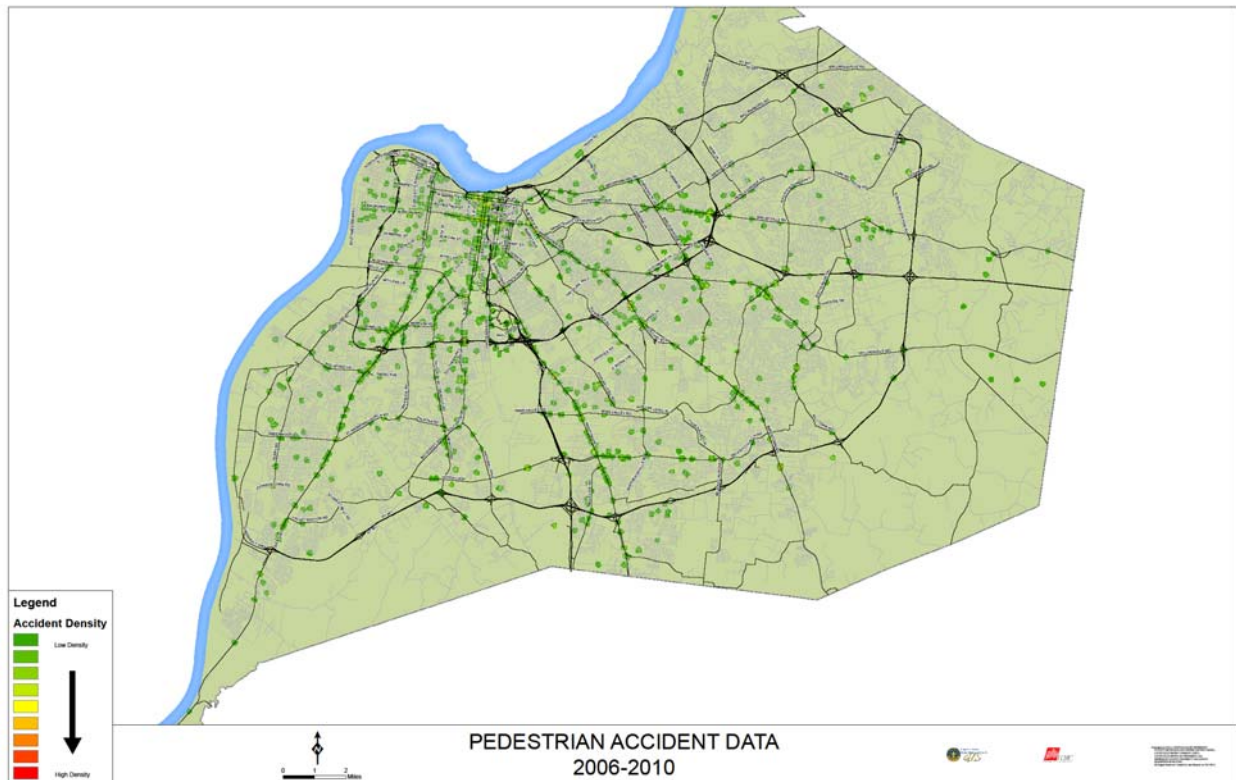


Figure 20: Pedestrian Collisions Ranked by Severity map, 2006-2012

## Chapter 5 – Discussion, Approaches & Recommendations

### SUMMARY OF FINDINGS

To summarize the data presented in the previous chapter,

- Crashes are most prevalent on weekdays and in the afternoon peak period.
- Crash road conditions are generally dry.
- Pedestrians and motorists are generally not impaired at the time of crashes.
- There is a clear concentration of pedestrian fatalities along major arterials.

Reducing these findings further, four primary conclusions emerge:

1. Most crashes occur on Local Streets.
2. Motorist are not seeing or yielding to pedestrians,
3. Pedestrians are darting or walking into the roadway and
4. Motorist inattention.

### APPROACHING PEDESTRIAN SAFETY

These four conclusions help simplify the complex nature of crashes. However, translating the findings into effective countermeasures is the next task. While posed with good intentions, the discussion of countermeasures can quickly become detailed and itemized: *Which intersections should be improved first? How should pedestrians be educated? How should motorists be educated? How can the police be involved?*

Before moving forward, a framework for implementation should be established and a clear understanding of who the countermeasures are intend for is needed. Safety is an evolving goal and it may be better to front load the discussion with high-level

considerations, rather than specific countermeasures. Taking the same approach as Safe Routes to School, this section applies The Five E's of Safe Routes to School to improve pedestrian safety.

#### *Five E's of Safe Routes to School*

The "Five E's" of Safe Routes to School to ensure that projects are well-rounded, multi-prong and time-tested approaches to getting more students walking and bicycling. The Five E's of Safe Routes to School include:

- Education
- Encouragement
- Enforcement
- Engineering
- Evaluation

Known as the Five E's of Five E's" of Safe Routes to School<sup>10</sup>, this straightforward approach is becoming the norm in cities across the U.S. and was used as a framework for the Louisville Pedestrian Master Plan, 2010-2020. While originally intended as a checklist for increasing walking, it can easily be applied to decreasing crashes. Developing a set of countermeasures to increase pedestrian safety should use the Five E's approach.



<sup>10</sup> Safe Routes to School  
<http://www.saferoutespartnership.org/local/getting-started-locally/5es>

## ACTION PLAN

### *Recommendations for Improved Pedestrian Safety*

This analysis confirms that many of the improvement made are effective and should continue. The findings also highlight the need for new focus areas, including continued use of best practices in engineering. The recommendations for improved pedestrian safety are the following:

#### *Education*

- **Promote walking to school safely at a young age.** Continue and expand the Safe Routes to School program to increase awareness while emphasizing navigation on arterial streets and high risk corridors.
- **Increase pedestrian and driver education.** Update and create new printed educational materials highlighting dangerous behaviors including failure to yield, speeding, aggressive driving, distracted and inattention.
- **Provide Safe Streets for Seniors presentations at senior centers located near high-risk corridors and major arterial streets.** Develop comprehensive active transportation programs for older adults including information on pedestrian safety, biking and fall prevention.
- **Distracted Driver Campaign.** Generate awareness about "One Text or Call Could Wreck It All." Remind others that the price for not paying attention to the road is too high, and that we all have a part to play in making sure everyone keeps their eyes and mind on the road and hands on the wheel.
- **Distracted Pedestrian Campaign.** Develop and implement a safety campaign aimed in part at pedestrians who are looking at their devices instead of where they're going.

#### *Encouragement*

- **Neighborhood Speed Watch Program.** Develop and implement a voluntary good



Safe Routes to School program increases awareness and improves navigation for young students.



Whenever you are not in your vehicle, you are a pedestrian! This brochure offers tips for both drivers and pedestrians to stay safe while sharing the road.



Cell phones make it easy for drivers to multitask. In 2009, 20 percent of injury crashes involved distracted driving, and of "those killed in distracted-driving-related crashes," 995 involved cell phone distraction, according to the National Highway Traffic Safety Administration.

driver program, allowing residents to set examples as good drivers.

- **Be Seen Campaign.** Distribute and encourage the use of reflectors to make pedestrians more visible, and lower the night time death and injury rate.

#### Enforcement

- **Pedestrian “Decoy” Operations.** Pedestrian decoys' are a way to bring attention to problems with motorists not yielding to pedestrians. Police officers in highly visible civilian clothes pose as pedestrians crossing the street while other hidden officers observe their attempts. If a motorist violates safe crossing rules by failing to yield to the pedestrian, the hidden officers pursue and apprehend violators.
- **Distracted Driving Enforcement Campaign.** Step up enforcement of driver violations involving talking or texting on cell phones.
- **DUI Enforcement Crackdown.** Target DUI enforcement crackdown along high pedestrian crash corridors.
- **Progressive Ticketing Campaign.** Progressive ticketing is a method for introducing ticketing through a three-stage process, to first educate, then warn, then ticket driver and pedestrian offenders.

#### Engineering

- **Develop and Implement a Lead Pedestrian Interval (LPI) standard.** LPI allows the ‘walk signal for pedestrians to appear 3 or more seconds before the green signals for drivers. Reduce conflicts at intersections with high pedestrian volumes.
- **Develop and implement intersection design standards for high crash locations.** Standards on intersection radii, shortening crossing distances, bringing cross-walks closer to the intersection, and slowing right-turning vehicles. .
- **Conduct field safety audits.** Examine vehicle speeds, sight distance, markings, signage, street lighting at high pedestrian crash intersections and corridors.



Police officers in highly visible civilian clothes pose as pedestrians crossing the street.



LPI, also known as a “pedestrian head start,” provides increased visibility and safety for pedestrians when drivers are turning, especially at right turns.

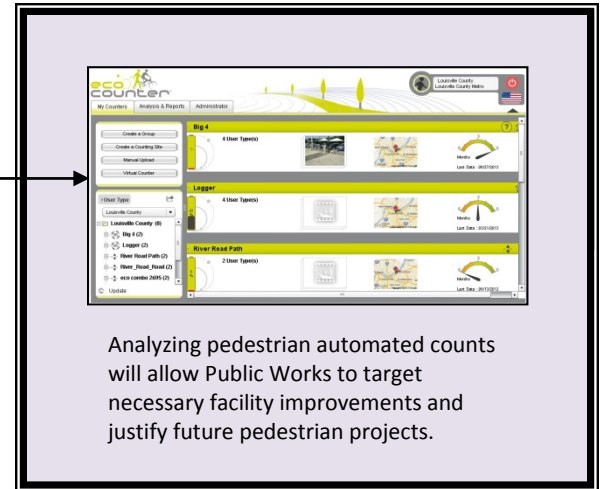


Improving facilities, such as the one above, will improve safety by increasing crosswalk visibility.



### Evaluation

- **Analyze pedestrian automated counts.** Analyze data from pedestrian automated counters to target high traffic areas for improved or future facilities.
- **Evaluate pedestrian crash data.** Use crash data to map and analyze safety concerns for pedestrians.
- **Create a pedestrian advisory committee.** Committee will create a list of improved facilities in order of priority and focus on safety improvements.

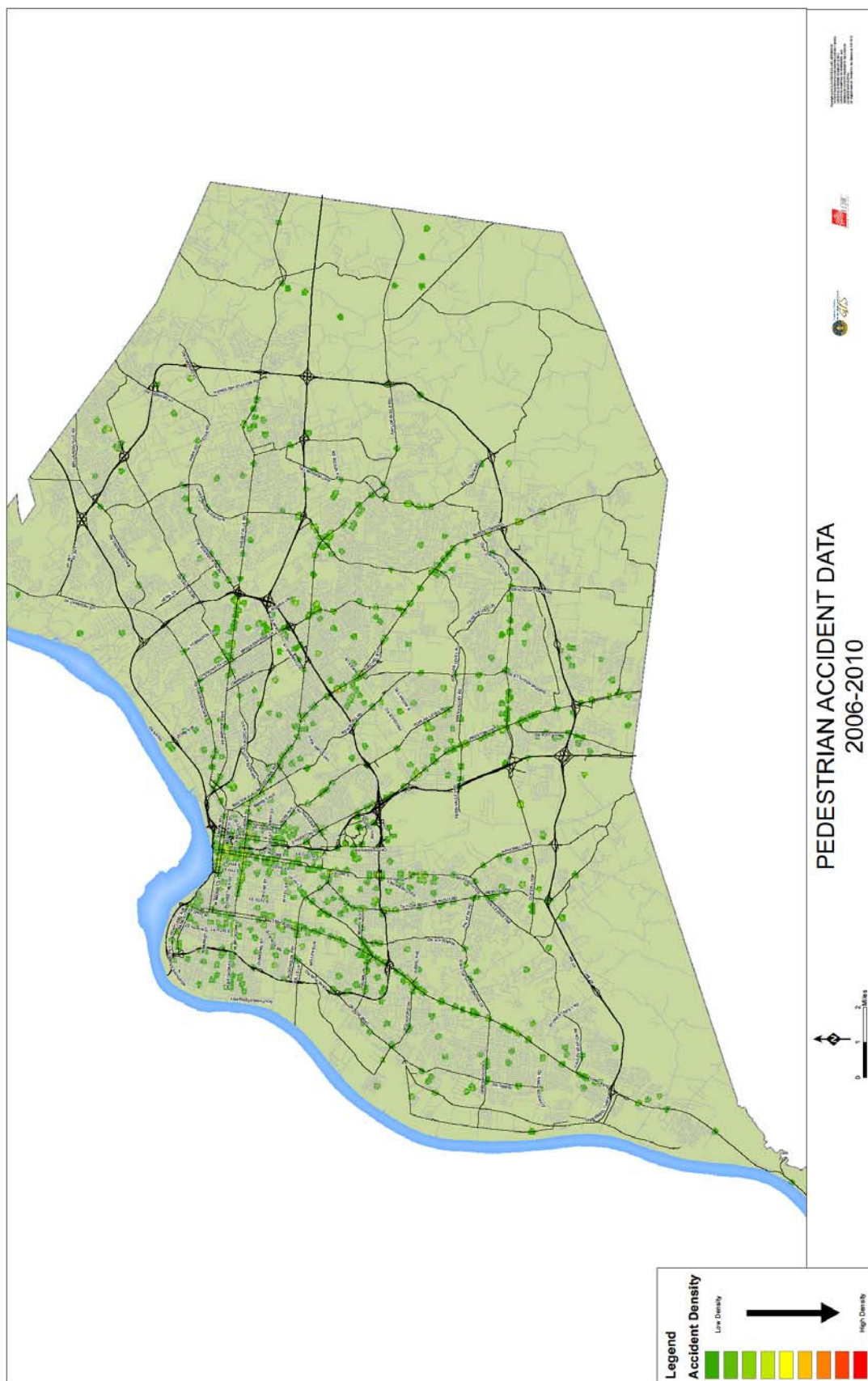


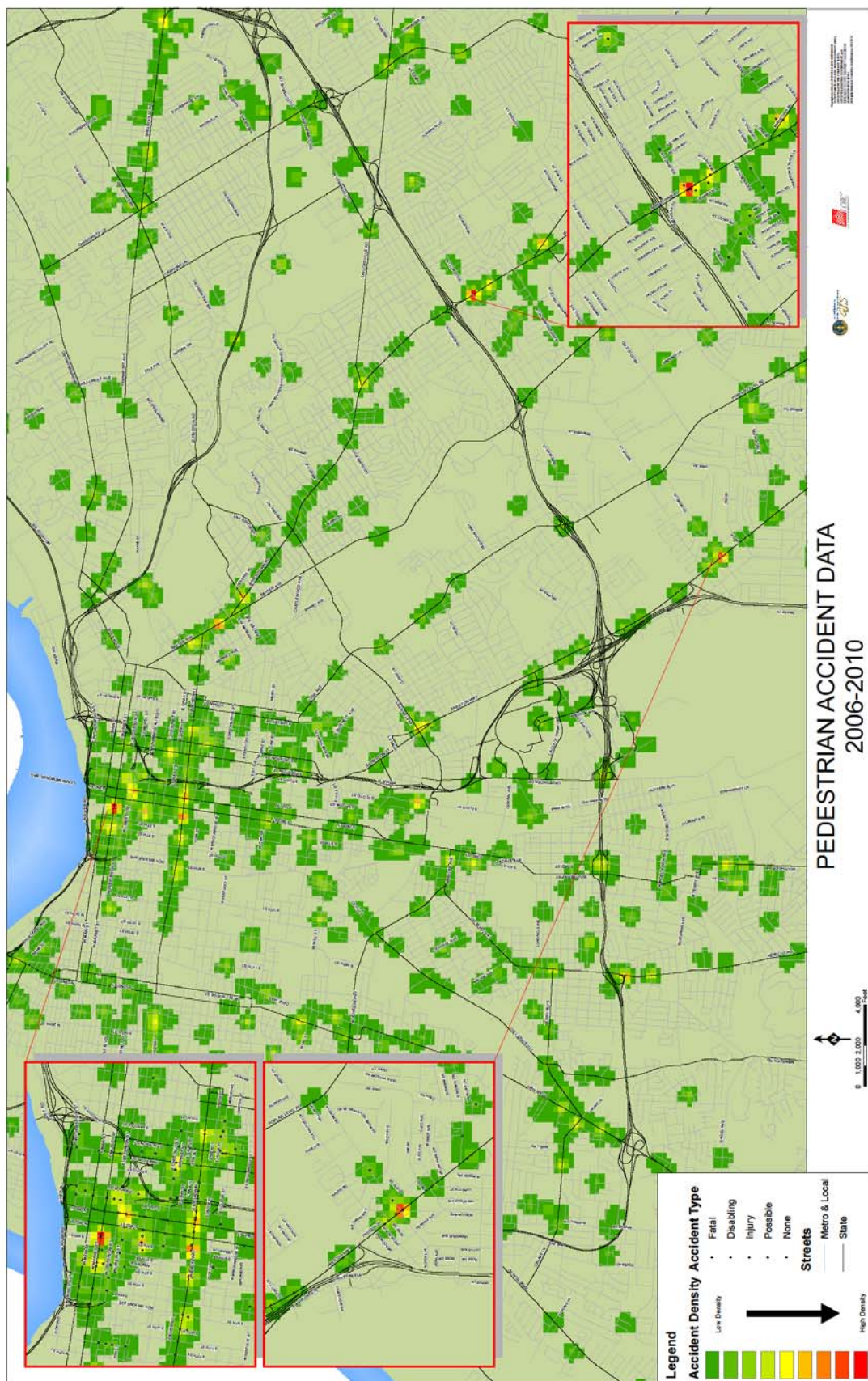
## REFERENCES

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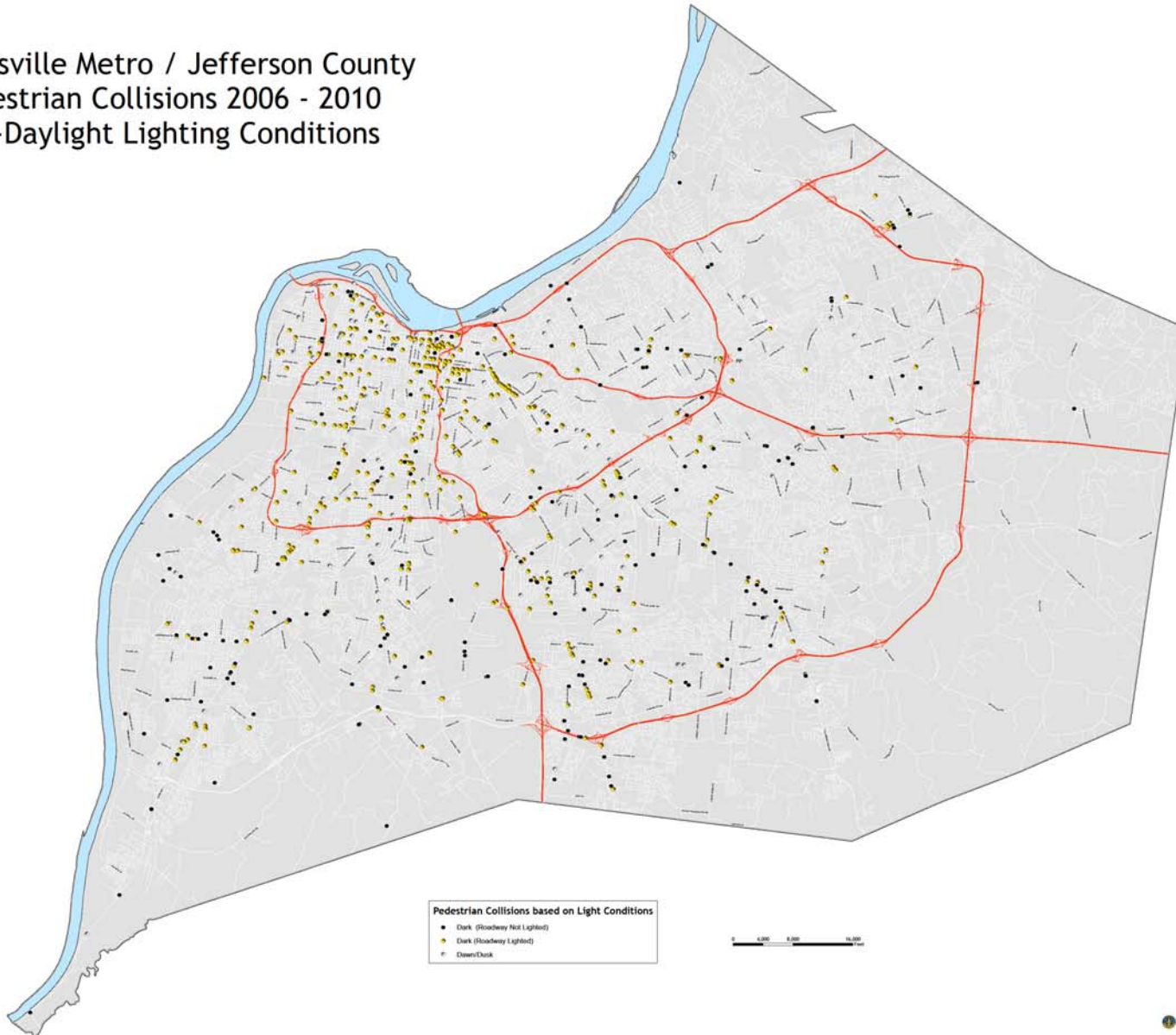
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# APPENDIX





Louisville Metro / Jefferson County  
Pedestrian Collisions 2006 - 2010  
Non-Daylight Lighting Conditions



Pedestrian Collisions based on Light Conditions

- Dark (Roadway Not Lighted)
- Dark (Roadway Lighted)
- Dawn/Dusk

0 4,000 8,000 16,000



## Linked Action Items

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Targeted Crash Condition	
Alcohol/Drugs	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Responsible Drinking Campaign for Pedestrians</li> <li>• Don't Drink &amp; Drive Campaign</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• Pedestrian Pace Car Program</li> </ul>
	<p><b>Enforcement:</b></p> <ul style="list-style-type: none"> <li>• DUI Enforcement Campaign</li> </ul>
Inattention	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Comprehensive School-Age Pedestrian Safety Program</li> <li>• Distracted Driving Campaign</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• Neighborhood Speed Watch Programs</li> </ul>
	<p><b>Enforcement:</b></p> <ul style="list-style-type: none"> <li>• Progressive Ticketing Program</li> </ul>
Failure to Yield Right-of-Way	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Increase Driver Facility Pedestrian Education</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• Neighborhood Speed Watch Programs</li> </ul>
	<p><b>Enforcement:</b></p> <ul style="list-style-type: none"> <li>• Progressive Ticketing Program</li> <li>• Pedestrian "Decoy" Operations</li> </ul>

Targeted Crash Condition	
Pedestrian age 51-64 is the most prevalent cohort age for crashes	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Provide Safe Streets for Seniors presentations at senior centers located near high-risk corridors and major arterial streets</li> <li>• Distracted Driving Campaign</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• Neighborhood Speed Watch Programs</li> </ul>
	<p><b>Enforcement:</b></p> <ul style="list-style-type: none"> <li>• Pedestrian “Decoy” Operations</li> </ul>
	<p><b>Engineering:</b></p> <ul style="list-style-type: none"> <li>• Conduct Road Safety Audits at high crash locations</li> <li>• Develop and Implement Lead Pedestrian Interval (LPI) policy</li> <li>• Provide facilities (sidewalks, shoulders, etc.) along high crash corridors</li> </ul>
Dark Clothing/Not Visible	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Comprehensive School-Age Pedestrian Safety Program</li> <li>• Distracted Driving Campaign</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• See and Be Seen Campaign</li> </ul>
Not at Intersection; Darting Into Road	<p><b>Education:</b></p> <ul style="list-style-type: none"> <li>• Comprehensive School-Age Pedestrian Safety Program</li> <li>• Distracted Driving Campaign</li> </ul>
	<p><b>Encouragement:</b></p> <ul style="list-style-type: none"> <li>• Pedestrian Pace Car Program</li> </ul>
	<p><b>Enforcement:</b></p> <ul style="list-style-type: none"> <li>• Progressive Ticketing Program</li> <li>• Neighborhood Speed Watch Programs</li> </ul>
	<p><b>Engineering:</b></p> <ul style="list-style-type: none"> <li>• Conduct Road Safety Audits at high crash locations</li> <li>• Provide facilities (sidewalks, shoulders, etc.) along high crash corridors</li> </ul>

Targeted Crash Condition	
Walking in Roadway	<b>Education:</b> <ul style="list-style-type: none"> <li>• Comprehensive School-Age Pedestrian Safety Program</li> <li>• Distracted Driving Campaign</li> </ul>
	<b>Encouragement:</b> <ul style="list-style-type: none"> <li>• Neighborhood Speed Watch Programs</li> </ul>
	<b>Engineering:</b> <ul style="list-style-type: none"> <li>• Conduct field safety audits at high crash locations</li> <li>• Provide pedestrian facilities (sidewalks, shoulders, etc.) along high crash corridors</li> </ul>
All Crashes/Programs	<b>Evaluation:</b> <ul style="list-style-type: none"> <li>• Analyze pedestrian automated counts</li> <li>• Evaluate pedestrian crash data</li> <li>• Create priority lists for improved facilities</li> </ul>

**NOTES:**

- 60% of fatalities occur on federal/state roads
- Meet with LMPD to discuss reports



## Close Calls

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The close call form is another tool we use to assess potential conflict points and the frequency of near misses at these locations. As you may know, bicycle and pedestrian related crashes are under reported and this offers another way to address issues before they result in a crash.

The form allows you to fill out your personal information and detailed questions about your close call. At the time of the incident were you a bicyclist, pedestrian or motorist? Did you have a close call with a bicyclist, pedestrian or motorist? Where did you have your close call, intersection or specific address or landmark? What date did this incident occur? What time of day did this incident occur? Finally, the form asks for a description of the close call.

The map below entitled Bicycle and Pedestrian "Close Call" Locations provides the exact locations of each reported close call. The table in the left hand corner provides the location, where were you, where were they, date, incident date and time of day. Pedestrian reported close calls were at ID locations 6,8,25, 29, 34 and 40.

### Key Findings from close call reports include

- Within the table, "Where Were You" refers to the person reporting the close call while "Where Were They" is the road users being reported.
- When pedestrians reported close calls there was roughly an even amount of motorists and bicyclists being reported.
- In two years (2011-2013) there have been 9 close calls reported by pedestrians.

### Select close call descriptions

#### *Entrance to Humana Fitness Center on 5<sup>th</sup>*

I was leaving my Yoga class at approx. 6:20 yesterday evening and when I exited the door of Humana's Fitness Center and turned the corner to head south on fifth, I was moved over by a cyclist who was on the sidewalk. I was knocked completely down with all my weight, purse and gym bag landing directly on my right hip. Very sore today! The cyclist took the blame in that he admitted he was not paying attention; however he made excuses when I pointed out to him that cyclists are not allowed under ordinance to be on the sidewalk. This is very frustrating to me.

#### *Hurstbourne and Tamarisk*

Light at intersection does not seem to be timed with other lights along Hurstbourne and cross walk light does not seem to work correctly either, so cars on Tamarisk who get tired of waiting for green sometimes run the red light. I was nearly hit by car running the red turning from Tamarisk southbound onto Hurstbourne.

#### *Frankfort Avenue*

Frankfort Ave. is notorious for bicycles on the sidewalks and nobody does anything about it. This venue to me is worthless as the police don't do anything regardless how many times someone complains. I don't believe the police do anything but carry the little yellow "WARNING" tags.

#### *Cherokee Park Scenic Loop*

This is an ongoing issue in the park: Cyclists of all kinds either straddle the pedestrian/vehicle line or often they use the pedestrian lane to navigate the loop. Many pedestrians utilize the loop and the cyclists don't indicate they are coming up behind us, making us vulnerable to getting hit if we were to

veer unexpectedly to the right or the left. It would be much less stressful for pedestrians if riders were to use the appropriate lane to navigate through the park, since they are technically a vehicle. Several of us in our running group express fear that we will one day get hit because they come up behind us quickly.

*Trevilian and Ridgefield Road*

I was crossing Trevilian with my child at the intersection with Ridgefield Rd. and a motorist rounded the hill headed towards Poplar Level at a relatively high speed. No obvious attempt was made by the motorist to slow down before I was able to clear the intersection.

*2<sup>nd</sup> near College of Business and Freedom Park*

Neither of the 2 crosswalk buttons on the EAST side of 2nd (College of Business and Freedom Park crosswalk) are functioning properly. The west side buttons do seem to work. Students rarely wait or even hit the buttons at all, but the traffic signal is not responding when they do. The signal seems to immediately respond to the west side buttons.

*5<sup>th</sup> and Jefferson*

[*Restaurant name*] delivery people have no respect for anyone on sidewalks or crosswalks and should be accountable for their reckless riding this is an ongoing problem that will result in someone being injured.

*Chestnut and Jackson by U of L Hospital*

A colleague and I were crossing West on Jackson at the corner of Chestnut and a motorist turning left onto Jackson almost hit us. She was asking someone for directions and we stopped in the middle of the road. We had the ped signal and luckily we were paying attention.

