

Pedestrian Crash Analysis

For Tippecanoe County and the Greater Lafayette Area

A Study of Pedestrian and Motor Vehicle Crashes
2013 through 2017

Prepared by the Area Plan Commission of Tippecanoe County
January 2020

Policy Board of the Area Plan Commission of Tippecanoe County

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Key Findings from this Report

The 2045 Metropolitan Transportation Plan: The Future of Mobility, targets improved safety of all road users with an objective to reduce both fatalities and serious injuries. It also calls for updating the Bicycle and Pedestrian Plan. The Area Plan Commission's analysis of 2013 through 2017 crash data is intended to be a key component in the updated Bicycle and Pedestrian Plan. This report's intent is to provide a better understanding of factors that are involved in pedestrian-motor vehicle crashes. Specific crash attributes were extracted from the ARIES crash database, analyzed and mapped. The findings in this report should be used to inform and influence the design and location of new pedestrian facilities, the redesign of existing roadways, the development of education programs for pedestrian and motorists, and enforcement campaigns.

When Crashes Occur:

-  There were 219 reported crashes that involved pedestrians in Tippecanoe County from 2013 through 2017.
-  An average of 44 pedestrian-vehicle crashes occurred annually in Tippecanoe County from 2013 to 2017.
-  Crashes were most prevalent from September through January, on Thursday and during the morning (7:00-8:00 a.m.) and afternoon (4:00-5:00 p.m.).
-  Less than 1 percent of all crashes in Tippecanoe County involved a pedestrian.

Injuries and Fatalities:

-  10 crashes resulted in 11 pedestrian fatalities from 2013 through 2017.
-  Pedestrians sustained an injury in nine out of ten crashes.

Who Was Involved:

-  Nearly 46% of the pedestrians involved in a crash were between the ages of 16 and 24.
-  Male pedestrians were involved in over 58% of all pedestrian crashes.
-  Over the five-year period, 26 children who were younger than 16 years of age were involved in a pedestrian crash.

Who Was at Fault:

-  Over the five-year period, motorists were nearly twice as likely to cause the crash.

Causes of Crashes:

- 🚶 The most common causes of crashes when the pedestrian was at fault were: Pedestrian Action (84.4%) and Failure to Yield (9.1%).
- 🚶 The most common causes of crashes when the motorist was at fault were: Failure to Yield (55.5%), Other, Driver (10.9%) and Pedestrian Action (10.2%).

Locations of Crashes

- 🚶 The majority of pedestrian-vehicle crashes (51.6%) were in the City of Lafayette.
- 🚶 The intersection of State and Grant Streets in West Lafayette was the intersection that had the greatest number of crashes with 8.
- 🚶 The corridors that had the highest number of crashes included: State Street in West Lafayette (29), Grant Street (14), South Street in Lafayette (12), Stadium Avenue (10), and Jischke Drive (10).
- 🚶 Nearly 60% of pedestrian crashes occurred at an intersection (124 crashes).
- 🚶 There were 9 crash locations in the urban area where no sidewalks or trails were present.
- 🚶 There were 17 crash locations in the urban area and fringe where partial sidewalks were present. Of those locations, 4 crashes occurred at the intersection of SR 38 and Kingsway Drive and 2 crashes occurred at Main Street and McCarty Lane.

Comparison to Indiana

- 🚶 The percentage of pedestrian crashes in Tippecanoe County (0.8%) is the same as the percentage of pedestrian crashes in the State of Indiana (0.8%).
- 🚶 The percentage of pedestrian crashes involving children 16 and younger was smaller in Tippecanoe County (15.2%) when compared to one year of data of the pedestrian crashes of that same age group that occurred throughout the State of Indiana (20.3%) in 2013.

Introduction

The purpose of this report is to provide useful information to a wide range of audiences concerning pedestrian crashes that occurred within Tippecanoe County during calendar years 2013 through 2017. While this report highlights the negative aspects of walking, it is only done to advance the safety of all road users. Research has shown that there are a variety of benefits to walking. This report identifies safety concerns and can be used to assist efforts to reduce risks to pedestrians in Tippecanoe County.

This report was also developed as a critical component of a new bicycle and pedestrian plan for Tippecanoe County. The new plan will address safety; therefore, a thorough understanding of the crashes that involve bicycles and pedestrians is necessary to develop beneficial infrastructure projects.

In this report, the term “fault” refers strictly to the behaviors required by statutes. It should be noted that there are extenuating circumstances that affect pedestrian behavior for both children and adults.

Whether a person walks for exercise or to a specific destination, it is important for pedestrians to be aware of their surroundings and follow the rules of the road. A number of the crashes in this report are a result of not following those rules. A leading cause of motor vehicle crashes is the driver being distracted. A pedestrian who is distracted has a greater chance of being in crash. Unfortunately, when a pedestrian is involved in a crash, chances are likely they will be injured.

Purdue University offers the following safety suggestions:

- Remove your headphones and maintain visual contact with vehicle traffic around you (your safety can be significantly impaired if you inhibit any one of your senses while walking near vehicle traffic).
- Do not use your cell phone or text while you are walking near traffic (being inattentive can prove to be very hazardous).
- Obey traffic signs and cross at properly marked crosswalks (that is what drivers expect you to do and that is where you may be more visible to them).
- When waiting to cross a street, stand behind the curb, not on it.
- Look both ways and make sure you have eye contact with drivers before you cross the street. Never assume that if you turn your back to a vehicle, the driver will see you and yield to your position in the street.
- Be extra cautious when it is raining and when it is dark if you are wearing dark-colored clothing. Under these conditions, your visibility to the driver is diminished significantly. Avoid wearing only dark colors in such conditions.
- When you begin to cross the street at crosswalks that require drivers to stop and yield to pedestrians, do not assume vehicles in the second lane are aware you are in the crosswalk. Proceed carefully and make sure all lanes of traffic are stopped as you proceed.
- Do not leave the sidewalk in favor of the street when the walkway is congested. Drivers don't expect you to be in the street.
- Do not engage in horseplay near any vehicle traffic.
- Do not enter the street to stand on the center line to await the traffic to clear on the other side of the road. When you do this, drivers cannot always see you.

It should be noted that the percentages expressed in this report are based on a “snapshot” of crashes during a five-year period, and that the relative proportions of these crash types and factors will change over time. They will also differ from proportions found in other urban areas and will certainly differ from crash characteristics of more rural areas.

About the Data

The data for this report came from the Indiana State Police (ISP) Automated Reporting Information Exchange System (ARIES) database of crash reports submitted by the police departments of Lafayette, West Lafayette, Purdue University, Dayton, and Battle Ground, the Tippecanoe County Sheriff, the Department of Natural Resources, and the ISP. The database contains a subset of the most important information that was submitted for each crash reported to the ARIES system. All crash reports that involved a pedestrian were obtained through the ARIES website.

Glossary (Terminology)

ARIES – Automated Reporting Information Exchange System developed and maintained by the Indiana State Police. ARIES provides officers an electronic means to complete the Indiana Officer's Crash Report form. The system also allows authorized individuals access to the Indiana State Police crash records database. ARIES was formerly known as the Vehicle Crash Record System (VCRS).

Alley – Indiana Code IC 9-13-2-2.5, "Alley" means a public way in an urban district that meets the following qualifications: 1) Is open to the public for vehicular traffic; 2) Is publicly maintained; 3) Is one (1) lane wide; 4) Is designated as an alley by the local authorities on an official map of the urban district.

Crash – The term "accident" is not used in this report; it implies that an event could not have been avoided by one or more parties. The vast majority of collisions between road users are due to an illegal action or error on the part of one or more parties.

Crosswalk – Indiana Code IC 9-13-2-40, "Crosswalk" means any of the following (1) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs, or in the absence of curbs, from the edges of the traversable roadway. (2) A part of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Driver – Any person who drives or is in actual physical control of a vehicle on a highway. Bicycles are statutorily defined as vehicles, thus cyclists are drivers.

Driveway – Indiana Code IC 9-13-2-49, "Driveway" means a way or place in private ownership that is used for vehicular travel by the owner and those having express or implied permission from the owner but not by other persons.

Footpath – Is a designated path typically with a surface material of mulch or grass.

Intersection – Indiana Code IC 9-13-2-84, (a) "Intersection" means the area embraced within: (1) the prolongation or connection of the lateral curb lines, or if none, then the lateral boundary lines of the roadways of two (2) highways that join at, or approximately at, right angles; or (2) the area within which vehicles traveling upon different highways joining at any other angle may come in conflict. (b) Where a highway includes two (2) roadways at least three (3) feet apart, every crossing of each roadway of the divided highway by an intersection highway is regarded as a separate intersection. If the intersecting highway also includes two (2) roadways at least three (3) feet apart, every crossing of two (2) roadways of the intersecting highway is regarded as a separate intersection.

Motorists – Distinct from the broader term "driver" a person in control of a motor vehicle.

Paved Shoulder – A paved portion of the roadway that is to the right of the white edge line on the right side of a road. Paved shoulders are not intended for regular travel by motor vehicles, but help in recovery from run-off-the-roadway incidents and provide a space for cyclists to travel outside the regular path of motorists.

Pedestrian – Any person afoot. This includes persons walking bicycles, riding skateboards, rollerblading using wheelchairs or other power-drive mobility devices, and using other forms of non-motorized/non-pedaled forms of transportation.

Property Damage Only Crash – A crash in which a vehicle or property is damaged and the occupant or non-motorist is not injured. A crash is required to be reported if the amount of the damage was \$750 or more.

Roadway – Indiana Code IC 9-13-2-157, (a) Except as provided in subsection (b), “roadway” means that part of a highway improved, designed, or ordinarily used for vehicular travel. (b) As used in IC 9-21-12-13, “roadway” means the part of a highway that is improved, designed, or ordinarily used for vehicular travel. The term does not include the sidewalk, berm, or shoulder, even if the sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles.

Safety Zone – Indiana Code IC 9-13-2-159, “Safety zone” means the area or space officially set apart with a roadway for the exclusive use of pedestrians and that is protected or is so marked or indicated by adequate signs as to be plainly visible at all times.

Sidepath – A facility adjacent to a roadway and separated from the roadway by either a curb or unpaved area. Both pedestrians and cyclists are permitted and expected to travel in either direction on such paths.

Sidewalk - Indiana Code IC 9-13-2-167, “Sidewalk” means the part of a street between the curb lines, or the lateral lines of a roadway, and the adjacent property lines intended for the use of pedestrians.

Street or Highway – Indiana Code IC 9-13-2-175, “Street” or “highway” means the entire width between the boundary lines of every way publicly maintained when any part of the way is open to the use of the public for purposes of vehicular travel. The term includes an alley in a city or town.

Shared Use Path – A paved path intended for use by both pedestrians and bicyclists. These paths may be located in entirely separated rights-of-way or may be parallel and adjacent to roadways. Such facilities are often referred to as “trails.”

Sharrow – A sharrow is a pavement marking symbol that indicates an appropriate bicycle positioning in a roadway used by motor vehicles and bicycles. Sharrows may be placed at the edge of the travel lane or at the center of the travel lane, depending on factors like on-street parking, width of travel lane, or posted speed.

Vehicle – Is any vehicle whether it be an automobile or truck. It also includes motorcycles, scooters and bicycles.

When Do Crashes Occur?

By Year

Over the five years analyzed, there were 219 crashes reported that involved pedestrians, **Table 1**. That is approximately 44 crashes per year. Pedestrians experienced the most crashes (51) in 2013 and the fewest (37) in 2015. **Figure 1** shows the number of crashes by year. While there was a significant drop in crashes between 2013 and 2014, the number of crashes steadily increased from 2015 through 2017.

Injuries were reported in 90% of the crash events over the five-year period. Looking at the data by year, the percentage of crashes with injuries fluctuated from the low-80s to high-90s. 2013 was the worst year in terms of number of crashes with injuries (46). 2014 had the fewest injury crashes (36).

Twelve crashes during the five-year period resulted in multiple injuries per crash. The worst crash occurred in 2013 when one crash resulted in 4 pedestrians being injured. That crash occurred at the intersection of 9th Street and Twyckenham Boulevard. Two additional crashes were nearly as bad with three injuries occurring in each crash. One occurred in 2016 and it was located near the intersection of Northwestern Avenue and Stadium Avenue. In that crash, 2 pedestrians were injured as well as the driver. The other crash occurred in 2017 at the intersection of US 52 and CR 500W. The pedestrian, driver, and a passenger were injured. There were eight additional crashes where two injuries occurred per crash.

Most often, if there was an injury caused by the crash, it was the pedestrian who was injured. That, however, was not always the case. Four crashes occurred in the five-year period where the pedestrian(s) and the motorist and/or passenger were injured.

There were 10 crashes that resulted in a fatality. 2013 and 2017 were the worst years with four fatality crashes each. One crash in 2013, on I-65, resulted in two fatalities. There were no crashes in 2016 in which a fatality occurred.

Table 1: Pedestrian Crashes, Injuries and Fatalities in Tippecanoe County

Year	Total Number	Property Damage Only	% of Prop. Damage Crashes	Number of Injury Crashes	% of Injury Crashes	Number of Injured People	Number of Fatal Crashes	Fatalities
2013	51	3	5.9%	46	90.2%	52	4	5
2014	39	3	7.7%	35	89.7%	36	1	1
2015	37	0	0.0%	36	97.3%	37	1	1
2016	44	2	4.5%	42	95.5%	47	0	0
2017	48	15	10.4%	39	81.3%	41	4	4
<i>Total</i>	219	13	5.9%	198	90.4%	213	10	11

Annually, an average of less than 1 percent of all crashes in Tippecanoe County involved pedestrians. **Table 2** compares the number of crashes involving pedestrians to the total number of crashes reported in Tippecanoe County. Again, 2013 was the worst year with just over 1% of the crashes involving a pedestrian.

Figure 1: Total Number of Pedestrian Crashes by Year

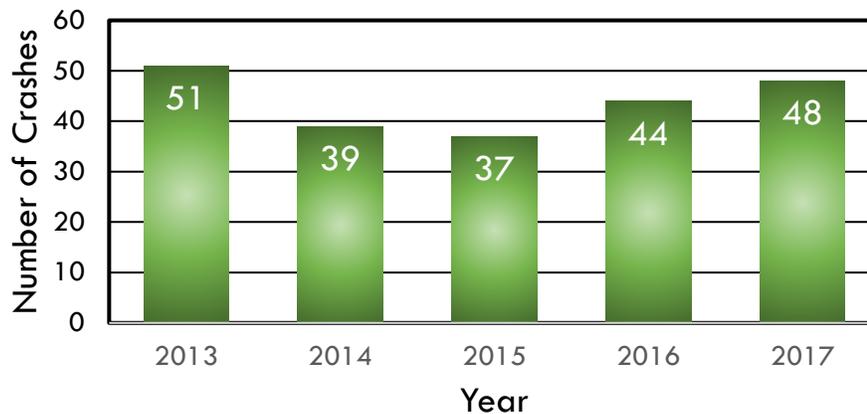


Table 2: Comparison of the Total Number of Pedestrian Crashes and Total Number of Crashes in Tippecanoe County

Year	Total # of Crashes in the County*	Pedestrian Crashes	Percentage
2013	4,789	51	1.1%
2014	5,357	39	0.7%
2015	5,793	37	0.7%
2016	5,833	44	0.8%
2017	5,645	48	0.9%
<i>Total</i>	<i>27,417</i>	<i>219</i>	<i>0.8%</i>

* Does not include crashes on private property

Table 3 shows crash data for the State of Indiana and for Tippecanoe County. Comparing the percentage of pedestrian crashes in Tippecanoe County to state crash data, the percentages are equal. According to the Indiana University Public Policy Institute Indiana Crash Facts reports, less than 1 percent of all crashes statewide involve a pedestrian.

Table 3: Pedestrian Crash Data, State of Indiana (2013-2016)

Year	Total # of Crashes	# of Pedestrian Crashes	State Percentage	County Percentage
2013	193,205	1,603	0.8%	1.1%
2014	205,532	1,675	0.8%	0.7%
2015	216,312	1,716	0.8%	0.7%
2016	223,733	1,798	0.8%	0.8%
<i>Total</i>	<i>838,782</i>	<i>6,792</i>	<i>0.8%</i>	<i>0.8%</i>

Source: Indiana University Public Policy Institute, Indiana Crash Facts 2016, Figure 3.2, page 46

By Month

Are there more crashes involving pedestrians during the summer or warmer months? One would expect that the number of crashes follow the seasons and there would be more crashes when it is warmer and fewer when it is colder. The crash data does not support that expectation. **Figure 2** compares the number of crashes by month to the average high monthly temperature. There are significantly fewer crashes during the summer months when compared to the number in fall and winter. The figure shows an increase in crashes beginning in September with a significant number continuing through and including January. The number then drops with only a slight increase in April and July.

Figure 2: Total Number of Pedestrian Crashes by Month Compared to Average High Temperature

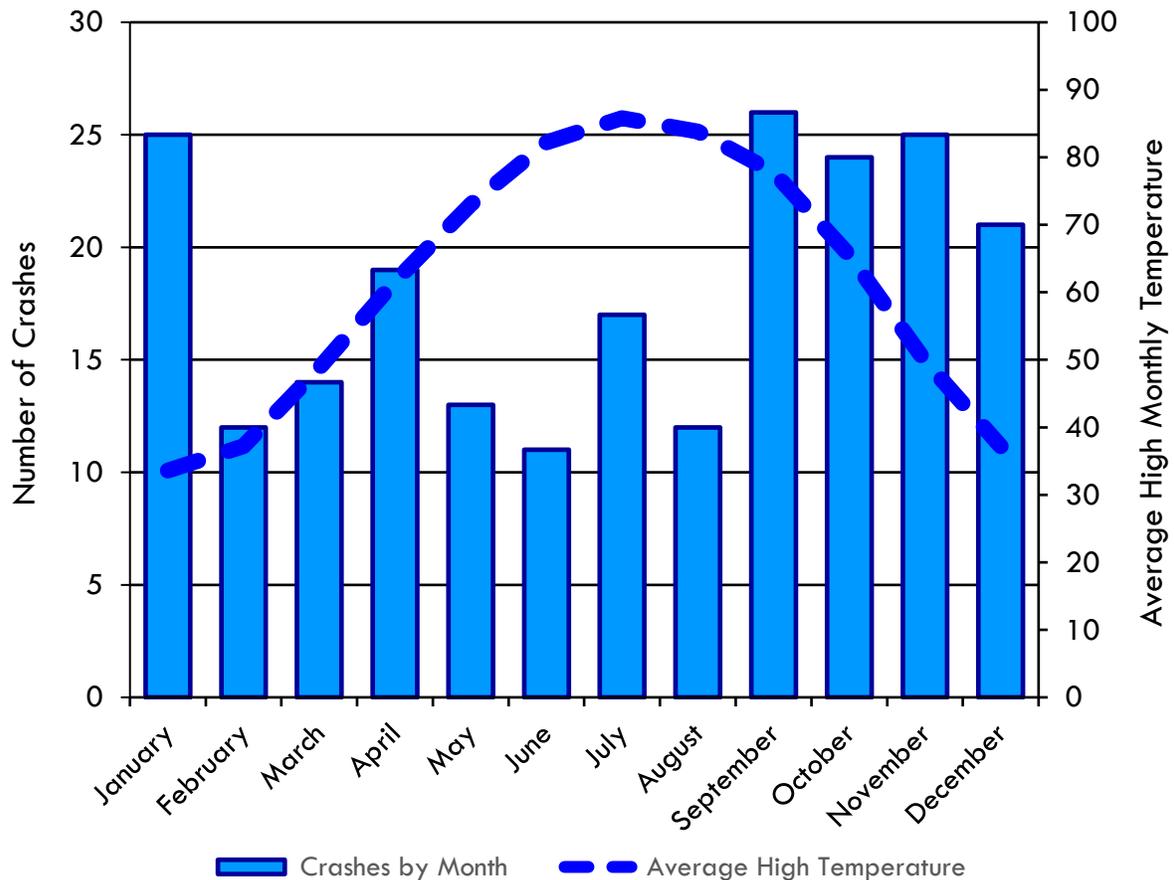


Table 4 shows the number of crashes by month and for each of the five years. The peak months, again, were October through January with a small dip in December. Interestingly, in 2013 the peak number of crashes occurred in April, but in 2017 it was in January. In the three mid years, it varied from September to December. The data shows there are no discernible patterns by month.

Table 5 compares the number of injury and fatal crashes to the total number of pedestrian crashes by month. The percentage of injury crashes by month varies from a low of 83 percent to a high of 100 percent. The months of April and December had the highest percentages while the months of January and October had the lowest. Another important fact is that over 90 percent of all pedestrian crashes involved injuries. **Table 5** also shows that 4.6 percent of the crashes involving pedestrians involved a fatality. Of the 219 crashes, 208 had injuries or fatalities.

Table 4: Total Number of Pedestrian Crashes by Month and Year

	2013	2014	2015	2016	2017	Total	%
January	5	3	2	6	9	25	11.4%
February	2	5	2	2	1	12	5.5%
March	2	2	3	2	5	14	6.4%
April	9	1	0	4	5	19	8.7%
May	5	2	3	1	2	13	5.9%
June	1	3	1	4	2	11	5.0%
July	5	4	2	3	3	17	7.8%
August	3	3	1	1	4	12	5.5%
September	6	2	6	7	5	26	11.9%
October	4	3	7	5	5	24	11.0%
November	5	7	3	6	4	25	11.4%
December	4	4	7	3	3	21	9.6%
<i>Total</i>	51	39	37	44	48	219	100.0%

Table 5: Comparison of the Total Number of Pedestrian Crashes to the Number of Injury and Fatal Crashes

Month	Total Number	Injury Crashes	Percentage	Fatal Crashes	Percentage
January	25	21	84.0%	1	4.0%
February	12	11	91.7%	1	8.3%
March	14	12	85.7%	1	7.1%
April	19	19	100.0%	0	0.0%
May	13	12	92.3%	1	7.7%
June	11	10	90.9%	1	9.1%
July	17	15	88.2%	2	11.8%
August	12	11	91.7%	0	0.0%
September	26	23	88.5%	0	0.0%
October	24	20	83.3%	3	12.5%
November	25	23	92.0%	0	0.0%
December	21	21	100.0%	0	0.0%
<i>Total</i>	219	198	90.4%	10	4.6%

Figure 3 compares the total number, injury and fatal crashes by month. Both the total number and injury crashes parallel each other with the largest numbers in the fall and early winter. It also shows two minor peaks in April and July. February, June and August had the fewest crashes as well as the fewest injury crashes. There were either no fatalities or only one fatality per month except for July and October. There were two fatal crashes in July and three in October.

Figure 3: Total Number of Pedestrian, Injury and Fatal Crashes by Month

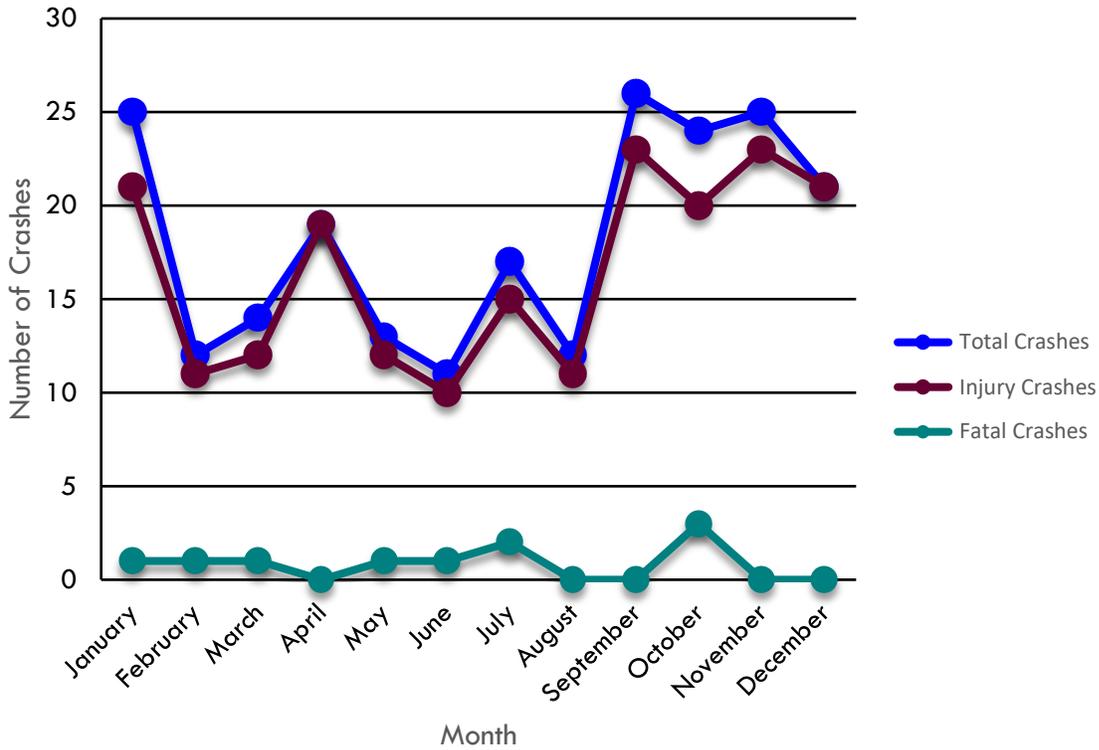


Table 6 provides a detailed look at the crashes in which an injury occurred by month and by year.

Table 6: Total Number of Injury Crashes by Month and by Year

	2013	2014	2015	2016	2017	Total	Percent
January	4	3	1	5	8	21	10.6%
February	2	4	2	2	1	11	5.6%
March	1	2	3	2	4	12	6.1%
April	9	1	0	4	5	19	9.6%
May	5	2	3	1	1	12	6.1%
June	1	2	1	4	2	10	5.1%
July	4	4	2	3	2	15	7.6%
August	3	3	1	1	3	11	5.6%
September	5	2	6	6	4	23	11.6%
October	3	2	7	5	3	20	10.1%
November	5	6	3	6	3	23	11.6%
December	4	4	7	3	3	21	10.6%
Total	46	35	36	42	39	198	100%

Tables 7, 8 and 9 looks at the crash data by the pedestrians' age and by year. **Table 7** summarizes the data for the entire county while **Tables 8 and 9** examine the data geographically divided by the Wabash River.

Table 7 shows that over a third of the crashes involved pedestrians who are 16 to 24 years of age. The second, third and fourth age groups that experienced the most crashes were persons 25 to 34 years of age (39 crashes), persons younger than 16 (26 crashes) and persons 45 to 54 years of age (24 crashes).

Table 7: Persons Involved in Pedestrian Crashes by Age of Pedestrians and by Year

	2013	2014	2015	2016	2017	Total	Percent
<16	9	5	3	6	3	26	11.2%
16-24	20	13	15	14	19	81	34.8%
25-34	9	7	6	11	6	39	16.7%
35-44	6	3	4	2	7	22	9.4%
45-54	8	5	1	6	4	24	10.3%
55-64	---	4	2	3	7	16	6.9%
65 >	3	1	4	3	2	13	5.6%
Unknown	4	2	3	2	1	12	5.2%
Total	59	40	38	47	49	233	100%

Table 8: Age of Pedestrians in Crashes that Occurred East and South of the Wabash River

	2013	2014	2015	2016	2017	Total	Percent
<16	7	5	3	5	1	21	16.2%
16-24	8	4	3	4	2	21	16.2%
25-34	3	4	5	5	6	23	17.7%
35-44	5	1	4	2	5	17	13.1%
45-54	7	5	---	4	3	19	14.6%
55-64	---	4	2	2	4	12	9.2%
65 >	2	1	2	2	2	8	6.9%
Unknown	1	2	3	2	0	9	6.2%
Total	33	26	22	26	23	130	100%

Table 9: Age of Pedestrians in Crashes that Occurred West and North of the Wabash River

	2013	2014	2015	2016	2017	Total	Percent
<16	2	---	---	1	2	5	4.9%
16-24	12	9	12	10	17	60	58.3%
25-34	6	3	1	6	---	16	15.5%
35-44	1	2	---	---	2	5	4.9%
45-54	1	---	1	2	1	5	4.9%
55-64	---	---	---	1	3	4	3.9%
65 >	1	---	2	1	---	4	3.9%
Unknown	3	---	---	---	1	4	3.9%
Total	26	14	16	21	26	103	100%

Tables 8 and 9 show an interesting picture when compared to each other. Nearly 60 percent of crashes involving pedestrians occurred east and south of the Wabash River. Looking at those crashes, the total numbers for each age group are nearly evenly divided. The crash data west and north of the Wabash River looks totally different as one would expect because of Purdue University. Nearly two-thirds of these crashes involved pedestrians who were 16 to 24 years of age. Another 15 percent of the crashes involved pedestrians 25 to 34.

By Day of Week

Crashes were more prevalent during the week than on the weekend. The day with the greatest number was Thursday with 21 percent of the crashes. Wednesday was a close second with nearly 19 percent. The fewest crashes occurred on Sunday at 6 percent. **Table 10** and **Figure 4** present this data.

Table 10: Total Number of Pedestrian Crashes by Day of Week and Year

Month	2013	2014	2015	2016	2017	Total	Percent
Sunday	3	4	2	1	3	13	5.9%
Monday	9	4	3	11	5	32	14.6%
Tuesday	4	6	6	1	10	27	12.3%
Wednesday	12	5	12	8	4	41	18.7%
Thursday	10	9	7	9	11	46	21.0%
Friday	8	9	5	7	7	36	16.4%
Saturday	5	2	2	7	8	24	11.0%
Total	51	39	37	44	48	219	

Figure 4: Crashes by Day of Week

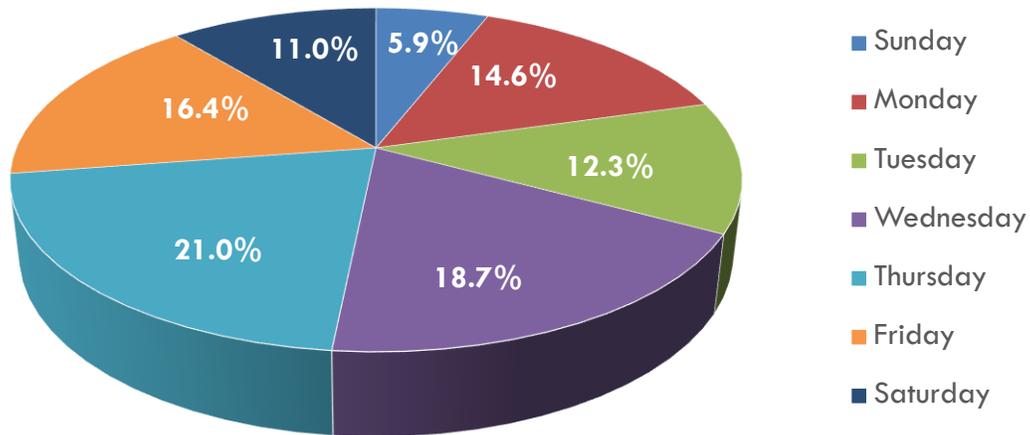


Table 11 looks at the crash data by pedestrian age and by day of the week. In the youngest age group, the two days with the largest number of crashes occurred on Wednesday and Thursday. During the rest of the week, the number of crashes was consistent except for Friday. For the age group with the highest number of crashes, 16-24, the days with the largest number occurred on Thursday with a significant number also occurring on Wednesday and Friday. For those persons who are slightly older (25-34), the day with the largest number was Thursday. For the remaining age groups, the number of crashes was more evenly distributed.

By Time of Day

Table 12 shows when crashes occurred by time of day and by year. **Figure 5** depicts the information graphically. Not surprisingly, there were very few crashes during the early morning hours. There was a peak in the number of crashes from 7:00 to 8:00 a.m. (the morning commute). Looking at that data for that hour by year, the number per year ranged from 4 (2016 and 2017) to 6 (2014).

Table 11: Pedestrians Involved in Crashes by Age and by Day of Week

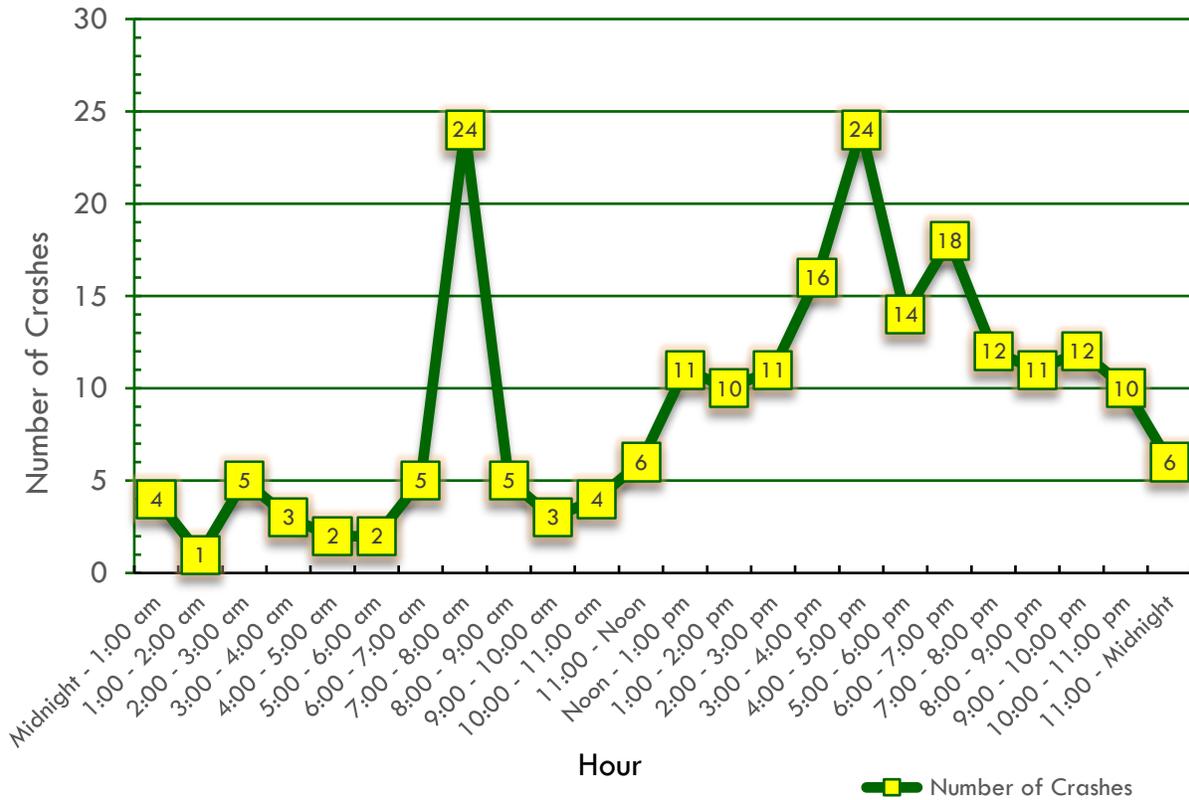
	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Total
<16	1	2	2	7	7	5	2	26
16-24	6	12	11	14	15	14	9	81
25-34	2	8	4	7	11	5	2	39
35-44	1	2	4	4	4	5	2	22
45-54	---	3	2	4	7	4	4	24
55-64	1	5	2	---	1	2	5	16
65 +	---	1	2	4	4	1	1	13
Unknown	3	2	1	4	---	2	---	12
<i>Total</i>	14	35	28	43	49	38	26	233

The number of crashes steadily increased beginning in the late morning and then peaked between 4:00 and 5:00 p.m. (the evening commute). The yearly data for that hour was not as uniform as the morning peak hour. There were only 2 crashes in 2013 and 3 in 2014. There were 7 crashes in 2015 and 6 crashes each in 2016 and 2017. The five-year total number of crashes from noon to 3:00 p.m. and from 7:00 p.m. to 11:00 p.m. were relatively consistent with 10 to 12 crashes an hour.

Table 12: Total Number of Pedestrian Crashes by Time of Day

	2013	2014	2015	2016	2017	Total	Percent
Midnight – 1 am	1	---	1	1	1	4	1.8%
1:00 – 2:00	1	---	---	---	---	1	0.5%
2:00 – 3:00	2	---	1	1	1	5	2.3%
3:00 – 4:00	2	---	---	1	---	3	1.4%
4:00 – 5:00	1	---	---	1	---	2	0.9%
5:00 – 6:00	---	---	---	1	1	2	0.9%
6:00 – 7:00	---	1	---	1	3	2	2.3%
7:00 – 8:00	5	6	5	4	4	24	11.0%
8:00 – 9:00	2	---	2	---	1	5	2.3%
9:00 – 10:00	1	---	2	---	---	3	1.4%
10:00 – 11:00	1	---	1	1	1	4	1.8%
11:00 – 12:00	1	---	1	1	3	6	2.7%
Noon – 1 pm	3	4	1	2	1	11	5.0%
1:00 – 2:00	2	3	1	1	3	10	4.6%
2:00 – 3:00	3	3	3	1	1	11	5.0%
3:00 – 4:00	4	2	3	4	3	16	7.3%
4:00 – 5:00	2	3	7	6	6	24	11.0%
5:00 – 6:00	5	2	2	4	1	14	6.4%
6:00 – 7:00	6	3	2	6	1	18	8.2%
7:00 – 8:00	3	2	1	3	3	12	5.5%
8:00 – 9:00	2	3	2	1	3	11	5.0%
9:00 – 10:00	3	5	1	---	3	12	5.5%
10:00 – 11:00	1	1	1	3	4	10	4.6%
11:00 – 12:00	---	1	---	1	4	6	2.7%
<i>Total</i>	51	39	37	44	48	219	

Figure 5: Pedestrian Crashes by Time of Day



Looking at the morning and evening peak hour crash data by pedestrians' age reveals additional information. For the morning peak hour, the number of crashes by age group is somewhat equal between persons 16 through 54 years of age. The evening peak hour is different; there are substantially more crashes that involve pedestrians between 16 and 24 years of age. **Table 13** shows the crash data by peak hour and by age group. Two crashes that involved multiple pedestrians occurred during the peak hours with one in the morning and the other in the evening.

Table 13: Age Group by Peak Hour

Age	7-8 a.m.	4-5 p.m.
<16	2	3
16-24	4	10
25-34	5	3
35-44	4	3
45-54	5	1
55-64	2	2
65 +	2	---
Unknown	1	2
Total	25	25

By Environmental Conditions

Atmospheric or Weather Conditions

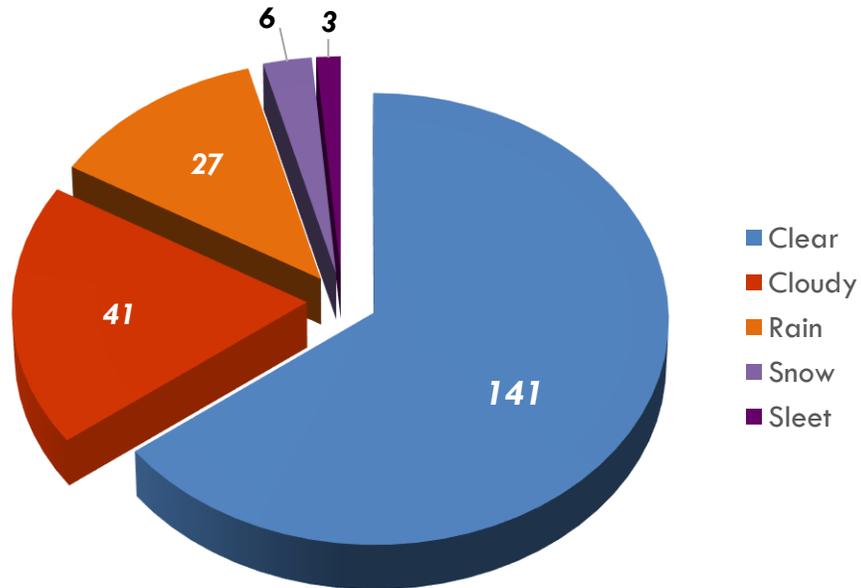
Weather conditions at the time of crashes were generally favorable. Conditions were clear 64 percent of the time and cloudy 18 percent of the time. It was raining when 12 of the crashes occurred, or 2.7 percent. Six crashes occurred when it was snowing and 3 when there was sleet or freezing rain. **Table 14** shows the information by weather condition type and by year and **Figure 6** shows the crash proportions by the five weather conditions. This analysis shows that very few crashes can be attributed to bad weather conditions.

Table 14: Crashes by Atmospheric Conditions

Year	Clear	% of Crashes	Cloudy	% of Crashes	Rain	% of Crashes	Snow	% of Crashes	Sleet	% of Crashes
2013	25	68.6%	11	21.6%	5	9.8%	---	---	---	---
2014	21	53.8%	11	28.2%	4	10.3%	2	5.1%	1	2.6%
2015	26	70.3%	4	10.8%	5	13.5%	1	2.7%	1	2.7%
2016	27	61.4%	6	13.6%	7	15.9%	3	6.8%	---	---
2017	32	66.7%	9	18.8%	6	12.5%	---	---	1	2.1%
Total	141	64.4%	41	18.7%	27	12.3%	6	2.7%	3	1.4%

Note: One crash in 2016 had an unknown atmospheric condition

Figure 6: Crashes by Atmospheric Conditions



Lighting Conditions

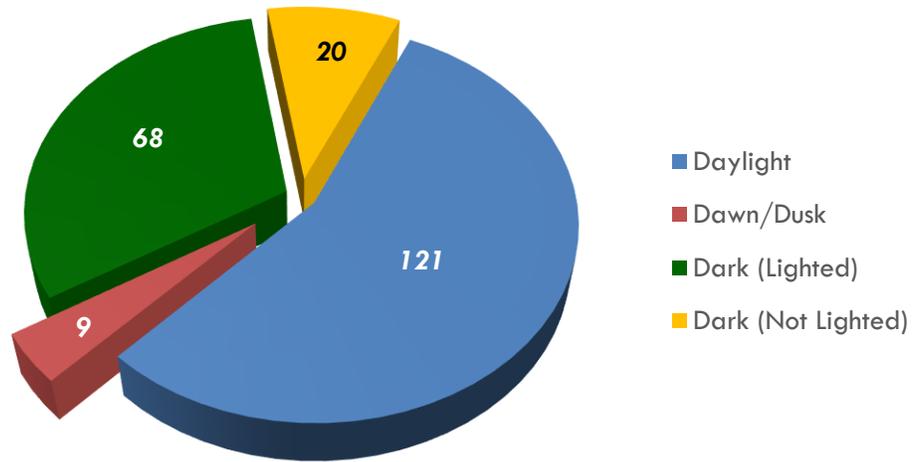
Just over half of the crashes (121) occurred during daylight hours, **Table 15**. 88 crashes occurred when it was dark. Over 30 percent of those night time crashes occurred at locations that were lighted while just over 9 percent occurred where there was no street lighting present. Only a small fraction, 4 percent, occurred at dawn or at dusk. **Figure 7** shows a breakdown of crashes by lighting conditions.

Table 15: Crashes by Lighting Conditions

Year	Daylight	% of Crashes	Dawn / Dusk	% of Crashes	Dark (Lighted)	% of Crashes	Dark (Not Lighted)	% of Crashes
2013	27	52.9%	3	5.9%	19	37.3%	2	3.9%
2014	20	51.3%	1	2.6%	12	30.8%	6	15.4%
2015	25	67.6%	1	2.7%	9	24.3%	2	5.4%
2016	24	54.5%	3	6.8%	12	27.3%	4	9.1%
2017	25	52.1%	1	2.1%	16	33.3%	6	12.5%
Total	121	55.3%	9	4.1%	68	31.1%	20	9.1%

Note: One crash in 2016 had an unknown lighting condition

Figure 7: Crashes by Lighting Conditions



Road Surface Conditions

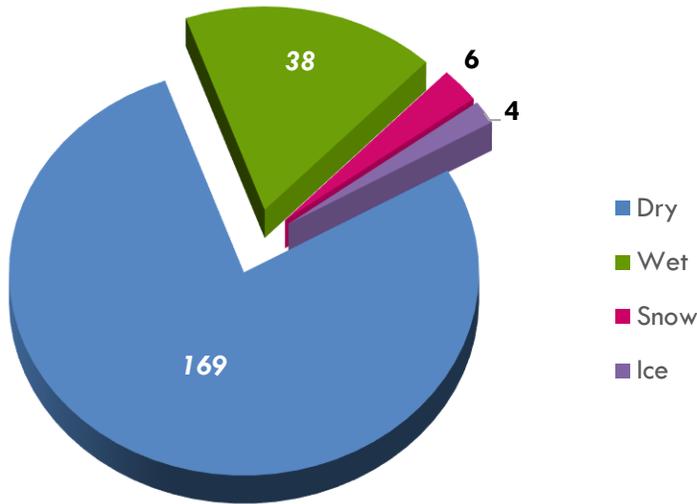
Road surface condition at the time of the crashes was mostly favorable. Conditions were dry nearly 80 percent of the time and wet about 17 percent. Snow, slush or ice were present less than 5 percent of the time. **Table 16** and **Figure 8** summarizes the data.

Table 16: Crashes by Road Surface Conditions

	Dry	% of Crashes	Wet	% of Crashes	Snow	% of Crashes	Ice	% of Crashes
2013	41	80.4%	9	17.6%	1	2.0%	---	---
2014	27	69.2%	8	20.5%	3	7.7%	1	2.6%
2015	29	78.4%	6	16.2%	---	---	2	5.4%
2016	32	72.7%	9	20.5%	2	4.5%	---	---
2017	40	83.3%	6	12.5%	---	---	1	2.1%
Total	169	77.2%	38	17.4%	6	2.7%	4	1.8%

Note: One crash in 2016 had an unknown road surface condition and one crash in 2017 reported loose material on the road.

Figure 8: Crashes by Road Surface Conditions



Type of Collision

The type of collision tells us what the vehicles were doing at the time of the crash. It provides information about the position of the vehicle and pedestrian and also their direction of travel. **Table 17** shows the data for each type of collision by year.

By far, the most frequent type of collision occurred when the pedestrian was hit head on. This type of collision accounted for a quarter of the crashes. The second and third most common types of collisions occurred when the vehicles were making a left turn and other, explain in the narrative. These accounted for 24.2 percent and 21.9 percent respectively. The other two notable types were crashes at a right angle and same direction sideswipe.

Table 17: Crashes by Type of Collision and by Year

Type of Collision	2013	2014	2015	2016	2017	Total	%
Head On	11	8	11	10	15	55	25.1%
Left Turn	14	9	12	10	8	53	24.2%
Other – Explain in Narrative	11	6	7	14	10	48	21.9%
Right Angle	6	5	2	6	5	24	11.0%
Same Direction Sideswipe	5	7	---	---	5	17	7.8%
Right Turn	---	1	2	2	2	7	3.2%
Backing Crash	---	2	---	---	2	4	1.8%
Left/Right Turn	2	---	---	1	---	3	1.4%
Left/Right Turn	---	---	1	---	1	2	0.9%
Backing Crash	1	---	1	---	---	2	0.9%
Non-Collision	1	1	---	---	---	2	0.9%
Unknown	---	---	1	1	---	2	0.9%
Total	51	39	37	44	48	219	

Injuries and Fatalities

State and Local Comparison

Fixing America's Surface Transportation Act, or FAST Act, requires the use of data when deciding which transportation projects should be funded with federal gas tax funds. The specific program for collecting and analyzing the data is called Transportation Performance Management, or TPM. There are six specific focus areas within the TPM, one of them is safety. The Safety TPM establishes targets or goals for crashes with fatalities, serious injuries and the number of non-motorist fatalities and serious injuries. These targets are set annually by INDOT and supported by MPOs.

When looking at the non-motorist fatalities and serious injuries Safety TPM, INDOT considers bicyclists, pedestrians and occupants in animal-drawn vehicles as non-motorized. The target is to reduce the five-year average of the combined number of fatalities and serious injuries. The target in 2018 was 381.51 crashes and for 2019 it is 393.47 crashes. **Table 18** shows the specific details for the non-motorist safety TPM.

Table 18: Non-Motorized Fatalities & Serious Injuries, Indiana

Year	Number Non-Motorized Fatalities	Number Non-Motorized Serious Injuries	Combined Total	Five-Year Rolling Average*
2012	79	301	380	373.00
2013	87	285	372	370.00
2014	94	277	367	375.20
2015	109	276	378	375.00
2016	106	280	386	376.50
2017	116	256	372	374.92
2018	140	265	405	381.51
2019	132	295	427	393.47

Source: Baseline INDOT Traffic Safety Performance Target Setting, Methodology and data decisions, Draft 2020

Table 19 shows the number of bicycle and pedestrian fatality and serious injury crashes in Tippecanoe County from 2013 through 2017. The serious injury crashes were identified by reading each crash report and noting whether or not the cyclist/pedestrian was transported to the hospital.

Table 19: Non-Motorized Fatalities & Serious Injuries, Tippecanoe County

Year	Number Non-Motorized Fatalities	Number Non-Motorized Serious Injuries	Combined Total	Five-Year Rolling Average*
2013	6	8	14	---
2014	1	5	6	---
2015	1	3	4	---
2016	0	6	6	---
2017	4	8	12	8.4

Table 20 shows a comparison of the total number of fatality crashes to the number of bicycle and pedestrian fatality crashes at the state level and for Tippecanoe County. Over 12% of the fatality crashes in Indiana from 2013 through 2016 involved a bicyclist or pedestrian. That percentage is slightly higher in Tippecanoe County over the same four-year period; the percentage is 14.8%.

Table 20: Bicycle & Pedestrian Crashes and Fatalities, Indiana and Tippecanoe County

Year	Total # of Fatalities in Indiana	Bike/Ped Fatalities	% Bike/Ped Fatal	Tip Co Total Fatal	Tip. Co Bike/Ped Fatal	Percent
2013	784	87	11.1%	22	6	27.3%
2014	745	94	12.6%	6	1	16.7%
2015	817	109	13.3%	18	1	5.6%
2016	829	106	12.8%	8	0	0.0%
<i>Total</i>	3,175	396	12.5%	54	8	14.8%

Fatalities, Incapacitating Injuries, and Injury Crashes in Tippecanoe County

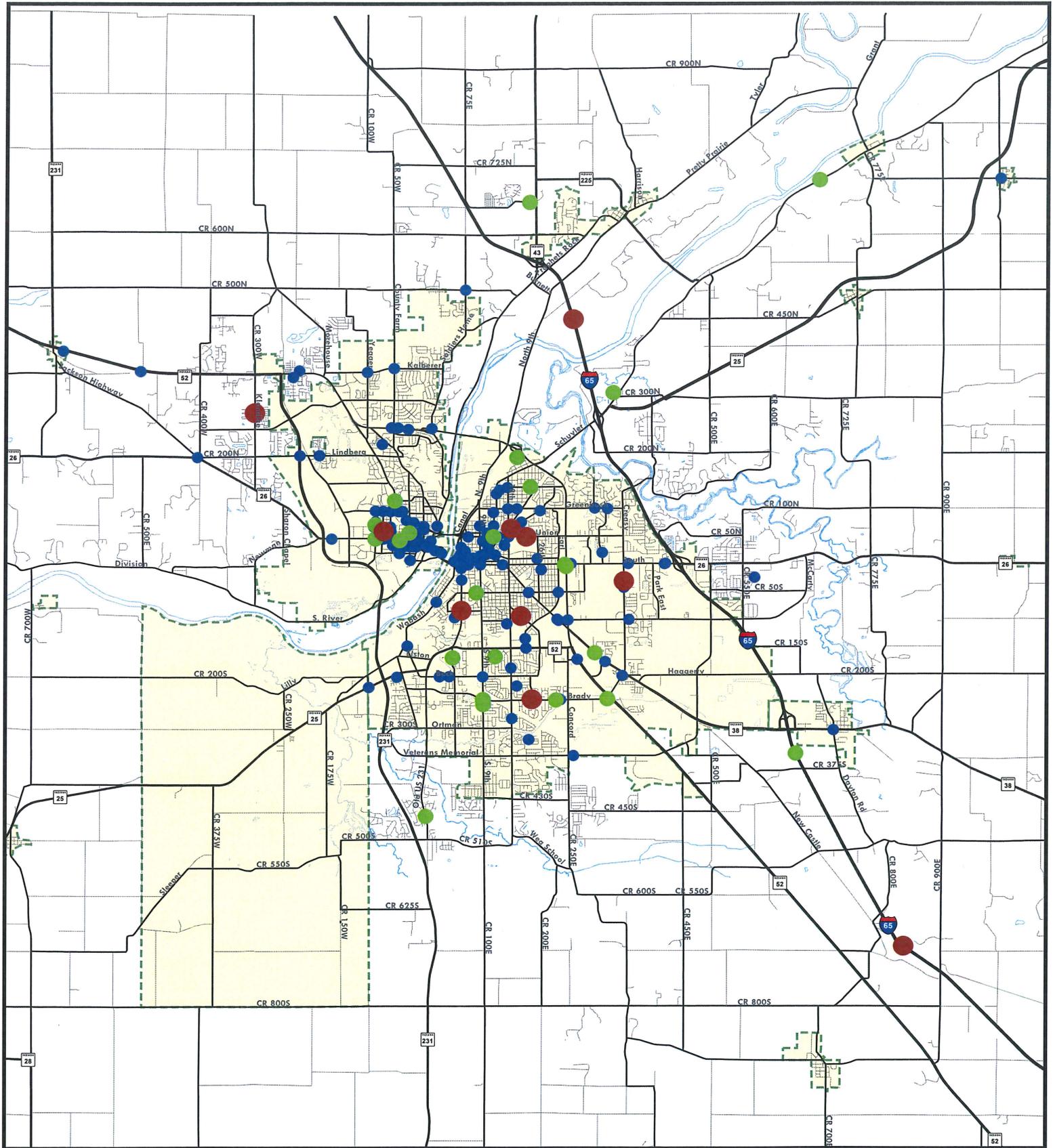
Looking at pedestrian fatalities, incapacitant injuries, and injury crashes in Tippecanoe County, **Figure 9** shows their locations. The locations where the 11 fatalities occurred were: I-65 (2 crashes), Creasy Lane near Fortune Drive, State Street at 21st Street, Commanche Trail at Brady Lane, South 4th Street near Owen Street, Union Street near 26th Street, Elmwood Avenue at 19th Street, Russell Street and 2nd Street, and Klondike Road near Pemberly Court. There was one location, I-65 between SR 43 and SR 25, where two fatalities occurred in one crash.

Looking more closely at the causes of those crashes, alcohol and drugs played a significant factor. Four of the crashes were related to alcohol use with three of them involving the pedestrian being intoxicated. Two crashes involved drug use with one crash involving the pedestrian under the influence. Of the four remaining crashes, two reports indicated the alcohol and drug tests were pending and no results were reported.

Crashes that occurred with an incapacitating injury reported were scattered mostly throughout the City of Lafayette. Of all those locations, there were two locations that had two crashes each. One location was at the intersection of South Street and Sagamore Parkway and the other was at the intersection of 9th Street and Twyckenham Boulevard. One serious injury crash occurred near McCutcheon High School. There were several on or near the Purdue campus and 5 in rural Tippecanoe County.

There were 165 crashes in which the pedestrians were not seriously injured. Their locations were scattered through the community. The corridors that had a significant number of non-injury pedestrian crashes were: State Street (West Lafayette) with 21; Grant Street with 11; South Street (Lafayette) with 10; 4th Street and Stadium Avenue with 8 each; Ferry Street, 9th Street and 18th Street with 7 each; and University Street with 6. The intersection of State Street and Grant Street had the greatest number with 7 crashes.

Figure 9: Locations of Injury, Incapacitating Injury and Fatality Crashes



Legend

- Injury Crashes
- Incapacitating Injury Crashes
- Fatal Crashes

Who Was Involved in the Crashes?

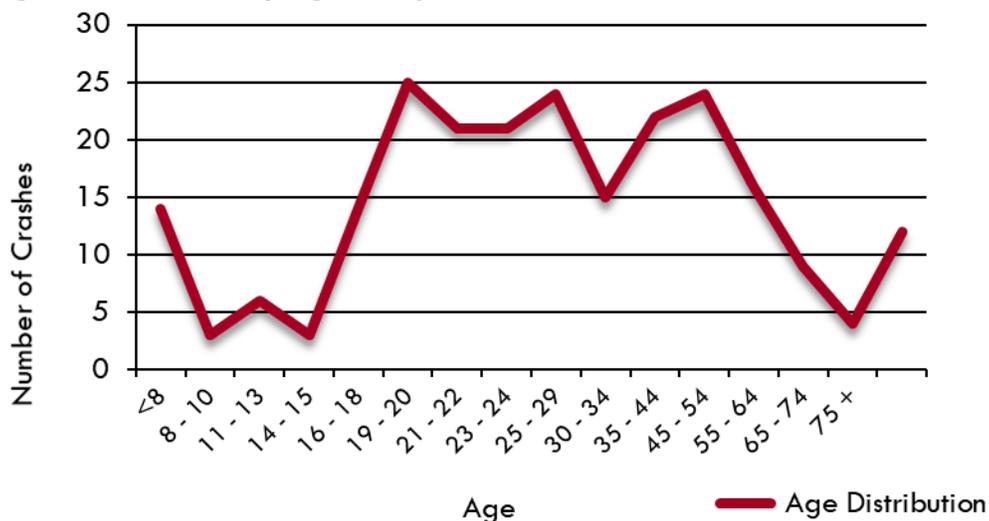
By Age of Pedestrian

Table 21 shows an interesting distribution of crashes by age groups. There were 6 groups that had over 20 crashes each with the 19-20, 25-29, and 45-54 age groups having the most with 25, 24 and 24 crashes respectively. These three age groups accounted for nearly a third of all crashes. The three age groups that had 22 and 21 crashes each were the 21-22, 23-24 and 35-44 age groups. Only 17 crashes involved children 10 or younger, or 6 percent of all the crashes. Persons who were 65 and older were involved in 13 crashes. **Figure 10** shows the age distribution.

Table 21: Pedestrians Involved in Crashes by Year and by Age Group

	2013	2014	2015	2016	2017	Total	Percent
< 8	6	2	1	4	1	14	6.0%
8-10	---	1	---	1	1	3	1.3%
11-13	3	1	1	---	1	6	2.6%
14-15	---	1	1	1	---	3	1.3%
16-18	3	3	4	1	3	14	6.0%
19-20	5	4	6	3	7	25	10.7%
21-22	5	1	3	6	6	21	9.0%
23-24	7	5	2	4	3	21	9.0%
25-29	4	3	5	9	3	24	10.3%
30-34	5	4	1	2	3	15	6.4%
35-44	6	3	4	2	7	22	9.4%
45-54	8	5	1	6	4	24	10.3%
55-64	---	4	2	3	7	16	6.9%
65-74	2	1	3	2	1	9	2.9%
75+	1	---	1	1	1	4	1.7%
Unknown	4	2	3	3	1	12	5.2%
	59	40	38	38	49	233	

Figure 10: Crashes by Age Group



Comparing 2013 pedestrian crash data for the entire state and Tippecanoe County reveals that children less than 8 years of age were slightly more likely to be involved in crashes within Tippecanoe County. The reverse is true for children ages 8 to 15. Older teenagers and young adults, especially those between 21 and 24 were involved more frequently in Tippecanoe County when compared to the state data. **Table 22** compares the State of Indiana’s data to that of Tippecanoe County’s.

In 2013, the percentage of crashes involving cyclists 45 to 54 years old was nearly the same for both Tippecanoe County and for the state.

Table 22: Comparison to the State of Indiana, 2013

	State of Indiana (2013 Crashes)		Tippecanoe County (2013 Crashes)		Tippecanoe County (Five Year Total)	
< 8	133	7.6%	6	10.2%	14	6.0%
8-15	223	12.7%	3	5.1%	12	5.2%
16-20	196	11.2%	8	13.6%	39	16.7%
21-24	147	8.4%	12	20.3%	42	18.0%
25-34	269	15.3%	9	15.3%	39	16.7%
35-44	205	11.7%	6	10.2%	22	9.4%
45-54	237	13.5%	8	13.6%	24	10.3%
55-64	160	9.1%	---	---	16	6.9%
65-74	115	6.5%	2	3.4%	9	3.9%
75+	72	4.1%	1	1.7%	4	1.7%
Unknown	---	---	4	6.8%	12	5.2%
<i>Total</i>	<i>1,757</i>		<i>59</i>		<i>233</i>	

Indiana Crash Facts, IS Public Policy Institute, Figure 6.2. Pedestrian and Pedalcyclists involved in Indiana Collision, by age group, 2013, page 81

Figure 11 shows the locations of crashes that involved pedestrians 22 years of age and younger. The information was color coded to reflect approximate grade levels: elementary and younger, middle, high school and undergraduate college students.

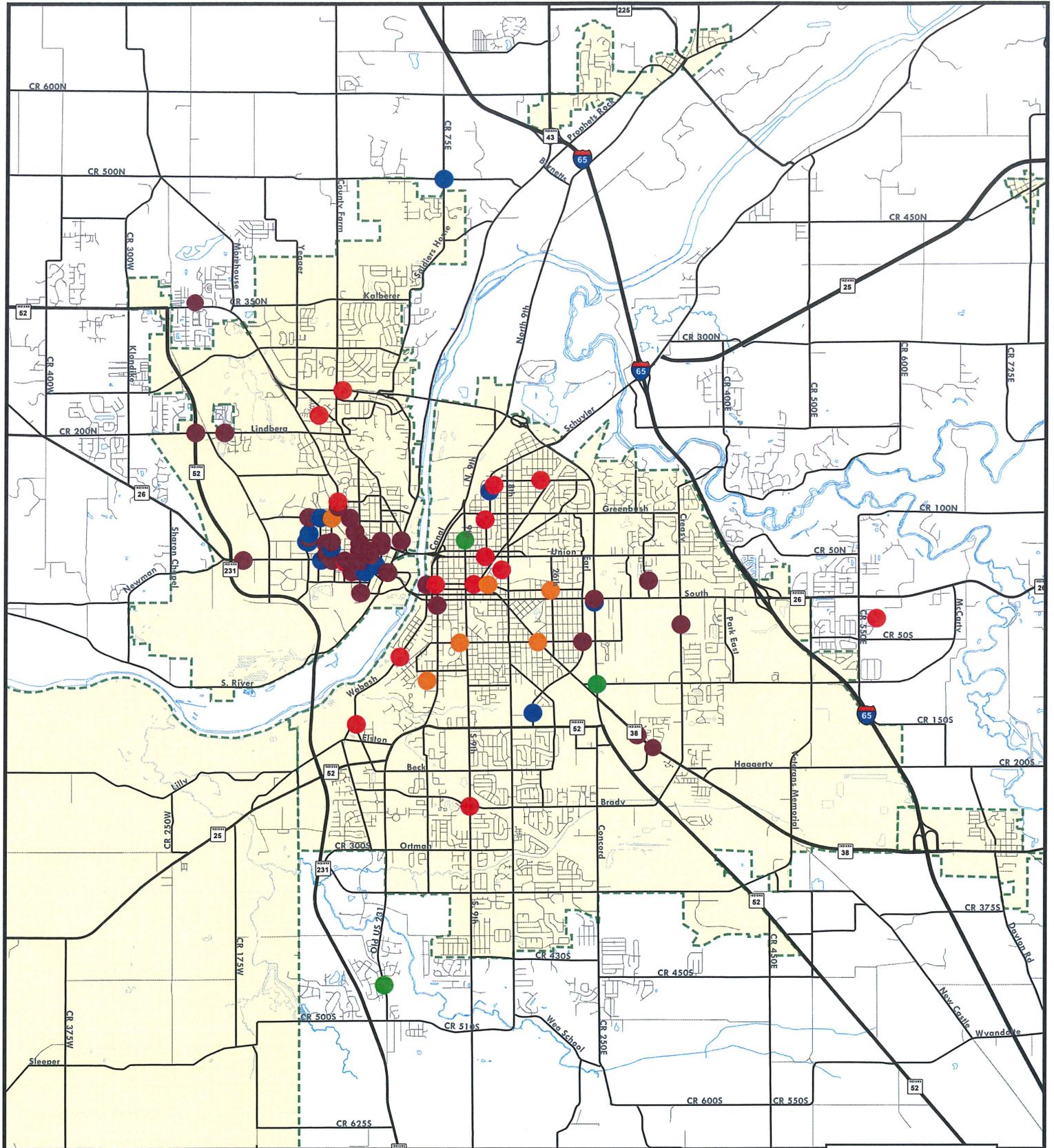
There were 15 locations where a child 10 or younger was involved in a crash. Many of the locations were in Lafayette (11 crashes) and the remainder were in West Lafayette. 4 crashes were located on residential streets that typically have low traffic volumes. All of the other crash locations were on thoroughfares with higher traffic volumes. The 9th Street and Twyckenham intersection is the only crash location that had multiple children (3) involved.

All but one of the crashes involving children between the ages of 11 to 13 occurred within the City of Lafayette. The one in West Lafayette occurred at Stadium Avenue and University Street. Of the 5 crashes in Lafayette, 2 occurred on Ferry Street and 2 occurred on Kossuth Street.

There were only 3 children involved in a crash whose ages were 14 or 15 years old and the crash locations were on Old US 231 by McCutcheon High School, at Sagamore Parkway and McCarty Lane, and at 9th Street and Hartford Street.

In the 16 to 18-year-old age group, 10 crashes occurred in and around the Purdue campus. Of those 10, 4 occurred on Jischke Drive with 3 of them occurring at Jischke Drive and 3rd Street. In Lafayette, 1 crash occurred on 22nd Street near Jefferson High School. The second occurred on Sagamore Parkway just south of the South Street intersection and the third occurred on 15th Street

Figure 11: Pedestrian Crashes Located by Age Group, 1 to 22 Years of Age



Legend

- 10 or Younger
- 11 to 13
- 14 to 15
- 16 to 18
- 19 to 22

just south of Underwood. The remaining crash occurred in the county at the intersection of CR 75E and CR 500N.

It's not surprising that nearly 75% of the crashes involving 19 to 22-year olds occurred on or near the Purdue campus. While the locations were scattered throughout campus, 3 crashes occurred at the intersection of Stadium Avenue and Jischke Drive and there were 2 locations where two crashes occurred at each location: State Street at University Street and State Street at Grant Street. Outside of the campus area, two crashes occurred on Lindberg Road and one occurred just outside of the city limits on Paramount Drive. While 2 crashes occurred in downtown Lafayette, the remaining 6 were on SR 38, Creasy Lane, Sagamore Parkway, Shenandoah Drive and Earl Avenue.

By Gender of Pedestrian

Male pedestrians were involved in more crashes, 129, than pedestrians who were female, 92, which is a 58.4 percent to 41.6 percent split. The big differences by age groups were the 25-29 and 45-54 age groups. There were substantially more males involved in crashes in those age groups when compared to the number of females involved. **Figure 12** portrays the crash data by gender. It should be noted that the information for age and/or gender was not recorded for 12 crashes.

Figure 12: Comparison of Pedestrian Involved in Crashes by Age Group and by Sex

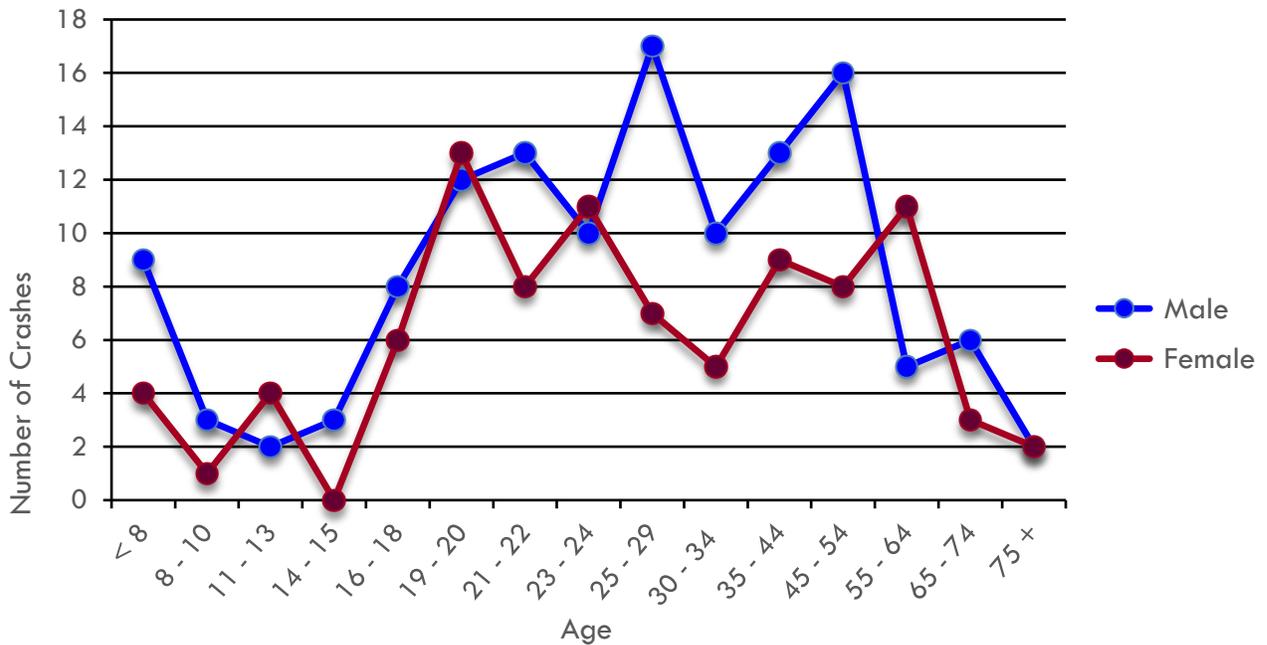


Table 23 breaks down the data by age group for crashes that only involved males. In looking at the data, over 22 percent of crashes involved males who were 35 through 54 years old. This is slightly more than the 19 to 22 age groups. The 25 to 29 age group was involved in 13.2 percent of the crashes. Just over 6 percent of the crashes involved males who were 65 and older and 7 percent of the crashes involved males younger than 8.

Table 24 shows the detailed data for crashes involving females. There are three age groups that experienced more crashes than their male counterparts. The group with the most was the 19 to 20 age group with 13 crashes. The 23 to 24 and 55 to 64 age groups tied for second with 11 crashes each. There were only four crashes involving females younger than 8 and 5 crashes involving females who were 65 and older.

Table 23: Pedestrian Involved in Crashes by Age of Pedestrian by Year, Male

Age	2013	2014	2015	2016	2017	Total	Percent
< 8	5	---	1	2	1	9	7.0%
8-10	1	---	---	1	1	3	2.3%
11-13	1	---	---	---	1	2	1.6%
14-15	---	1	1	1	---	3	2.3%
16-18	2	1	3	1	1	8	6.2%
19-20	4	1	2	2	3	12	9.3%
21-22	2	1	1	4	5	13	10.1%
23-24	1	2	2	3	2	10	7.8%
25-29	4	2	5	5	1	17	13.2%
30-34	4	3	---	2	1	10	7.8%
35-44	2	1	4	2	4	13	10.1%
45-54	5	3	---	6	2	16	12.4%
55-64	---	1	---	---	4	5	3.9%
65-74	1	1	2	1	1	6	4.7%
75+	1	---	---	1	---	2	1.6%
<i>Total</i>	33	17	21	31	27	129	

Table 24: Pedestrians Involved in Crashes by Age of Pedestrian by Year, Female

Age	2013	2014	2015	2016	2017	Total	Percent
< 8	---	2	---	2	---	4	4.3%
8-10	---	1	---	---	---	1	1.1%
11-13	2	1	1	---	---	4	4.3%
14-15	---	---	---	---	---	---	---
16-18	1	2	1	---	2	6	6.5%
19-20	1	3	4	1	4	13	14.1%
21-22	3	---	2	2	1	8	8.7%
23-24	6	3	---	1	1	11	12.0%
25-29	---	1	---	4	2	7	7.6%
30-34	1	1	1	---	2	5	5.4%
35-44	4	2	---	---	3	9	9.8%
45-54	3	2	1	---	2	8	8.7%
55-64	---	3	2	3	3	11	12.0%
65-74	1	---	1	1	---	3	3.3%
75+	---	---	1	---	1	2	2.2%
<i>Total</i>	22	21	14	14	21	92	

By Age and Gender of the Motor Vehicle Driver

Analysis of age and gender of motor vehicle drivers demonstrated that there were slightly more males involved in crashes. Just over half, 98 crashes, involved male drivers versus 84 crashes involving females. **Figure 13** shows the crash data by gender and **Tables 25** and **26** show the data in more detail. It should be noted that the information for age and/or gender of the vehicle driver was not recorded for 37 crashes.

Figure 13 shows a peak for male drivers in the 25 to 34 age group and a secondary peak in the 45 to 54 age group. A smaller third peak involved drivers 19 to 20 years of age. Looking at female drivers, there are two peaks. The largest is for drivers in the 35 to 44 age group with a secondary

peak for drivers in the 21 to 22 age group. With both genders combined, the age group with the most crashes was the 25 to 34 age group. There were 13 crashes involving drivers 75 years of age or older. Most of those crashes occurred in 2016 and 2017.

Figure 13: Comparison of Crashes by Age Group and Sex, Vehicle Driver

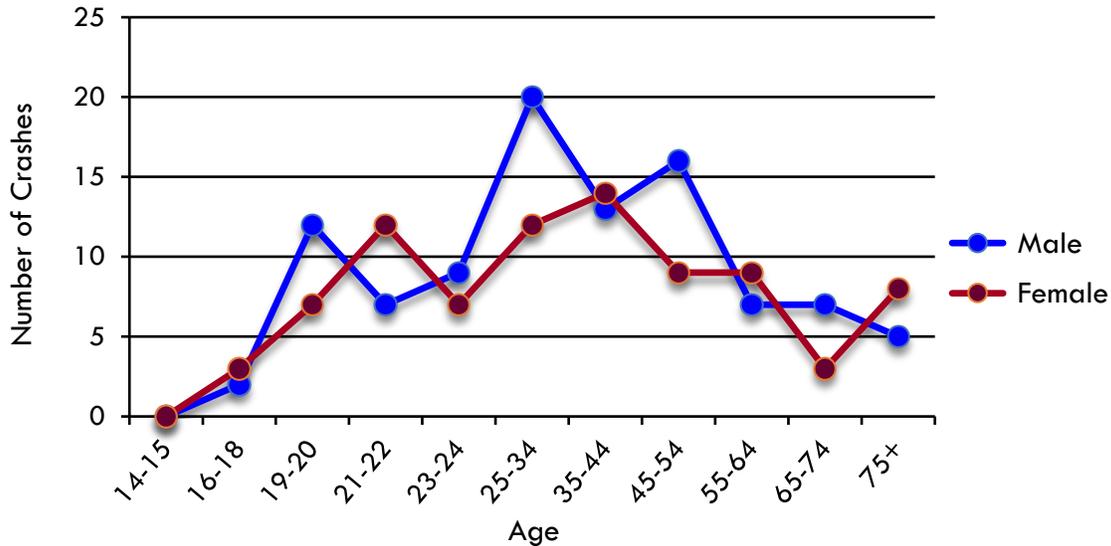


Table 25: Pedestrian Crash by Age of Driver by Year, Male

Age	2013	2014	2015	2016	2017	Total	Percent
14-15	---	---	---	---	---	---	---
16-18	2	---	---	---	---	2	2.0%
19-20	1	2	4	3	2	12	12.2%
21-22	2	---	2	2	1	7	7.1%
23-24	1	1	3	2	2	9	9.2%
25-34	6	4	2	3	5	20	20.4%
35-44	2	4	2	2	3	13	13.3%
45-54	3	3	2	4	4	16	16.3%
55-64	---	1	2	1	3	7	7.1%
65-74	2	1	1	---	3	7	7.1%
75+	---	1	---	2	2	5	5.1%
Total	19	17	18	19	25	98	

Table 26: Pedestrian Crash by Age of Driver by Year, Female

Age	2013	2014	2015	2016	2017	Total	Percent
14-15	---	---	---	---	---	---	---
16-18	1	---	---	2	---	3	3.6%
19-20	2	---	2	1	2	7	8.3%
21-22	2	2	3	3	2	12	14.3%
23-24	2	2	3	---	---	7	8.3%
25-34	5	1	---	5	1	12	14.3%
35-44	6	---	2	4	2	14	16.7%
45-54	1	5	1	---	2	9	10.7%
55-64	2	2	1	1	3	9	10.7%
65-74	---	1	---	1	1	3	3.6%
75+	1	1	1	2	3	8	9.5%
Total	22	14	13	19	16	84	

Where Did Crashes Occur?

By Location

Figure 14 shows the location of pedestrian crashes throughout Tippecanoe County over the five-year study period. While the majority of crashes appear to be clustered in the heart of both cities and on the Purdue campus, crashes also occurred in the suburbs and in rural Tippecanoe County.

In order to better understand and identify problematic locations such as intersections and corridors, the community was divided into four subareas. The subareas also made it easier to look at the data where there were concentrations of crashes. The subareas closely follow municipal boundaries except for the Purdue/Levee area. The Purdue/Levee area also includes Chauncey Village and the Levee.

Over the five years studied, just over half of the crashes occurred in Lafayette and nearly a third of the crashes occurred in the Purdue/Levee area. **Table 27** shows the breakdown of crashes by sub area. Nearly 7 percent of the crashes occurred in the remaining portion of West Lafayette and nearly 9 percent occurred in the rural portions of the county.

Table 27: Total Number of Crashes by Sub Area

	2013	2014	2015	2016	2017	Total	
Purdue/Levee	20	10	12	15	15	72	32.9%
West Lafayette	2	1	2	3	7	15	6.8%
Lafayette	24	24	21	24	20	113	51.6%
Rural Tipp. Co.	5	4	2	2	6	19	8.7%
Total	51	39	37	44	48	219	

Lafayette

Figure 15 shows the location of crashes within the City of Lafayette. There were 113 reported over the five-year period or 51.6%. With the City encompassing just over 29 square miles, that equates to 3.9 crashes per square mile for the five years.

An area of crash concentration is in and near the Lafayette downtown, roughly the area bounded by Salem Street, 18th Street, Alabama Street and the Wabash River. Over a third of the crashes in Lafayette, 35.4% were in this area. **Table 28** breaks down the crashes by year for the downtown area and for the remaining part of Lafayette.

Table 28: Total Number of Crashes in Lafayette

	2013	2014	2015	2016	2017	Total	
Downtown Lafayette	10	6	7	7	10	40	35.4%
Remaining Lafayette	14	16	16	17	10	73	64.6%
Total	24	22	23	24	20	113	

Comparing the two areas, the number of crashes in the downtown area fluctuated between 6 and 10 crashes per year. The high of 10 occurred in 2013 and 2017 with relatively the same number, 6/7, in the three mid years. The crashes in the remaining portion of Lafayette saw a large number in 2016 with the smallest number the following year.

Figure 14: Pedestrian Crashes Located in Tippecanoe County, 2013-2017

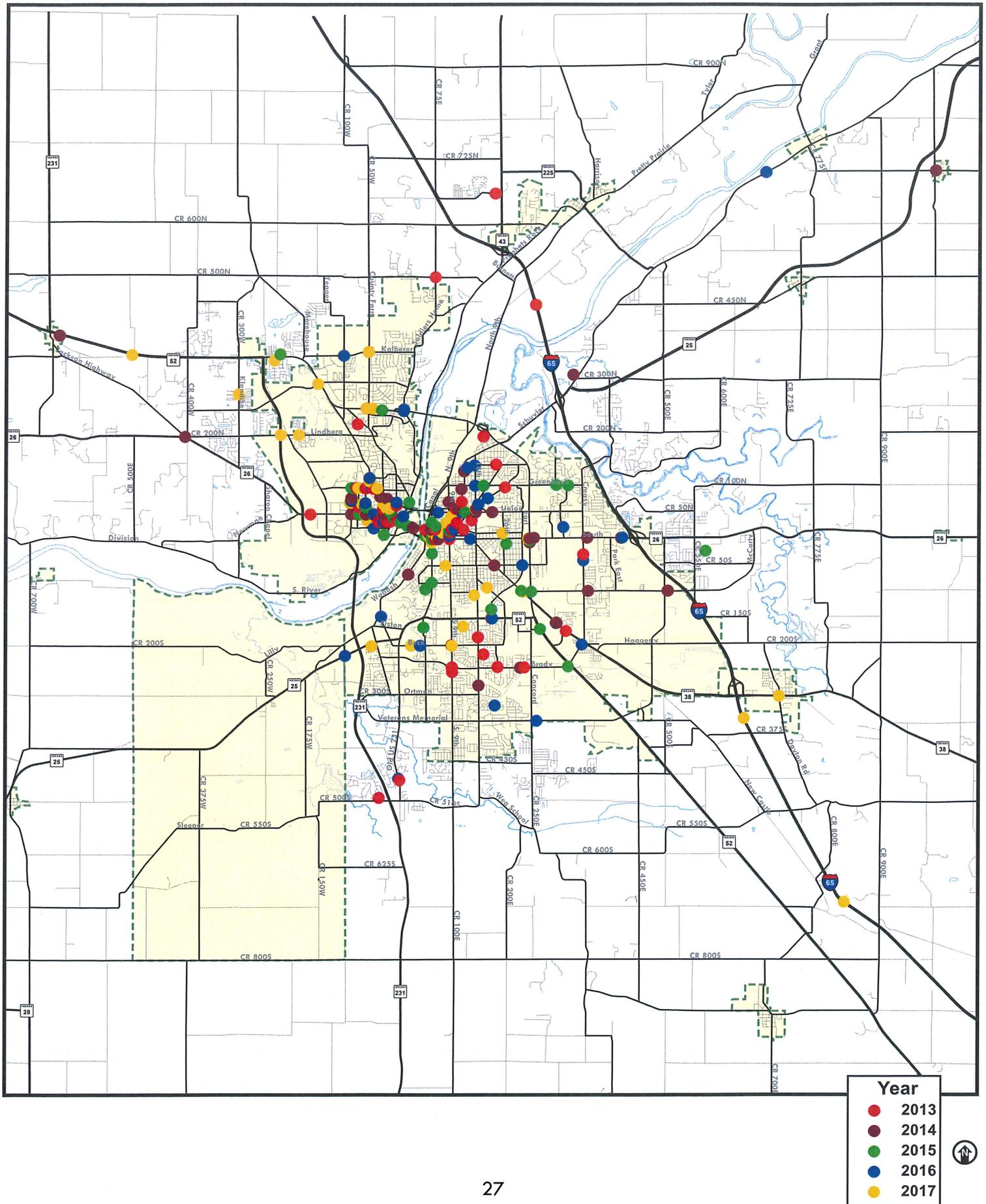
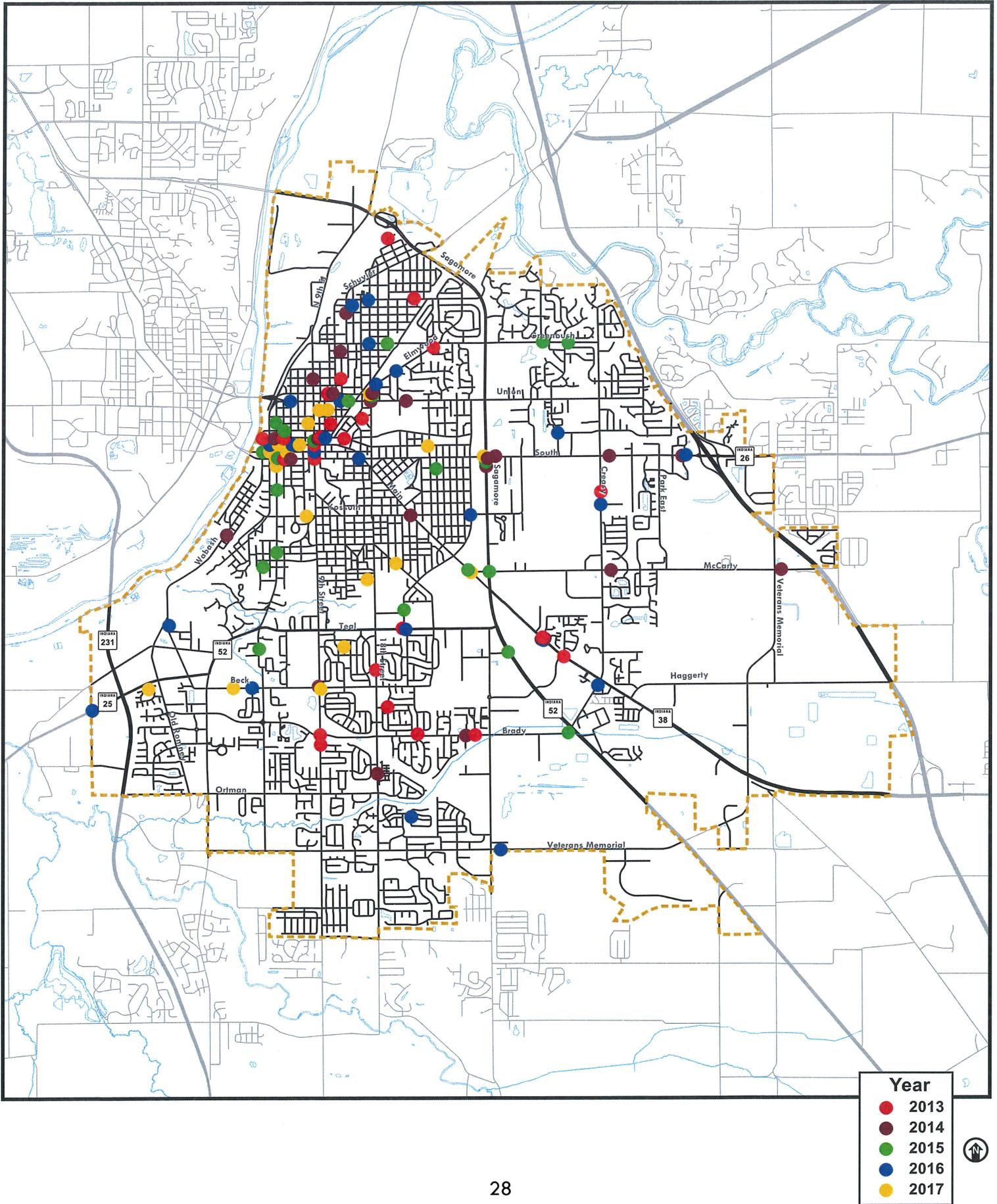


Figure 15: Pedestrian Crashes Located in Lafayette



Crashes occurred on many of the major roads within Lafayette. The following 15 corridors experienced four or more crashes over the five-year period: South Street (12), Ferry Street (9), 9th Street (9), 18th Street (8), 4th Street (8), Main Street (8), Sagamore Parkway (7), SR 38 (5), Union Street (5), Salem Street (5), Brady Lane/Twyckenham Boulevard (5), McCarty Lane (5), Columbia Street (4), Beck Lane (4) and Greenbush Avenue (4).

There were only two intersections within Lafayette where there were three or more crashes reported at each intersection. The intersection of SR 38 and Kingsway Drive experienced the most with 4 and the intersection of 18th Street and Salem Street experienced 3. There were seven intersections where two crashes occurred per intersection: South Street and 4th Street, South Street and Sagamore Parkway, South Street and Red Cloud Trail, Teal Road and 22nd Street, 9th Street and Beck Lane, Main Street and McCarty Lane and Ferry Street at 10th Street. There was one location that experienced 2 crashes that was not at an intersection and it was located 200 feet south of the intersection of South Street and Sagamore Parkway.

West Lafayette Area

Outside of the Purdue/Levee area, there were 15 crashes involving pedestrians over the five-year period in West Lafayette. Covering just over 11.3 square miles, there were 1.3 crashes per square mile. **Figure 16** shows where those crashes occurred.

There are six corridors where four or more crashes occurred. The Sagamore Parkway corridor had the most with 4 crashes. There were 2 crashes each within the Kalberer Road, Lindberg Road and Stadium Avenue corridors.

Looking at crashes by intersection, they were mostly scattered throughout West Lafayette. The only intersection with 2 crashes was at Stadium Avenue and Garfield Street. All of the crashes, but two, were on major thoroughfares. The two that were not were at the intersections of Carlisle Road and Hall Road, and Pearl Street and Rusk Street.

Purdue Area

72 crashes occurred in the Purdue/Levee area. Given that this area is smaller than the others, it's not surprising that the crash rate is 28.8 crashes per square mile. This is significantly greater than Lafayette's and West Lafayette's rates. Over 32 percent of all the pedestrian crashes during the five-year period occurred in this area. **Figure 17** shows the location of the crashes.

Figure 17 shows numerous crashes on State Street. Except for one crash located east of US 52/231, 28 crashes occurred from Jischke Drive on campus to Roebuck Drive in the Levee. Nearly all of them occurred at an intersection. Over 40 percent of the pedestrian crashes in the Purdue/Levee area occurred in this corridor.

Crashes occurred on many of the major roads that cross this area. Excluding State Street, the following eight corridors saw four or more crashes over the five-year period: Grant Street (14), Stadium Avenue (10), Jischke Drive (10), University Street (7), Northwestern Avenue (7), River Road (6), Wood Street (5) and Oval Drive (4).

The intersection that had the highest number of crashes was State Street and Grant Street with 8 crashes. State Street and River Road had the second highest with 5 crashes while State Street and Oval Drive was third with 4. The following intersections experienced three crashes apiece: State Street and Chauncey Avenue, State Street and Russell Street, Jischke Drive and 3rd Street and Jischke Drive and Stadium Avenue. The following intersections experienced two crashes apiece: State Street and Jischke Drive, State Street and University Street, Stadium Avenue and Russell Street,

Figure 16: Pedestrian Crashes Located in West Lafayette

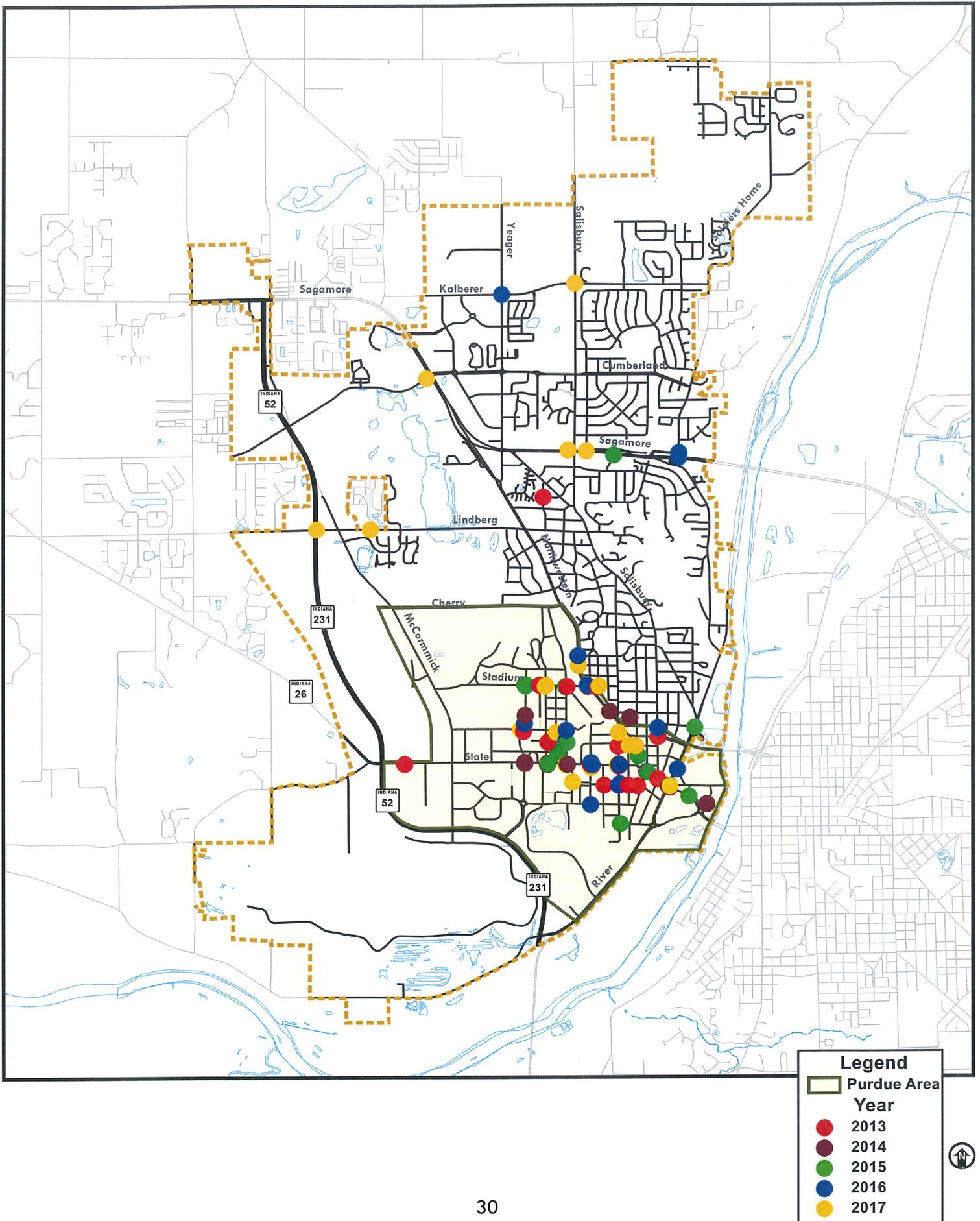
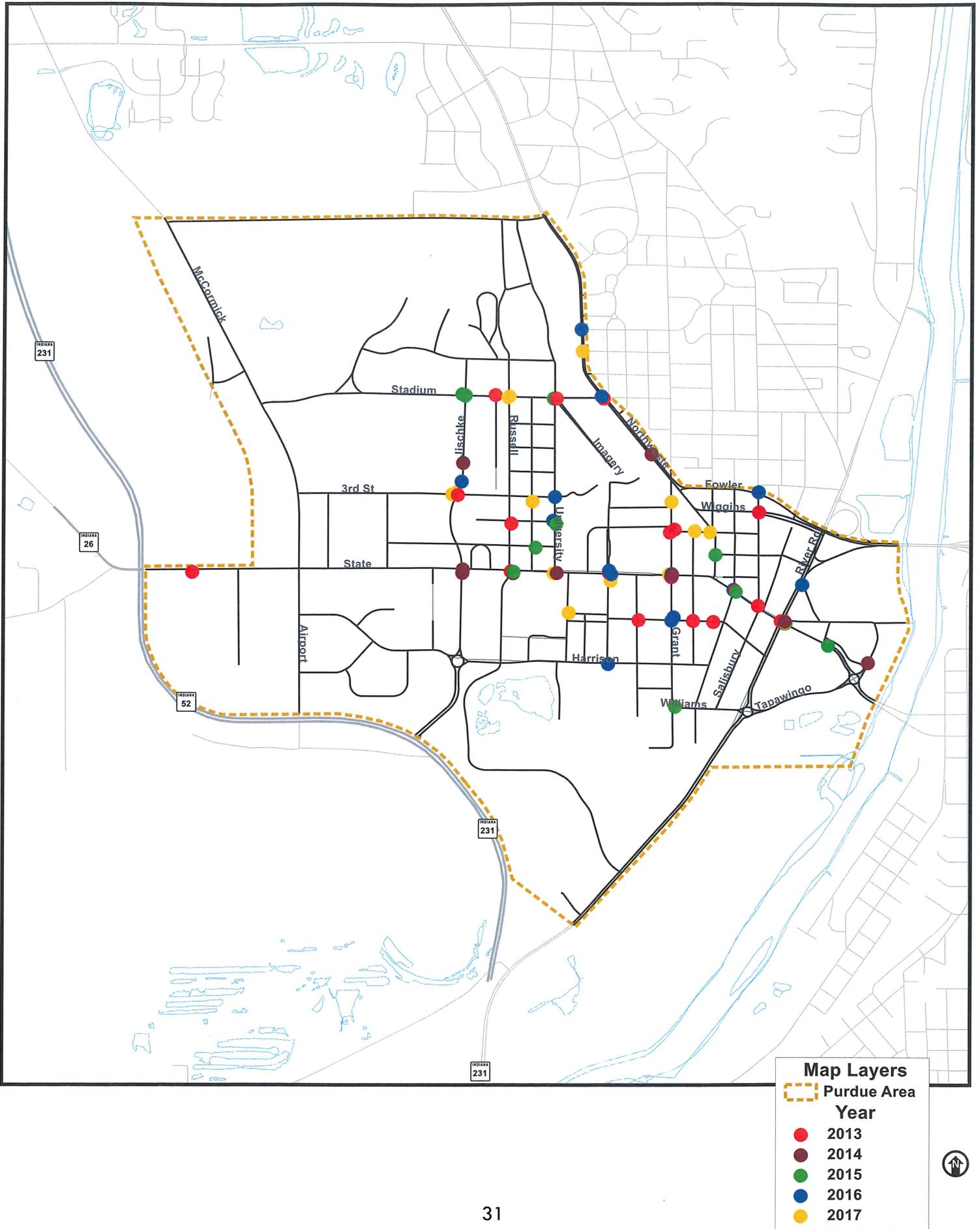


Figure 17: Pedestrian Crashes Located in the Purdue Area



Stadium Avenue and University Street, Stadium Avenue and Northwestern Avenue, University Street and 2nd Street, Grant Street and Wood Street and Northwestern Avenue and North Street.

Rural Tippecanoe County

The number of crashes that occurred in the suburban fringe and rural portions of Tippecanoe County was substantially fewer than in both cities and the Purdue/Levee area. Only 19 crashes occurred in rural Tippecanoe County. That translates to 8.7% of all the crashes over five years. Comparing the number of crashes by square mile, the rate is extremely small.

Figure 18 shows the locations of the crashes. Seven crashes occurred on a county road. Of those crashes, 2 occurred at McCutcheon High School. Another seven crashes occurred on a state road or the Interstate. Three crashes were on I-65, 2 on US 52 (both west of West Lafayette), 1 on SR 38 within the Town of Dayton and 1 on SR 26 west of West Lafayette.

Three crashes occurred in residential subdivisions. The ages of those pedestrians varied from younger than 10 to 60.

The two remaining crashes occurred on Paramount Drive and Hunter Drive. Both streets connect to Sagamore Parkway and are located just outside of West Lafayette.

By Specific Location

Geographically we know where all the crashes occurred. Another way to analyze the crash data is to look at where they occurred in the roadway. For example, many of the crashes that occurred in Tippecanoe County took place at intersections. Those that had more than one crash reported have already been individually identified. This section looks at crashes that occurred in the roadway and at specific areas of the road such as at intersections, driveways, alleys, crosswalks and on sidewalks. **Table 29** displays this information.

By far, the majority of crashes, 124, occurred at an intersection. Of those, the overwhelming majority, 108, occurred within the crosswalk. Looking at the data by year, in 2014 and 2015, all but one of the crashes that occurred in the intersection occurred within the crosswalk. The percentage of crashes occurring in a crosswalk at an intersection in 2013, 2016 and 2017 was smaller but still significant. **Figure 19** shows the locations where all the crashes at an intersection occurred as well as those that occurred in a crosswalk.

Table 29: Crashes by Specific Location

Year	Roadway	Intersection	Driveway	Alley	Crossing	Sidewalk	Total	Crosswalk
2013	19	27	2	2		1	51	23
2014	16	19	2		2		39	19
2015	12	21	3			1	37	20
2016	12	29	1	1	1		44	22
2017	17	28	3				48	24
<i>Total</i>	76	124	11	3	3	2	219	108

The next most frequent crash location was in the roadway where 76 crashes occurred. **Figure 20** shows the locations of these crashes. Some examples of these types of crashes include people walking or running across the street, in construction zones, or emergency responders being hit. The greatest number occurred in 2013 with 19 crashes and the lowest in 2015 and 2016 with 12 crashes each.

Figure 18: Pedestrian Crashes Located in Rural Tippecanoe County

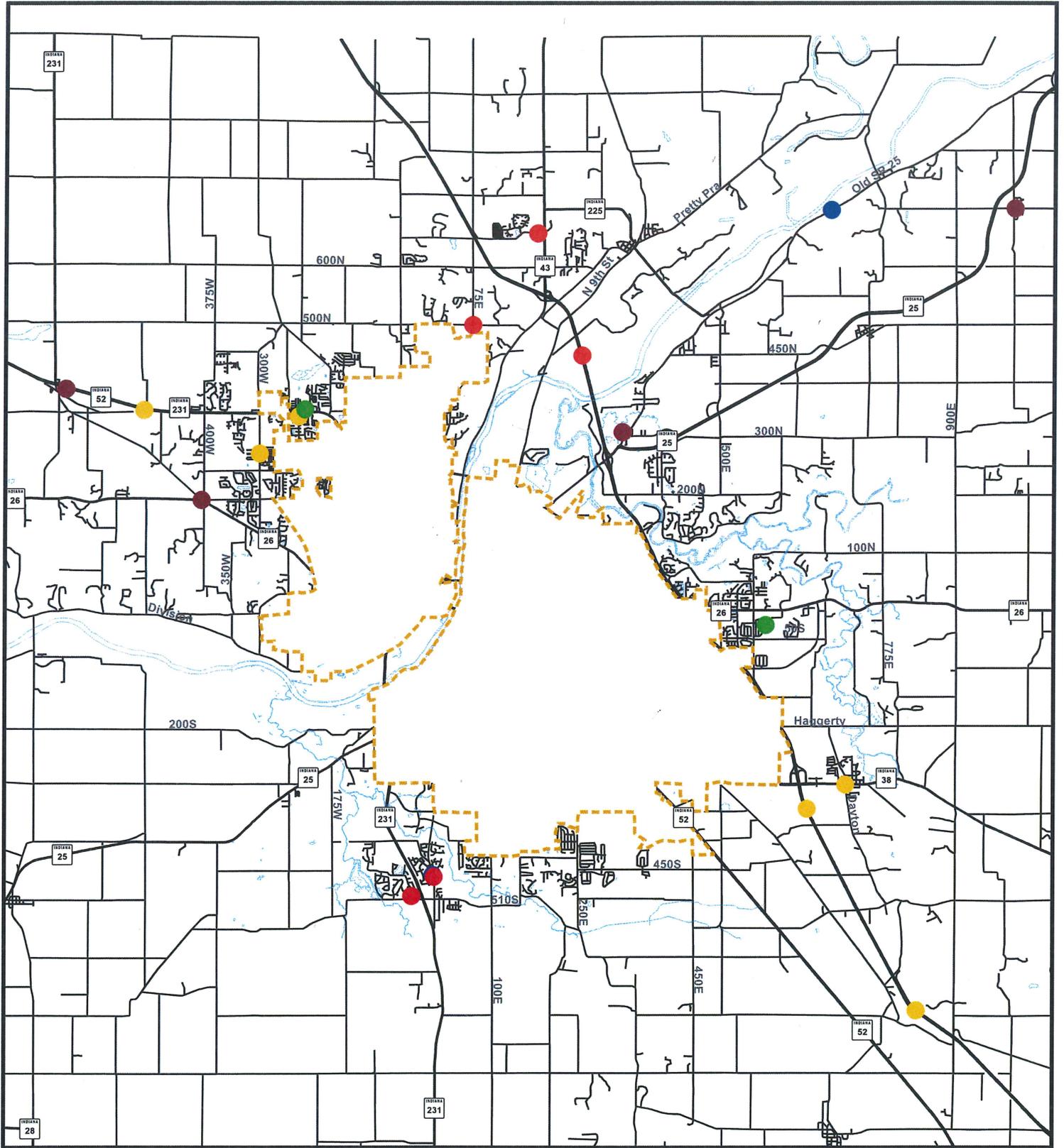
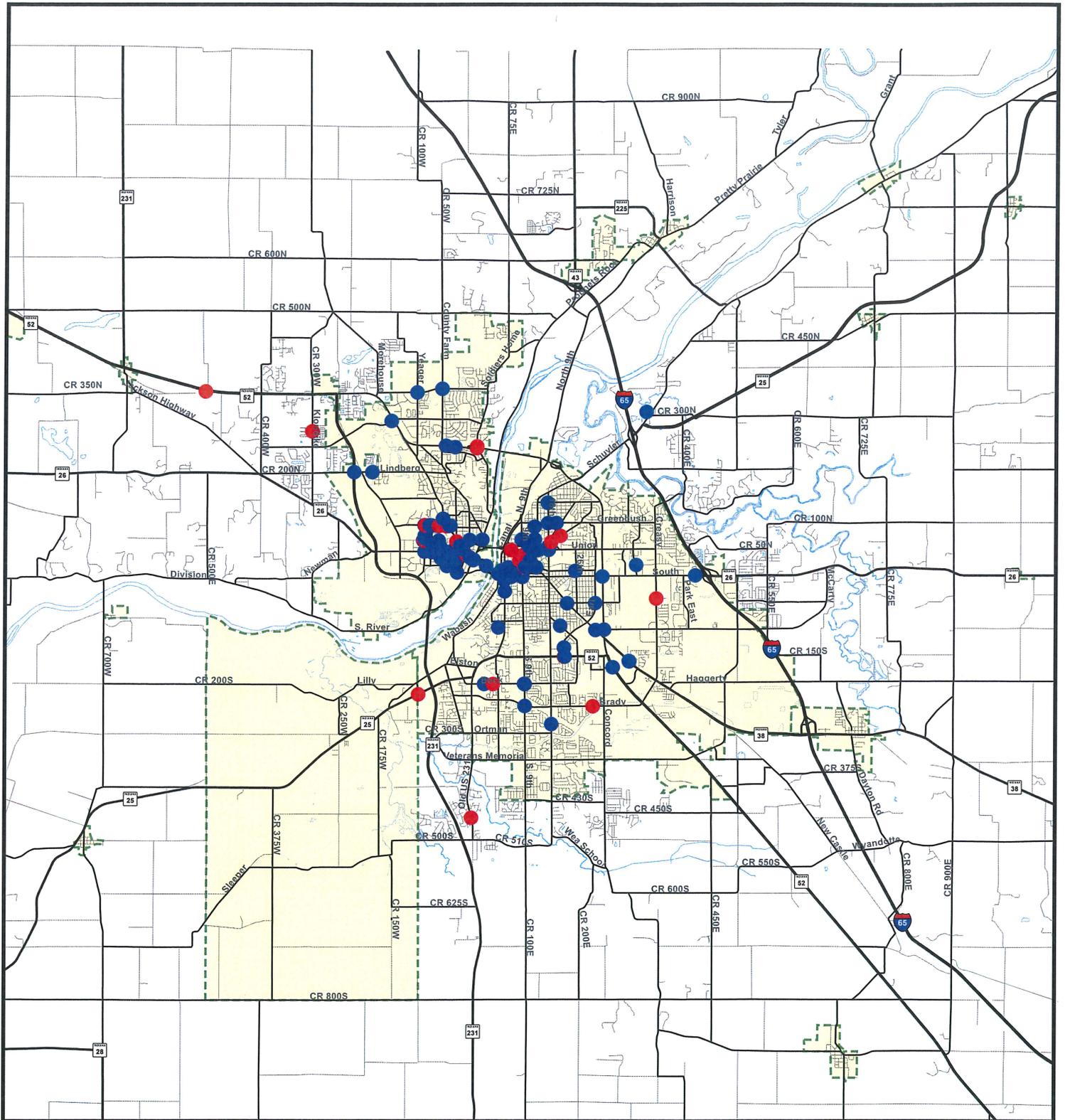


Figure 19: Pedestrian Crashes within a Crosswalk Versus Crashes not in a Crosswalk



Legend

- Not in Crosswalk
- Within a Crosswalk



Of the remaining 19 crashes, 11 of them occurred at a driveway. 3 occurred in or at the entrance to an alley. There were 3 crashes that occurred in a marked pedestrian crossing which were not located at an intersection. Two of them occurred at the crossing on Jischke Drive just north of 3rd Street and the other occurred on Tapawingo Drive by Wabash Landing shopping area.

Lack of and Incomplete Sidewalks

A sidewalk provides a safe means for people to walk. One would expect to see sidewalks within the cities and towns and in the areas developing on the fringes of both cities. Conversely, one would not expect them on county and state roads in rural areas. The Cities of Lafayette and West Lafayette have an extensive system of sidewalks and they are generally found on both sides of the road. However, there are locations in both cities where sidewalks are missing, or a sidewalk may exist on only one side. **Figure 21** and **Tables 30** and **31** show the crash locations where there were either no sidewalks or partial sidewalks.

The location of crashes where no sidewalks were present occurred both urban and rural locations. Of the 219 crashes, 21 occurred where there were no sidewalks present. That equates to approximately 10 percent of all the pedestrian crashes. There were 6 locations on roads under the City of Lafayette’s jurisdiction and 1 location under West Lafayette’s jurisdiction. 2 crashes occurred where there has been significant land-use development and they were on Paramount Drive and at US 52 at Calloway Drive. The third crash location was in the unincorporated town of Colburn. All the other crashes occurred in the rural area.

Table 30: Crash Locations Where There are No Sidewalks

Street	Cross Street	Jurisdiction	Urban/Rural
21 st Street	Moore Street	Lafayette	Urban
Potomac Avenue	Catula Avenue	Lafayette	Urban
South Beck Lane	South of Old Romney Road	Lafayette	Urban
Poland Hill Road	South of Teal Road	Lafayette	Urban
Euclid Avenue	South of Winthrop Street	Lafayette	Urban
South Street	East of Creasy Lane	Lafayette	Urban
Carlisle Road	Hall Road	West Lafayette	Urban
Paramount Drive	North of Sagamore Parkway	Tippecanoe County	Urban
CR 500N	CR 75E	Tippecanoe County	Rural
CR 650N	West of SR 43	Tippecanoe County	Rural
Gushwa Drive	West of Old SR 25	Tippecanoe County	Rural
Old SR 25	West of CR 775E	Tippecanoe County	Rural
CR 700N	East of Strong Avenue	Tippecanoe County	Unincorporated Town
SR 25W	CR 100W	INDOT	Rural
US 52	CR 500W	INDOT	Rural
US 52	East of US 231N	INDOT	Rural
US 52	Calloway Drive	INDOT	Urban
SR 26W	Jackson Highway	INDOT	Rural
I-65	South of Swisher Road	INDOT	Rural
I-65	South of SR 38	INDOT	Rural
I-65	South of Lauramie Creek	INDOT	Rural

There were just as many crash locations, 21, where only partial sidewalks were present. Nearly all of them were located within Lafayette. 4 locations were in West Lafayette. There were two locations that had multiple crashes. One was at the intersection of Main Street and McCarty Lane, 2 crashes, and the other at SR 38 and Kingsway Drive with 4 crashes.

Table 31: Crash Locations Where There are Partial Sidewalks

Street	Cross Street	Jurisdiction	Urban/Rural
2 nd Street	Murphy Street	Lafayette	Urban
Beck Lane	Payless driveway	Lafayette	Urban
Beck Lane	Limestone Lane	Lafayette	Urban
Veterans Memorial South	East of Concord Road	Lafayette	Urban
Brady Lane	West of US 52	Lafayette	Urban
State Street	21 st Street	Lafayette	Urban
27 th Street	O’Ferral Street	Lafayette	Urban
21 st Street	Elmwood Avenue	Lafayette	Urban
Greenbush Avenue	West of Shenandoah	Lafayette	Urban
McCarty Lane	East of Veterans Memorial East	Lafayette	Fringe
Main Street (2 crashes)	McCarty Lane	Lafayette	Urban
Lindberg Road	Mida Drive	West Lafayette	Urban
Cumberland Avenue	West of US 52	West Lafayette	Urban
Sagamore Parkway West	Covington Street	INDOT	Urban
Sagamore Parkway West	Nighthawk Drive	INDOT	Urban
SR 38	East of Maple Point Drive	INDOT	Urban
SR 38 (4 crashes)	Kingsway Drive	INDOT	Urban

The Indiana Department of Transportation maintains all state roads, US routes and the interstate in Tippecanoe County. Unfortunately, many of these roads within the urban area lack sidewalks or a trail. Only a small segment on SR 26 that is east of the interstate, portions of US 52 (Teal Road and Relocated US 231), and small portions of SR 38 west of Creasy Lane and within the Town of Dayton have sidewalks or a trail. **Tables 30** and **31** show five crash locations that are under the jurisdiction of INDOT and in the urban area. The crash that occurred on US 52 at Calloway Drive is located near Tippecanoe Mall. The locations on SR 38 are also located near Tippecanoe Mall and it should be noted that the portion of sidewalk that does exist was constructed by the City of Lafayette. Likewise, the sidewalk and trail located at Covington Street and Nighthawk Drive were constructed by the City of West Lafayette.

Tables 30 and **31** reflect who currently has jurisdiction over the roads. Within the last ten years INDOT has relinquished various roads within both cities and the county. Many of them lacked sidewalks when relinquished and both cities have made progress in constructing sidewalks or trails along them. The City of Lafayette constructed sidewalks and trails along US 52 or Sagamore Parkway. The City of West Lafayette construction sidewalks and trails along SR 443, now Happy Hollow Road and on SR 526, now McCormick and Airport Roads.

While Sagamore Parkway in West Lafayette is no longer signed as US 52, it is still under INDOT’s jurisdiction. If this portion of road was to be relinquished, INDOT should follow the recommendations of the US 52 Corridor Study and construct sidewalks and trails.

Who and What are Causing the Crashes?

Who Is At Fault

A crash is a complex event, and determining fault is not always clear. To better determine who was at fault, APC staff individually reviewed each crash report. Over the five-year period, motorists were more at fault than pedestrians. **Table 32** shows the yearly variation. Overall, motorists were nearly twice as likely to be at fault as pedestrians. The difference is even more extreme in 2017 where nearly 73 percent of the crashes were the fault of the motorists. Interestingly, pedestrians were at fault more than motorists in 2014.

Table 32: Crash Data by Fault and by Year

Year	Total	Pedestrian Fault	Percent	Motorists Fault	Percent	Both	Percent
2013	51	17	33.3%	32	62.7%	2	3.9%
2014	39	21	53.8%	18	46.2%	0	---
2015	37	13	35.1%	24	64.9%	0	---
2016	44	16	36.4%	28	63.6%	0	---
2017	48	10	20.8%	35	72.9%	3	6.3%
<i>Total</i>	219	77	35.2%	137	62.6%	5	2.3%

Primary Circumstance

Many circumstances contribute to a crash. For each crash report, law enforcement officers are allowed to specify two “Driver”, one “Vehicle”, and one “Environmental” contributing circumstance for each vehicle involved in the crash. For each of the vehicles, one of the four possible contributing circumstances must be listed as the primary contributing circumstance (the Primary Factor) for the crash. **Table 33** lists all of the primary contributing circumstances reported for all 219 crash reports.

The leading causes of crashes during the study period were Failure to Yield Right-of-Way and Pedestrian Action with 83 crashes each. These two circumstances accounted for three-quarters of all the crashes that involved a pedestrian. Both 2013 and 2017 had the greatest number of crashes where the primary factor was Failure to Yield Right-of-Way. 2013 had the greatest number of crashes where the primary factor was Pedestrian Action.

The number of crashes due to other types of contributing circumstances is significantly less. The third leading cause was Other, (Driver) Explained in Narrative with 18 crashes and tied for fourth was Ran off the Road, Right and Unsafe Speed with 6 crashes each.

The Causes of Crashes Where the Pedestrian Was at Fault

Looking at the crash data where the pedestrian was at fault, there were only 6 contributing circumstances reported for the 77 crashes. The leading cause was Pedestrian Action with 65 crashes, or 84.4%. Nearly two-thirds of them occurred in the roadway. An 23 occurred in an intersection, 2 occurred at a driveway and 1 at an alley. The second leading cause was Failure to Yield Right-of-Way with 7 crashes. There was 1 crash that identified cell phone usage as the primary factor.

Table 34 shows the specific details.

Table 33: Crash Data by Primary Factor and by Year

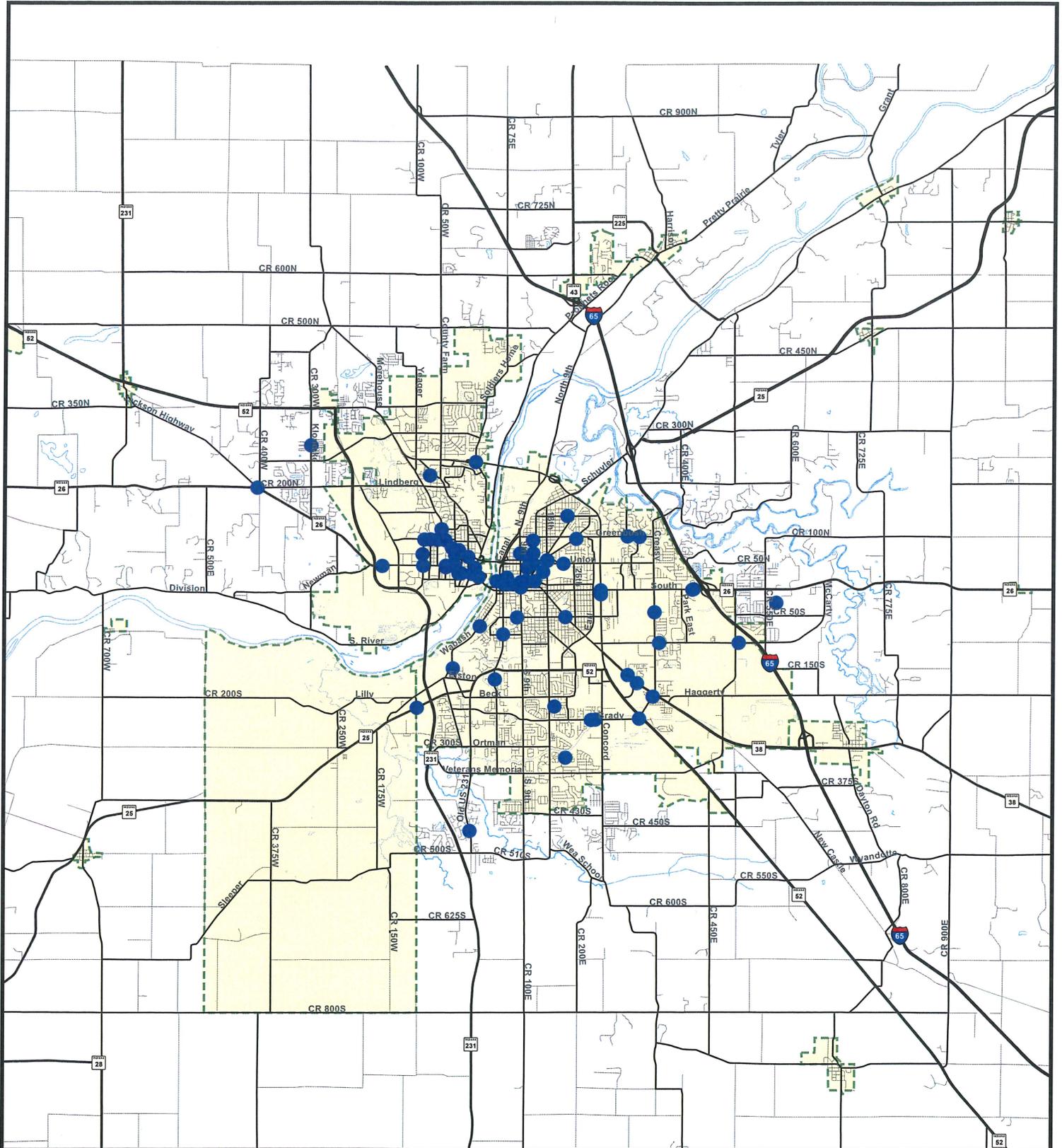
Primary Circumstance	2013	2014	2015	2016	2017	Total	Percent
Failure to Yield Right-of-Way	19	16	14	15	19	83	37.9%
Pedestrian Action	20	15	17	18	13	83	37.9%
Other (Driver), Explained in Narrative	6	3	2	2	5	18	8.2%
Ran Off Road, Right	2	---	1	2	1	6	2.7%
Unsafe Speed	---	---	1	2	3	6	2.7%
Improper Lane Usage	---	1	1	2	1	5	2.3%
Unsafe Backing	---	2	---	---	2	4	1.8%
Disregard Signal/ Regulator Sign	1	---	---	---	2	3	1.4%
Improper Turning	1	1	---	1	---	3	1.4%
Other (environmental), Explained in Narrative	---	1	---	---	---	1	0.5%
Cell Phone Usage	---	---	---	---	1	1	0.5%
Unsafe Lane Movement	1	---	---	---	---	1	0.5%
Left of Center	1	---	---	---	---	1	0.5%
View Obstructed	---	---	---	1	---	1	0.5%
Distracted Driving	---	---	---	1	---	1	0.5%
Speed to Fast for Weather Conditions	---	---	1	---	---	1	0.5%
Other (Vehicle), Explained in Narrative	---	---	---	---	1	1	0.5%
<i>Total</i>	51	39	37	44	49	219	

Table 34: The Causes of Crashes Where the Pedestrian Was at Fault

Circumstance	Number of Crashes	Percent	In Roadway	At Intersection	At Driveway	Alley	Crosswalk
Pedestrian Action	65	84.4%	39	23	2	1	13
Failed to Yield	7	9.1%	5	2	---	---	2
Other, Driver	2	2.6%	1	1	---	---	1
Cell Phone Usage	1	1.3%	---	1	---	---	1
Disregard Signal/Sign	1	1.3%	---	1	---	---	1
Other Environmental	1	1.3%	1	---	---	---	---
<i>Total</i>	77		46	28	2	1	18

Looking at where the crashes occurred, 46 occurred in the roadway while 28 occurred at an intersection. **Figure 22** shows the crash locations where the pedestrian was at fault. It appears they occurred primarily in the urban area. The crash reports indicate that the main cause for crashes in the roadway was the pedestrian walking into the roadway. At intersections, the two main causes were walking in the roadway and disregarding the traffic signal or stop sign.

Figure 22: Locations of Crashes Where the Pedestrian was at Fault



Legend
● Crash Location



The Causes of Crashes Where the Motorist was at Fault

There were more than twice as many contributing circumstances reported when motorists were at fault. While there were only 6 when the pedestrian was at fault, 15 contributing circumstances were reported for the motorists.

The leading cause of crashes when the motorist was at fault was Failure to Yield with 76 crashes. Nearly all of them occurred at an intersection. **Table 35** shows the break down by circumstance and location and **Figure 23** shows the locations where the motorist was at fault.

Dropping to a distant second and third, the next two most frequent circumstances were Other, Driver and Pedestrian Action with 15 and 14 crashes respectively. Again, many of these crashes occurred at an intersection. The fourth leading circumstance, tied, was Ran Off Road, Right and Unsafe Speed having 6 crashes each. Many of these crashes occurred in the roadway instead of at an intersection.

Of the 137 crashes where the motorist was at fault, 94 of them, or nearly 70 percent, occurred at an intersection. The second geographical location was in the roadway with 27 crashes and the third was at a driveway with 9 crashes. Three crashes occurred at a pedestrian crossing and the contributing circumstances were Failure to Yield, Pedestrian Action and Driver Distracted.

Table 35: The Causes of Crashes Where the Motorist Was at Fault

Circumstance	Number of Crashes	Percent	In Roadway	At Intersection	At Driveway	In Alley	At Xing	On Sidewalk
Failure to Yield	76	55.5%	2	65	7	1	1	---
Other, Driver	15	10.9%	4	10	1	---	---	---
Pedestrian Action	14	10.2%	3	9	1	---	1	---
Ran Off Road, Right	6	4.4%	3	1	---	---	---	2
Unsafe Speed	6	4.4%	4	1	---	1	---	---
Improper Lane Usage	5	3.6%	4	1	---	---	---	---
Unsafe Backing	4	2.9%	4	---	---	---	---	---
Improper Turning	3	2.2%	---	3	---	---	---	---
Disregard Signal/Sign	2	1.5%	---	2	---	---	---	---
Speed too Fast (Wx.)	1	0.7%	1	---	---	---	---	---
Driver Distracted	1	0.7%	---	---	---	---	1	---
Left of Center	1	0.7%	---	1	---	---	---	---
Other, Vehicle	1	0.7%	1	---	---	---	---	---
Unsafe Lane	1	0.7%	1	---	---	---	---	---
View Obstructed	1	0.7%	---	1	---	---	---	---
<i>Total</i>	137		27	94	9	2	3	2

When crashes occurred in a crosswalk, the motorist was more likely to be at fault than the pedestrian, with 90 crashes where the motorists was at fault compared to 18 where the pedestrian was at fault. **Table 36** shows the number of crashes by circumstance where the motorist was at fault.

Table 36: The Causes of Crashes Where the Motorist Was at Fault at Crosswalks

Circumstance	Crosswalk
Failure to Yield	67
Other, Driver	9
Pedestrian Action	7
Unsafe Speed	1
Improper Turning	2
Disregard	1
Driver Distracted	1
Left of Center	1
View Obstructed	1
<i>Total</i>	90

Next Steps

This Report provides an in-depth examination of pedestrian crashes that occurred within Tippecanoe County. It should not be considered as the final analysis though. Additional analysis is needed to see if there are any commonalities between certain types of crashes. One would be a closer examination of those that involved a fatality and an incapacitating injury and the location at which they occurred. Another one would be an examination of intersections to see if these crashes occurred where there were no painted or faded crosswalks, no pedestrian count down lights and right turn on red allowances. A third possibility would be an in-depth look at crashes that occurred where there were no facilities for pedestrians to safely walk.

Another method to see if improvements are making it safer involve conducting a before and after study following the completion of major road improvements, especially those that use federal gas tax funds. Even before the implementation of the Complete Street Policy, local road improvements were including amenities for pedestrians such as sidewalks, trails, signage, warning flashers, lighting and pavement markings. These before and after studies would be useful to see if any and all of these improvement made an impact on pedestrian safety.