METROPOLITAN TOPEKA PLANNING ASSOCIATION (MTPO),
CITY OF TOPEKA AND SHAWNEE COUNTY, KS

MTPO TRANSPORTATION SAFETY PLAN

IMPROVING TRANSPORTATION SAFETY IN TOPEKA & SHAWNEE COUNTY, KS

AUGUST 2019
FINAL REPORT

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Final Report

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METROPOLITAN TOPEKA PLANNING ASSOCIATION (MTPO),
CITY OF TOPEKA AND SHAWNEE COUNTY, KS

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Thank you to the MTPO, City of Topeka & Shawnee County Core Team and Advisory Committee that led the planning process and the consultant team. Thanks to the MTPO Policy Board and Technical Advisory Board for their continued support and commitment to improve transportation safety in Topeka and Shawnee County.

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1. INTRODUCTION

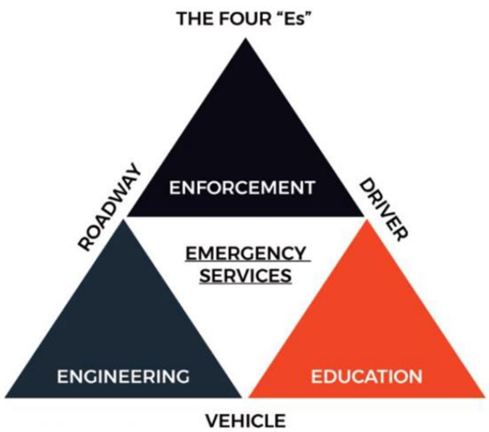
The Metropolitan Topeka Planning Organization (MTPO), City of Topeka and Shawnee County, KS initiated the development of a Regional Transportation Safety Plan to improve the health and well-being of residents and visitors who travel on their local transportation system. This includes travelers on city streets, county roads, sidewalks, bikeways, and transit. This Plan focused on local roadways which does not include state and federal highways in the Topeka / Shawnee County area which are under the jurisdiction of the Kansas Department of Transportation (KDOT) and the Federal Highway Administration (FHWA). Crashes involving drivers, pedestrians, bicyclists and transit users is a public health issue. Between 2010 and 2016 (seven years), there were a total of 23,591 crashes in the Topeka / Shawnee County region including 5,545 injury crashes and 68 fatal crashes. The estimated cost to society resulting from crashes during this period is approaching an average cost of $194 million per year (see Table 1).

Table 1. Estimated Crash Costs to Society in Topeka/Shawnee County on Local Roadways (2010 – 2016)

Cost of Crashes to Society				
MTPO (2010 – 2016) – Local Roadways (Non-Highway)				
Severity	Crashes	Cost per Crash Severity+	Cost to Society	Average Cost per Year
PTO	17,978	$3,250	$58,428,500	$8,346,928
*Injury	5,545	$175,200	$971,484,000	$138,783,428
Fatality	68	$4,733,650	$321,888,200	$45,984,028
Total	23,591		$1,351,800,700	$193,114,385
+Crash costs for Highway Safety analysis, Report Number FHWA-SA-17-071 (January 2018)				
*Average cost for all severities of injury crashes				

Source for crash costs: https://safety.fhwa.dot.gov/hsip/docs/fhwasa17071.pdf

The development of this Transportation Safety Plan involved:



- Working with a Core Team and Advisory Group
- Performing a high-level crash analysis between 2010 – 2016
- Identifying key crash types and locations
- Engaging with the public through public survey/meetings
- Selecting four Emphasis Areas
- Selecting potential countermeasure strategies utilizing the "5-E's" of Safety (Education, Engineering, Enforcement, Emergency Services, Executive Policies) for reducing serious injury and fatality crashes
- Developing an implementation plan for the MTPO, City of Topeka and Shawnee County for moving forward.

Crashes are preventable and it takes a focused community effort with a commitment to safety to make a difference.

1.1. EXECUTIVE SUMMARY

1.1.1. PURPOSE OF THE PLAN

The Purpose of the Plan is to identify locations/corridors that may benefit from systemic, low cost safety improvements and to provide direction in the prioritization of local transportation safety needs within the MTPO Region.

1.1.2. PLAN OBJECTIVES

The Plan objectives focus on four areas that will improve the health and well-being of residents and visitors who travel on their local transportation system.

A. **Reduce crashes (especially injury and fatality) on local roads in Topeka/Shawnee County** – Reduce the frequency of overall crashes (currently trending up) while focusing on reducing crashes involving injuries and fatalities (currently trending down).

B. **Provide data-driven recommendations for countermeasures and project locations** – Utilize information from the detailed crash analysis towards the selection of Emphasis Areas, development of potential countermeasures (utilizing each of the

"5-E's" of Safety and focusing on specific locations with a higher frequency of crashes.

C. **Help all stakeholders work together toward common transportation safety goals** – Bring key local stakeholders together from each of the "5-E's" of Safety to develop and focus on common transportation safety goals as defined in Objective A.

D. **Provide a strategy for measuring future progress** – Define performance measures for each Emphasis Area, identify a local "Transportation Safety Champion" to lead an ongoing Local Transportation Safety Coalition who makes future recommendations (based on crash trends) and follows through with implementing strategies towards the transportation safety goals defined in Objective A.

1.1.3. GENERAL OVERVIEW

Topeka, the State Capital of Kansas, is the fifth largest city in the state with a population approaching 128,000. Shawnee County covers 556 square miles and is the third most populous county in Kansas. The county contains four other incorporated communities beyond Topeka including the City of Auburn, Silver Lake, Rossville, and Willard.

This plan applies to all local roadways (non-highway) within the Shawnee County boundary. Crashes within Shawnee County were separated by geographic location to provide a more detailed review of where crashes are occurring. Figure 1 shows the Topeka urbanized area which includes the City of Topeka. Crashes located in the area shaded in green were considered within the Topeka urbanized area and crashes located outside these shaded areas were considered within rural Shawnee County. Figure 2 shows the break-down of Shawnee County's crashes from 2010-2016 by geographical jurisdiction. There were 1,799 reported crashes without latitude and longitude connected to the data point, which accounts for nearly 8 percent of all reported crashes. While more than half the miles of local roadway in Shawnee County are rural, approximately three-fourth of the vehicle miles traveled and nearly 90 percent of the crashes occurred within the Topeka urbanized area.

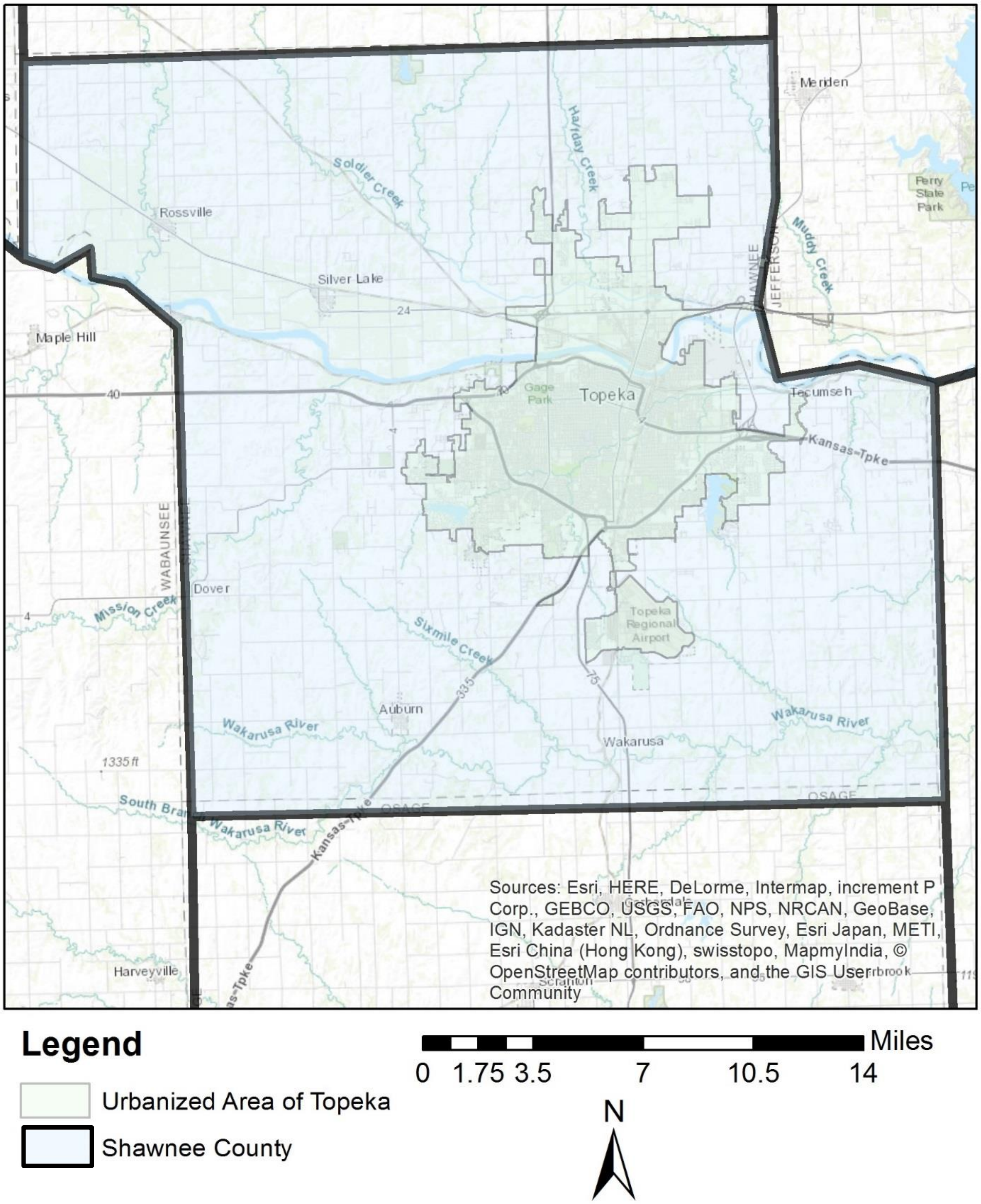


Figure 1. Topeka and Shawnee County boundaries used in the analysis

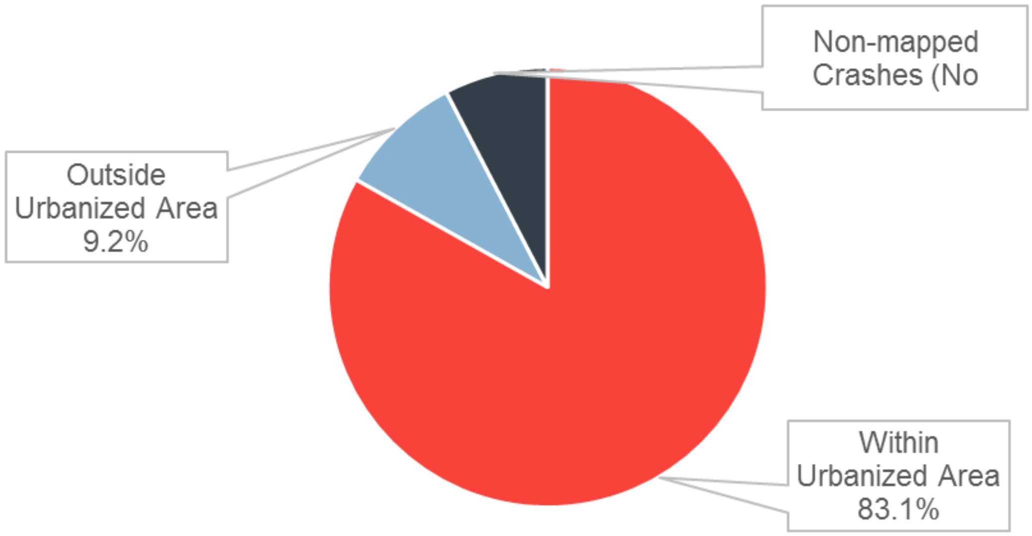


Figure 2. Percentage of geographic jurisdiction of crashes within Shawnee County, 2010-2016

1.1.4. OVERSIGHT, STAKEHOLDERS, AND PUBLIC INPUT

The development of the Plan was managed by the Metropolitan Topeka Planning Organization (MTPO) who established a Core Team for oversight including additional staff from the MTPO, City of Topeka and Shawnee County, KS. Monthly calls with the Core Team were held to discuss the status of the Plan. The Core Team members have the authority to implement recommendations from the Plan with support from the City/MTPO Policy Board, MTPO Technical Advisory Committee, Topeka City Council and Shawnee County Commission.

Members of the Core Team included:

- Carlton Scroggins (MTPO / City of Topeka) – Project Manager
- Taylor Ricketts (MTPO / City of Topeka)
- Bill Fiander (MTPO / City of Topeka)
- Jason Peek (City of Topeka)
- Brian Faust (City of Topeka)
- Terry Coder (City of Topeka) / Kristina Ericksen (City of Topeka)
- Curt Niehaus (Shawnee County)

Early in the process, an Advisory Committee was established with a diverse group of key local stakeholders representing each of the "5-Es" of Safety. Each of these representatives is an expert in their field and represents an agency or organization that has its own transportation safety goals either in the Topeka/Shawnee County region or statewide. Advisory Committee meetings were held during the development of the Plan on February 26, 2018, June 11, 2018, September 27, 2018 and November 5, 2018.

Members of the Advisory Team included:

- Eric Nichol (KDOT)
- Mike Spadafore (KDOT)
- Edwin Rothrock (Topeka Metro)
- Andy Fry (Topeka Community Cycle Project / Topeka Metro)
- SGT Gary Ludolph (Topeka Police Dept.)
- LT Harold Tillman (KHP Troop B Topeka)
- Lisa Hecker (Program Consultant, KDOT)
- Jim Green (Emergency Management Coordination, City of Topeka)
- Alex Wiebel (Kansas Traffic Safety Resource Office)
- Amanda Horner (Kansas Traffic Safety Resource Office)

One open house public meeting was held during the development of the project to inform the public about the Plan, obtain their concerns for transportation safety, and allow them to provide initial feedback towards the Plan development.

The open house public meeting was held on July 31, 2018 at the Topeka City offices, 620 SW Madison Street, 1st Floor Conf. Room (Holliday Room) from 11:00 am to 1:00 pm (12 attendees) and then again from 5:00 pm to 7:00 pm (9 attendees). A presentation was given about the Plan followed by a number of stations including a representative from the Kansas Traffic Safety Resource Office (KTSRO) with information pamphlets, member of the consultant team who could pull up specific intersections or roadway segments included in the analysis and several tables of maps of the Topeka / Shawnee County area for the public to mark areas of concern.

Prior to the public meetings, a public survey was posted on Survey Monkey via the MTPO Plan website to obtain input on locations where there was a concern with transportation safety including intersections and roadway segments both inside outside of the City of Topeka. The survey also focused on obtaining attitudes towards a variety of subjects involving transportation safety for drivers, pedestrians, bicyclists and transit users. A station was also set-up at the open house so that the public could complete the public survey while attending. A press release was distributed to the local press prior to the open house public meeting inviting the public to attend Figure 3 as well as complete the online public survey. Over 300 participants completed the public survey. shows the results of question 10 which asked for the top three transportation safety priorities as it relates to decreasing transportation related injuries and fatalities. The top four selections were distracted driving, intersections, pedestrians/bicyclists and speed. A summary of the results of the public survey is available in the Appendix to the Plan.

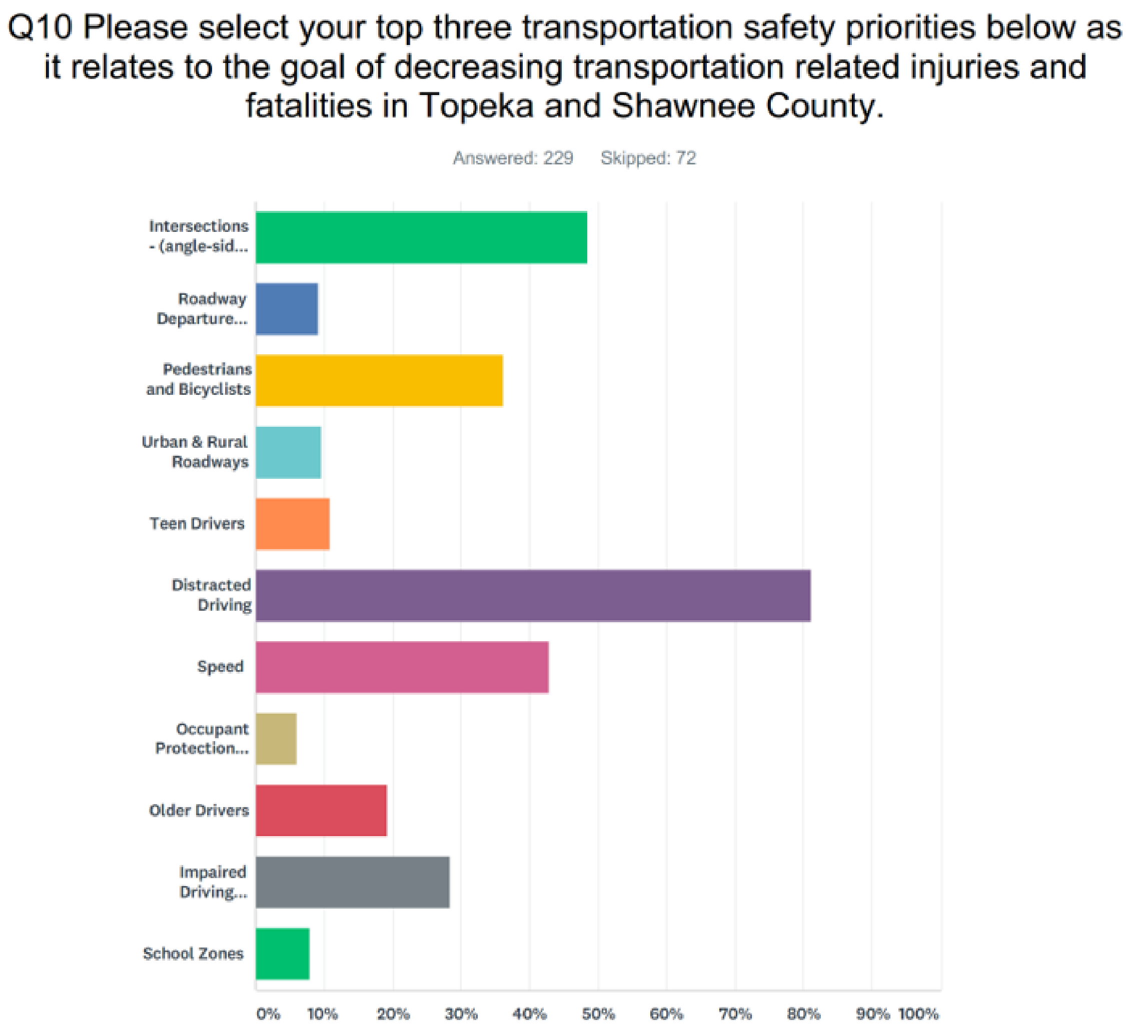


Figure 3. Public survey responses - top three transportation safety priorities

1.1.5. OVERVIEW OF ALL CRASHES

Table 2 presents the frequency of each accident class by severity (fatality, serious injury, minor injury, property damage only). The accident class variable includes all designations shown under both the "multi-vehicle crash" and "single-vehicle crashes" headings. This data shows that the most prominent multi-vehicle crash types are angle-side impact and rear-end while the most prominent single-vehicle crash types are collision with fixed object and collision with parked motor vehicle. These four crash types make up over 80 percent of the total number of crashes (19,126 out of 23,591).

Table 2. Summary of crash frequency by accident class and severity in Shawnee County, 2010-2016

Accident Class	Fatality	Serious Injury	Minor Injury	Property Damage Only	Total Crashes
Multi-vehicle crashes	**25**	**118**	**3,707**	**12,221**	**16,071**
Rear-end	4	26	1,363	4,541	5,934
Angle – side impact	16	73	2,001	5,541	7,631
Head-on	4	10	184	263	461
Sideswipe – opposite direction	1	4	46	249	300
Sideswipe – same direction	0	4	86	1,151	1,241
Backed into	0	0	21	439	460
Other	0	0	2	12	14
Unknown	0	1	4	25	30
Single-vehicle crashes	**43**	**147**	**1,573**	**5,719**	**7,520**
Collision with fixed object	23	66	768	2,423	3,296
Collision with parked motor vehicle	1	7	128	2,111	2,265
Collision with pedestrian	9	28	231	5	273
Collision with pedalcycle	3	15	187	9	214
Collision with animal	1	2	25	772	800
Collision with railway train	2	0	3	4	9
Collision with other object	0	0	15	96	112
Other non-collision	1	8	69	196	275
Overturned	3	21	145	88	258
Unknown	0	0	2	15	18
TOTAL	**68**	**265**	**5280**	**17,940**	**23,591**

Table 3 shows the percentage of fatal crashes and of injury crashes in each accident class. While collisions with parked cars make up a very small proportion of fatal and injury crashes, the other three crash types (angle, rear-end, and fixed-object) make up over 75 percent of injury crashes. While angle crashes make up the largest percentage of injury crashes (37 percent), collisions with fixed objects are the most fatal crash type, accounting for 34 percent of all fatal crashes in the county. Rear-end crashes, while making up a fourth of all injury crashes, only account for 6 percent of fatal crashes. On the other hand, pedestrian crashes account for over 13 percent of all fatal crashes, despite making up only about one percent of total crashes.

Table 3. Percent of fatal and injury crashes by accident class in Shawnee County, 2010-2016

Accident Class	Fatal Crashes	Serious Injury Crashes	Minor Injury Crashes	All Injury Crashes
Multi-vehicle crashes	**36.8%**	**44.5%**	**70.2%**	**69.0%**
Rear-end	5.9%	9.8%	25.8%	25.0%
Angle – side impact	23.5%	27.5%	37.9%	37.4%
Head-on	5.9%	3.8%	3.5%	3.5%
Sideswipe – opposite direction	1.5%	1.5%	0.9%	0.9%
Sideswipe – same direction	0.0%	1.5%	1.6%	1.6%
Backed into	0.0%	0.0%	0.4%	0.4%
Other	0.0%	0.0%	0.0%	0.0%
Unknown	0.0%	0.4%	0.1%	0.1%
Single-vehicle crashes	**63.2%**	**55.5%**	**29.8%**	**31.0%**
Collision with fixed object	33.8%	24.9%	14.5%	15.0%
Collision with parked motor vehicle	1.5%	2.6%	2.4%	2.4%
Collision with pedestrian	13.2%	10.6%	4.4%	4.7%
Collision with pedalcycle	4.4%	5.7%	3.5%	3.6%
Collision with railway train	2.9%	0.8%	0.5%	0.1%
Collision with animal	1.5%	0.0%	0.1%	0.5%
Collision with other object	0.0%	0.0%	0.3%	0.3%
Other non-collision	1.5%	3.0%	1.3%	1.4%
Overturned	4.4%	7.9%	2.7%	4.4%
Unknown	0.0%	0.0%	0.0%	0.0%
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The yearly trends for crashes were also analyzed for Shawnee County for the entire seven-year analysis period. Crashes are shown by severity type for each year in the analysis period in Figure 4. Graphs showing the trend lines for F&SI crashes are shown in Figure 5. There was an increasing trend in the number of total crashes year to year during the analysis period. F&SI crashes declined overall. Severe injury crashes decreased steadily for the entire period; however, fatal crashes show an increasing trend.

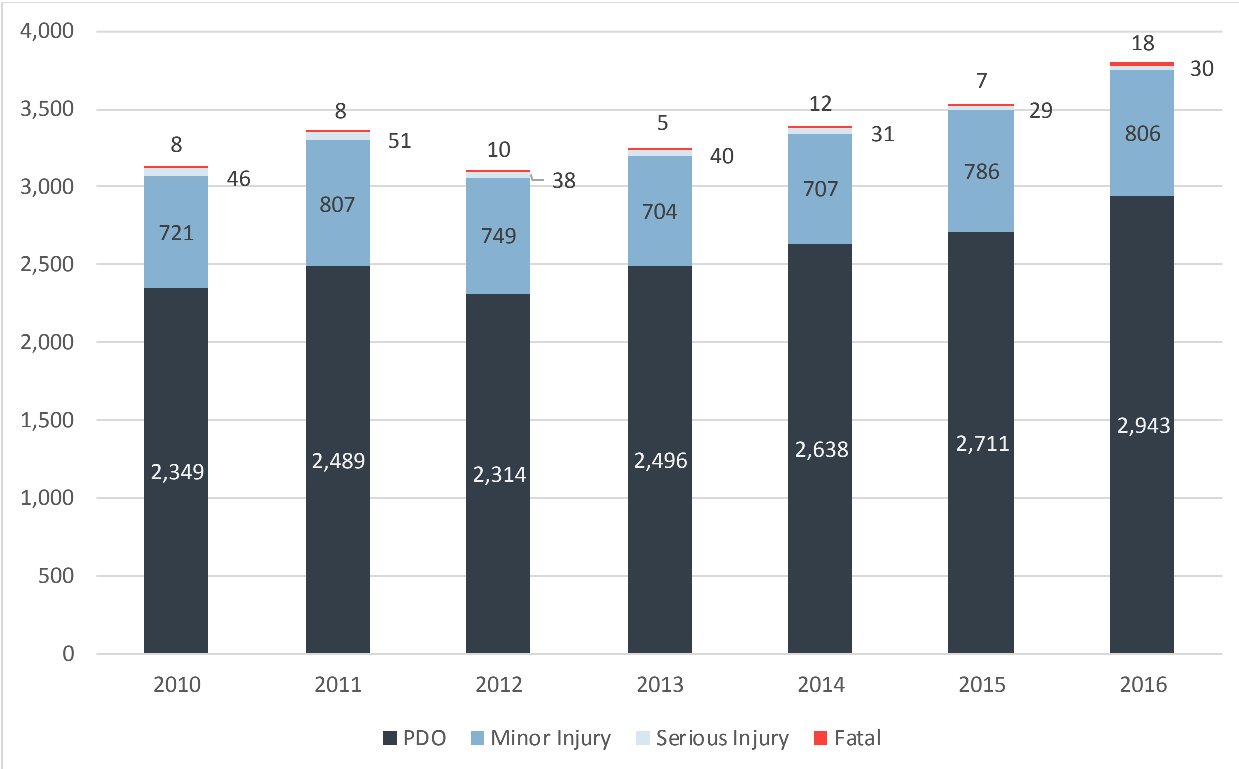


Figure 4. Crashes by year and severity in Shawnee County, 2010-2016

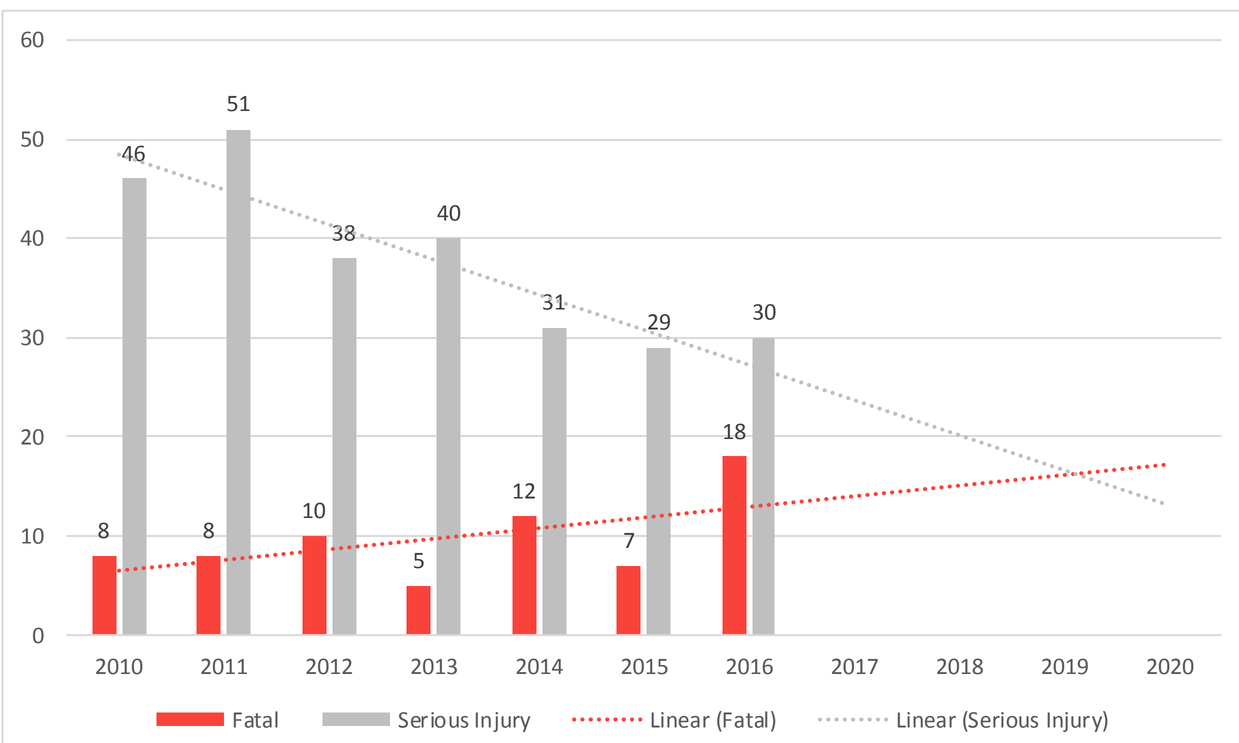


Figure 5. Fatal and severe injury crashes by year with trend lines in Shawnee County, 2010-2016

When comparing the percentage of contributing circumstances that result in fatality or serious injury crashes versus overall crashes in Shawnee County, there is an significant increase in "Too fast for conditions", "Under the influence or alcohol", "Disregarded traffic sign, signals, or markings", "Reckless / Careless driving", "Exceeded posted speed limit" and "Under the influence of illegal drugs" (see Figure 4).

Table 4. Top 20 contributing circumstances for fatal and serious injury crashes in Shawnee County, 2010-2016

Shawnee County Rank	Category	Contributing Circumstance	% for F&SI Crashes	% for Total Crashes
1	Driver	Failed to yield the right of way	22.8	19.0
2	Driver	Too fast for conditions	**15.9**	**5.7**
3	Driver	Under the influence of Alcohol	**15.3**	**3.6**
4	Driver	Inattention (general sense)	15.3	20.3
5	Driver	Disregarded traffic signs, signals, or markings	**12.0**	**5.1**
6	Driver	Reckless / Careless driving	**11.1**	**2.1**
7	Driver	Exceeded posted speed limit	**8.1**	**1.0**
8	Driver	No contributing circumstance	6.0	4.5
9	Driver	Over correction / Over steering	6.0	1.2
10	Driver	Ill or Medical condition	4.5	1.0
11	Driver	Other distraction in or on vehicle	3.6	2.0
12	Driver	Aggressive / Antagonistic driving	3.3	0.4
13	Driver	Followed too closely	3.3	11.6
14	Environment	Rain, mist, or drizzle	3.0	1.1
15	Driver	Avoidance or Evasive action	2.7	2.0
16	Driver	Wrong side or wrong way	2.7	0.4
17	Driver	Unknown	2.4	0.3
18	Driver	Red light running (disregarded traffic signal)	2.4	2.7
19	Driver	Under the influence of illegal Drugs	**2.4**	**>0.1**
20	Pedestrian	Improper crossing	2.4	0.2

1.1.6. DATA ANALYSIS AND RESULTS

The City of Topeka Planning Department provided GIS shapefiles for both intersections and roadway segments within the MTPO regional area. This data for intersections included information on approximately 65 different attributes such as location, intersection type, entering AADT and crash types (angle, rear-end, roadway departure, pedestrian, pedalcycle, other). There are approximately 10,283 public roadway intersections in the Topeka/Shawnee County region which does not including private driveways (see Figure 6).

The consultant team attempted to utilize traffic volume data in the safety analysis for both intersections and roadway segments. There were challenges with breaking the approach volume data for each intersection down so that it could be used to calculate accurate intersection crash rates. The consultant team could provide entering volume data for around 27 percent of the intersections in the City which is not a representative sample size to calculate comparable intersection crash rates for the detailed analysis. The consultant team also attempted to utilize traffic volumes to calculate roadway section crash rates. The lower volume roadway sections were resulting in very high calculated crash rates with just one crash which was not reasonable for comparisons in the analysis.

A separate analysis of roadway segments was also performed. The consultant team developed 639 roadway segments in Google Earth (see Figure 7) based on similar cross-sectional roadway characteristics and coded them into the following categories:

- Two-lane undivided
- Two-lane divided
- Three-lane undivided
- Three-lane divided
- Four-lane undivided
- Four-lane divided
- Five-lane undivided
- Five-lane divided
- X lane (one-way)

The coded segments included most paved roadway segments in Shawnee County as well as arterial and collector roadways in the City of Topeka. Segments are generally defined as having homogeneous characteristics in terms of cross-section and AADT. Since traffic volumes were not utilized due to inconsistent data availability, the focus was on cross-section. The roadway segments were then matched with the data provided by the Shawnee County Planning Department and KDOT crash data to calculate crash frequency per mile. The roadway segment data included approximately 36 attributes regarding roadway characteristics and crash data.

The segments with the highest frequency of all crash types are shown in Figure 8. Many of the segments with the most total crashes are also included in the fatal and serious injury list. Generally, these segments are the locations with the most vehicles.

A separate Excel spreadsheet database was developed for intersections and roadway segments for the analysis so that the MTPO can sort and rate locations based on a variety of measures for future use. A separate .kmz (Google Earth) file was also created for intersections and roadway segments which correlate with the information provided in the Excel spreadsheet database for use by the MTPO.

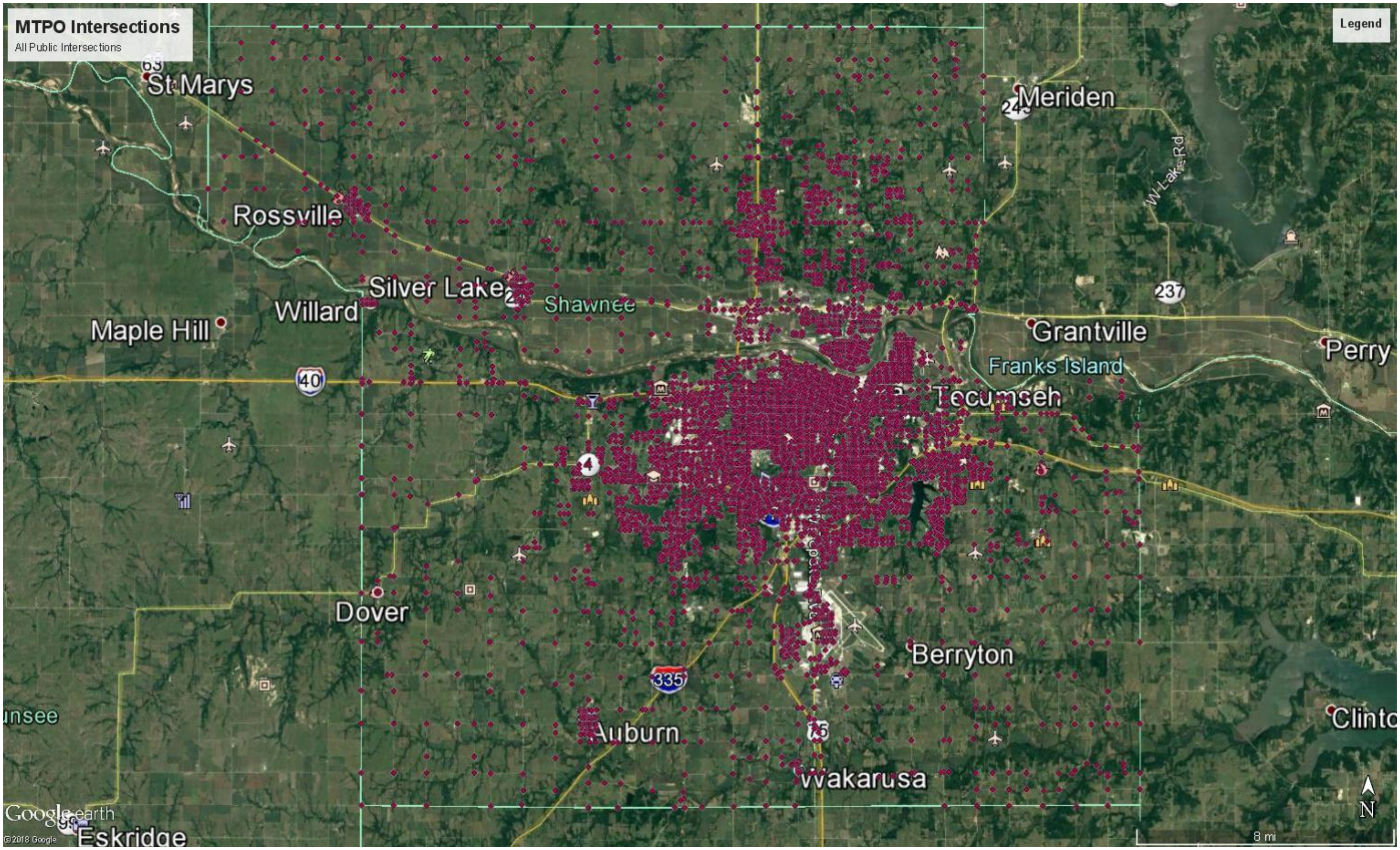


Figure 6. Map of public road Intersections in the Topeka/Shawnee County Region (2017)

Source: Topeka Planning Department

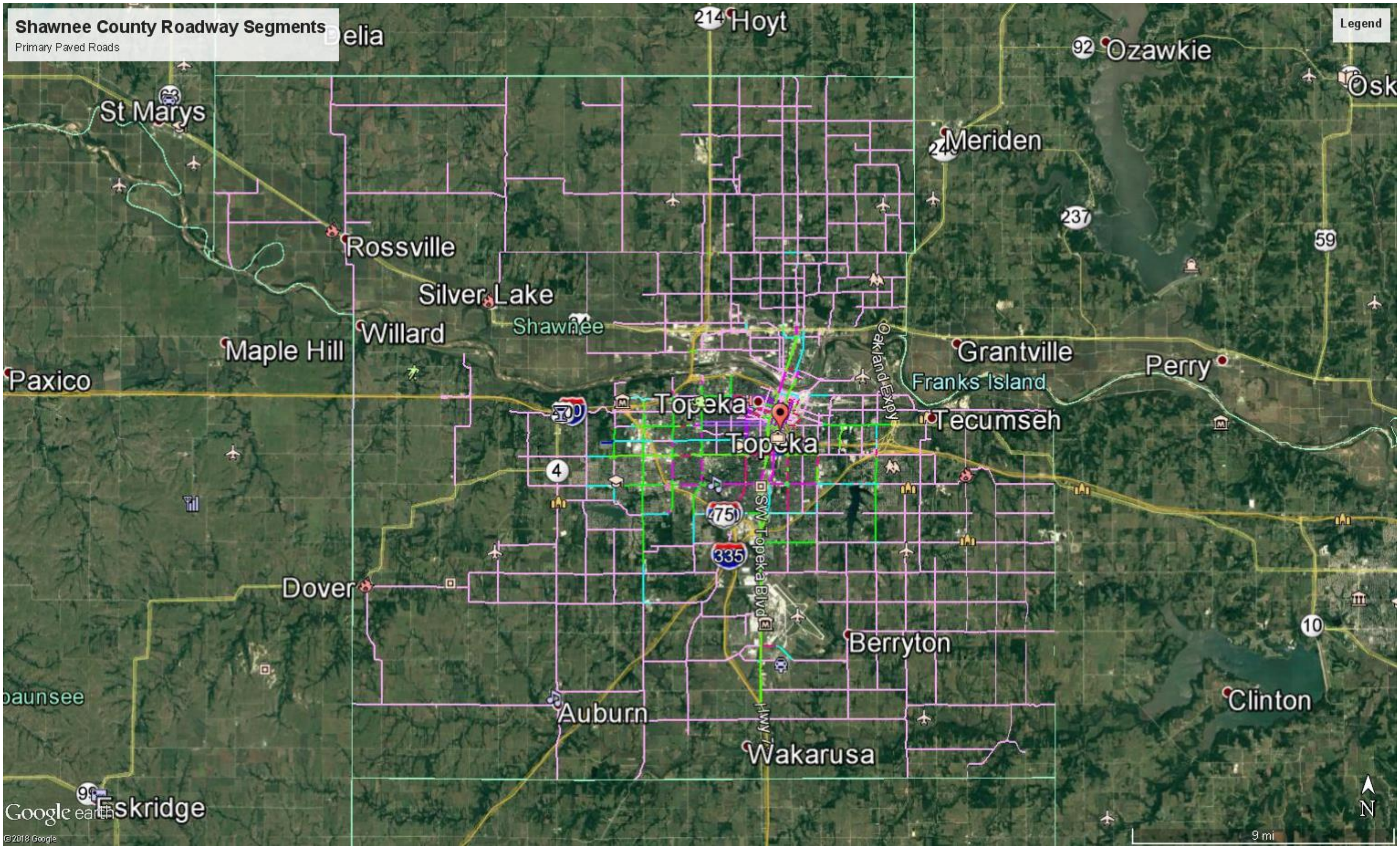


Figure 7. Map of 639 Public Roadway Segments in the Topeka/Shawnee County Region (2017)

Source: WSP USA, Inc.

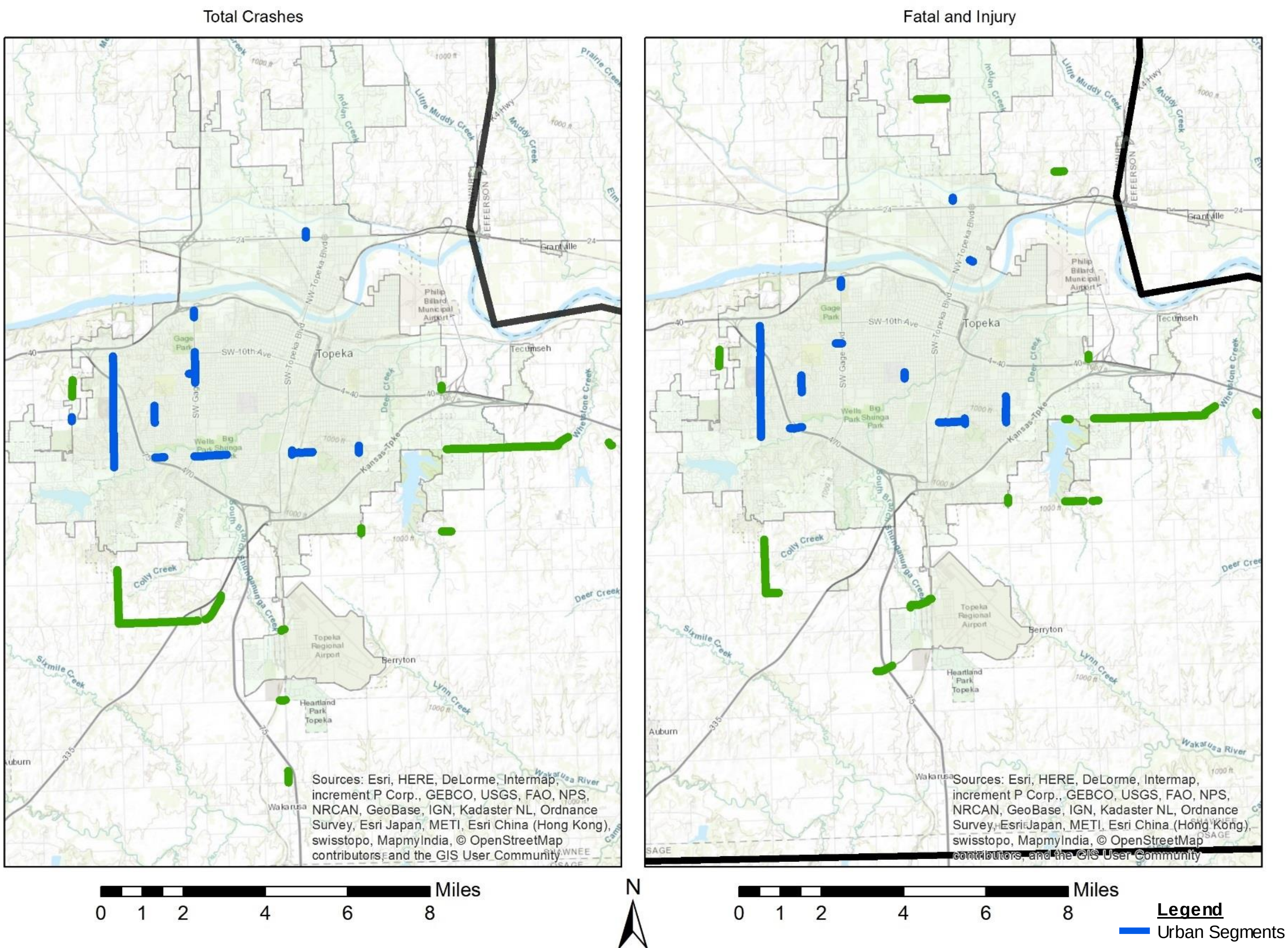


Figure 8. Top 15 roadway segments for total and fatal/serious injury crashes in Shawnee County, 2010-2016

1.1.7. RISK ASSESSMENT AND SELECTION OF EMPHASIS AREAS

Based on the results of the overall crash analysis, four crash types were selected by the MTPO Core Team for a risk assessment to be performed:

- Angle Crashes,
- Rear-End Crashes,
- Roadway Departure Crashes (fixed object, overturned, etc.), and
- Vulnerable Road User Crashes (i.e. Pedestrians, Bicyclists)

A risk assessment is comprised of three core elements: risk identification, risk analysis and risk evaluation.

- Risk identification involves properly understanding the details of each crash type such as where, when, the frequency, roadway type, intersection type and other details.
- Risk analysis works with information gathered during the risk identification about each crash type. A risk analysis involves a detailed consideration of uncertainties, hazards, consequences, likelihood, events, scenarios, controls and their effectiveness. A crash typically has multiple causes and consequences resulting in different crash severity levels (property damage only, injury or fatality).
- Risk evaluation calls on transportation safety professionals to examine the results of the risk analysis and decide if the crash type should be included in an Emphasis Area as a focus area to identify specific crash countermeasure strategies.

Emphasis Areas are crash focus areas which are chosen as a result of the risk assessment process. The Kansas Strategic Highway Safety Plan (2017), maintained by the Kansas Department of Transportation, includes the following Emphasis Areas: Impaired Driving, Intersections, Occupant Protection, Older Drivers, Roadway Departure, and Local Roads. Transportation safety professionals then identify potential crash countermeasure strategies utilizing the "5-E's" of Safety (Education, Engineering, Enforcement, Executive Policies) for reducing serious injury and fatality crashes.

After reviewing the overall crash analysis, detailed risk assessment of specific crash types and the public's response to their top three transportation safety priorities, the Project Advisory Committee selected the following Emphasis Areas for the Plan to focus on:

- Intersections – encompasses angle and rear-end crashes which are the top two crash types in the City of Topeka / Shawnee County. Second highest safety concern identified from the public survey.
- Speed – contributing circumstance in 24 percent of all fatality and serious injury crashes in the City of Topeka / Shawnee County. Third highest safety concern identified from the public survey.

- Distracted Driving – Inattention is a contributing circumstance in 20 percent of all crashes and 15 percent of all fatality and serious injury crashes in the City of Topeka / Shawnee County. Top safety concern identified from the public survey.
- Pedestrian and Bicyclist – High risk group with over 95 percent of all pedestrian and bicycle crashes with vehicles resulting in an injury or fatality. Fourth highest safety concern identified from the public survey.

The focus on these Emphasis Areas will involve the development of potential countermeasures focused on the "5-E's" of Safety for implementation consideration with the goal of reducing injury and fatality crashes in the MTPO Region. One performance measure will be established for each Emphasis Area in order to determine if the countermeasures are effective in meeting the goal.

The Federal Highway Administration (FHWA), through the Kansas Department of Transportation (KDOT), requires each MPO to establish safety performance measures within their jurisdiction. As a result, this plan establishes safety performance measures for the MTPO aimed at reducing fatalities and serious injuries involving each Emphasis Area. These safety performance measures were developed specifically to address crash frequency and severity occurring within the MTPO.

1.1.8. EMPHASIS AREAS

The consultant team performed the tasks shown below for each emphasis area (**Intersections, Speed, Distracted Driving and Pedestrian & Bicyclist**):

- **Crash Analysis** – A detailed crash analysis was performed for the type(s) of crashes occurring with each emphasis area to obtain an understanding of the frequency, locations and other details needed to develop effective countermeasures.

For instance, Table 5 shows the breakdown of intersection and intersection-related crashes by severity level. The most common intersection crash types are angle crashes and rear-end crashes. These two crash types make up over 80 percent of both total and fatal-and-injury intersection and intersection-related crashes. Angle crashes are the most severe, accounting for over two-thirds of total intersection-related fatalities and over half of the intersection-related injury crashes. Not surprisingly, multi-vehicle crashes are more than 10 times more common than single-vehicle crashes at and around intersections.

Table 5. Intersection and intersection-related crash by crash type and severity level

Accident Class	Fatal crashes	Injury crashes	Total Crashes
Multi-vehicle crashes	**20**	**2,664**	**10,048**
Rear-end	2	881	3,664
Angle – side impact	15	1,620	5,371
Head-on	2	99	260
Sideswipe – opposite direction	1	22	139
Sideswipe – same direction	0	36	489
Backed into	0	2	104
Other	0	1	3
Unknown	0	3	18
Single-vehicle crashes	**3**	**397**	**841**
Collision with fixed object	0	82	368
Collision with parked motor vehicle	0	10	82
Collision with pedestrian	2	111	115
Collision with pedalcycle	0	127	133
Collision with animal	0	1	14
Collision with railway train	0	0	1
Collision with other object	0	4	17
Other non-collision	0	16	53
Overturned	1	44	53
Unknown	0	2	5
TOTAL	**23**	**3,061**	**10,889**

— **High Priority Locations** – were identified for the type(s) of crashes occurring with each emphasis area including the top 15 locations (intersections and roadway segments), within the city limits of Topeka and in rural Shawnee County, for total and F&SI crashes.

For instance, intersections with the most pedestrian crashes in the City of Topeka are shown in Table 6 No "intersection related" pedestrian crashes occurred outside of the city limits of Topeka in rural areas.

Table 6. Intersections with the highest frequency of pedestrian crashes in the City of Topeka, 2010-2016

Rank	Top F&I Intersection	F&I Crashes
1	SW Topeka Blvd, SW 5th St	4
2	SW 12th St, SW Jackson St	3
3	SW Orchard St, SW 6th Ave	3
4	SW 10th Ave, SW Topeka Blvd	2
5	SE 15th St, SE Adams St	2
6	SW Washburn Ave, SW 12th St	2
7	SW Wanamaker Rd, SW 21st St	2
8	SE California Ave, SE 25th St	2
9	NW Topeka Blvd, NW Paramore St	2
10	SW Gage Blvd, SW Lydia Ave	2
11	SE Monroe St, SE 6th Ave	2
12	SE Quincy St, SE 8th Ave	2
13	SW 5th St, SE 5th St, S Kansas Ave	2
14	SW Lincoln St, SW 10th Ave	2
15	SW 17th St, SW Wanamaker Rd	2

Heat maps for each emphasis area were also developed to verify the high priority locations identified in the tables (see Figure 9 for a heat map of pedestrian related crashes).

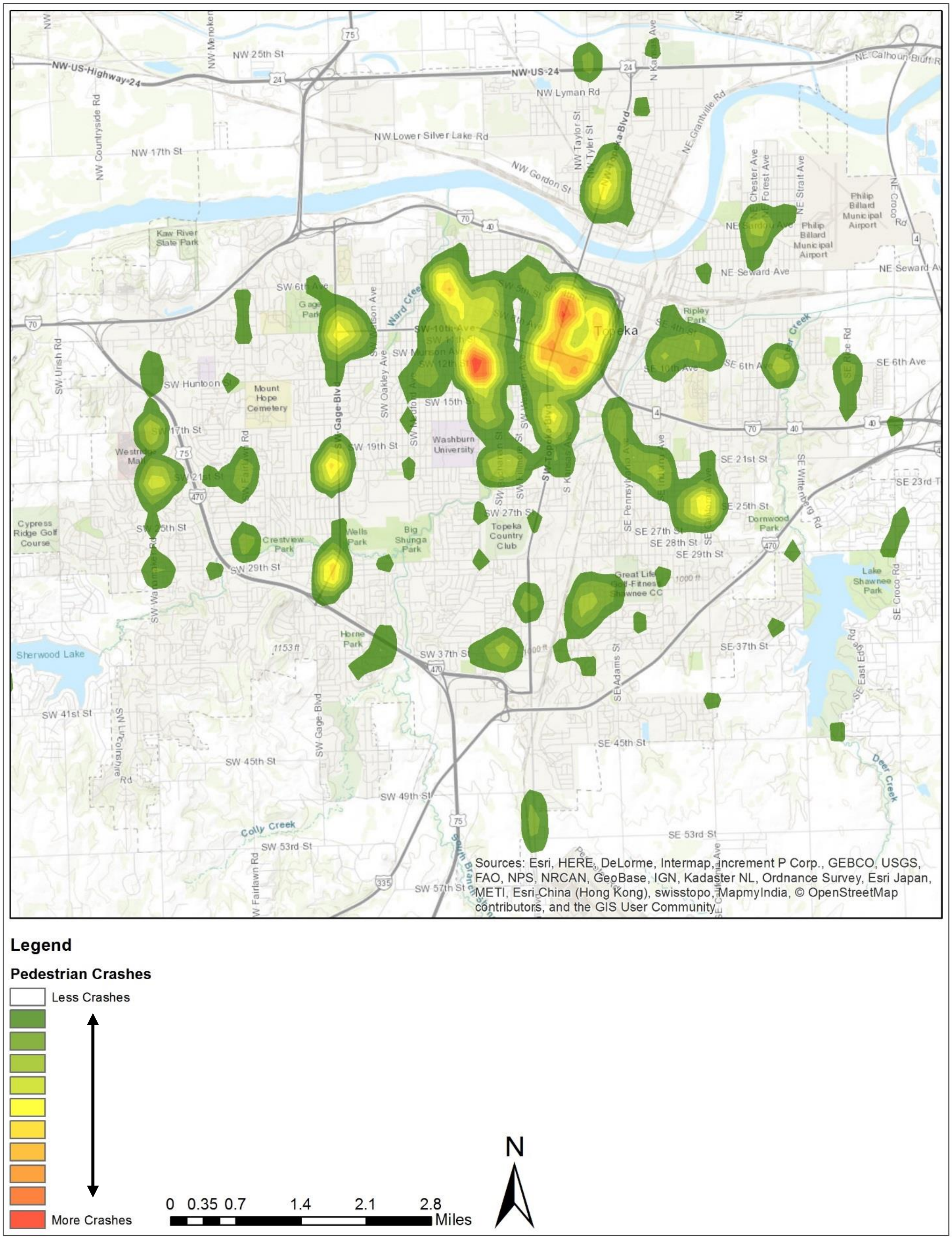


Figure 9. Heat map of crashes involving pedestrians (2010-2016)

— **Performance Measures** – one performance measure was developed for each emphasis area (besides Pedestrian & Bicyclist which has one for each) based on the results of detailed crash analysis and the priorities of reducing fatality and serious injury crashes in Topeka and Shawnee County.

For instance, the performance measure for the Districted Driving emphasis area is:

"The performance indicator is to reduce the trend of fatal and injury crashes involving distracted drivers by 10% for a 5-year average by 2024."

Figure 10 shows actual fatality / injury crashes involving distracted drivers between 2010 and 2016, the trend line for the five-year averages trending up (265+ in 2024) and the projected five-year averages through 2024 (205+) assuming countermeasures are implemented during that time period.

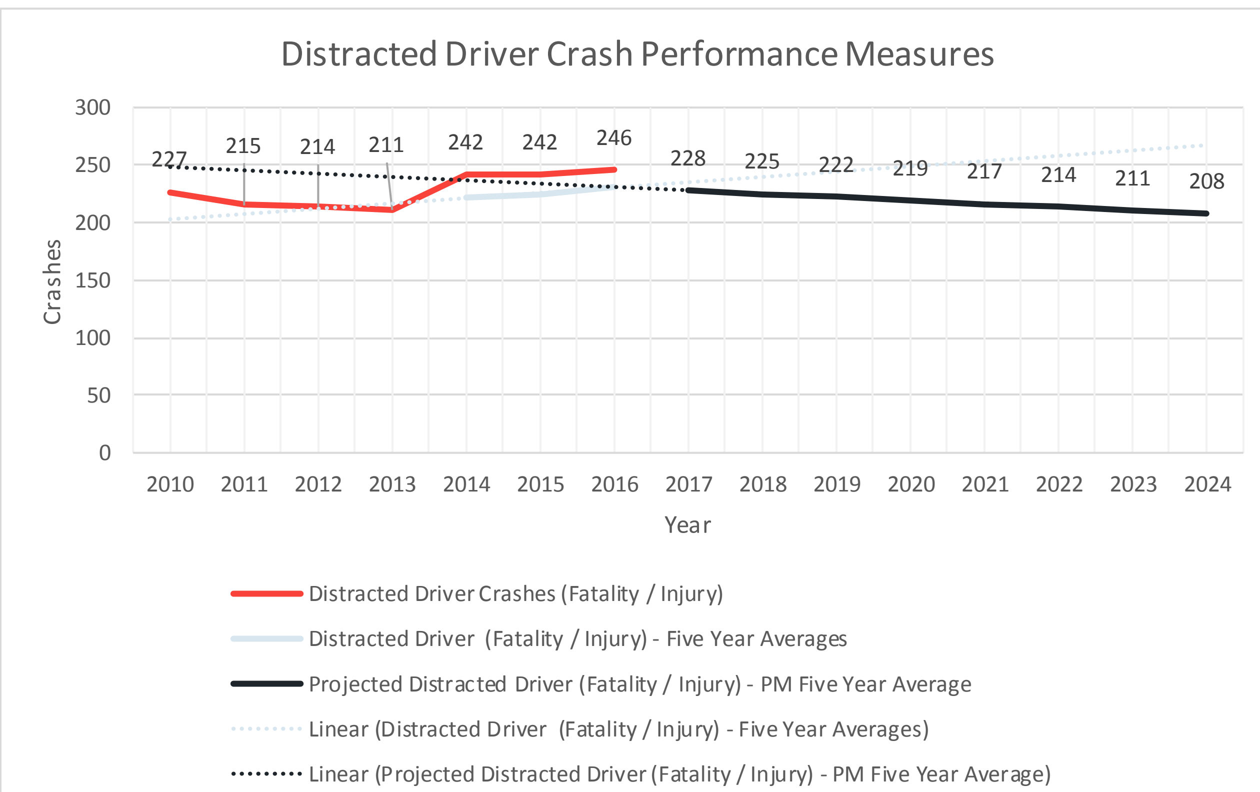


Figure 10. Distracted Driving Related Crash Performance Measures (2017 – 2024)

Recommended changes to the safety performance measures as presented in the 2019 – 2022 MTPO Transportation Improvement Plan (TIP) are also included in the Plan.

- **Countermeasures –** were developed for each emphasis area focused on the 5-E's of Safety (Education, Engineering, Enforcement, Emergency Services and Executive (Policy).

For example, Table 7 summarized the countermeasures developed by the project Advisory Committee in support of reducing fatality and serious injury crashes involving pedestrians and bicyclist.

Table 7. Pedestrian and Bicyclist Crash Countermeasures

PEDESTRIANS AND BICYCLISTS				
EDUCATION	ENGINEERING	ENFORCEMENT	EMERGENCY SERVICES	EXECUTIVE (POLICY)
Safe driving awareness through public service announcements* $	Road Safety Audit program* $$	"Dummy Cars"* $	Work with emergency services to identify potential "bottlenecks" in the transportation system $$ +	Vision Zero* $$
S.A.F.E. (Seatbelts Are For Everyone) Program* $	Roadway configuration review* $ +			Enhance City "Traffic Calming" program from 2005 $
Bike helmet giveaways and educational campaigns $$	Implement lead pedestrian intervals at signalized intersections $ +			Implement a data collection program that includes pedestrian and cyclists in traffic counts $
	Construct dedicated pedestrian and bicycle infrastructure $$$$ +			Update "City Bicycle Master Plan" $$
	Install rectangular rapid flashing beacons (RRFB's) and high visibility crosswalks at unsignalized pedestrian crossings $$$ +			Use benefit-to-cost analyses and road safety audits to prioritize bicycle and pedestrian safety for CIP budgeting $

*Over-arching strategies for all categories
Relative Cost to Implement and Operate: $ Low, $$ Moderate, $$$ Moderate to High, $$$$ High
+ Has a CMF associated with it

1.1.9. PLAN IMPLEMENTATION

Implementing the Plan is the key to reaching the goal of reducing injury and fatality crashes in the MTPO Region. The countermeasures developed for each Emphasis Area are both reasonable and implementable. Developing the right strategy for implementation will result in success. There will need to be support from elected officials, professional staff with the City of Topeka and Shawnee County, and commitment from the public to support the countermeasures for a common purpose while reflecting on their own habits when driving, walking or biking. One option for the City of Topeka and Shawnee County to consider is to become a Vision Zero community.

This plan, and subsequent plan updates, should be utilized to assist the City of Topeka, Shawnee County and the MTPO in selecting prioritized locations to implement safety countermeasures. The steps for prioritizing implementation of safety countermeasures at specific locations include:

1. **Review high crash areas against current CIP projects** – compare the list of high crash intersections and roadway segments with current CIP projects. Include the appropriate safety countermeasures within those projects that will directly address specific identified crash patterns.

2. **Crash frequency versus crash rates** – crash frequency is focused on the number and severity of crashes during a certain time period. This plan focused on crashes between 2010 and 2016 (seven-year period). Crash rates measure the number of crashes per million vehicle miles (MVM) traveled for roadway sections and number of crashes per ten-million entering vehicles (TMEV) for intersections. The number of crashes at intersections or along roadway segments is a function of exposure – the volume of pedestrians, bicycles, and vehicle traffic traveling through the area. When volumes of pedestrians, bicycles or vehicles is unavailable or inconsistent throughout the transportation network, crash frequencies are an acceptable method of performing crash analysis.

3. **Develop lists of priority locations for Future CIPS** - compare the list of high crash intersections and roadway segments with future planned CIP projects. Consider initiating safety projects in the future CIP that will address specific crash patterns at an intersection or along a roadway segment.

4. **Include the appropriate safety countermeasures** - Include the appropriate safety countermeasures within those projects that will directly address specific identified crash patterns in support of the plan.

An implementation schedule of proposed transportation safety countermeasures, focused on the 5-E's of Safety, was provided for Short term (1 – 5 years), Medium Term (5 – 7 years) and Long Term (7 to 10 years) as shown below:

SHORT TERM (1 – 5 YEARS)

- Develop a "Vision Zero" Policy towards becoming a Vision Zero City (Executive Policy)
- Implement a "Distracted Driving" ordinance (Executive Policy)
- Support the Kansas Negligent Driving bill (Executive Policy)
- Update "Topeka Bikeways Master Plan" (Executive Policy) – *In Process*
- Safe driving awareness through public service announcements (Education)
- Support the S.A.F.E. (Seatbelts Are For Everyone) Program in local high/middle schools (Education)
- Develop education material for new intersection types and new traffic control devices (Education)
- Bike helmet giveaways and educational campaigns (Education)
- Initiate roadway configuration reviews (Engineering)
- Initiate a Road Safety Audit program (Engineering)
- Enhance City "Traffic Calming" program from 2005 (Engineering)
- Dynamic Message Signage ("Put Phone Down" Message) (Education)
- Friendly school competition programs (Education)
- Simulators in a safe environment (Education)
- Implement a data collection program that includes pedestrian and cyclists in traffic counts (Executive Policy)
- Implement systemic low-cost countermeasures for reducing crashes at traffic signal-controlled intersections (Engineering)
  - Implement lead pedestrian intervals at signalized intersections as a system-wide low-cost safety improvement where pedestrian signals are present

MEDIUM TERM (5 – 7 YEARS)

- Implement Safety Performance Evaluation & Planning (Policy) as relates to reduction of angle crashes at intersections (Engineering)
- Perform strategic enforcement at intersections with safety issues by working with local law enforcement agencies (Enforcement)
- Work with emergency services to identify potential "bottlenecks" in the transportation system

LONG TERM (7 – 10 YEARS)

- Implement countermeasures at stop sign controlled intersections that are focused on Speed Differential Management (Engineering)
  - Rumble strips (centerline / shoulder)
  - Rural intersection conflict warning system
- Construct traditional and alterative intersection types which reduce the number of conflict points (Engineering)
- Construct dedicated pedestrian and bicycle infrastructure per the Topeka Bikeways Master Plan (Engineering)
- Install rectangular rapid flashing beacons (RRFB's) and high visibility crosswalks at unsignalized pedestrian crossings (Engineering)

1.1.10. MEASURING PROCESS

The most effective way to measure progress, in relation to any goal, is to regularly access whether countermeasures are being implemented by the appropriate agencies and evaluate the results of those changes within a reasonable timeframe. The MTPO should evaluate crash data on an annual basis to assess progress in each of the Emphasis Areas, as well as progress on countermeasure implementation. Emphasis Areas and countermeasures will be reassessed in the Plan if it is determined that **1)** substantial progress in that area has been made or **2)** the countermeasures and approaches being applied aren't showing the expected level of crash reductions. If substantial progress has been made, and the safety culture is positive and sustainable, then a new Emphasis Area should be selected.

Emphasis Area crash trends are managed at a detailed level over time. It is also recommended that a five-year moving average be utilized to measure Emphasis Area crash trends rather than a year-by year comparison.

Potential future Emphasis Areas include:

- Roadway Departure (fixed object in urban and rural areas) - Roadway departures leading to collisions with fixed objects were the third most common crash type in Shawnee County, and was the crash type with the most fatal crashes of any single class. Most roadway departure crashes (83%) are not associated with intersections.
- Urban & Rural Arterials – Urban and rural arterials in the MTPO area were identified as high frequency corridors when analyzing all crashes, angle-side impact, rear-end and roadway departure crashes.
- Teen Drivers - The youngest category of drivers, age 14 to 21 account for the largest percentage of these serious speed-related crashes. These drivers often lack the experience to choose an appropriate speed for the conditions they are driving in and may be more likely to lose control of their vehicle when driving too fast for those conditions.

A reasonable schedule for updating the Plan is on a five-year cycle. That will provide additional five-year moving averages when reviewing each performance measure and allow time for implementation of countermeasures as well as a few years of "after" data. The ongoing Advisory Committee utilized to maintain the Plan should also be involved when there is need for an update. The county-wide crash trends should be updated as crash trends for each Emphasis Area. Emphasis Areas should be reassessed based on level of crash reductions in support of the goal and whether the safety culture is self-sustaining. Adjust the use of certain countermeasures if they are challenging to implement or not as effective as anticipated. Continue to work towards the goal of zero fatal and serious injury crashes by the timeframe established in "Vision Zero".

A successful plan should be measured by the extent of progress gained over time towards your performance measure goals and making the appropriate adjustments. If over a ten-year period the MTPO is able to add new emphasis areas to the Plan, that is a positive sign of a successful plan.

Engaging with the public through ongoing transportation safety surveys, asking similar questions, can also measure the change in public perception on this subject over time. If you see a definite shift in the culture of the MTPO community regarding transportation safety, that is a key measure of a successful plan.

A minimum of seven years of geospatially enabled crash data should be obtained from the Kansas Department of Transportation (KDOT), the City of Topeka and Shawnee County, whichever is the most useable for the analysis. Roadway features data including number of lanes, level of access control, divided or undivided, presence of auxiliary lanes, speed limit, annualized traffic volumes, intersection type, presence of streetlighting, pedestrian crossings, pedestrian volumes, bicycle volumes and other geospatially enabled data should also be available.

If the MTPO is considering utilizing AASHTOWare's Safety Analyst software, purchased by KDOT for statewide use, both the crash data and roadside features data needs to be compatible with the use of Safety Analyst. A minimum set of data elements required to use Safety Analysist includes[1]:

[1] Safety Analyst, Data Requirements, AASHTOWare: http://www.safetyanalyst.org/datareq.htm

2. DATA ANALYSIS AND RESULTS

2.1. DESCRIPTION OF PLAN BOUNDARIES, ROADWAY NETWORK, DEMOGRAPHICS

Topeka, the State Capital of Kansas, is the fifth largest city in the state with a population approaching 128,000. Shawnee County covers 556 square miles and is the third most populous county in Kansas. The county contains four other incorporated communities beyond Topeka including the City of Auburn, Silver Lake, Rossville, and Willard.

This plan applies to all local roadways (non-highway) within the Shawnee County boundary. Crashes within Shawnee County were separated by geographic location to provide a more detailed review of where crashes are occurring. Figure 11 shows the City Limits of Topeka. Crashes located in the area shaded in green were considered within the City of Topeka and crashes located outside these shaded areas were considered within rural Shawnee County. Figure 12 shows the break-down of Shawnee County's crashes from 2010-2016 by geographical jurisdiction. There were 1,799 reported crashes without latitude and longitude connected to the data point, which accounts for nearly 8 percent of all reported crashes. A breakdown of the local roadway system in Shawnee County, including the City of Topeka, are shown in Table 8 and Table 9. While more than half the miles of local roadway in Shawnee County are rural, approximately three-fourth of the vehicle miles traveled and nearly 90 percent of the crashes occurred within the City Limits of Topeka.

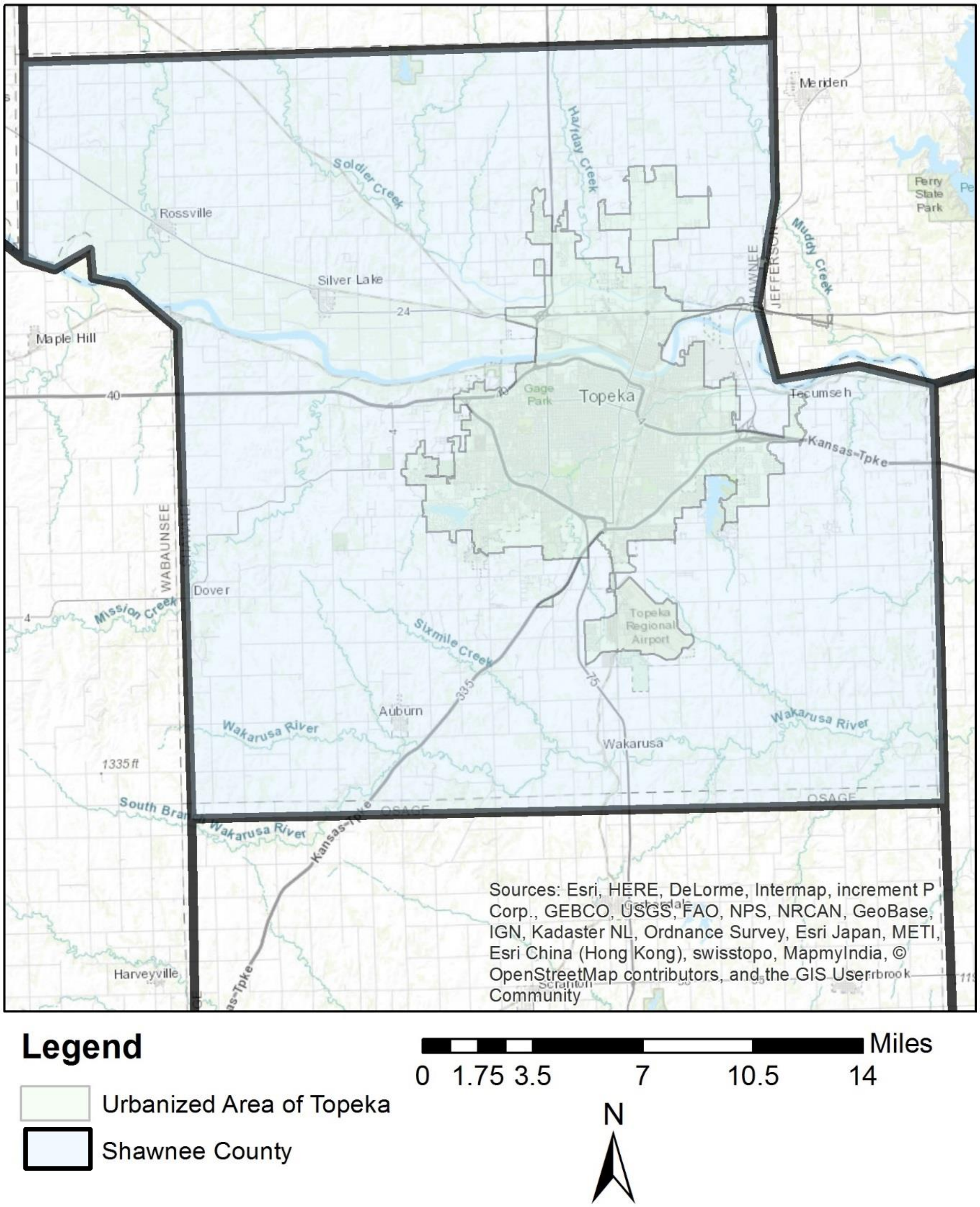


Figure 11. Topeka and Shawnee County boundaries used in the analysis

Table 8. Topeka, KS Urban Mileage and Travel by Urban Area and County, Corporate (2017)

City of Topeka Local Roadways (Non-Highway)											
Principal Arterial		Minor Arterial		Major Collector		*Minor Collector		Local (lowest functional classification)		Total	
Miles	DVMT	Miles	DVMT	Miles	DVMT	Miles	DVMT	Miles	DVMT	Miles	DVMT
8.0	144,908	98.8	923.315	63.3	150,401	0.0	0	578.9	278,456	748.9	1,497.080

**Note: The Minor Collectors are all in the rural part of the County*
Source: Kansas Department of Transportation (KDOT):
https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burTransPlan/prodinfo/Mileage_Travel/Urban-CCL_FunC2017.pdf

Table 9. Shawnee County, KS Mileage and Travel on County Non-State Rural Non-Corporate Roads (2017)

Rural Shawnee County Local Roadways (Non-Highway)							
Rural Major Collectors		Rural Minor Collectors		Rural Local (lowest functional classification)		Rural Non-Highway Total	
Miles	DVMT	Miles	DVMT	Miles	DVMT	Miles	DVMT
231.9	247,603	51.7	17,658	728.5	173,513	1,012.1	438,774

Source: Kansas Department of Transportation (KDOT):
https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burTransPlan/prodinfo/Mileage_Travel/FunClassCountyNon-State_2017.pdf

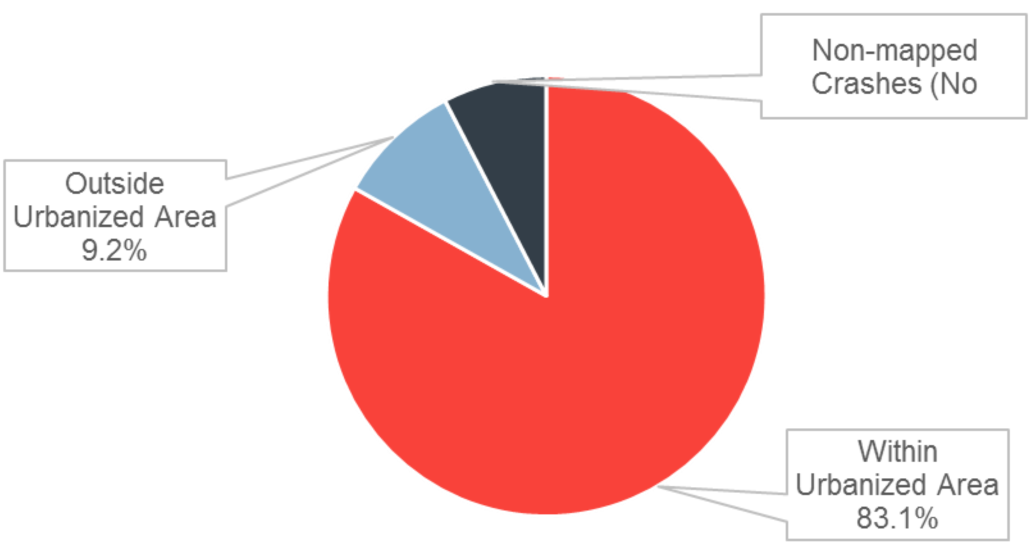


Figure 12. Percentage of geographic jurisdiction of crashes within Shawnee County, 2010-2016

The fatal and injury crashes by location, type and severity are shown in Figure 13 - Figure 15. Within the city limits there was a higher number of multi-vehicle crashes, especially same direction sideswipes, side-angle impacts, and rear-end collisions. As anticipated, collisions involving pedestrians and bicyclists were also higher within the city limits of Topeka than in the rural areas of the County. Single-vehicle crashes such as collisions with animals, overturning, and collisions with fixed objects were more common were more common in rural areas of Shawnee County.

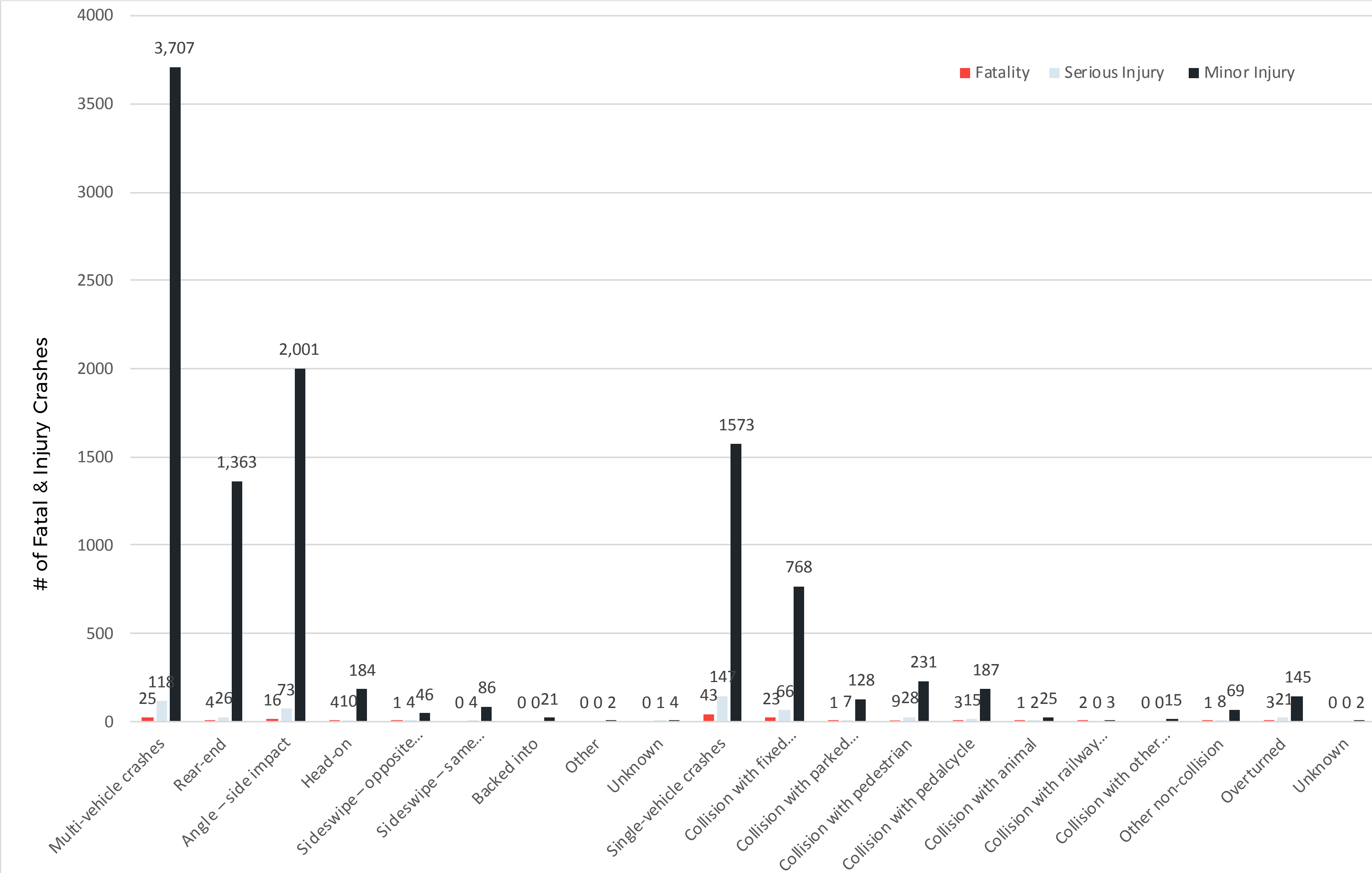


Figure 13. Fatal and injury crashes by type and severity for all of Shawnee County, 2010-2016

Considering only crashes that resulted in at least one fatality or injury, the most prevalent multi-vehicle crash types in Shawnee County were angle-side impact (2,000+), rear-end (1,400+), head-on (200+), sideswipe opposite direction, sideswipe same direction and backed into. For single-vehicle fatal and injury crashes, the most common crash types were collision with fixed objects (750+), collision with parked vehicle (100+), collision with pedestrian (200+), collision with pedacycle (170+) and overturned (100+).

Figure 14 through Figure 15 show the breakdown of fatal and injury crashes by type and severity level for crashes within the Topeka city limits and in rural Shawnee County, respectively.

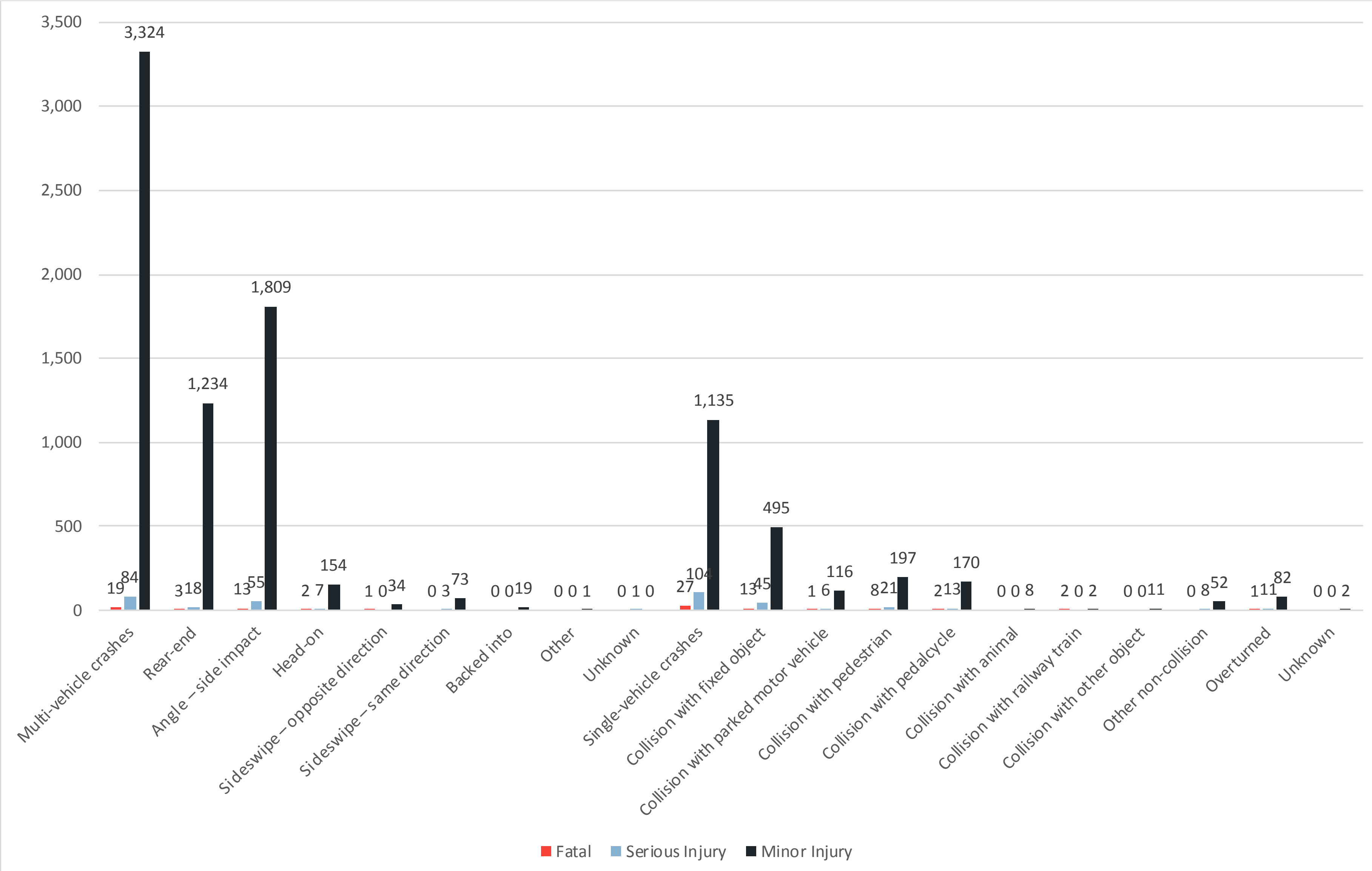


Figure 14. Fatal and injury crashes by type and severity within the city limits of Topeka, 2010-2016

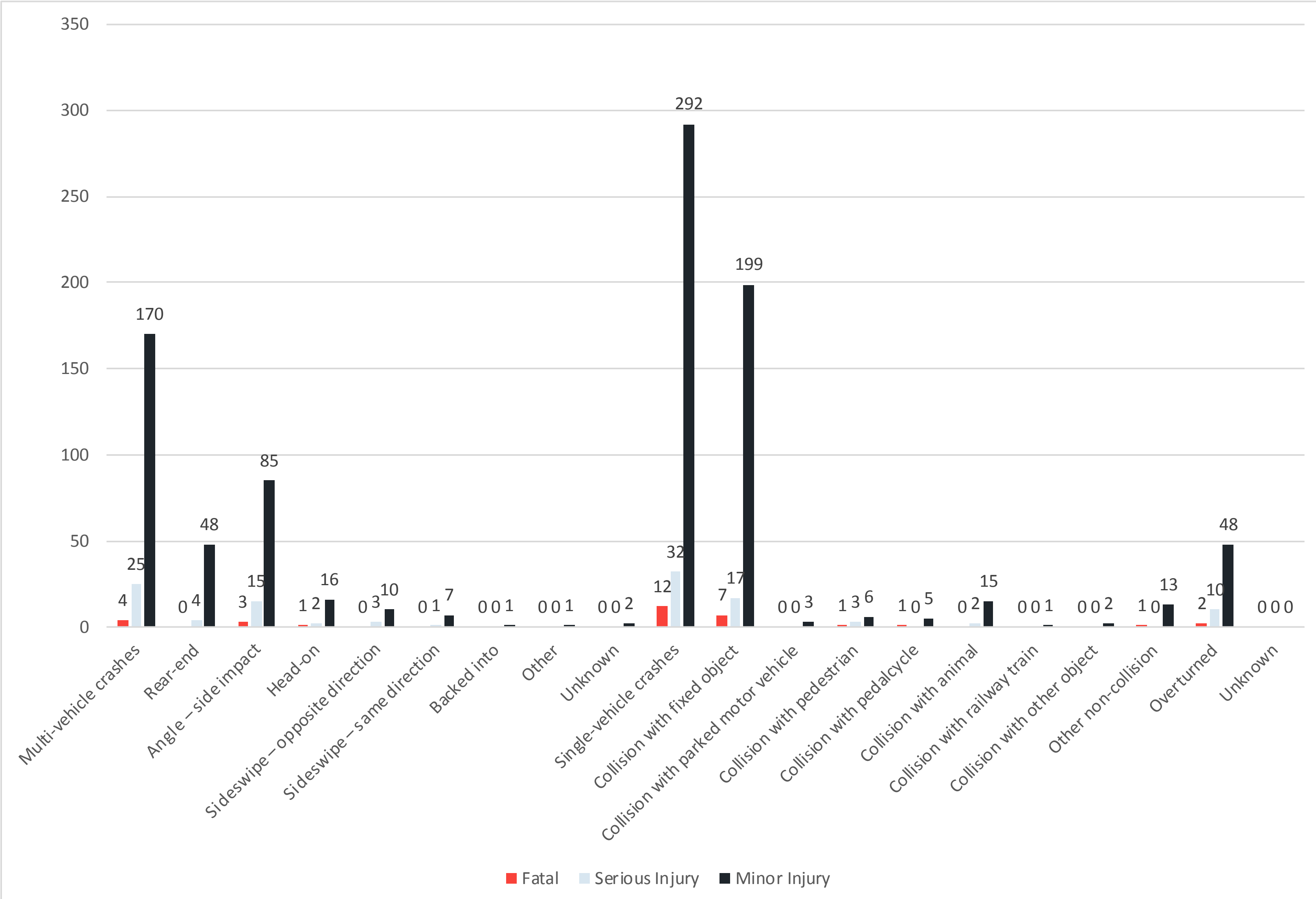


Figure 15. Fatal and injury crashes by type and severity within rural Shawnee County, 2010-2016

The most prevalent fatal and injury crash types within the City of Topeka boundaries were angle-side impact, followed by rear-end, collision with fixed object, collision with pedestrian, and collision with pedalcycle. As you move into rural areas of the County, the most prevalent crash types become collision with fixed object followed by angle-side impact, rear-end, overturned, collision with animal, collision with pedalcycle, and collision with pedestrian.

2.2. OVERVIEW OF ALL CRASHES

2.2.1. SEVERITY AND CRASH TYPE ANALYSIS

Table 10 presents the frequency of each accident class by severity (fatality, serious injury, minor injury, property damage only). The accident class variable includes all designations shown under both the “multi-vehicle crash” and “single-vehicle crashes” headings. This data shows that the most prominent multi-vehicle crash types are angle-side impact and rear-end while the most prominent single-vehicle crash types are collision with fixed object and collision with parked motor vehicle. These four crash types make up over 80 percent of the total number of crashes (19,126 out of 23,591).

Table 10. Summary of crash frequency by accident class and severity in Shawnee County, 2010-2016

Accident Class	Fatality	Serious Injury	Minor Injury	Property Damage Only	Total Crashes
Multi-vehicle crashes	**25**	**118**	**3,707**	**12,221**	**16,071**
Rear-end	4	26	1,363	4,541	5,934
Angle – side impact	16	73	2,001	5,541	7,631
Head-on	4	10	184	263	461
Sideswipe – opposite direction	1	4	46	249	300
Sideswipe – same direction	0	4	86	1,151	1,241
Backed into	0	0	21	439	460
Other	0	0	2	12	14
Unknown	0	1	4	25	30
Single-vehicle crashes	**43**	**147**	**1,573**	**5,719**	**7,520**
Collision with fixed object	23	66	768	2,423	3,296
Collision with parked motor vehicle	1	7	128	2,111	2,265
Collision with pedestrian	9	28	231	5	273
Collision with pedalcycle	3	15	187	9	214
Collision with animal	1	2	25	772	800
Collision with railway train	2	0	3	4	9
Collision with other object	0	0	15	96	112
Other non-collision	1	8	69	196	275
Overturned	3	21	145	88	258
Unknown	0	0	2	15	18
TOTAL	**68**	**265**	**5280**	**17,940**	**23,591**

Table 11 shows the percentage of fatal crashes and of injury crashes in each accident class. While collisions with parked cars make up a very small proportion of fatal and injury crashes, the other three crash types (angle, rear-end, and fixed-object) make up over 75 percent of injury crashes. While angle crashes make up the largest percentage of injury crashes (37 percent), collisions with fixed objects are the most fatal crash type, accounting for 34 percent of all fatal crashes in the county. Rear-end crashes, while making up a fourth of all injury crashes, only account for 6 percent of fatal crashes. On the other hand, pedestrian crashes account for over 13 percent of all fatal crashes, despite making up only about one percent of total crashes.

Table 11. Percent of fatal and injury crashes by accident class in Shawnee County, 2010-2016

Accident Class	Fatal Crashes	Serious Injury Crashes	Minor Injury Crashes	All Injury Crashes
Multi-vehicle crashes	**36.8%**	**44.5%**	**70.2%**	**69.0%**
Rear-end	5.9%	9.8%	25.8%	25.0%
Angle – side impact	23.5%	27.5%	37.9%	37.4%
Head-on	5.9%	3.8%	3.5%	3.5%
Sideswipe – opposite direction	1.5%	1.5%	0.9%	0.9%
Sideswipe – same direction	0.0%	1.5%	1.6%	1.6%
Backed into	0.0%	0.0%	0.4%	0.4%
Other	0.0%	0.0%	0.0%	0.0%
Unknown	0.0%	0.4%	0.1%	0.1%
Single-vehicle crashes	**63.2%**	**55.5%**	**29.8%**	**31.0%**
Collision with fixed object	33.8%	24.9%	14.5%	15.0%
Collision with parked motor vehicle	1.5%	2.6%	2.4%	2.4%
Collision with pedestrian	13.2%	10.6%	4.4%	4.7%
Collision with pedalcycle	4.4%	5.7%	3.5%	3.6%
Collision with railway train	2.9%	0.8%	0.5%	0.1%
Collision with animal	1.5%	0.0%	0.1%	0.5%
Collision with other object	0.0%	0.0%	0.3%	0.3%
Other non-collision	1.5%	3.0%	1.3%	1.4%
Overturned	4.4%	7.9%	2.7%	4.4%
Unknown	0.0%	0.0%	0.0%	0.0%
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Fatal and serious injury (F&SI) crashes are the two highest severities possible for collisions, and are generally analyzed together since the numbers of each are often too low to analyze separately and because the factors that lead to these crashes tend to be similar. Serious injury crashes include those coded as “incapacitating (disabling) injury” in the crash report. Crashes coded as “not incapacitating injury” and “possible injury (complaint of pain)” are considered minor injuries for this analysis. When considering fatal and severe injury crashes, angle crashes and collisions with fixed objects make up over half of all F&SI crashes. The categories with the next highest numbers of F&SI crashes are pedestrian related, rear-end collisions, and overturning.

Table 12 presents the proportion of each crash type that has a fatal or injury severity level versus the proportion that has a PDO severity level. For both multiple- and single-vehicle crashes, 24 percent are severe (fatal or severe/minor injury), 76 percent include only property damage. As expected, the most severe crash types are pedestrian and bicycle crashes, roll-over crashes (labeled as “overturn”), collisions with trains, and head-on collisions. However, these five crash types are somewhat rare—they make up only 4 percent of total crashes and just over 15 percent of all fatal and injury crashes.

Table 12. Percent of crashes in each accident class that are fatal- or injury-level severity in Shawnee County, 2010-2016

Accident Class	Fatal and All Injury Crashes	PDO Crashes
Multi-vehicle crashes	**24.0%**	**76.0%**
Rear-end	23.5%	76.5%
Angle – side impact	27.4%	72.6%
Head-on	43.0%	57.0%
Sideswipe – opposite direction	17.0%	83.0%
Sideswipe – same direction	7.3%	92.7%
Backed into	4.6%	95.4%
Other	14.3%	85.7%
Unknown	16.7%	83.3%
Single-vehicle crashes	**23.5%**	**76.5%**
Collision with fixed object	26.0%	74.0%
Collision with parked motor vehicle	6.0%	94.0%
Collision with pedestrian	98.2%	1.8%
Collision with pedalcycle	95.8%	4.2%
Collision with railway train	55.6%	44.4%
Collision with animal	3.5%	96.5%
Collision with other object	13.4%	86.6%
Other non-collision	28.4%	71.6%
Overturned	65.5%	34.5%
Unknown	11.1%	88.9%
TOTAL	**23.8%**	**76.2%**

After a review of the data and considerations of the priorities of Topeka and Shawnee County, the project Advisory Committee selected angle side-impact, rear-end, roadway departure, as well as pedestrian and bicycle collisions for further investigation through a risk assessment analysis included in Section 2 of this report.

2.2.2. TIME OF DAY ANALYSIS

Hourly histograms detailing the frequency of both total crashes and fatal and severe injury crashes throughout the day are shown in Figure 16 and Figure 17, respectively. For hourly crashes, hour "00" represents the hour beginning at midnight. For total crashes, peaks are seen in the PM peak hours between 3:00 pm and 6:00 pm. Smaller peaks are found in the 7:00 am hour and the noon hour. In general, crash frequency is lowest in the very early morning hours, increases through the evening peak, and then begins to decrease again. This pattern likely follows the volume of vehicles on the road throughout the day. For F&SI crashes, the frequency is much more random throughout the day. The evening peak hours between 5:00 and 7:00 pm have the most serious crashes, but there are several hours throughout the day where serious crashes are occurring. F&SI crashes are more likely to occur during the late hours of the night and early hours of the morning than total crashes.

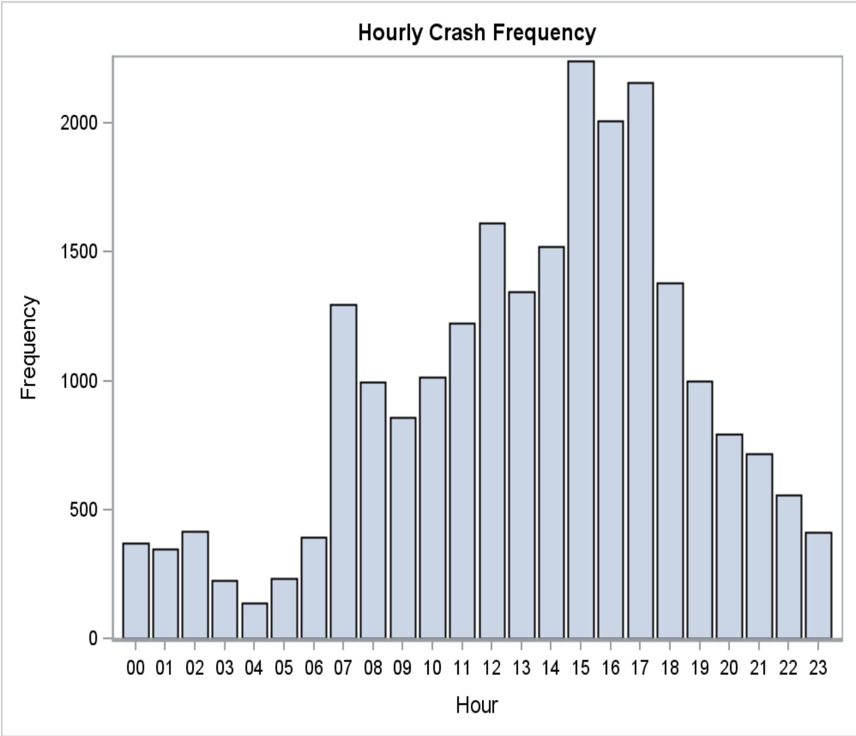


Figure 16. Histogram for total crashes by hour of the day in Shawnee County, 2010-2016

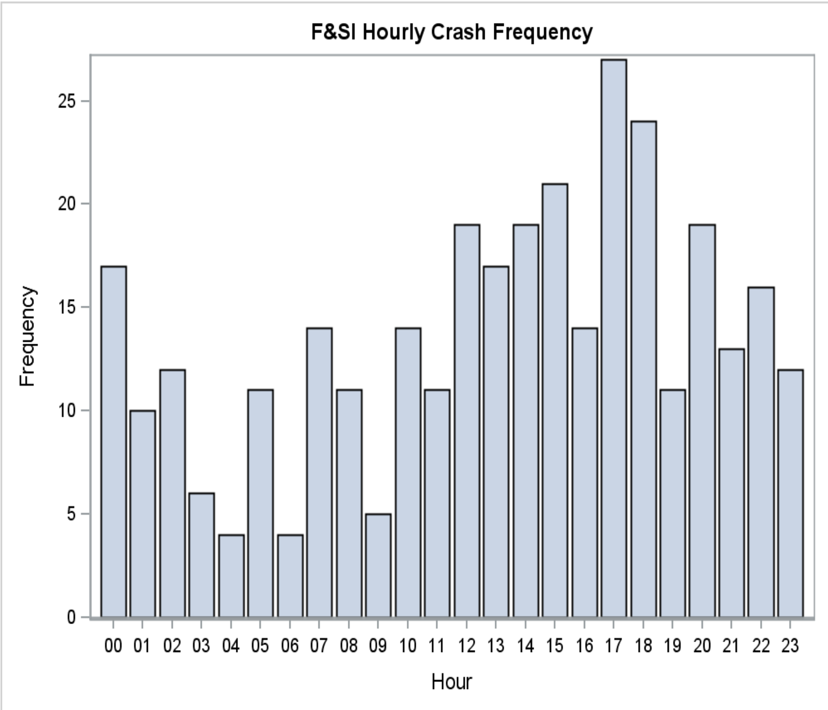


Figure 17. Histogram of fatal and severe injury crashes by hour of the day in Shawnee County, 2010-2016

Figure 18 and Figure 19 show histograms for all crashes and F&SI crashes. When looking at total crashes by day of week, Friday sees the most crashes and Sunday sees the fewest crashes. F&SI crashes are more likely to occur on weekends than weekdays.

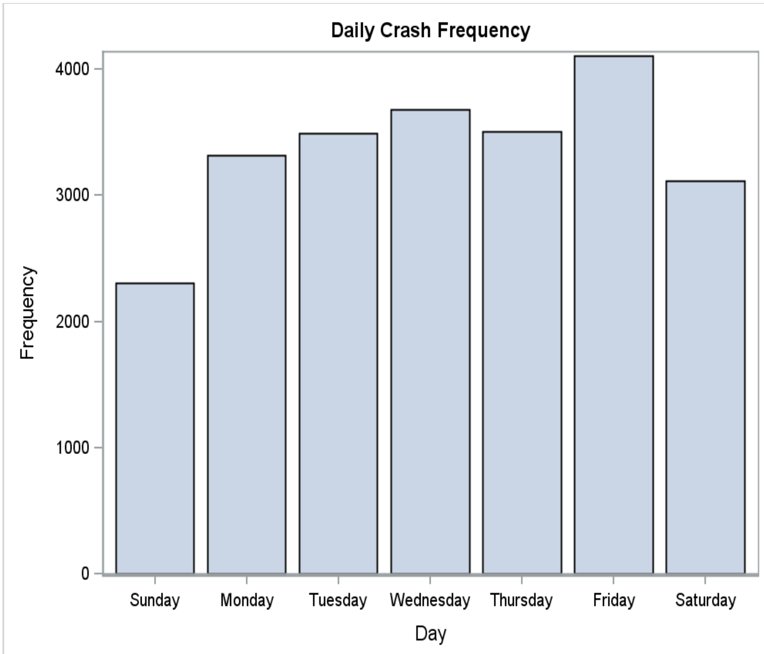


Figure 18. Histogram for all crashes by day of the week in Shawnee County, 2010-2016

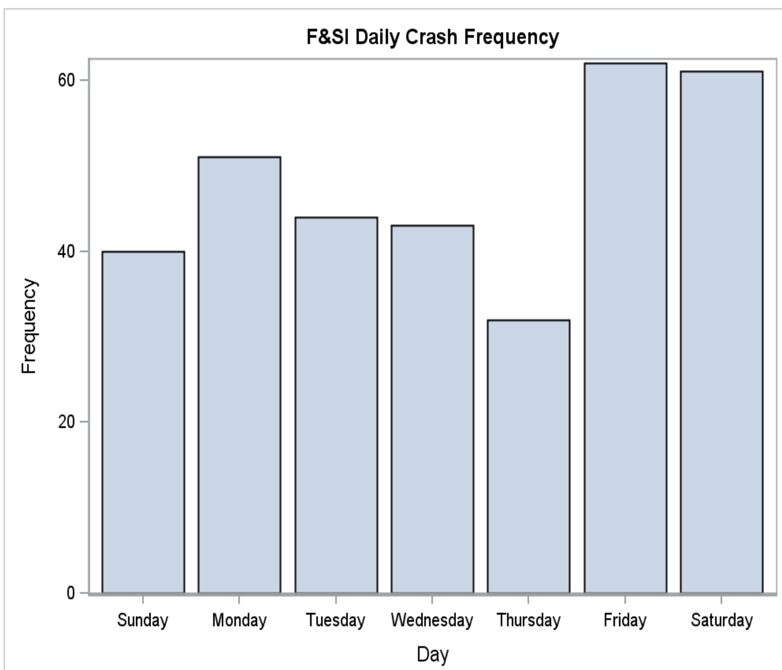


Figure 19. Histogram for fatal and severe crashes by day of the week in Shawnee County, 2010-2016

Histograms for the months are shown in Figure 20 and Figure 21 for total and fatal/serious injury crashes. Evaluating crashes by month of year, we see that when considering all severity levels combined, crash frequency is consistent throughout the year. When considering only F&SI crashes, June sees substantially more crashes than other months, with December and August as the next highest months. The higher variance in the severe injury and fatal crashes than the total may at least partially due to the relatively fewer data points.

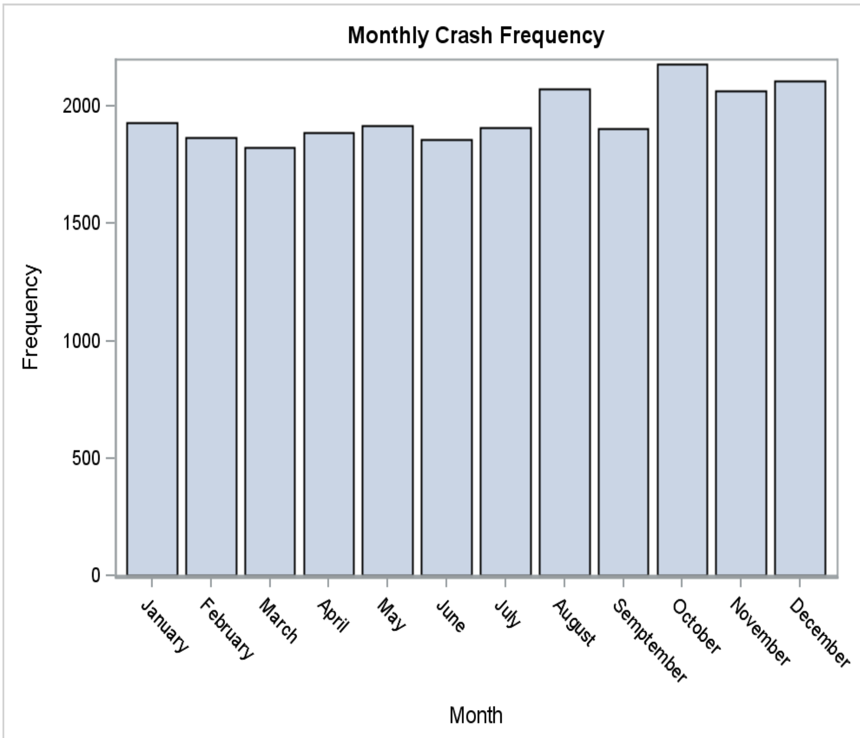


Figure 20. Histogram for total crashes by month of the year in Shawnee County, 2010-2016

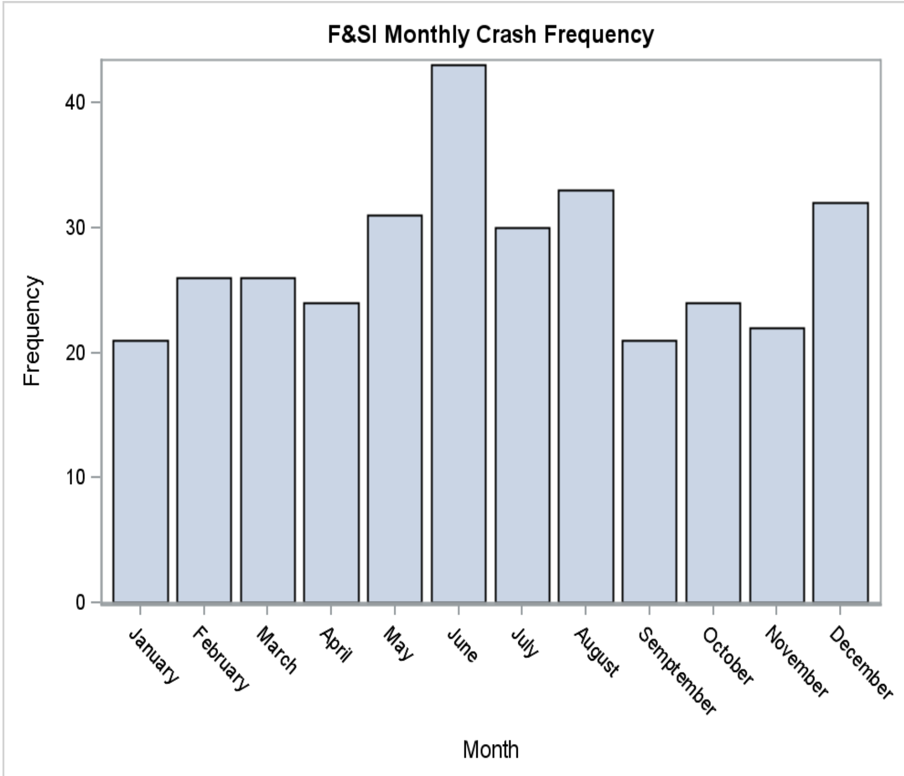


Figure 21. Histogram for fatal and serious injury crashes by month of the year in Shawnee County, 2010-2016

The yearly trends for crashes were also analyzed for Shawnee County for the entire seven-year analysis period. Crashes are shown by severity type for each year in the analysis period in Figure 22. Graphs showing the trend lines for total crashes, F&SI aggregated, and F&SI individually are shown in Figure 23 through Figure 25. There was an increasing trend in the number of total crashes year to year during the analysis period. F&SI crashes declined overall. Severe injury crashes decreased steadily for the entire period; however, fatal crashes show an increasing trend.

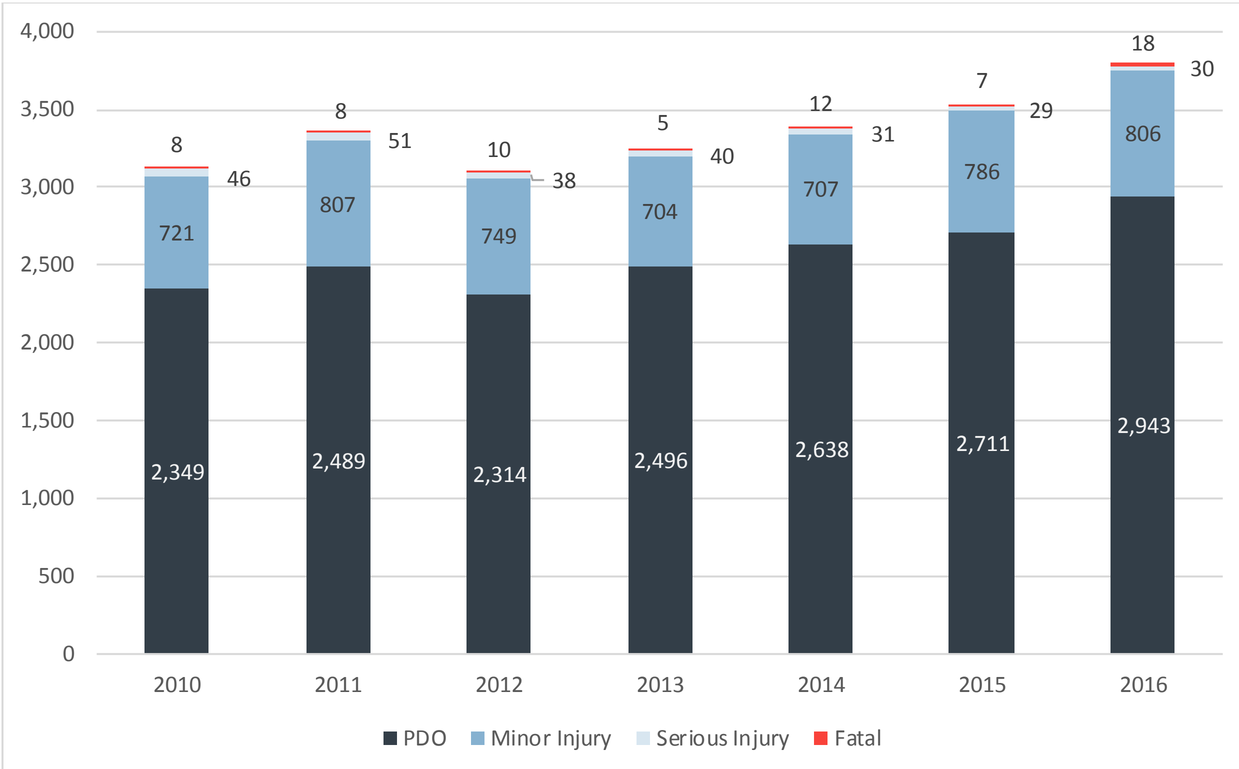


Figure 22. Crashes by year and severity in Shawnee County, 2010-2016

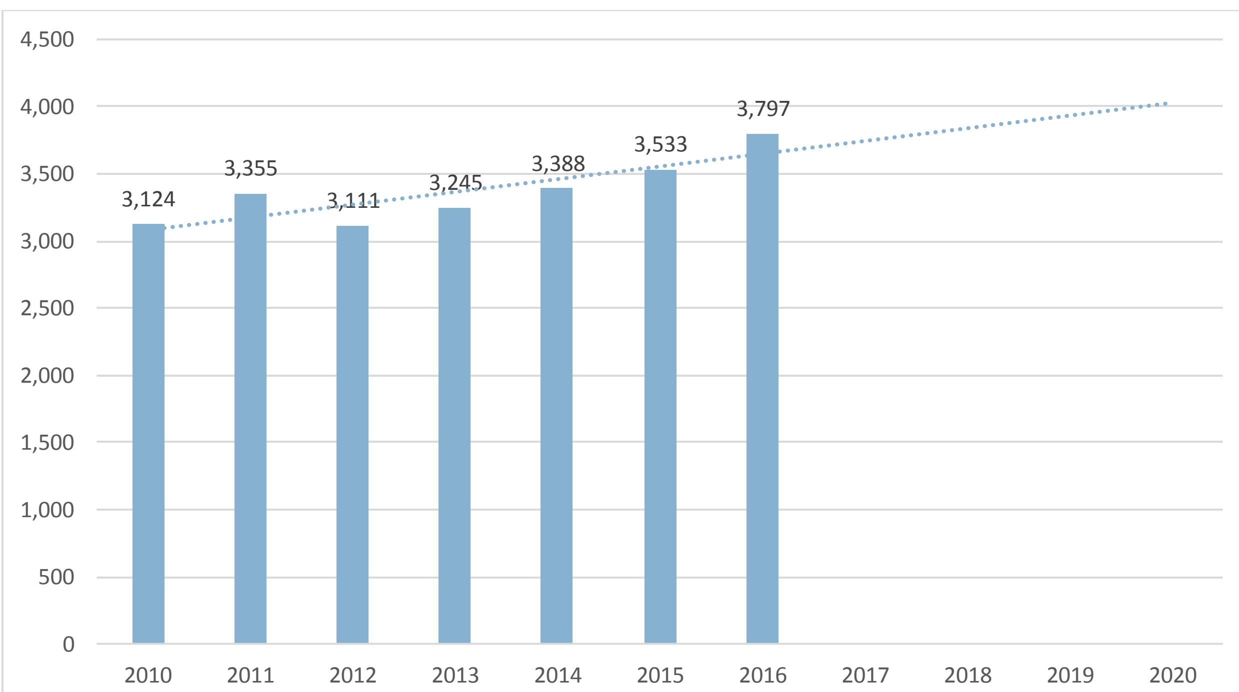


Figure 23. Total crashes by year with trend line in Shawnee County, 2010-2016

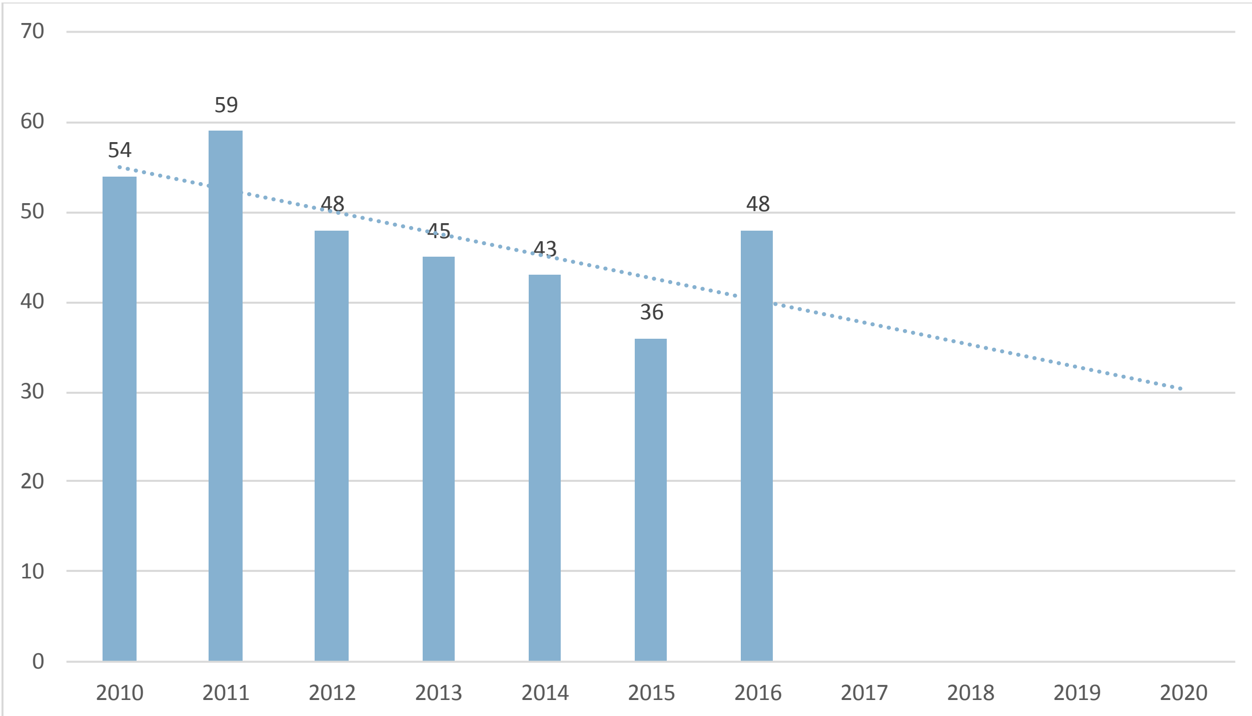


Figure 24. Fatal and severe injury combined crashes by year with trend line in Shawnee County, 2010-2016

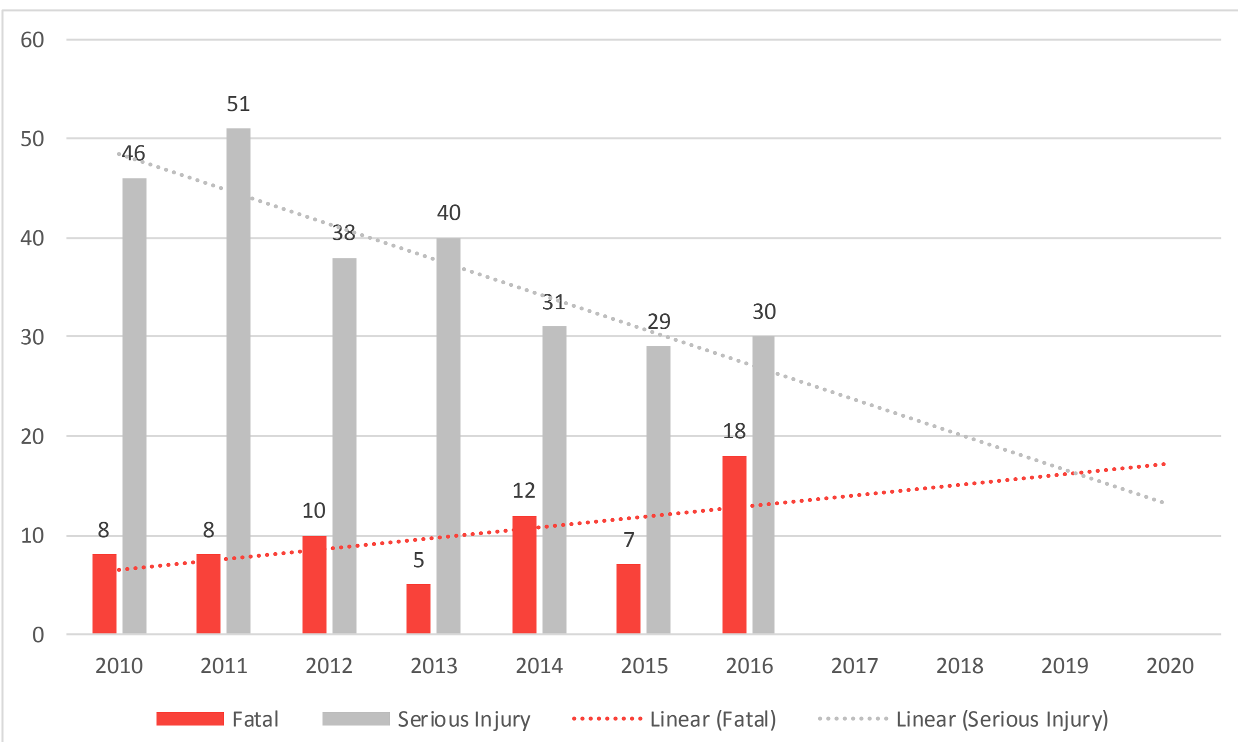


Figure 25. Fatal and severe injury crashes by year with trend lines in Shawnee County, 2010-2016

2.2.3. DRIVER AGE ANALYSIS

To analyze the driver age, only one age per crash was reviewed so that the total number of drivers evaluated is the same as the number of crashes, and the proportions shown for each age group sum up to 100 percent. For multi-vehicle crashes, the age of the first driver listed in the crash records was used. Of the 23,591 recorded crashes, 2,722 crashes were coded with a driver age of “zero” and 48 crashes had missing codes for driver age. Combined, these missing values account for approximately 11.7 percent of all the crashes. There were also six crashes involving 11 to 13-year-olds, which aren’t captured in the analysis.

The crash data was then graphed by each age individually (Figure 26) and for five-year bins (Figure 27). The most frequent driver ages are 17 and 18, but with the 20-24 age range having the highest sum-total in any five-year age range. There was no increased crash frequency for older drivers (65 years of age or older) for any crash type, which may be due to reduced vehicle miles traveled or a smaller older driver population living in Shawnee County.

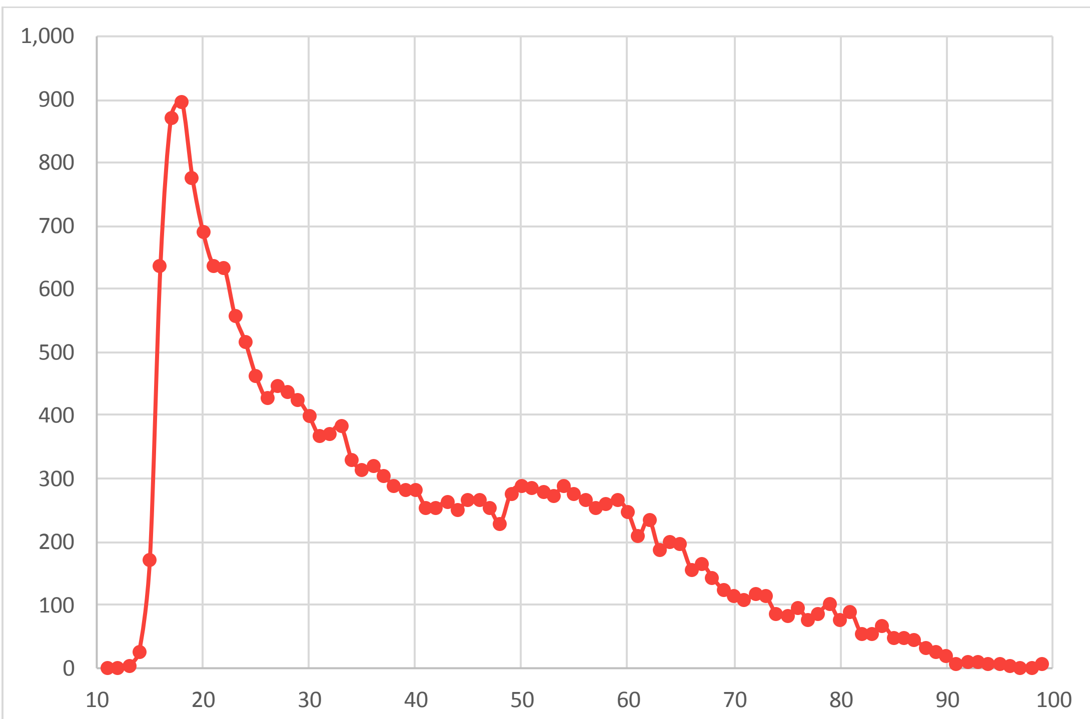


Figure 26. Total crashes by driver age in Shawnee County, 2010-2016

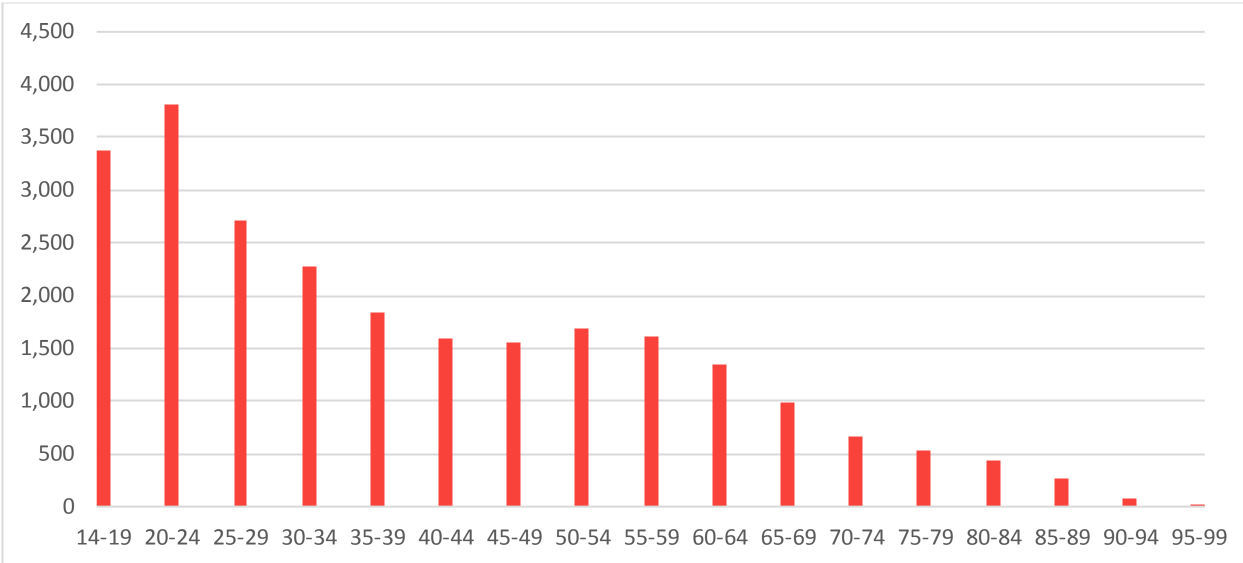


Figure 27. Total crashes by driver age in Shawnee County with five-year bins, 2010-2016

Histograms with seven-year bins for all crashes, injury, and fatal crashes are shown in Figure 28 through Figure 29. For all severity levels, the younger age groups tend to get in crashes more frequently. This trend for fatal crashes has two deviant points where fatalities for the 22-29 age range and the 70-79 age range were less frequent than the next age group.

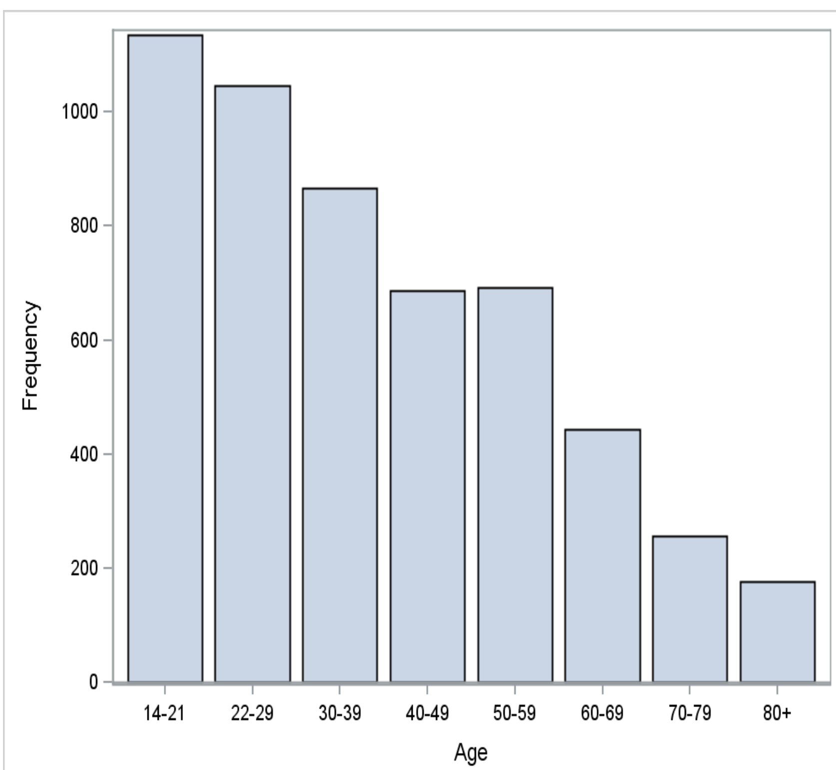


Figure 28. Crash frequency by age for minor and severe injury crashes in Shawnee County, 2010-2016

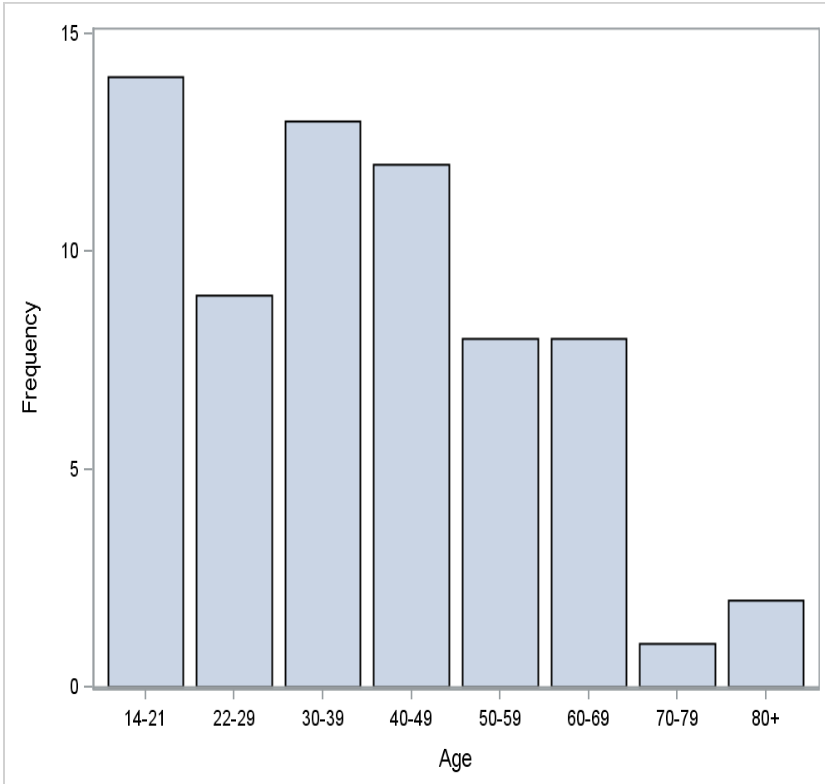


Figure 29. Crash frequency by age for fatal crashes in Shawnee County, 2010-2016

The crash frequency of young drivers (age 14-21) for each year is shown in Figure 30 and Figure 31 for total and F&SI crashes, respectively. While the average total crashes for the period increased for the past two periods, fatal and serious injury crashes were steadily decreasing until there was a minor spike in 2016. This means that young drivers may be in increasingly more crashes by frequency, but are generally safer in that the severity of the crashes is reducing.

In 2010, the driver's license laws for teen drivers changed in Kansas. The state rolled out a new licensing law that become known as the Graduated Driver's License Law (GDL). This law replaced the previous teen driver law which was largely based upon age to determine the type of license a teenager would receive. The new GDL was based upon a multi-faceted approach of: education / experience, driving restrictions, and law enforcement. At first glance, this law appears overly complex with numerous conditions and restrictions placed upon new teen drivers and their parents / guardians. However, upon closer inspection, each step or condition has a purpose and reasoning based in quality research and science. The focus on teen driving over the last 10 years in Kansas has resulted in a reduction in teen driving related fatalities and serious injuries statewide. See the Kansas Department of Revenue GDL website for more information:

https://www.ksrevenue.org/dovgdl.html

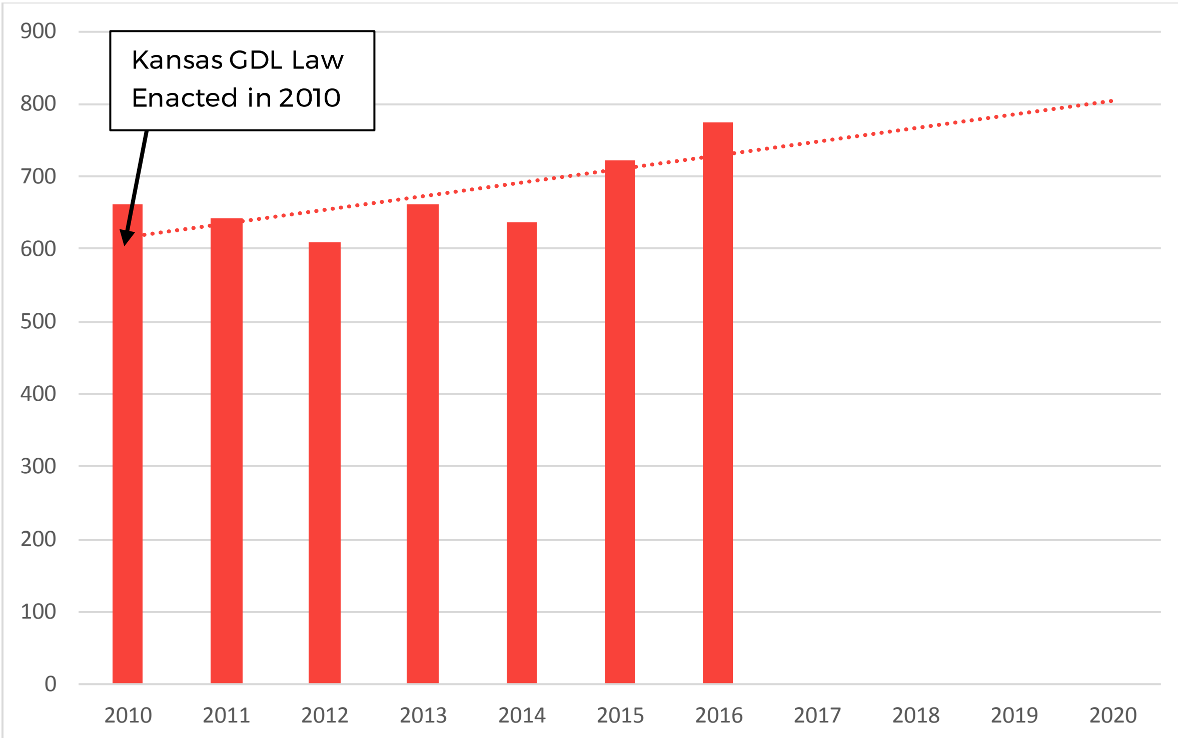


Figure 30. Total crashes for young drivers by year in Shawnee County, 2010-2016

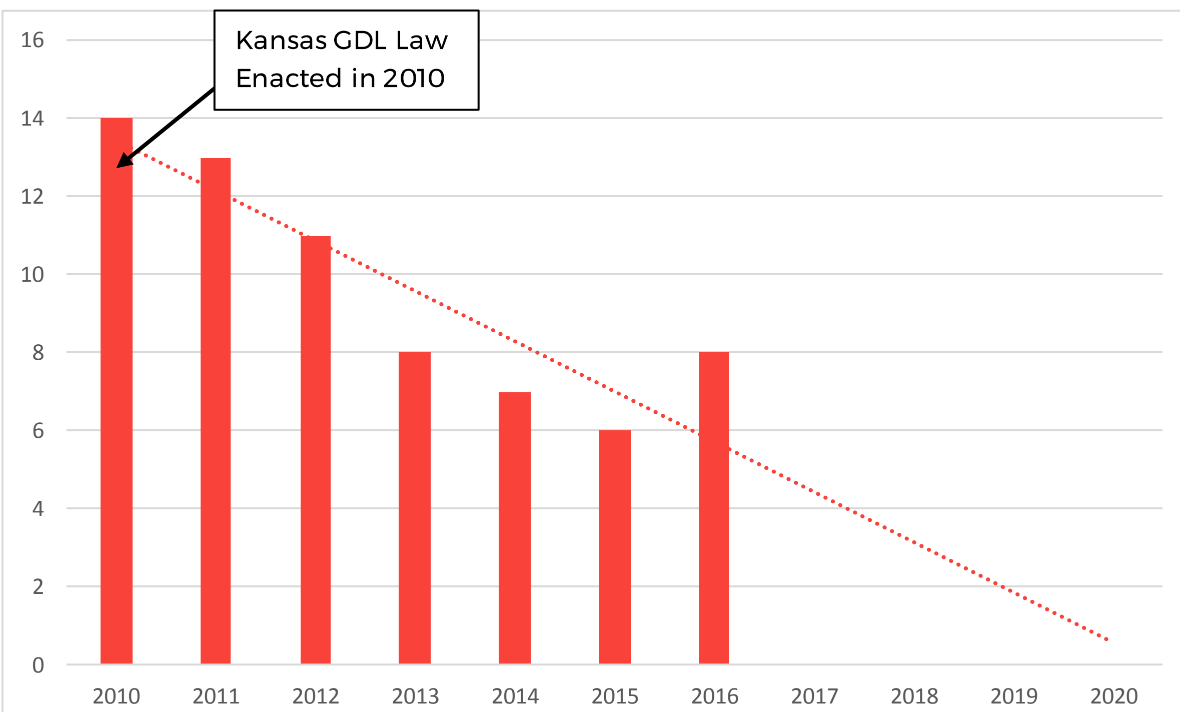


Figure 31. Fatal and serious injury crashes for young drivers by year in Shawnee County, 2010-2016

2.2.4. CONTRIBUTING CIRCUMSTANCES ANALYSIS

Kansas crash records include driver/pedestrian, environmental, vehicular, and roadway contributing circumstances as well as weather, lighting, and road surface conditions at the time of the crash.

The top 20 contributing circumstances for all crashes and F&SI crashes are shown in Table 13 and Table 14. Most contributing circumstances in both cases are driver or pedestrian related. There were over 90 contributing circumstances noted for all crashes, and 60 contributing circumstances for the fatal and serious injury crashes. For all crashes, the rank and percentage for Shawnee County were compared to State of Kansas, which generally shows similar trends for the contributing circumstances. However, "failure to yield" has a higher percentage of occurrence in Shawnee County (19 percent vs. 10 percent), while reported animal crashes have a much lower occurrence (3 percent vs. 13 percent) than statewide.

Table 13. Top 20 contributing circumstances for all crashes in Shawnee County, 2010-2016 compared to the 2016 ranking for the contributing circumstances in the State of Kansas

Shawnee County Rank	Kansas Rank	Category	Contributing Circumstance	% for Shawnee County	% for Kansas*
1	1	Driver	Inattention (general sense)	20.3	20.3
2	3	Driver	Failed to yield the right of way	19.0	10.4
3	4	Driver	Followed too closely	11.6	8.3
4	5	Driver	Too fast for conditions	5.7	5.5
5	6	Driver	Unknown	5.3	4.1
6	9	Driver	Disregarded traffic signs, signals, or markings	5.1	2.7
7	n/a	Driver	No contributing circumstance	4.5	n/a
8	7	Driver	Improper lane change	3.9	2.9
9	11	Driver	Improper backing	3.7	2.1
10	2	Environment	Animal: domestic or wild	3.6	13.3
11	14	Driver	Made improper turn	3.5	1.9
12	8	Driver	Under the influence of Alcohol	3.6	2.9
13	13	Driver	Red light running (disregarded traffic signal)	2.7	1.9
14	15	Driver	Reckless / Careless driving	2.1	1.6
15	10	Driver	Avoidance or Evasive action	2.0	2.2
16	12	Driver	Other distraction in or on vehicle	2.0	2.0
17	18	Roadway	Icy or slushy	1.4	1.5
18	16	Driver	Over correction / Over steering	1.2	1.6
19	20	Environment	Rain, mist, or drizzle	1.1	1.4
20	24	Driver	Exceeded posted speed limit	1.0	0.7

* Based on 2016 Crash Data from:
https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burTransPlan/prodinfo/2016factsbook/CCs.pdf

When comparing the percentage of contributing circumstances that result in fatality or serious injury crashes versus overall crashes in Shawnee County, there is an significant increase in "Too fast for conditions", "Under the influence or alcohol", "Disregarded traffic sign, signals, or markings", "Reckless / Careless driving", "Exceeded posted speed limit" and "Under the influence of illegal drugs" (see Table 14).

Crashes involving motorcycles, were also reviewed. The number of overall crashes involving motorcycles in Shawnee County have been steadily decreasing (see Figure 32) while crashes resulting in a fatality or serious injury have also been trending downward during the review period (see Figure 33).

Table 14. Top 20 contributing circumstances for fatal and serious injury crashes in Shawnee County, 2010-2016

Shawnee County Rank	Category	Contributing Circumstance	% for F&SI Crashes	% for Total Crashes
1	Driver	Failed to yield the right of way	22.8	19.0
2	Driver	Too fast for conditions	**15.9**	**5.7**
3	Driver	Under the influence of Alcohol	**15.3**	**3.6**
4	Driver	Inattention (general sense)	15.3	20.3
5	Driver	Disregarded traffic signs, signals, or markings	**12.0**	**5.1**
6	Driver	Reckless / Careless driving	**11.1**	**2.1**
7	Driver	Exceeded posted speed limit	**8.1**	**1.0**
8	Driver	No contributing circumstance	6.0	4.5
9	Driver	Over correction / Over steering	6.0	1.2
10	Driver	Ill or Medical condition	4.5	1.0
11	Driver	Other distraction in or on vehicle	3.6	2.0
12	Driver	Aggressive / Antagonistic driving	3.3	0.4
13	Driver	Followed too closely	3.3	11.6
14	Environment	Rain, mist, or drizzle	3.0	1.1
15	Driver	Avoidance or Evasive action	2.7	2.0
16	Driver	Wrong side or wrong way	2.7	0.4
17	Driver	Unknown	2.4	0.3
18	Driver	Red light running (disregarded traffic signal)	2.4	2.7
19	Driver	Under the influence of illegal Drugs	**2.4**	**>0.1**
20	Pedestrian	Improper crossing	2.4	0.2

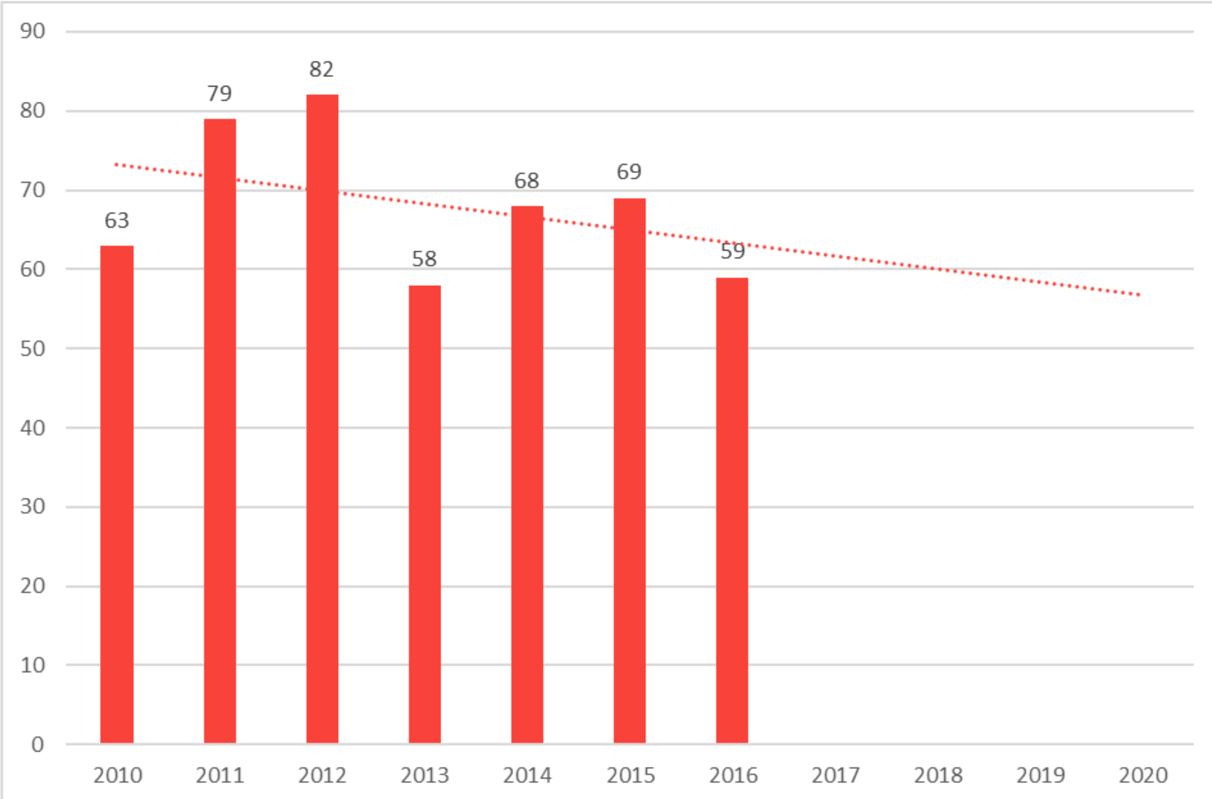


Figure 32. Crashes involving motorcycles in Shawnee County, 2010-2016

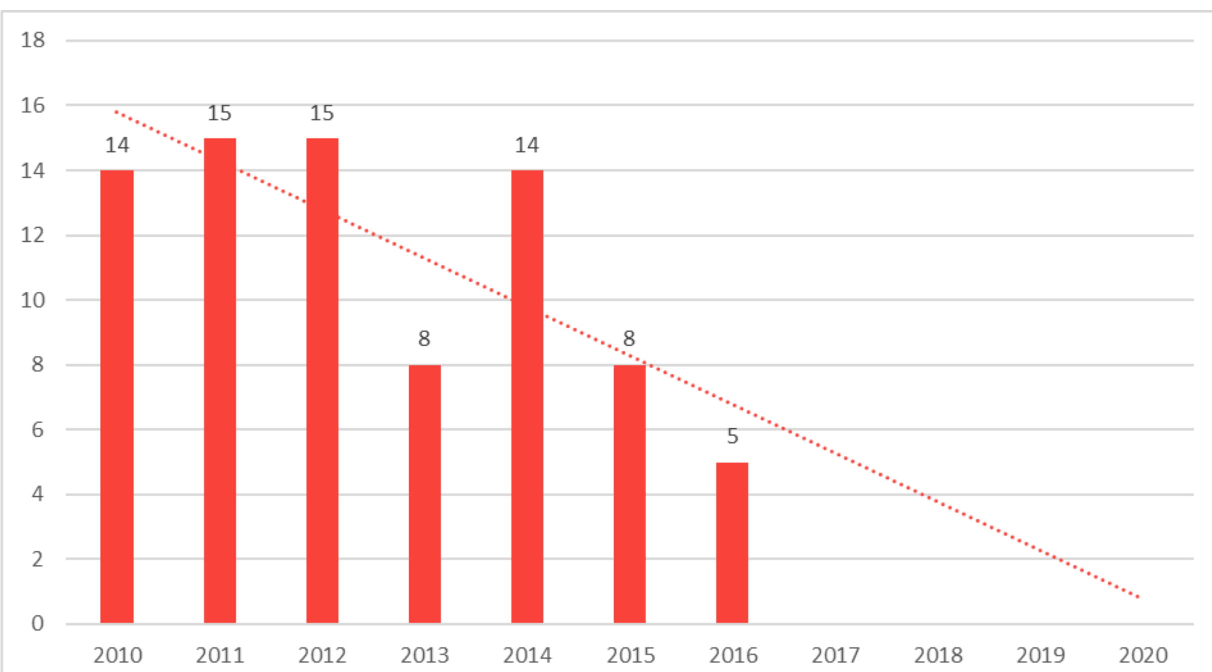


Figure 33. Fatal and serious injury crashes involving motorcycles in Shawnee County, 2010-2016

Environmental factors including weather, road surface, and lighting conditions are summarized in Figure 34 through Figure 36. Overall, most crashes occur with no adverse weather conditions on dry roads during daylight conditions.

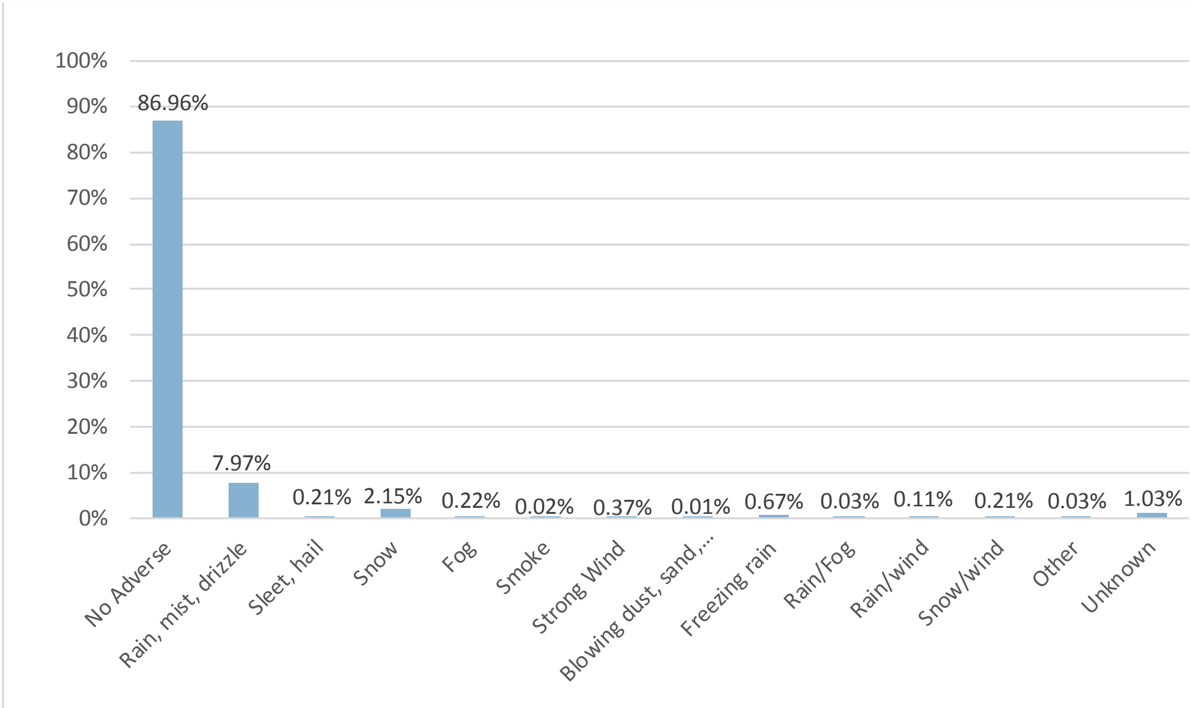


Figure 34. Weather conditions for crashes in Shawnee County, 2010-2016

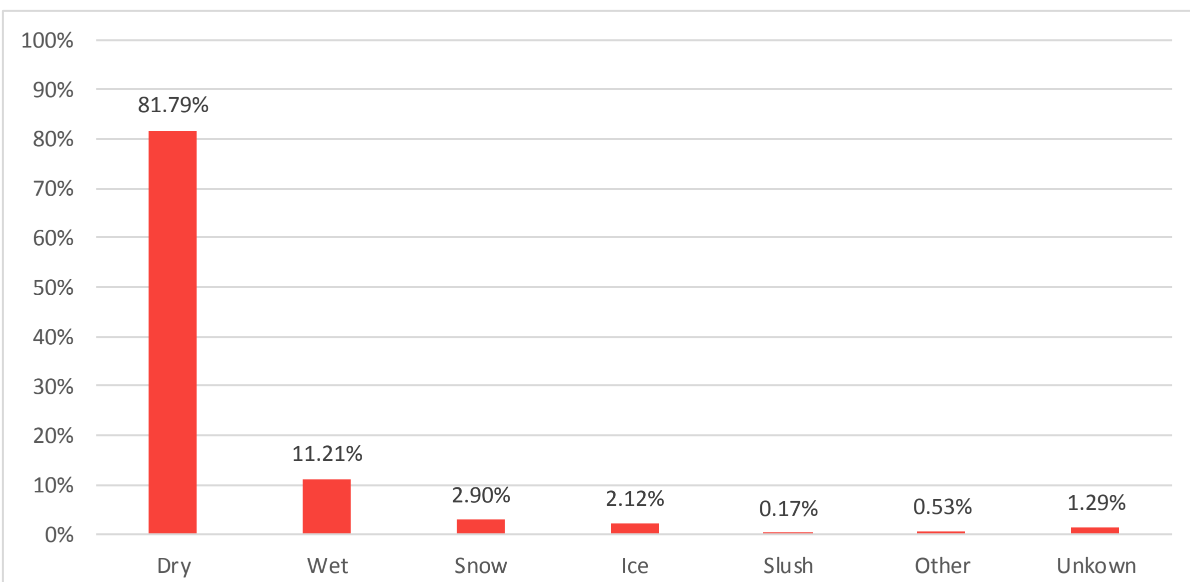


Figure 35. Road Surface Conditions for crashes in Shawnee County, 2010-2016

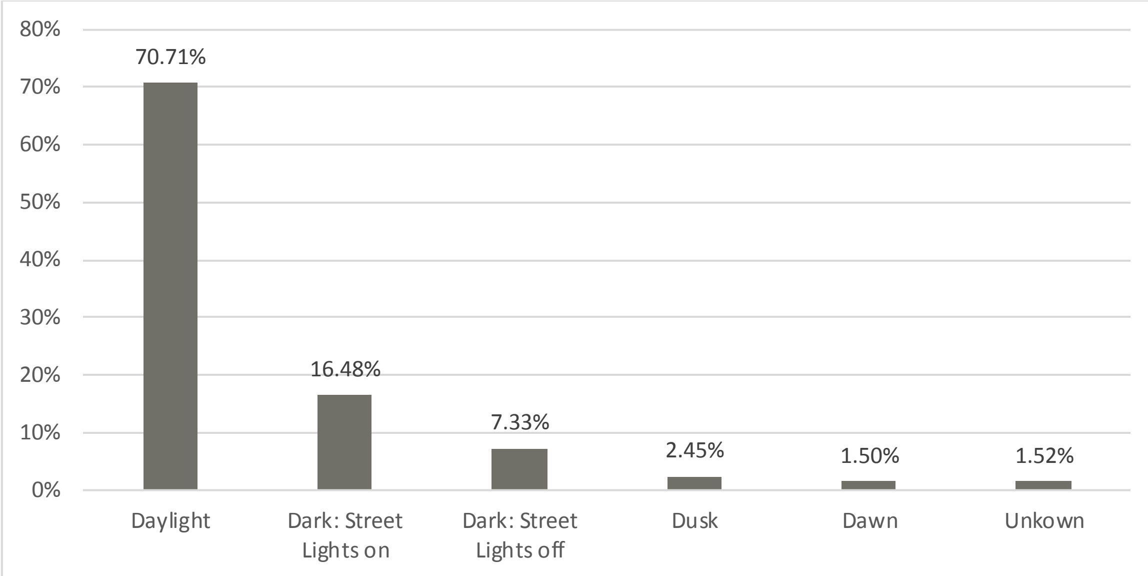


Figure 36. Lighting conditions for crashes in Shawnee County, 2010-2016

2.3. SUMMARY OF HISTORICAL CRASH TRENDS

This section provides a summary of the 23,591 crashes that occurred on city streets and county roads in Shawnee County, Kansas, between January 1, 2010 and December 31, 2016. This analysis is based on a review of crash records provided by the Kansas Department of Transportation (KDOT). The crash data for the entire county were analyzed by crash type, severity, time of day, driver age, location with respect to Topeka's city limits, and contributing circumstances to determine the top four crash types for more in-depth analysis.

2.4. DATA SOURCES AND DESCRIPTION OF DATA USED

The City of Topeka Planning Department provided GIS shapefiles for both intersections and roadway segments within the MTPO regional area. This data for intersections included information on approximately 65 different attributes such as location, intersection type, entering AADT and crash types (angle, rear-end, roadway departure, pedestrian, pedalcycle, other). There are approximately 10,283 public roadway intersections in the Topeka/Shawnee County region which does not including private driveways (see Figure 37). An edited table of intersection attributes is shown in Table 15.

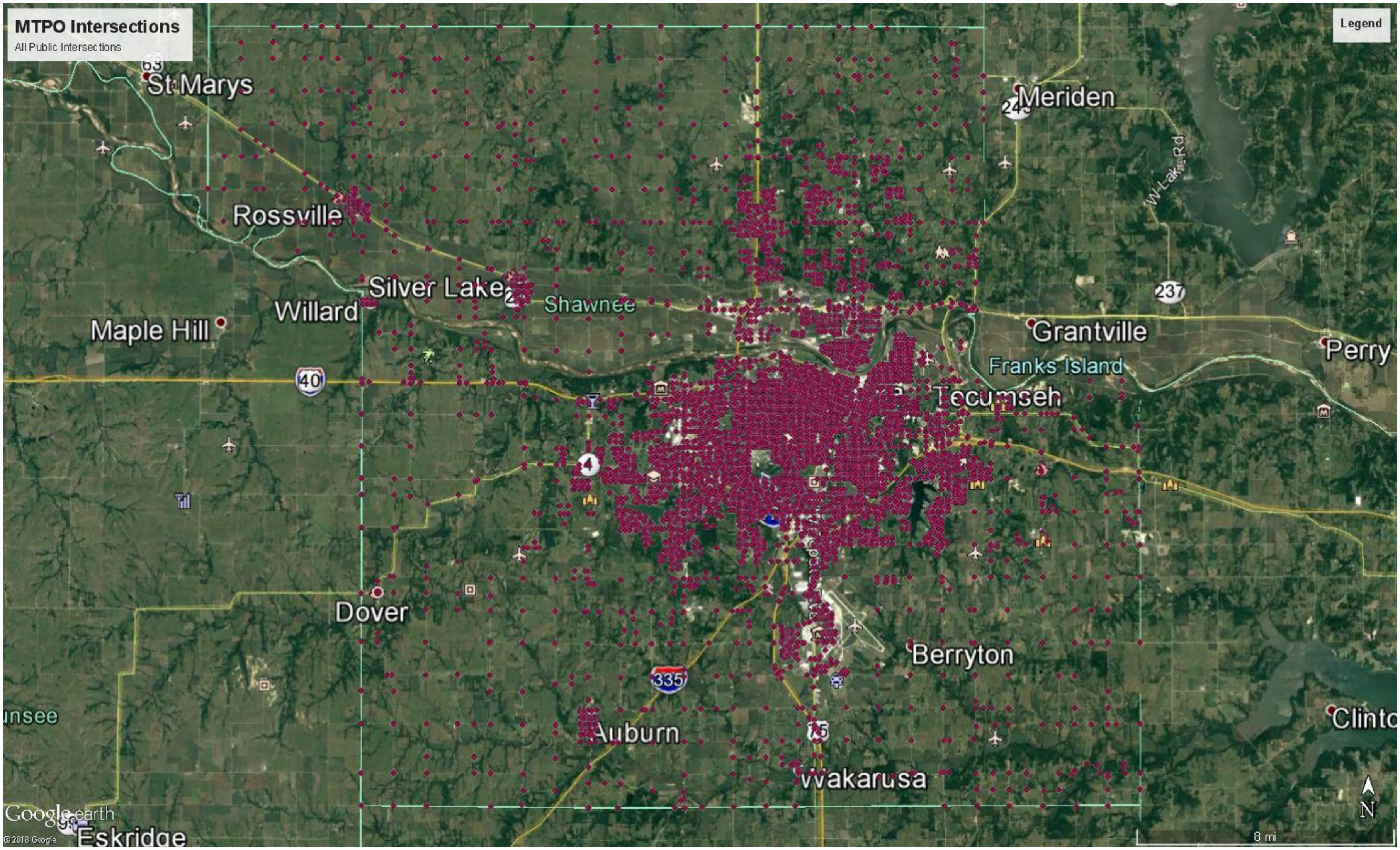


Figure 37. Map of Public Road Intersections in the Topeka/Shawnee County Region (2017)

Source: Topeka Planning Department

Table 15. Table of Intersection Attributes @17th & Fairlawn (Edited)

SW 17TH ST , SW FAIRLAWN RD	
OBJECTID_12	110
STREETS	SW 17TH ST , SW FAIRLAWN RD
LASTUPDATE	6/15/2017
LASTEDITOR	DHAAG
IntType	Intersection
GlobalID	{53AE001A-146D-47AA-92F6-6285F91AA0DB}
MIN_DR	0.083
MIN_WLK	0.167
OID_	11449
STREETS_1	SW 17TH ST , SW FAIRLAWN RD
StopSignal	4
POINT_X	-95.743379
POINT_Y	39.036502
Angle_FI	1
Angle_TOT	5
Pedalcycle_FI	1
Pedalcycle_TOT	1
Pedestrian_FI	
Pedestrian_TOT	
RearEnd_FI	2
RearEnd_TOT	14
RoadDepart_FI	
RoadDepart_TOT	
Total_FI	4
Total_TOT	21
numAADTs	4
IntAADT	28908.80751

Source: Topeka Planning Department / MRI Global

Key items from the data for the intersection of 17st Street & Fairlawn Road include: signalized intersection with 28,908 vehicles per day entering; total of 21 crashes (2010 – 2016) including five angle crashes, one pedalcycle crash and 14 rear end crashes; Four fatal/injury crashes including: one angle, one pedalcycle and two rear-end crashes.

The consultant team attempted to utilize traffic volume data in the safety analysis for both intersections and roadway segments. There were challenges with breaking the approach volume data for each intersection down so that it could be used to calculate accurate intersection crash rates. The consultant team could provide entering volume data for around 27 percent of the intersections in the City which is not a representative sample size to calculate comparable intersection crash rates for the detailed analysis. The consultant team also attempted to utilize traffic volumes to calculate roadway section crash rates. The lower volume roadway sections were resulting in very high calculated crash rates with just one crash which was not reasonable for comparisons in the analysis.

A separate analysis of roadway segments was also performed. The consultant team developed 639 roadway segments in Google Earth (see Figure 38) based on similar cross-sectional roadway characteristics and coded them into the following categories:

- Two-lane undivided
- Two-lane divided
- Three-lane undivided
- Three-lane divided
- Four-lane undivided
- Four-lane divided
- Five-lane undivided
- Five-lane divided
- X lane (one-way)

The coded segments included most paved roadway segments in Shawnee County as well as arterial and collector roadways in the City of Topeka. Segments are generally defined as having homogeneous characteristics in terms of cross-section and AADT. Since traffic volumes were not utilized due to inconsistent data availability, the focus was on cross-section. The roadway segments were then matched with the data provided by the Shawnee County Planning Department and KDOT crash data to calculate crash frequency per mile. The roadway segment data included approximately 36 attributes regarding roadway characteristics and crash data (see Table 16).

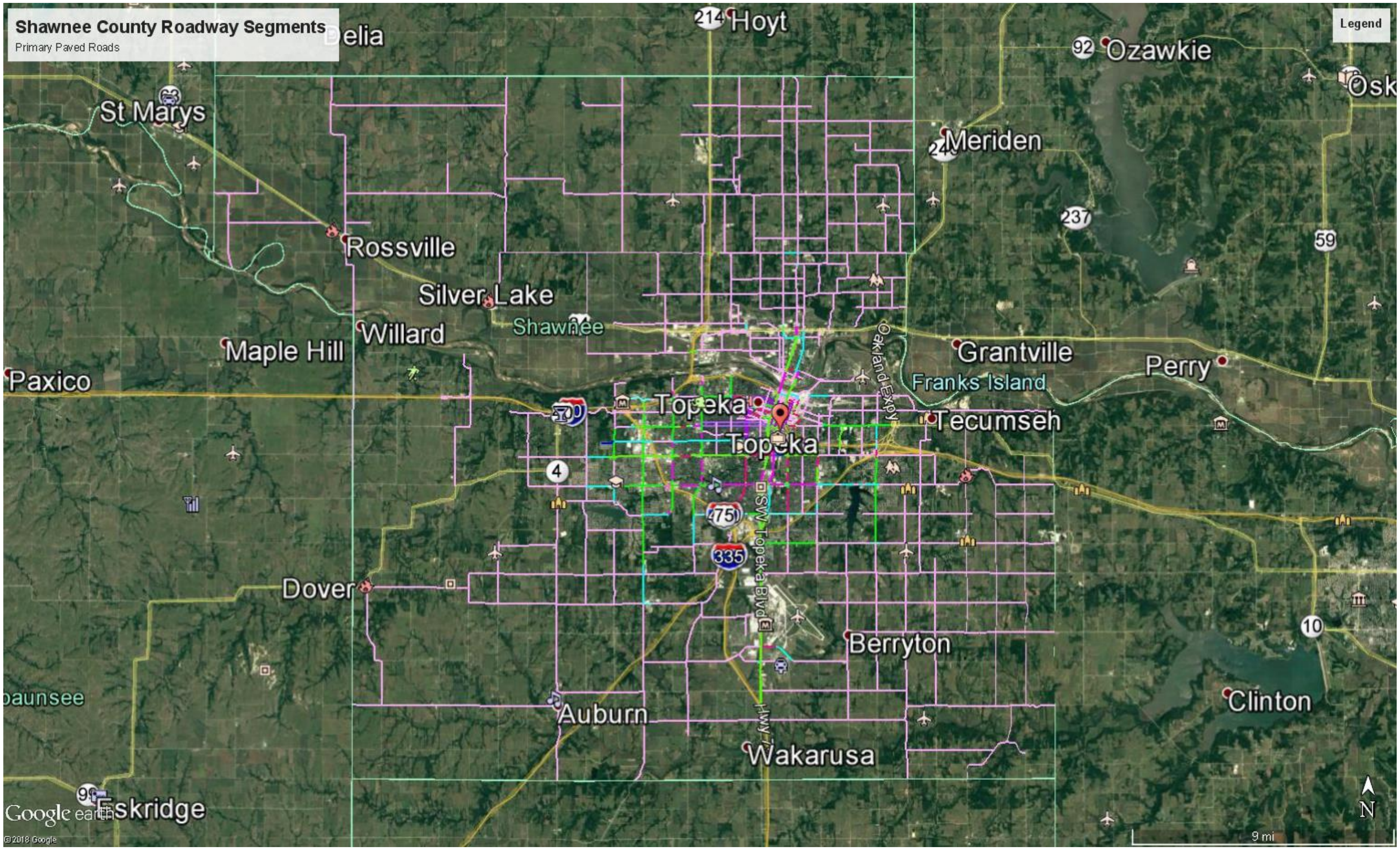


Figure 38. Map of 639 Public Roadway Segments in the Topeka/Shawnee County Region (2017)

Source: WSP USA, Inc.

Table 16. Table of Roadway Segment Attributes on a section of Gage Blvd (4-Lane) from South of 25th Street to South of 21st Street (Edited)

Gage Bld. 4-Lane	
Name	Gage Bld. 4-Lane
FolderPath	~GE7EF6.kmz/MTPO Transportation Safety Plan
SymbolID	8
AltMode	0
Base	0
Clamped	-1
Extruded	0
Snippet	
PopupInfo	0.463947720878629
Shape_Leng	0.463948
MPTOID	586
START_X	-95.724972
START_Y	39.02147
MID_X	-95.724985
MID_Y	39.024832
END_X	-95.724964
END_Y	39.028195
AADT_MEAN	11248.59186
Total_TOT	38
Total_FI	8
RoadDepart_TOT	4
RoadDepart_FI	1
RearEnd_TOT	21
COUNTTOT	21
RearEnd_FI	4
Pedestrian_TOT	
Pedestrian_FI	
Pedalcycle_TOT	
Pedalcycle_FI	
Angle_TOT	6
Angle_FI	1

Source: Topeka Planning Department / MRI Global

Key items from the data for this segment of Gage Blvd. include: four-lane segment with 11,248 vehicles per day; total of 38 crashes (2010 – 2016) including four roadway departure crashes, 21 rear-end and six angle and seven other crash types. Eight fatal/injury crashes including: one angle, one roadway departure four rear-end and two other crash types.

The top 15 roadway segments, their length and the total number of crashes occurring on each segment for both total and F&SI crashes within the City of Topeka are shown in Table 17. Table 18 shows the same information for crashes occurring outside the city limits of Topeka. As discussed previously, crash rates were not calculated due to restraints in the available volume data.

Roadway segments utilized crashes per mile per year for each crash type to identify segments with a higher frequency of occurrence. Of the 639 coded roadway segments, those with longer segment lengths (primarily in rural areas) resulted in lower crashes per mile frequencies while those with shorter segment lengths (primarily in urban areas) could result in higher crashes per mile frequencies.

The segments with the highest frequency of all crash types are shown in Figure 39. Many of the segments with the most total crashes are also included in the fatal and serious injury list. Generally, these segments are the locations with the most vehicles.

A separate Excel spreadsheet database was developed for intersections and roadway segments for the analysis so that the MTPO can sort and rate locations based on a variety of measures for future use. A separate .kmz (Google Earth) file was also created for intersections and roadway segments which correlate with the information provided in the Excel spreadsheet database for use by the MTPO.

Table 17. Roadway segments with the highest frequency of all crash types within the City of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	110	47.35	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	27	11.62
2	SW Huntoon Street 3-Lane (2 EB, 1 WB)	SW Woodhull St.	SW Gage Blvd.	0.1548	36	33.22	SW Huntoon Street 3-Lane (2 EB, 1 WB)	SW Woodhull St.	SW Gage Blvd.	0.1548	9	8.3
3	SE California Avenue 5-Lane	Dillons Access	SE 28th St.	0.0739	16	30.95	SE California Avenue 5-Lane	Dillons Access	SE 28th St.	0.0739	4	7.74
4	SE California Avenue 4-Lane Divided	Walgreens Access South of SW 29th St.	Dillons Access	0.1	20	28.56	SW Wanamaker 5-Lane	SW Huntoon Street	SW 10th Ave.	0.4525	20	6.31
5	S Kansas Ave 5-Lane	Aldi's Access South of SW 29th St.	Jim Clark Auto World Access	0.1038	20	27.52	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	22	6.3
6	SW Wanamaker 5-Lane	SW 30th Ter.	SW Westport Dr.	1.9188	335	24.94	SW Wanamaker 5-Lane	SW 30th Ter.	SW Westport Dr.	1.9188	83	6.18
7	SW Fairlawn 5-Lane	SW 22nd Pl.	SW 19th Ter.	0.421	72	24.43	NW Rochester Road 3-Lane (NB 3, SB 1)	Dillons/Walmart Access	North Walmart Access	0.075	3	5.72
8	Gage Blvd. 4-Lane	South of SW Emland Dr.	EB I-70 Off-Ramp	0.1602	27	24.08	SE California Avenue 4-Lane Divided	Walgreens Access South of SW 29th St.	Dillons Access	0.1	4	5.71
9	SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	75	23.68	SW Washburn Avenue 4-Lane Undivided	SW Hampton St.	North of SW 20th St.	0.1508	6	5.68
10	SW 29th Street 5-Lane	SW Fairlawn Rd.	SW Prairie Rd.	0.223	35	22.42	SE California Avenue 4-Lane Divided	SE 28th St.	South of SE 24th St.	0.4602	18	5.59
11	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	75	21.48	Gage Blvd. 4-Lane	South of SW Emland Dr.	EB I-70 Off-Ramp	0.1602	6	5.35

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
12	SW 29th Street 5-Lane	SW Gage Blvd.	SW Randolph Ave.	0.7906	112	20.24	SE Adams Street 4-Lane Divided	South of SE 29th St.	North of SE 29th St.	0.134	5	5.33
13	SW Urish Road 4-Lane Divided	SW 21st Street (S of RAB)	SW 21st Street (N of RAB)	0.0952	13	19.5	NW Morse Street 4-Lane Divided	NW Central Avenue	N Kansas Avenue	0.0819	3	5.23
14	NW Rochester Road 4-Lane Divided	US-24	Dillons / Walmart Access	0.1493	20	19.14	SW 29th Street 4-lane w/ turn lanes	West of SW McClure Road / EB I-470 Ramp	SW Fairlawn Road	0.3047	11	5.16
15	Gage Blvd. 5-Lane	South of SW 15th Street	North of SW 10th Avenue	0.7505	94	17.89	SW Fairlawn 5-Lane	SW 22nd Plaza	SW 19th Terrace	0.421	15	5.09

Table 18. Roadway segments with the highest frequency of all crash types outside the city limits of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SE 45th St. 2-Lane Divided	SE Croco Rd. (W of RAB)	SE Croco Rd. (E of RAB)	0.0862	9	14.92	SW University Blvd 2-Lane Undivided	Around the Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	2	3.07
2	SW 61st St. 3-Lane	SW Wanamaker Rd.	East of Main Access to Washburn Rural H.S. Parking Lot	0.314	20	9.1	SE 29th St. 2-Lane Undivided	SE Stanley Rd.	SE Ward Rd.	0.1021	1	1.4
3	SE California 2-Lane Divided	SE 45th St.	SE 44th Terrace	0.1282	5	5.57	SE Croco Rd. 2-Lane Divided	South of SE Sycamore Dr.	North of SE Sycamore Dr.	0.1032	1	1.38
4	SW University Blvd 2-Lane Undivided	Around Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	3	4.61	SW 61st St. 3-Lane	SW Wanamaker Rd.	East of Main Access to Washburn Rural H.S. Parking Lot	0.314	3	1.36

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
5	SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	42	4.6	SW 29th St. 3-Lane	West of SE Aquarius Dr.	East of SE Aquarius Dr.	0.1152	1	1.24
6	SE Croco Rd. 2-Lane Divided	South of SE Sycamore Dr.	North of SE Sycamore Dr.	0.1032	3	4.15	SE California 2-Lane Divided	SE 45th St.	SE 44th Terrace	0.1282	1	1.11
7	SW Topeka Blvd 2-Lane Undivided	SW 93rd St.	South of US-75 SB Off-Ramp	0.277	6	3.09	SW Urish 5-Lane	SW 17th St.	SW Huntoon St.	0.4002	3	1.07
8	SE 29th St. 2-Lane Undivided	SE Stanley Rd.	SE Ward Rd.	0.1021	2	2.8	SE 45th St. 3-Lane	SE Croco Rd.	Third Private Driveway	0.1396	1	1.02
9	SW Urish 5-Lane	SW 17th St.	SW Huntoon St.	0.4002	7	2.5	SW 77th St. 2-Lane Divided	West of US-75 SB Off-Ramp	SW Morrill Rd.	0.4159	2	0.69
10	SW 61st St. 2-Lane Undivided	East of Main Access to Washburn Rural H.S. Parking Lot	West of SW Lewelling Rd.	1.6159	24	2.12	SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	6	0.66
11	SW Burlingame Rd. 2-Lane Divided	South of SW 57th St.	North of SW 57th St.	0.137	2	2.09	SE 45th St. 2-Lane Undivided	East of SE East Edge Rd.	West of SE Pawnee Dr.	0.4588	2	0.62
12	SE 45th St. 3-Lane	SE Croco Rd.	Third Private Driveway	0.1396	2	2.05	NE 31st St. 2-Lane Undivided	NE Kaw Valley Rd.	NE Happy Hollow Rd.	0.23	1	0.62
13	SW 77th St. 3-Lane	Rail Rd. Crossing	SW Topeka Blvd.	0.1407	2	2.03	SW 29th St. 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	13	0.61
14	SW 29th St. 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	42	1.97	NW 46th St. 2-Lane Undivided	NW Kendall Dr.	NW Rochester Rd.	0.722	3	0.59
15	SW Burlingame Rd. 2-Lane Undivided	East of SW Lewelling Rd.	South of SW 57th St.	0.5848	8	1.95	SW University Blvd 2-Lane Undivided	SW 65th St.	Curve to the West of SW Topeka Blvd.	0.5116	2	0.56

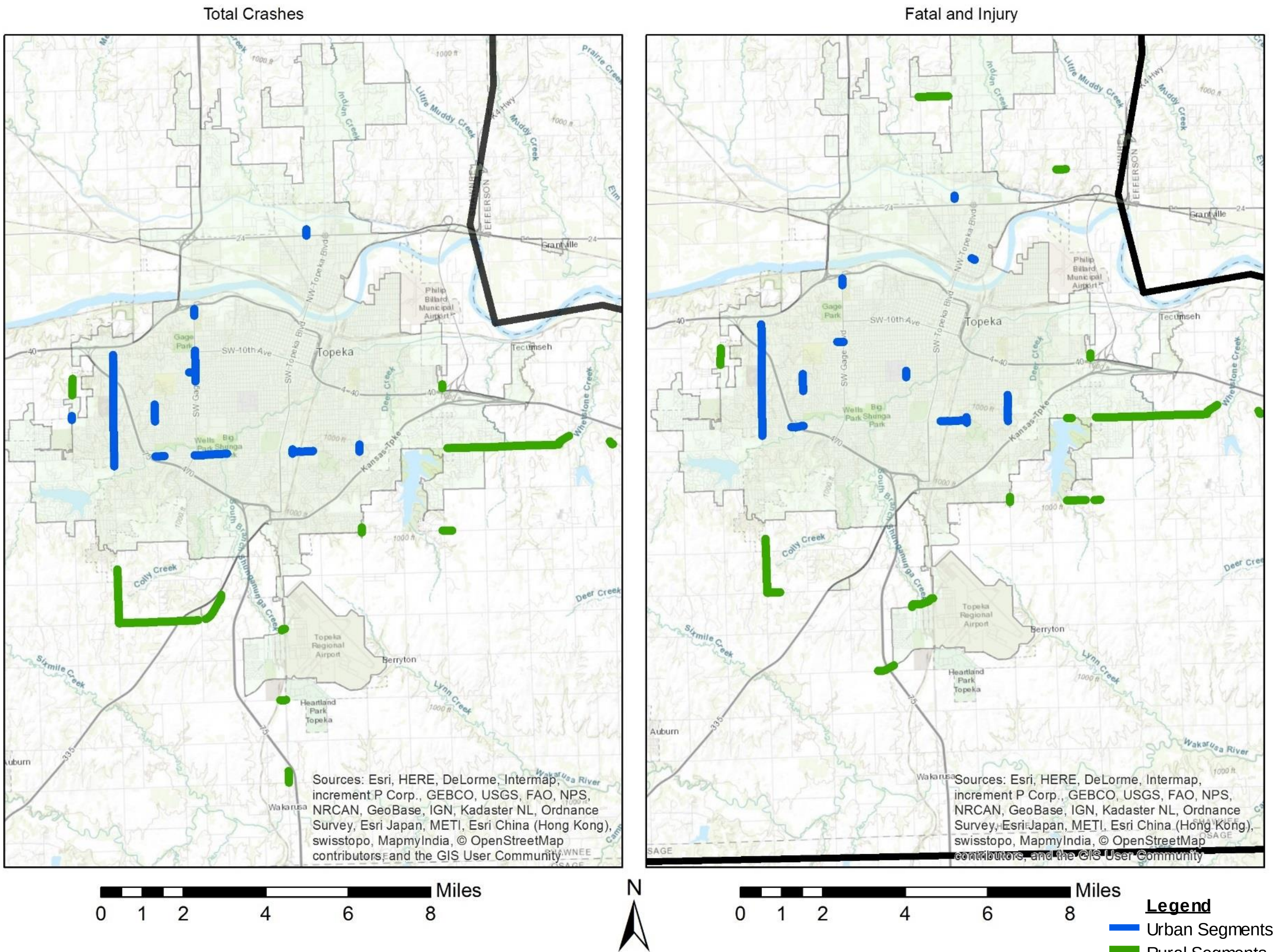


Figure 39. Top 15 roadway segments for total and fatal/serious injury crashes in Shawnee County, 2010-2016

2.5. RISK ASSESSMENT AND SELECTION OF EMPHASIS AREAS

Based on the results of the overall crash analysis, four crash types were selected by the MTPO Core Team for a risk assessment to be performed:

- Angle Crashes,
- Rear-End Crashes,
- Roadway Departure Crashes (fixed object, overturned, etc.), and
- Vulnerable Road User Crashes (i.e. Pedestrians, Bicyclists)

A risk assessment is comprised of three core elements: risk identification, risk analysis and risk evaluation:

- Risk identification - involves properly understanding the details of each crash type such as where, when, the frequency, roadway type, intersection type and other details.
- Risk analysis - works with information gathered during the risk identification about each crash type. A risk analysis involves a detailed consideration of uncertainties, hazards, consequences, likelihood, events, scenarios, controls and their effectiveness. A crash typically has multiple causes and consequences resulting in different crash severity levels (property damage only, injury or fatality).
- Risk evaluation - calls on transportation safety professionals to examine the results of the risk analysis and decide if the crash type should be included in an Emphasis Area as a focus area to identify specific crash countermeasure strategies.

Emphasis Areas are crash focus areas which are chosen as a result of the risk assessment process. The Kansas Strategic Highway Safety Plan (2017), maintained by the Kansas Department of Transportation, includes the following Emphasis Areas: Impaired Driving, Intersections, Occupant Protection, Older Drivers, Roadway Departure, and Local Roads. Transportation safety professionals then identify potential crash countermeasure strategies utilizing the “5-E’s” of Safety (Education, Engineering, Enforcement, Executive Policies) for reducing serious injury and fatality crashes.

2.5.1. ROADWAY DEPARTURE LEADING TO COLLISION WITH FIXED OBJECTS

Roadway departures leading to collisions with fixed objects were the third most common crash type in Shawnee County, and was the crash type with the most fatal crashes of any single class. Over two thirds of all roadway departure crashes occurred within the City of Topeka most of which are striking a curb before proceeding off of the roadway. Most of the roadway departure crashes are non-intersection related.

Figure 40 and Figure 41 show the yearly crash frequencies for roadway departures in Shawnee County for total and fatal and serious injury crashes, respectively. The total number of roadway departure crashes seems to be remaining mostly steady with a bit of an increase in the last few years. Fatal and serious injury crashes had a general downward trend until there was a substantial increase in 2016 (18 fatal & serious injury crashes).

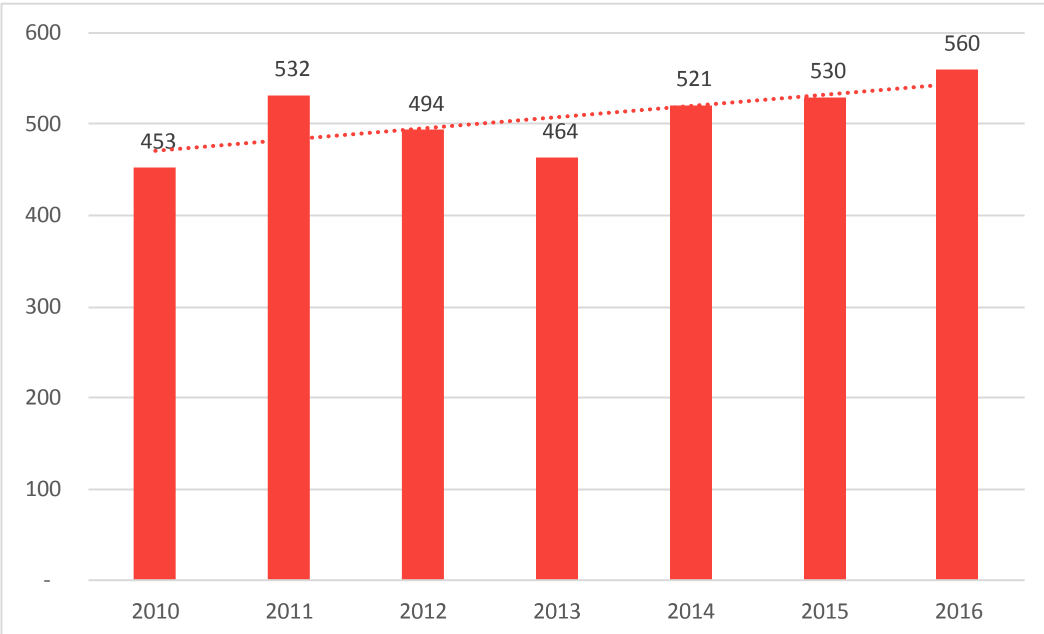


Figure 40. Total roadway departure crashes in Shawnee County, 2010-2016

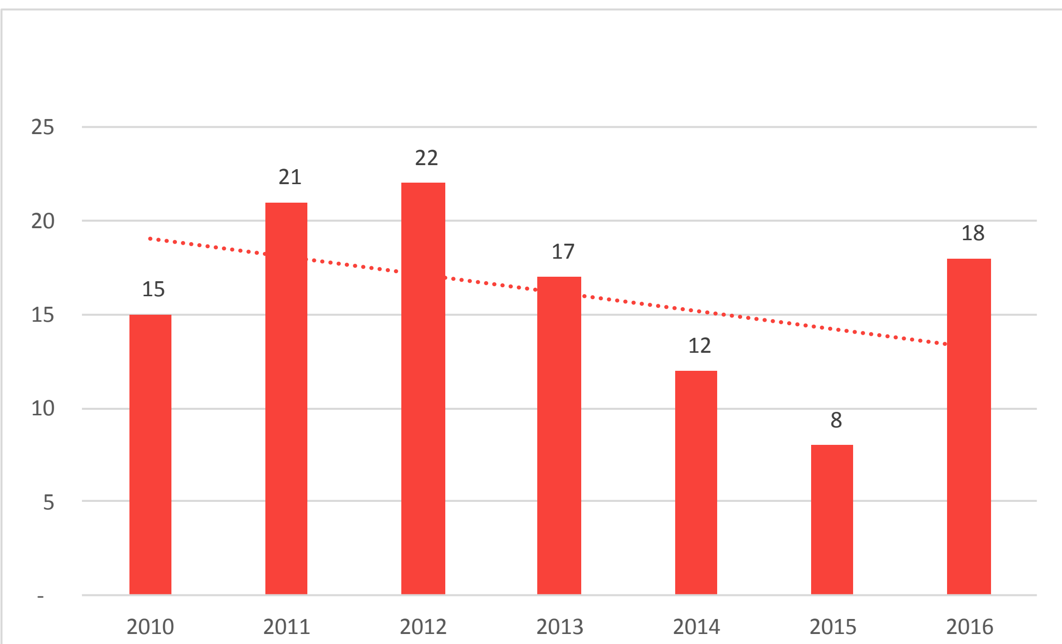


Figure 41. Fatal and serious injury roadway departure crashes in Shawnee County, 2010-2106

The intersections with the most frequent occurrence of roadway departure crashes are organized in Table 19 for crashes within the City of Topeka and in Table 20 for crashes outside the city limits. Several include roundabout intersections. The segments in Topeka and outside the city with the most crashes per mile are shown in Table 21 and Table 22, respectively. These intersections and segments are also mapped in Figure 42and Figure 43. Most of the fatal and serious injury crashes occurred along roadway segments, as there were three intersections within the city and nine intersections outside of the city with any fatal or serious roadway departure crashes.

Table 19. Intersections with the highest frequency of roadway departure crashes in the City of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SE Adams St, SE 29th St	6	SE Adams St, SE 29th St	2
2	SW 17th St, SW Wanamaker Rd	5	SW Greenwood Ave, SW 1st St	2
3	SW Greenwood Ave, SW 1st St	4	NW Central Ave, NW Morse St	2
4	SW 29th St, SW Topeka Blvd	4		
5	SW Huntoon St, SW Gage Blvd	4		
*6	SW Urish Rd, SW 21st St. (NB Approach)	4		
7	SW 38th St, SW Topeka Blvd	3		
8	SE 21st St, SE Golden Ave	3		
9	SW Gage Blvd, SW 21st St	3		
*10	SW Urish Rd, SW 21st St (WB approach)	3		
11	SE Rice Rd, SE Cyprus Dr	3		
12	NE Seward Ave, NE Branner St	3		

**Note: #6 and #10 are different approaches to the roundabout at SW Urish Road & SW 21st Street*

Table 20. Intersections with the highest frequency of roadway departures crashes outside the city limits of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SW Wanamaker Rd, SW 61st St	3	SW 77th St, SW Wanamaker Rd	2
2	SW 53rd St, SW Gage Blvd	2	SW Valencia Rd, SW 57th St	2
3	SE West Edge Rd, SE 37th St	2	SW Wanamaker Rd, SW 61st St	1
4	NW Button Rd, NW 62nd St	2	SE West Edge Rd, SE 37th St	1
5	SW 77th St, SW Wanamaker Rd	2	NW Button Rd, NW 62nd St	1
6	SW 53rd St, SW Wanamaker Rd (SB approach)	2	SW 53rd St, SW Wanamaker Rd (SB approach)	1
7	SW Valencia Rd, SW 57th St	2	SE West Edge Rd, SE Leisure Ln	1
8	SE 45th St, SE Croco Rd	2	SE 4th Ter, SE Tecumseh Rd	1
9	SE Tecumseh Rd, SE 10th St	2	NE Meriden Rd, NE 35th St	1
10			SE 45th St, SE East Edge Rd	1
11			SW Urish Rd, SW 17th St	1
12			NE Happy Hollow Pl, NE Happy Hollow Rd	1
13			NE 74th St, NE Sherman Rd	1
14			NW 13th St, NW Valencia Rd	1
15			SE Ramp Rd, SE West Edge Rd	1
16			SW Hidden Valley Dr, SW 18th St	1
17			SW 57th St, SW Wenger St	1
18			N Milton St, W 9th St	1

Table 21. Roadway segments with the highest frequency of roadway departures crashes in the City of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW Urish Rd. 4-Lane Divided	Topeka Fire Station #1 Driveway	SW 21st St. Roundabout	0.0952	6	9	NW Morse St. 4-Lane Divided	NW Central Ave.	NE Quincy St.	0.08187	2	3.49
2	Gage Blvd. 4-Lane	SW 28th St.	NB Approach	0.2416	14	8.28	SW Washburn Avenue 4-Lane Undivided	SW Hampton St.	South of SW 19th St.	0.15084	3	2.84
3	Gage Blvd. 4-Lane	SW 28th St.	North of SW 26th St.	0.2416	14	8.28	SW Washburn Ave. 4-Lane Undivided	SW Hampton St.	South of SW 19th St.	0.15084	3	2.84
4	SW 8th Ave. 3-Lane	East of SW Lane St.	SW Lincoln St.	0.0568	3	7.55	SW Huntoon St. 3-Lane (2 EB, 1 WB)	West of SW Seabrook Ave.	SW Gage Blvd.	0.15481	3	2.77
5	SW 8th Ave. 4-Lane Divided	SW Lincoln St.	SW Buchanan St.	0.0787	4	7.26	S Kansas Ave 5-Lane	Second Access South of SE 29th St.	North of First Access North of SE 29th St.	0.10382	2	2.75
6	NW 46th St. 4-Lane Divided	West of NW Fielding Rd.	East of NW Fielding Rd.	0.0897	4	6.37	SW 8th Ave. 3-Lane	East of SW Lane St.	SW Lincoln St.	0.05678	1	2.52
7	SE California Avenue 4-Lane Divided	(Roundabout)	(Roundabout)	0.1000	4	5.71	SE Branner Trafficway 4-Lane Divided	SE Branner St.	SE 6th Ave.	0.06337	1	2.25
8	NW 46th St. 2-Lane Divided	West of NW Topeka Blvd (Roundabout)	East of NW Topeka Blvd (Roundabout)	0.0736	3	5.82	Gage Blvd. 4-Lane	SW 28th St.	North of SW 26th St.	0.2415	4	2.37
9	SE California Ave. 4-Lane Divided	East Access South of SE 29th St.	West Access North of SE 29th St.	0.1	4	5.71	SE Branner Trafficway 4-Lane Divided	SE Branner St.	SE 6th Ave.	0.06337	1	2.25
10	SE Adams St. 4-Lane Divided	South of SE Pioneer Way	South of SE Jefferson St.	0.1776	7	5.63	SE Adams St. 3-Lane (2 NB, 1 SB)	WB I-70 Off-Ramp	SE Overton St.	0.12925	2	2.21
11	SE Adams St. 4-Lane Divided	South of SE 15th St.	On-Ramp to EB I-70	0.1542	6	5.56	NW Lyman Rd. 2-Lane Undivided	NW Taylor St.	NW Polk St.	0.07156	1	2

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
12	SW 6thAve. 5-Lane	SE 7th St.	SE Chandler St.	0.1521	5	4.69	SE Indiana Ave. 2-Lane Divided	South of SE 21st St.	North of SE 21st St.	0.07176	1	1.99
13	SE CaliforniaAve. 4-Lane Divided	SE 13th St. (I-70 Int.)	SE 11th St. (I-70 Int.)	0.213	7	4.69	SE California Ave. 5-Lane	Dillons Access	SE 28th St.	0.07385	1	1.93
14	SW Huntoon St. 3-Lane (2 EB, 1 WB)	West of SW Seabrook Ave.	SW Gage Blvd.	0.1548	5	4.61	SW 6thAve. 5-Lane	SE 7th St.	SE Chandler St.	0.15214	2	1.88
15	SW Montara Parkway 2-Lane Divided	West of RR Crossing	SW Topeka Blvd.	0.0656	2	4.36	SW 8thAve. 4-Lane Divided	SW Lincoln St.	SW Buchanan St.	0.0787	1	1.82

Table 22. Roadway segments with the highest frequency of roadway departures crash types outside the city limits of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SE California 2-Lane Divided	SE 45th St.	SE 44th Terrace	0.1282	4	4.46	SW University Blvd 2-Lane Undivided	Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	1	1.54
2	SW Urish Road 2-Lane Divided	South of SW 17th St. (RAB)	North of SW 17th St. (RAB)	0.0738	1	1.94	SE California 2-Lane Divided	SE 45th St.	SE 44th Terrace	0.1282	1	1.11
3	SW 61st Street 3-Lane	SW Wanamaker Rd.	E of Main Access to Washburn Rural HS Parking	0.314	4	1.82	SE 45th Street 3-Lane	SE Croco Rd.	Third Private Driveway	0.1396	1	1.02
4	SE 45th Street 2-Lane Divided	West of SE Croco Rd. (RAB)	East of SE Croco Rd. (RAB)	0.0862	1	1.66	SW Urish 5-Lane	SW 17th St.	SW Huntoon St.	0.4002	2	0.71
5	SW University Blvd 2-Lane Undivided	Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	1	1.54	SW 77th Street 2-Lane Divided	West of US-75 SB Off-Ramp	SW Morrill Rd.	0.4159	2	0.69
6	SW Urish 5-Lane	SW 17th St.	SW Huntoon St.	0.4002	4	1.43	SW University Blvd 2-Lane Undivided	SW 65th St.	Curve to the West of SW Topeka Blvd.	0.5116	2	0.56

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
7	SE 29th Street 2-Lane Undivided	SE Stanley Rd.	SE Ward Rd.	0.1021	1	1.4	NE Croco Road 2-Lane Undivided	NE Seward Ave.	T-Inter. – SE Corner of Phillip Billard Airport	0.7787	3	0.55
8	Gage Blvd. 2-Lane	SW 53rd St.	SW 45th St.	1.0193	9	1.26	SW Burlingame Road 2-Lane Undivided	East of SW Lewelling Rd.	South of SW 57th St.	0.5848	2	0.49
9	SW Urish Road 2-Lane Divided	South of SW Huntoon (RAB)	North of SW Huntoon (RAB)	0.1136	1	1.26	SW 61st Street 3-Lane	SW Wanamaker Rd.	E of Main Access to Washburn Rural HS Parking	0.314	1	0.45
10	SW Hodges Road 2-Lane Undivided	SW 29th St.	K-4 Highway	0.4998	4	1.14	SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	4	0.44
11	SW Burlingame Road 2-Lane Divided	South of SW 57th St.	North of SW 57th St.	0.137	1	1.04	Gage Blvd. 2-Lane	SW 53rd St.	SW 45th St.	1.0193	3	0.42
12	SW Topeka Blvd 2-Lane Undivided	SW 93rd St.	South of US-75 SB Off-Ramp	0.277	2	1.03	NE Seward Avenue 2-Lane Divided	West of SB K-4 Off-Ramp	East of NB K-4 Off-Ramp	0.4282	1	0.33
13	SE 45th Street 3-Lane	SE Croco Rd.	Third Private Driveway	0.1396	1	1.02	SW 29th Street 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	7	0.33
14	SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	9	0.99	SW Fairlawn 2-Lane	SW Brentwood Rd.	SW Redbud Lane	0.4419	1	0.32
15	SW Burlingame Road 2-Lane Undivided	East of SW Lewelling Rd.	South of SW 57th St.	0.5848	4	0.98	NE 35th Street 2-Lane Undivided	North Kansas Ave.	East of NE Rockaway Trail	0.9256	2	0.31

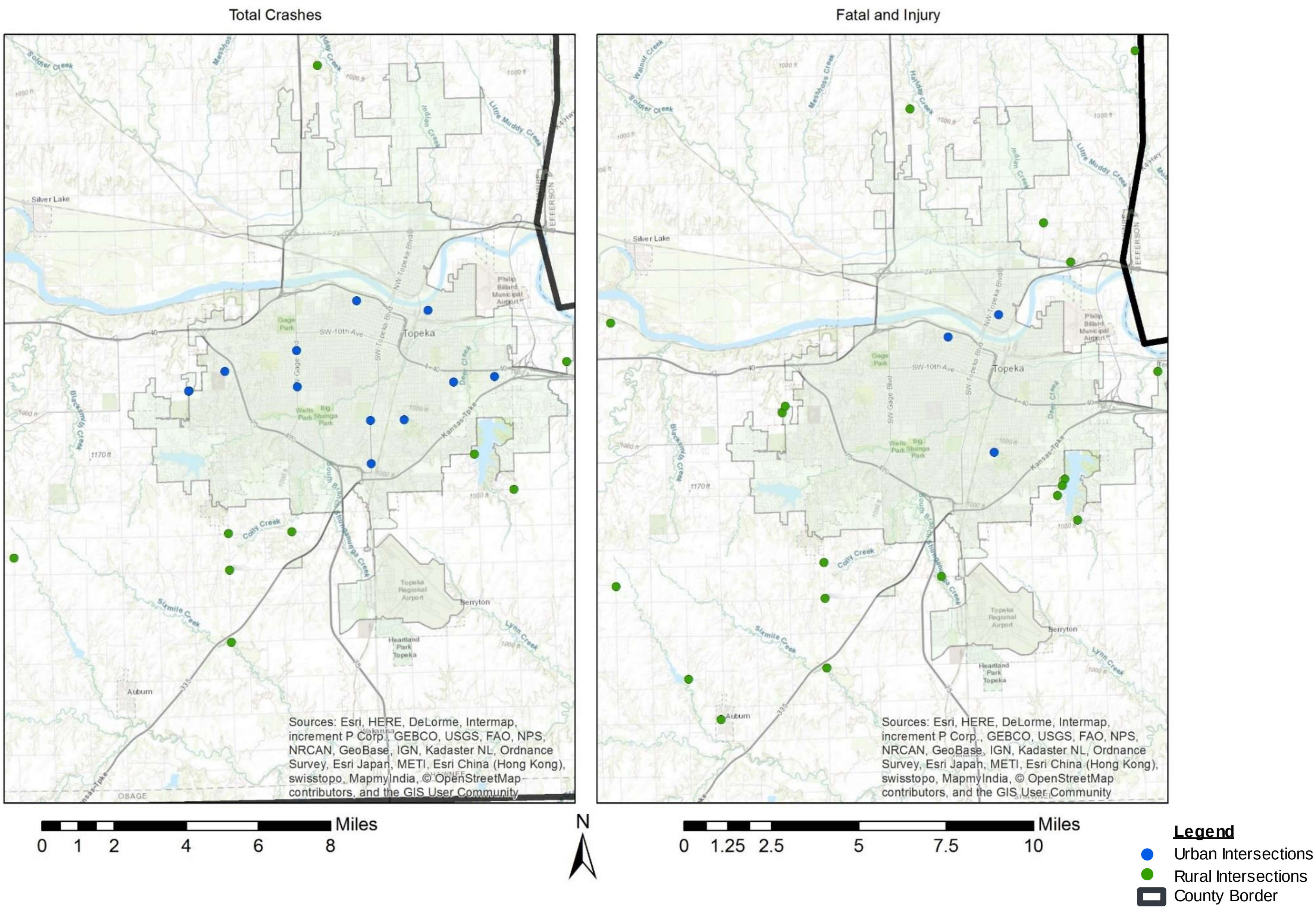


Figure 42. Top 15 intersections with roadway departures (total and fatal/serious injury) crashes in Shawnee County, 2010-2016

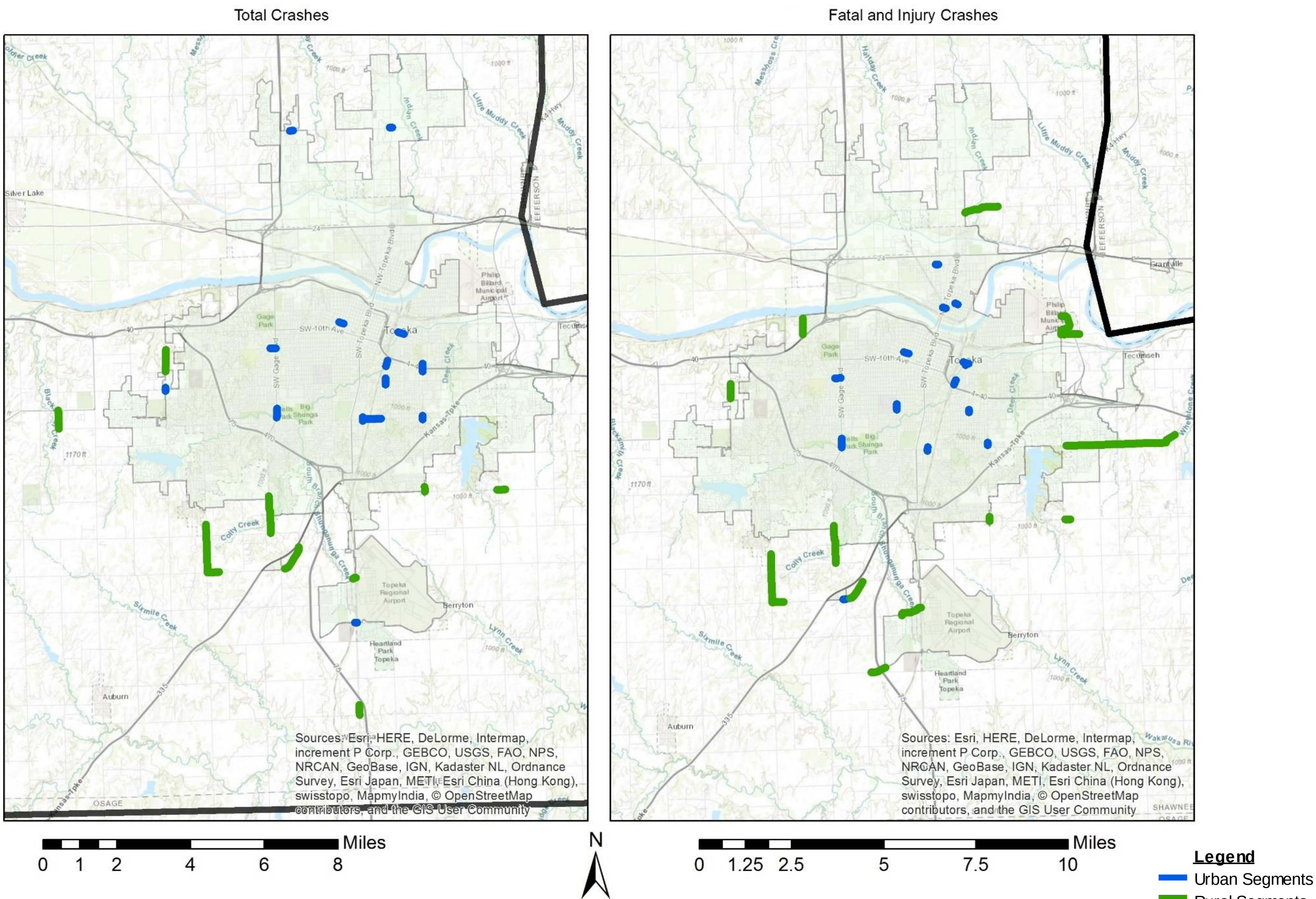


Figure 43. Top 15 segments with roadway departure (total and fatal/serious injury) crashes in Shawnee County, 2010-2016

2.5.2. VULNERABLE ROAD USERS (I.E. PEDESTRIANS, BICYCLISTS)

2.5.2.1 PEDESTRIANS

Over 98 percent of all pedestrian crashes result in either an injury or a fatality, and nine pedestrians have died in Shawnee County during the seven-year study period. Figure 44shows the number of pedestrian crashes per year. Figure 45 shows the number of fatal and serious injury pedestrian crashes per year. The dotted line in each figure represents the trend over time, projected out to 2020. Overall, the total number of pedestrian crashes has remained relatively flat, but the trend in fatal and serious injuries is increasing. A map of the location of each pedestrian crash in Shawnee County from 2010 through 2016 is shown in Figure 46. Generally, the pedestrian crashes occur more in the urban area of Topeka, where pedestrians are frequently walking.

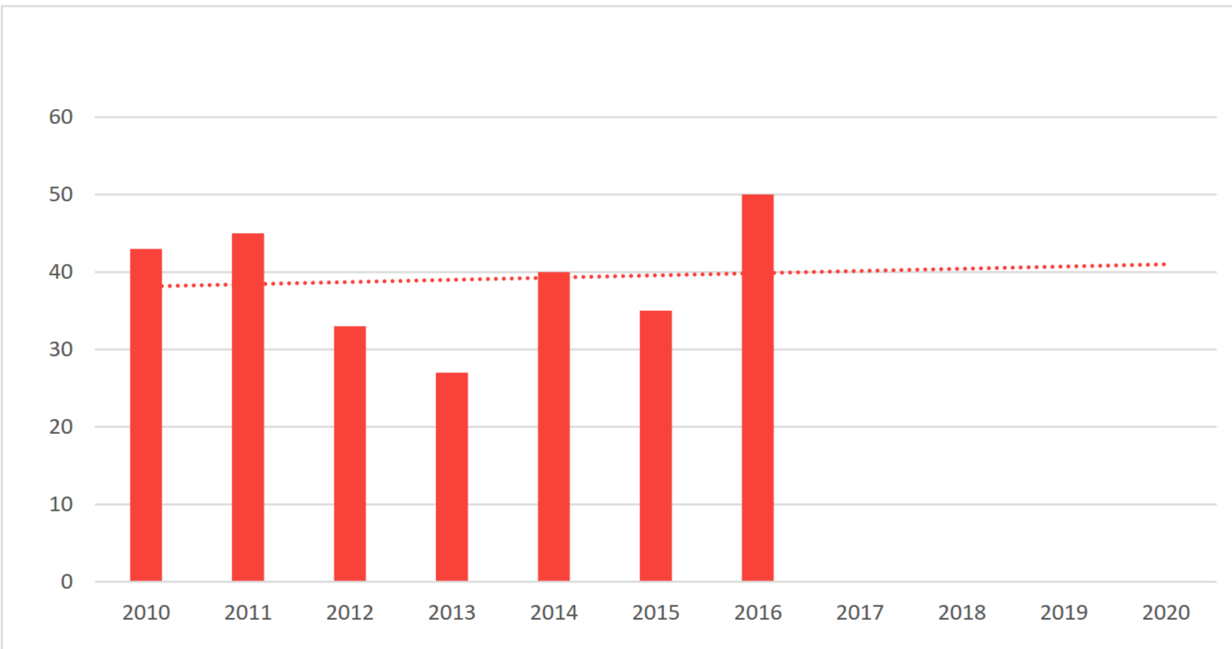


Figure 44. Total pedestrian crashes in Shawnee County, 2010-2016

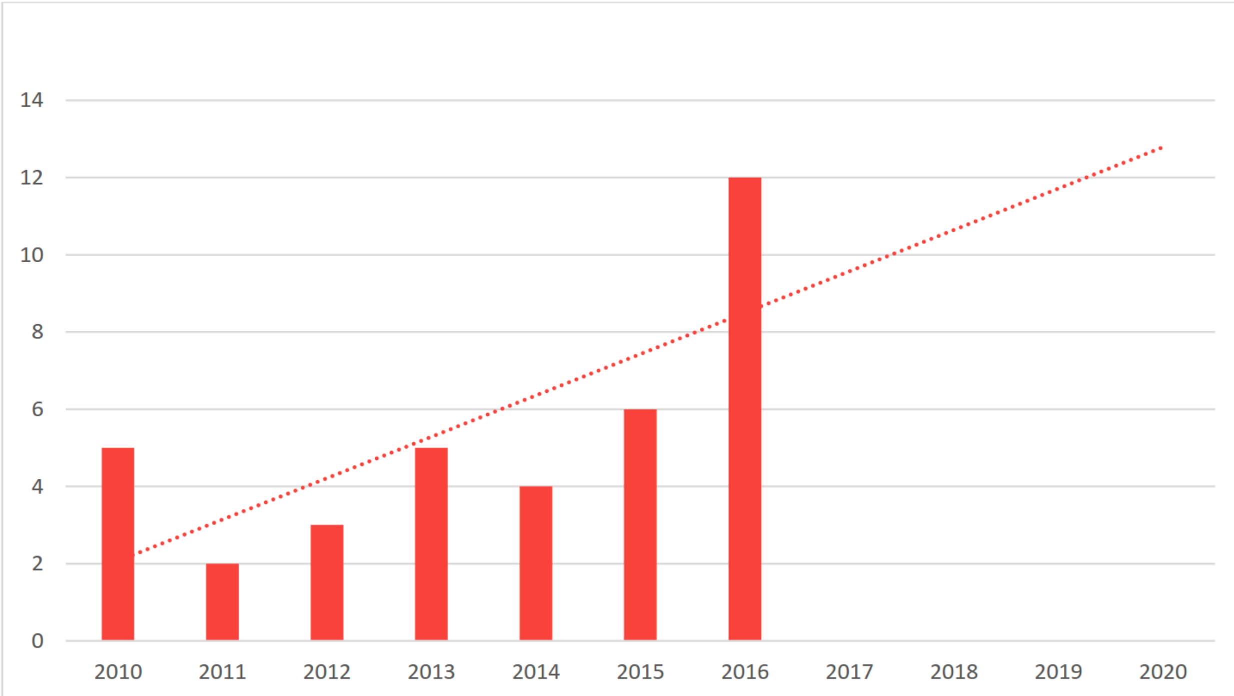


Figure 45. Total pedestrian crashes resulting in an injury or fatality in Shawnee County, 2010-2016

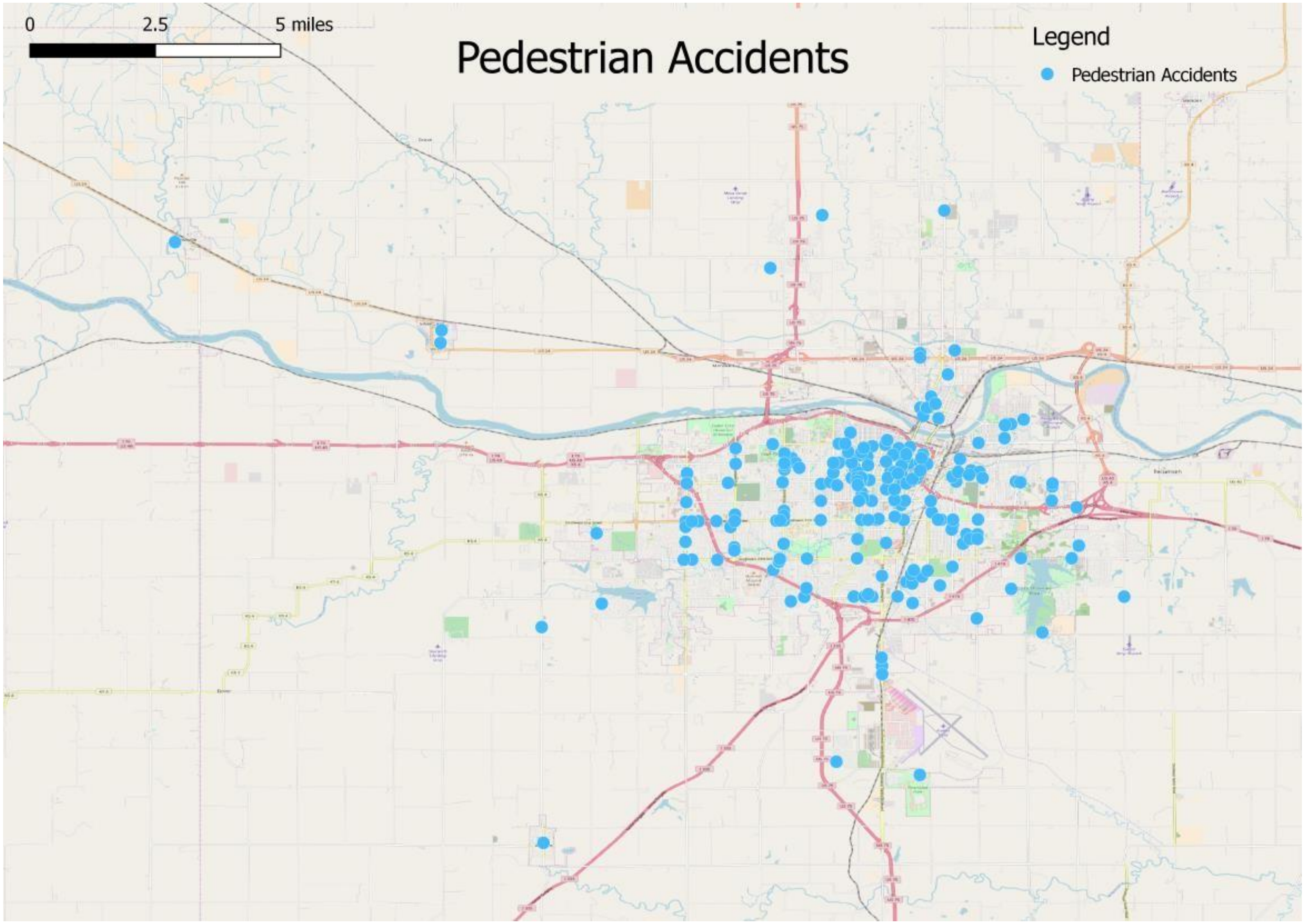


Figure 46. Location of pedestrian crashes throughout Shawnee County, 2010-2016

2.5.2.2 BICYCLES

Over 95 percent of all bicycle crashes with vehicles result in an injury or fatality, and three cyclists have died in Shawnee County during the seven-year study period. The total and fatal-and-serious-injury crashes are shown by year in Figure 47 and Figure 48, respectively. The trend line in each figure projects expected crashes through 2020 based on the data from 2010 through 2016. For both total as well as fatal and serious injury crashes, there is an upward trend in crash frequency. This upward trend is likely due to an increase in cyclist activity in the City of Topeka.

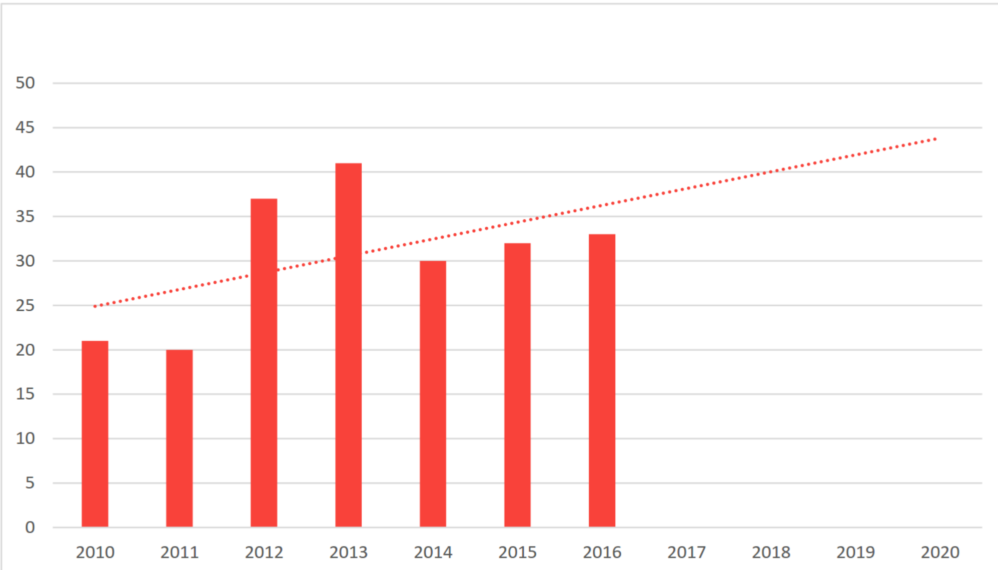


Figure 47. Total vehicle to bicycle crashes in Shawnee County, 2010-2016

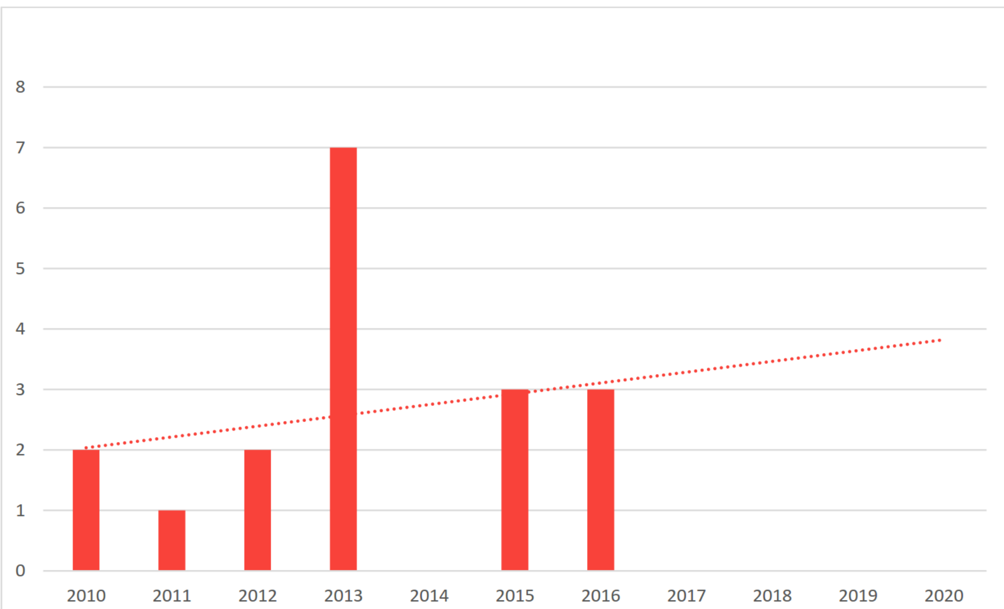


Figure 48. Fatal and serious injury bicycle crashes in Shawnee County. 2010-2016

Figure 49 shows the locations of all bicycle crashes in Shawnee County. In general, these crashes are more likely to occur along segments of the roadway than at intersections. The only intersection-related bicycle crash occurred at the intersection of SW Burlingame Road & SW 57th Street, which is located outside of the city limits of Topeka. Most of the bicycle crashes within the City are along urban arterial roadways.

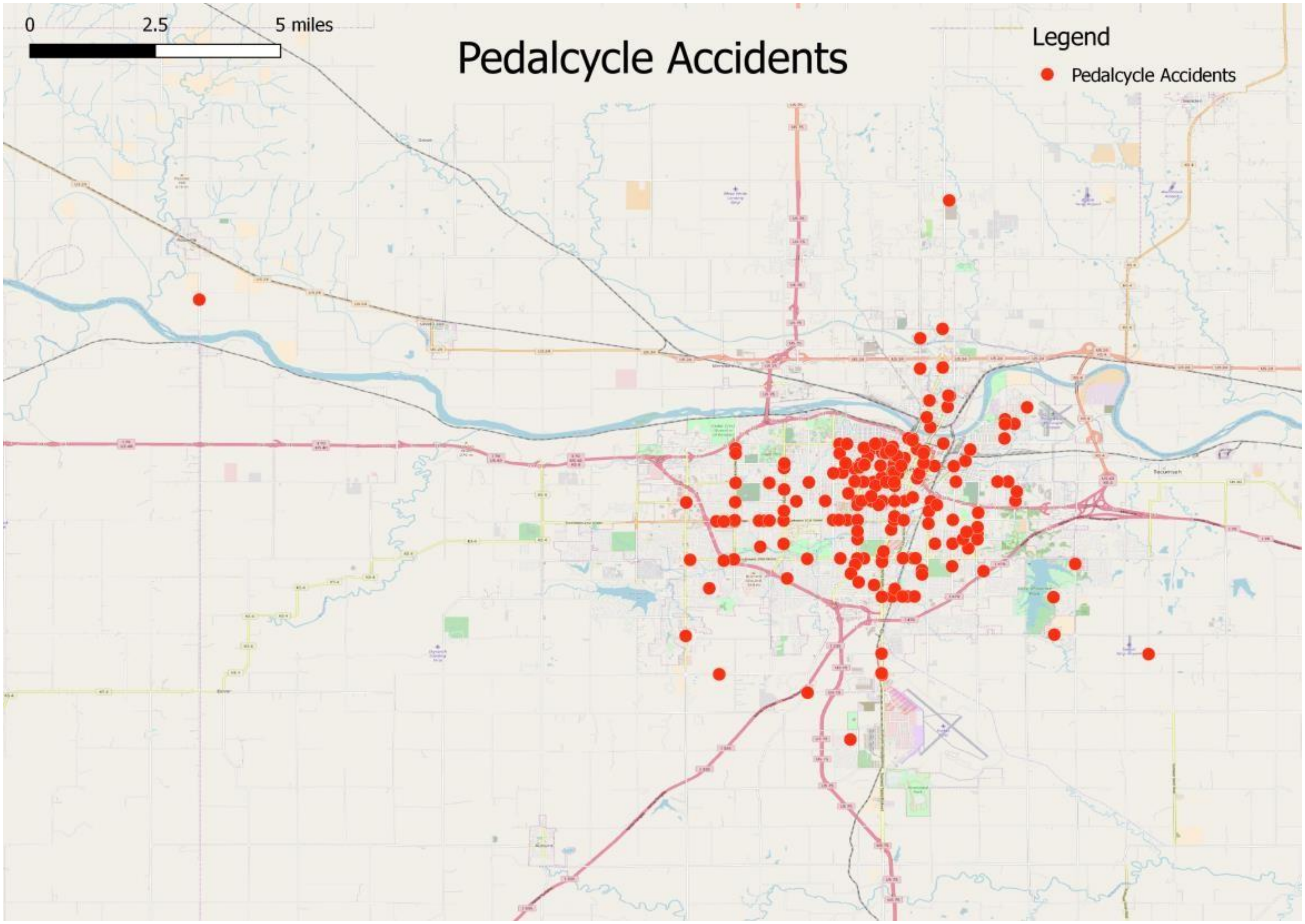


Figure 49. Location of bicycle crashes throughout Shawnee County, 2010-2016

2.3.5 SELECTION OF EMPHASIS AREAS

After reviewing the overall crash analysis, detailed risk assessment of specific crash types and the public's response to their top three transportation safety priorities, the Project Advisory Committee selected the following Emphasis Areas for the Plan to focus on:

- Intersections – encompasses angle and rear-end crashes which are the top two crash types in the City of Topeka / Shawnee County. Second highest safety concern identified from the public survey.
- Speed – contributing circumstance in 24 percent of all fatality and serious injury crashes in the City of Topeka / Shawnee County. Third highest safety concern identified from the public survey.
- Distracted Driving – Inattention is a contributing circumstance in 20 percent of all crashes and 15 percent of all fatality and serious injury crashes in the City of Topeka / Shawnee County. Top safety concern identified from the public survey.
- Pedestrian and Bicyclist – High-risk group with over 95 percent of all pedestrian and bicycle crashes with vehicles resulting in an injury or fatality. Fourth highest safety concern identified from the public survey.

The focus on these Emphasis Areas will involve the development of potential countermeasures focused on the "5-E's" of Safety for implementation consideration with the goal of reducing injury and fatality crashes in the MTPO Region. One performance measure will be established for each Emphasis Area to determine if the countermeasures are effective in meeting the goal.

The Federal Highway Administration (FHWA), through the Kansas Department of Transportation (KDOT), requires each MPO to establish safety performance measures within their jurisdiction. As a result, this plan establishes safety performance measures for the MTPO aimed at reducing fatalities and serious injuries involving each Emphasis Area. These safety performance measures were developed specifically to address crash frequency and severity occurring within the MTPO.

2.5.3. ANGLE CRASHES

Angle crashes were the most prevalent crash type in Shawnee County, and the crash type with the most fatal and injury crashes, accounting for over a third of all injury and nearly a fourth of all fatal crashes. In general, most angle crashes occur at either signalized or stop-controlled intersections where vehicles fail to yield right-of-way to other vehicles. Overall, the general pattern of angled crashes followed the typical patterns for all crash types regarding environmental contributing factors.

The yearly trends for total angled crashes are shown in Figure 50 while the yearly trends for fatal and serious injury crashes are shown in Figure 51. In general, the number of angle crashes has shown an upward trend from 2010-2016; however, the frequency of fatal and serious injury crashes has a slight downward trend.

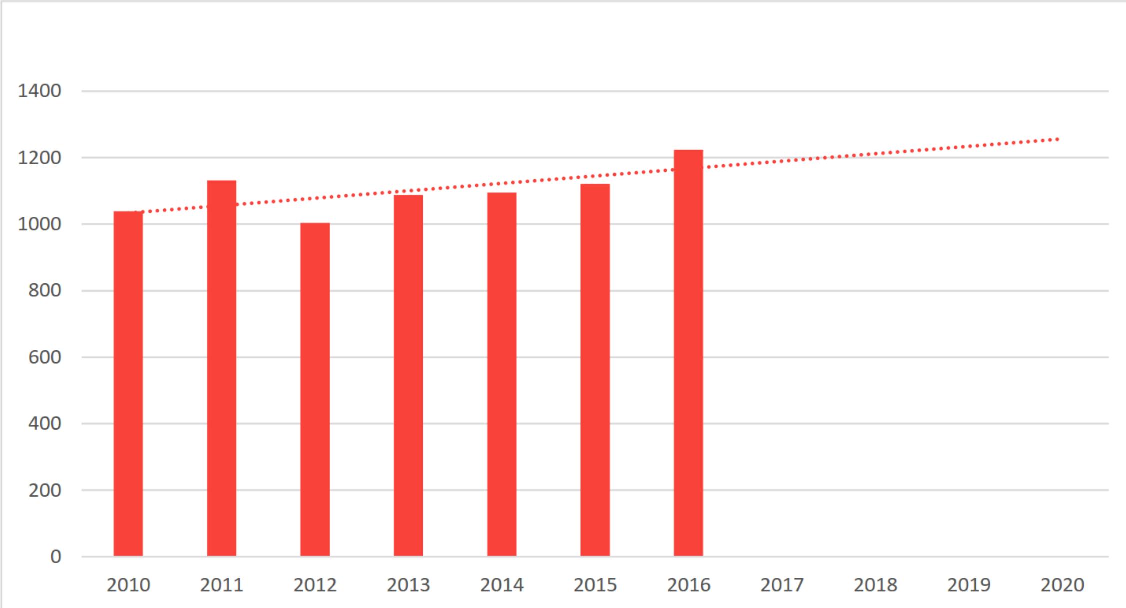


Figure 50. Total angle crashes in Shawnee County, 2010-2016

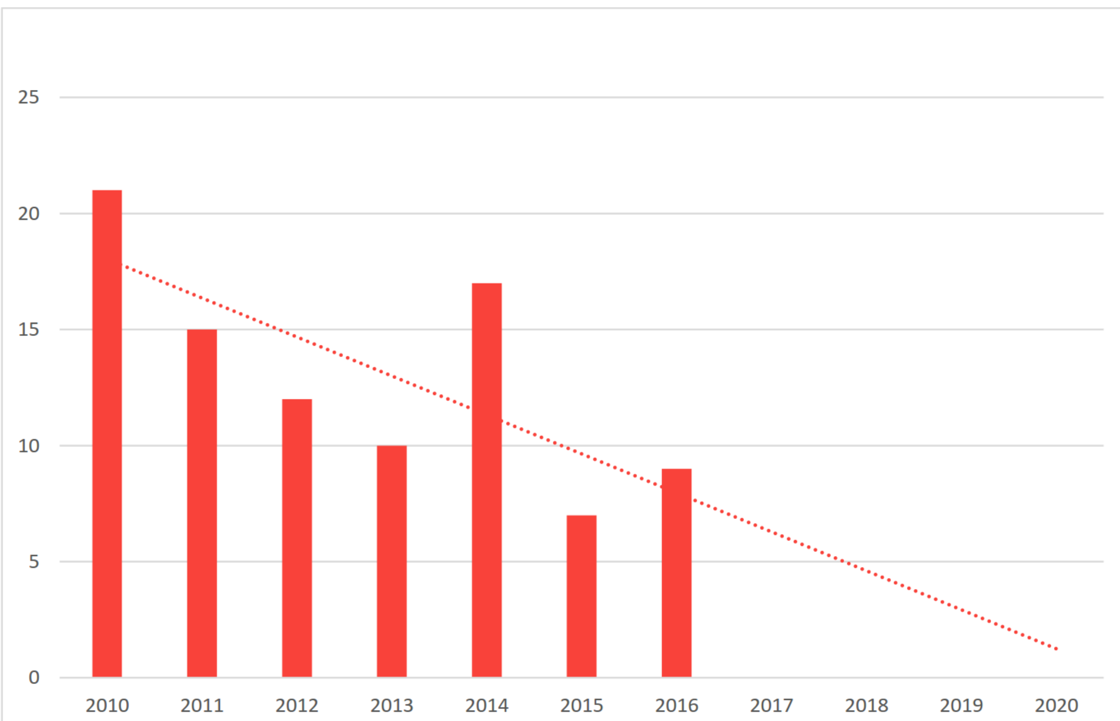


Figure 51. Fatal and serious injury angle crashes in Shawnee County, 2010-2016

The top 15 intersections with the most right-angle crashes within the city limits of Topeka are shown in Table 23 and Table 24 for the most right-angle crashes outside of the city limits. The top 15 intersections for angled crashes are shown in Figure 52. The crashes were separated by inside and outside of the city limits of Topeka as well as by total and fatal crashes.

Table 23. Intersections with the highest frequency of right-angle crashes in the City of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SW 29th St, SW Fairlawn Rd	54	SE 21st St, SE Adams St	23
2	SE 21st St, SE Adams St	47	SW Huntoon St, SW Gage Blvd	20
3	SW Huntoon St, SW Gage Blvd	46	SW Lane St, SW 10th Ave	17
4	SW 19th Ter, SW Wanamaker Rd, SW Westridge Mall	38	SW 29th St, SW Fairlawn Rd	15
5	SW Huntoon St, SW Topeka Blvd	37	SW Westover Rd, SW 17th St, SW Oakley Ave	13
6	SW Lane St, SW 10th Ave	37	SW 6th Ave, SW Topeka Blvd	13
7	SW Huntoon St, SW Fairlawn Rd	35	SE Indiana Ave, SE 29th St	13
8	SW Westover Rd, SW 17th St, SW Oakley Ave	34	SW Lane St, SW Huntoon St	12
9	SW Gage Blvd, SW 12th St	31	SE 15th St, SE Adams St	12
10	SW 10th Ave, SW Gage Blvd	31	SE 4th St, SE Golden Ave	12
11	SW 15th St, SW MacVicar Ave	31	SW 19th Ter, SW Wanamaker Rd, SW Westridge Mall	11
12	SW 6th Ave, SW Topeka Blvd	29	SW Huntoon St, SW Topeka Blvd	11
13	SW Fairlawn Rd, SW 21st St	29	SW Fairlawn Rd, SW 21st St	11
14	SW Topeka Blvd, SW 12th St	29	SW Topeka Blvd, SW 12th St	11
15	SW Washburn Ave, SW 10th Ave	28	SW 15th St, SW MacVicar Ave	10
16	SW 37th St, S Kansas Ave	28	SW Wanamaker Rd, SW 21st St	10
17	SW Lane St, SW Huntoon St	28	SW 29th St, SW Randolph Ave	10

Table 24. Intersections with the highest frequency of angle crashes outside the city limits of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SW Auburn Rd, SW 29th St	11	SW 61st St, SW Auburn Rd	9
2	SW Indian Hills Rd, SW 21st St	11	SW Auburn Rd, SW 29th St	6
3	SW 61st St, SW Auburn Rd	11	SE Croco Rd, SE 61st St	5
4	SW 93rd St, SW Topeka Blvd, SE 93rd St	7	NW 39th St, NW Green Hills Rd	4
5	SE 45th St, SE Adams St	7	SW 93rd St, SW Topeka Blvd, SE 93rd St	3
6	SE Croco Rd, SE 61st St	7	SE 45th St, SE Adams St	3
7	SE 37th St, SE Tecumseh Rd	6	SW Burlingame Rd, SW 57th St	3
8	SW Topeka Blvd, SE Gary Ormsby Dr, SW Gary Ormsby Dr	6	SE Paulen Rd, SE 37th St	3
9	SW Burlingame Rd, SW 57th St	5	SE Paulen Rd, SE 53rd St	3
10	SE Paulen Rd, SE 37th St	5	SE Berryton Rd, SE 53rd St	3
11	SW Huntoon St, SW Urish Rd	5	SW Indian Hills Rd, SW 21st St	2
12	SE Paulen Rd, SE 53rd St	5	SE 37th St, SE Tecumseh Rd	2
13	SE 29th St, SE West Edge Rd	4	SW Huntoon St, SW Urish Rd	2
14	SE Berryton Rd, SE 53rd St	4	SE Berryton Rd, SE 93rd St	2
15	NW 39th St, NW Green Hills Rd	4	SW 53rd St, SW Auburn Rd	2
16	SW Indian Hills Rd, SW 53rd St	4	Ne Meriden Rd, NE 62nd St	2
17			SW 69th St, SW Burlingame Rd	2
18			NW Fielding Rd, NW Hunters Ridge Ter	2

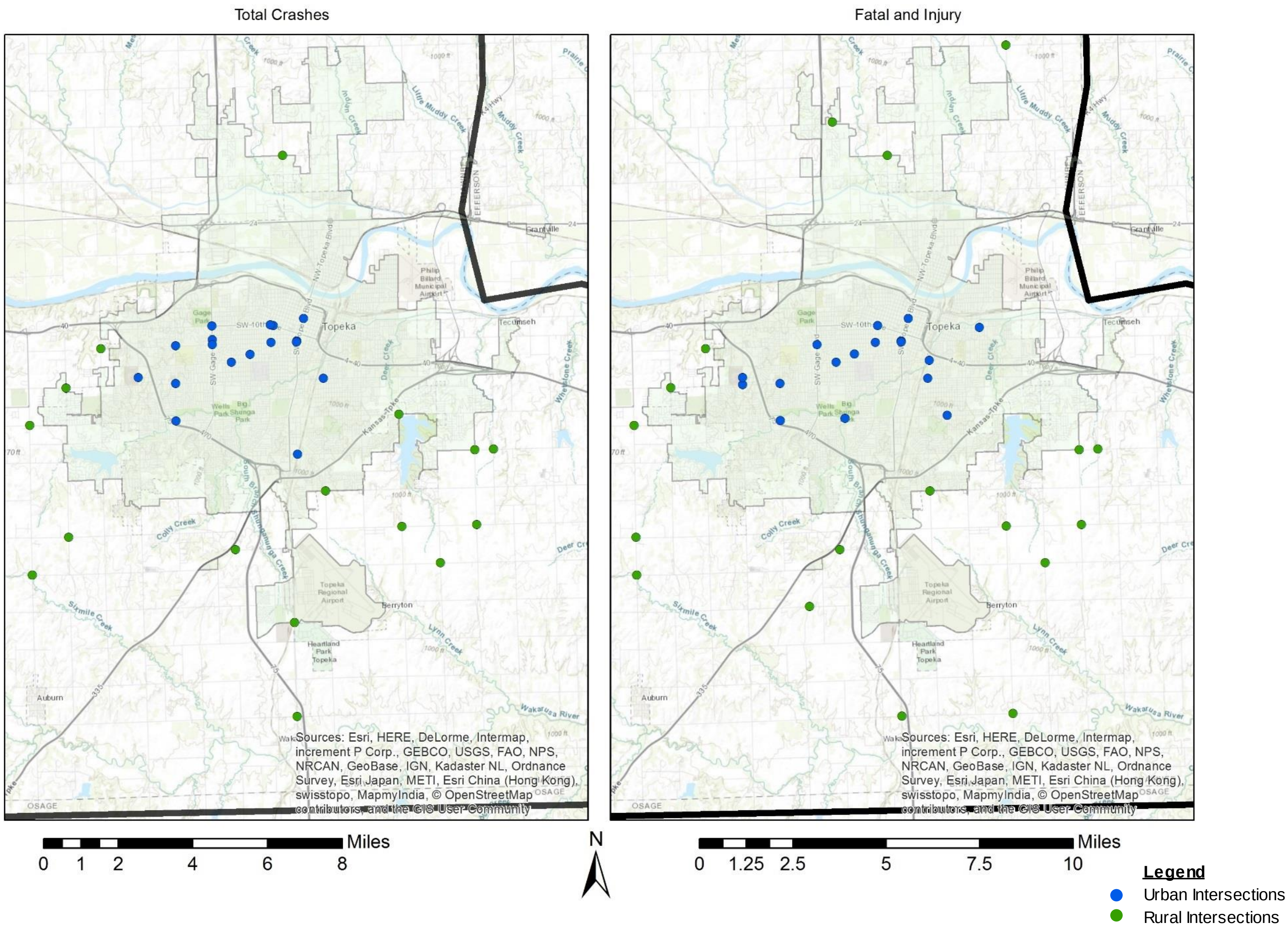


Figure 52. Top 15 intersections with angle (total and fatal/serious injury) crashes in Shawnee County, 2010-2016

The 15 segments with the most right-angle crashes per mile per year for within Topeka are shown in Table 25. Table 26 shows the segments outside of the city limits with the most right-angle crashes per mile per year. Many of the same intersections and segments are included in both the total and fatal and serious injury right-angle crash lists. The top 15 roadway segments for angled crashes are shown in Figure 53. The crashes were separated by inside and outside of the city limits of Topeka as well as by total and fatal crashes. Segments with a high frequency of angle crashes tend to have many driveways along them.

Table 25. Roadway segments with the highest frequency of angle crashes in the City of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	50	21.52	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	10	4.3
2	SW Huntoon St. 3-Lane (2 EB, 1 WB)	SW Woodhull St.	SW Gage Blvd.	0.1548	23	21.22	SE California Ave. 5-Lane	Dillons Entrance	SE 28th St.	0.0739	2	3.87
3	SE California Ave. 5-Lane	Dillons Access	SE 28th St.	0.0739	10	19.34	SW Huntoon St. 3-Lane (2 EB, 1 WB)	SW Woodhull St.	SW Gage Blvd.	0.1548	4	3.69
4	SE California Ave. 4-Lane Divided	Walgreens Access South of SW 29th St.	Dillons Access	0.1	11	15.71	SE Adams St. 4-Lane Divided	South of SE 29th St.	North of SE 29th St.	0.134	3	3.2
5	SW Wanamaker 5-Lane	SW 30th Terrace	SW Westport Dr.	1.9188	159	11.84	SW MacVicar Ave. 3-Lane (2 NB, 1 SB)	South of SW 6th Ave.	Kwick Shop Access North of SW 6th Ave.	0.0952	2	3
6	NW Rochester Rd.4-Lane Divided	US-24 Highway	Dillons / Walmart Access	0.1493	12	11.48	SW Wanamaker 5-Lane	SW 30th Terrace	SW Westport Dr.	1.9188	40	2.98
7	SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	34	10.73	SE California Ave. 4-Lane Divided	Walgreens Access South of SW 29th St.	Dillons Access	0.1	2	2.86
8	SW 29th St. 5-Lane	SW Fairlawn Rd.	SW Prairie Rd.	0.223	16	10.25	SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	9	2.84
9	SW Fairlawn 5-Lane	SW 22nd Plaza	SW 19th Terrace	0.421	30	10.18	SE Adams 2-Lane Undivided	I-70 EB On-Ramp	I-70 WB Off-Ramp	0.1742	3	2.46
10	S Kansas Ave 5-Lane	Aldi's Access South of 29th St.	Jim Clark Auto World Access	0.1038	7	9.63	SW Burlingame Rd.4-Lane Divided	South of SW 42nd St.	SW Mayfair Place	0.6621	10	2.16
11	SW 29th St. 5-Lane	SW Gage Blvd.	SW Randolph Ave.	0.7906	52	9.4	SE California Ave. 4-Lane Divided	SE 13th St.	SE 11th St.	0.213	3	2.01

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
12	SE Adams 2-Lane Undivided	i-70 EB On-Ramp	I-70 WB Off-Ramp	0.1742	10	8.2	SW 29th St. 5-Lane	SW Gage Blvd.	SW Randolph Ave.	0.7906	11	1.99
13	SW 5th St. 2-Lane One-Way EB	SW Tyler St.	SW Topeka Blvd.	0.0553	3	7.75	NW Rochester Rd.3-Lane (NB 3, SB 1)	Dillons/Walmart Access	North Walmart Access	0.075	1	1.91
14	Gage Blvd. 5-Lane	South of SW 15th St.	North of SW 10th Ave.	0.7505	40	7.61	SW 29th St. 4-lane w/turn lanes	West of SW McClure Rd./ EB I-470 Ramp	SW Fairlawn Rd.	0.3047	4	1.88
15	SW 29th St. 4-lane w/ turn lanes	West of SW McClure Rd./ EB I-470 Ramp	SW Fairlawn Rd.	0.3047	16	7.5	Gage Blvd. 4-Lane	South of SW Emland Drive	EB I-70 Off-Ramp	0.1602	2	1.78

Table 26. Roadway segments with the highest frequency of angle crash types outside the city limits of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW 61st Street 3-Lane	SW Wanamaker Rd.	East of Main Access to Washburn Rural H.S. Parking Lot	0.314	4	1.82	SE 29th Street 2-Lane Undivided	SE Stanley Rd.	SE Ward Rd.	0.1021	1	1.4
2	SE 29th Street 2-Lane Undivided	SE Stanley Rd.	SE Ward Rd.	0.1021	1	1.4	SW 61st Street 3-Lane	SW Wannamaker Rd.	East of Main Access to Washburn Rural H.S. Parking Lot	0.314	1	0.45
3	Lower Silver Lake Road 4-Lane Divided	West of SB US-75 Off-Ramp	NW Moundview Court	0.346	2	0.83	NE Goodell Road 2-Lane Undivided	East of K-4 NB Off-Ramp	SE 2nd St.	1.1127	1	0.13
4	SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	3	0.33	NW 78th Street 2-Lane Undivided	NW Wilson Rd.	NW Rochester Rd.	1.4779	1	0.1

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
5	SW 10th Avenue 2-Lane Undivided	SW Patton Rd.	SW Wanamaker Rd.	4.8219	9	0.27	SW 61st Street 2-Lane Undivided	East of Main Access to Washburn Rural H.S. Parking Lot	West of SW Levelling Rd.	1.6159	1	0.09
6	SW 61st Street 2-Lane Undivided	East of Main Access to Washburn Rural H.S. Parking Lot	West of SW Lewelling Rd.	1.6159	3	0.27	NW Carlson Road 2-Lane Undivided	W 1st St.	NW 42nd Terrace	1.988	1	0.07
7	21st Street - 3-Lane	SW Indian Hills Rd.	West of SW Urish Rd.	0.7052	1	0.2	21st Street 2-Lane	West of Hodges Rd. (termini)	SW Indian Hills Rd.	2.3495	1	0.06
8	Main Street 2-Lane Undivided	Rossville Jr. / Sr. High Access	NW 54th St.	0.8341	1	0.17	NW 62nd Street 2-Lane Undivided	NW Rochester Rd.	NE Meriden Rd.	2.5015	1	0.06
9	SE 45th Street 2-Lane Undivided	East of SE California Ave.	SE Berryton Rd.	0.9442	1	0.15	SW 29th Street 2-Lane	East of SW Croco Rd.	SE Shaw nee Heights Rd.	3.0465	1	0.05
10	SW Wanamaker Road 2-Lane Undivided	SW 61st St.	SW 69th St.	0.9896	1	0.14	SW Burlingame Road 2-Lane Undivided	SW 93rd St.	SW 61st St.	4.1626	1	0.03
11	NW 50th Street 2-Lane Undivided	NW Green Hills Rd.	NW Rochester Rd.	1.0027	1	0.14	SW 10th Avenue 2-Lane Undivided	SW Patton Rd.	SW Wanamaker Rd.	4.8219	1	0.03
12	SW 29th Street 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	3	0.14	SE 45th Street 2-Lane Undivided	SE Croco Rd.	SE Woodring Rd. (terminal)	5.9594	1	0.02
13	SE Shaw nee Heights Road 2-Lane Undivided	SE 69th St.	SE 61st St.	1.0287	1	0.14	NW Topeka Blvd 2-Lane Undivided	NE 46th St.	NE 94th Rd.	5.9973	1	0.02
14	NE Goodell Road 2-Lane Undivided	East of K-4 NB Off-Ramp	SE 2nd St.	1.1127	1	0.13	SW 53rd Street 2-Lane Undivided	SW Valencia Rd.	SW Burlingame Rd.	8.4841	1	0.02
15	NW Rochester Road 2-Lane Undivided	North of NW 46th St.	NW 94th Rd.	5.9265	5	0.12	SE 53rd Street 2-Lane Undivided	SW Topeka Blvd.	E 1 Rd.	10.0732	1	0.01

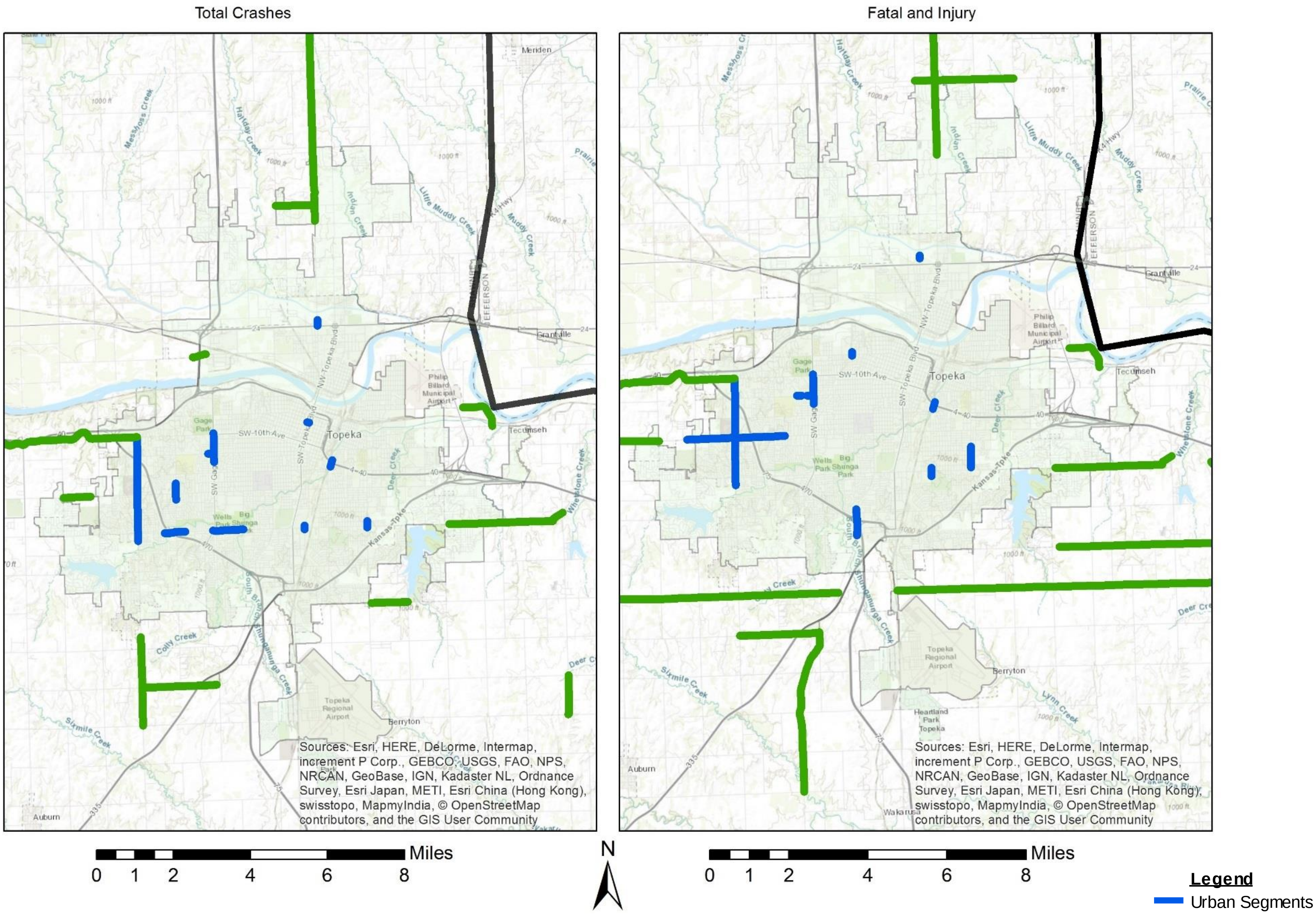


Figure 53. Top 15 roadway segments with angle (total and fatal/serious injury) crashes in Shawnee County, 2010-2016

2.5.4. REAR-END

Rear-end vehicle collisions were the second most common crash type in Shawnee County during the study period. Typical locations for rear-end collisions include signalized intersections, driveways or unsignalized intersections with many vehicles turning off major roads during peaks, and four-lane roads with no left and/or right-turn lanes present.

Table 27 compares the frequency of posted speed limits for rear-end crashes to the miles of roadway in the database with the same speed limits. Roadways with 40 mph speed limits were overrepresented in the crash data compared to the relatively low mileage of such roads in the database.

Table 27. Frequency of rear-end collisions compared to posted speed limit

Posted Speed Limit	Crash Frequency	% of Crashes	Miles of Roadway	% of Miles
15	n/a	0.0%	13.7	**0.6%**
20	262	1.1%	5.1	**0.2%**
25	124	0.5%	22.8	**1.0%**
30	9571	40.6%	1206.2	**53.4%**
35	2871	12.2%	347.0	**15.4%**
40	7133	30.2%	102.8	4.6%
45	1163	4.9%	141.4	**6.3%**
50	342	1.5%	72.0	**3.2%**
55	247	1.1%	110.3	**4.9%**
60	10	0.0%	7.6	**0.3%**
65	40	0.2%	66.1	**2.9%**
70	10	0.0%	42.0	**1.9%**
75	11	0.1%	60.4	**2.7%**
None	1808	7.7%	62.3	**2.8%**

The driver, environmental, and roadway conditions for rear-end collisions resembles the aggregated crash data in that most of the crashes occurred during the daylight in clear weather on dry roads. Rear-end collisions do have a slightly increased rate of occurrence during wet pavement conditions (13% vs. 11%) as compared to all crash types. Figure 54 and Figure 55 show the total number of crashes and fatal/serious injury crashes by year, respectively. There is a slightly increasing trend for rear-end collisions throughout, while the F&SI crashes seem to occur much more randomly.

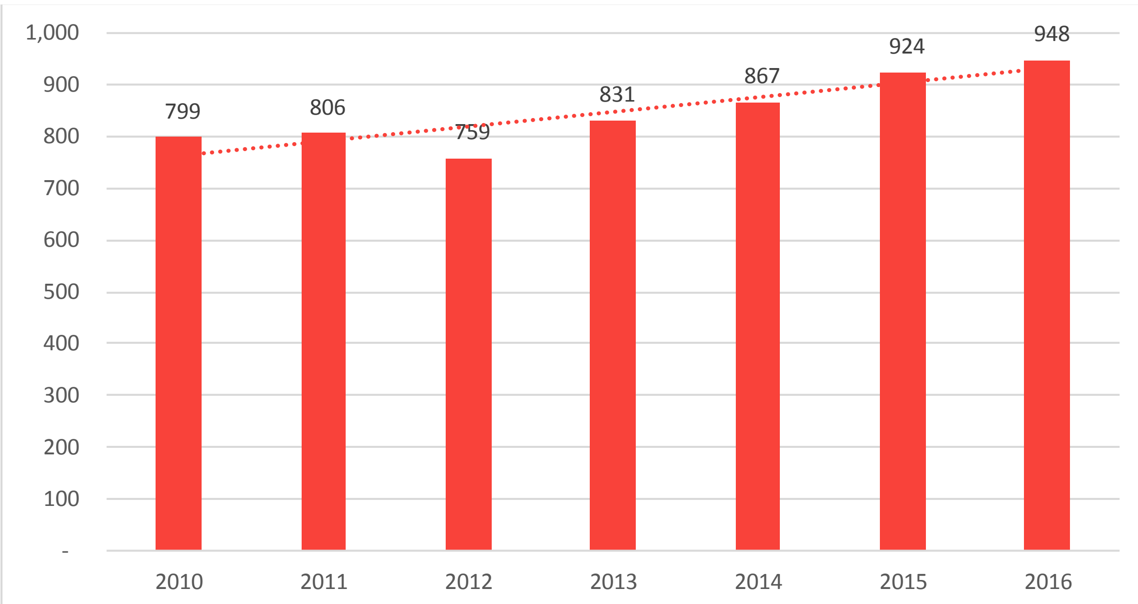


Figure 54. Total rear-end crashes in Shawnee County, 2010-2016

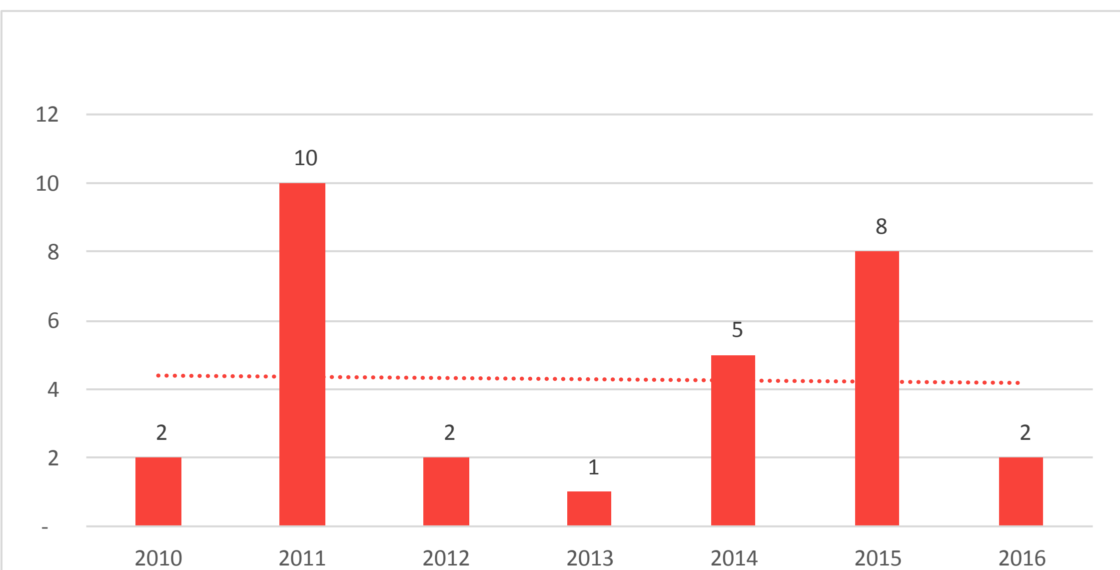


Figure 55. Fatal and serious injury rear-end crashes in Shawnee County, 2010-2016

The top 15 intersections with the highest frequency of rear-end collisions are shown in Table 28 (in the City) and Table 29 (outside of the city limits). The 15 intersections with the highest frequency of total/fatal and injury rear-end crashes both within and outside of the City of Topeka are shown in Figure 56.

Table 28. Intersections with the highest frequency of rear-end crashes in the City of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SW Gage Blvd, SW 21st St	68	SW Gage Blvd, SW 21st St	14
2	SW Washburn Ave, SW 21st St	62	SW Washburn Ave, SW 21st St	13
3	SW Gage Blvd, SW 29th St	52	SW 17th St, SW Wanamaker Rd	13
4	SW Fairlawn Rd, SW 21st St	52	SW Gage Blvd, SW 29th St	12
5	SW Wanamaker Rd, SW 21st St	49	SW Fairlawn Rd, SW 21st St	11
6	SW 17th St, SW Wanamaker Rd	45	SW 10th Ave, SW Topeka Blvd	11
7	SW 6th Ave, SW Topeka Blvd	45	SW Gage Blvd, SW 6th Ave	11
8	SW 10th Ave, SW Topeka Blvd	43	SW 29th St, SW Lincoln St	11
9	SW Gage Blvd, SW 6th Ave	38	SW 29th St, SW Wanamaker Rd	10
10	SW 29th St, SW Topeka Blvd	38	SW Topeka Blvd, SW 1st St, NW Topeka Blvd	10
11	SW 29th St, SW Wanamaker Rd	37	SW Topeka Blvd, SW 21st St	9
12	SW Topeka Blvd, SW 21st St	32	SW 21st St, SW Sims Ave	9
13	SW 10th Ave, SW Gage Blvd	31	SW Wanamaker Rd, SW 21st St	8
14	SW 37th St, S Kansas Ave	31	SW 6th Ave, SW Topeka Blvd	8
15	SW Topeka Blvd, SW 1st St, NW Topeka Blvd	30	SE California Ave, SE 29th St	8

Table 29. Intersections with the highest frequency of angle crashes outside the city limits of Topeka, 2010-2016

Rank	Top Total Intersection	Total Crashes	Top F&I Intersection	F&I Crashes
1	SE 29th St, SE West Edge Rd	8	SW Roundabout Rd, SW Wanamaker RD (South Approach Of 53rd St.)	3
2	SW Indian Hills Rd, SW 21st St	7	SE 29th St, SE West Edge Rd	2
3	SW Roundabout Rd, SW Wanamaker RD (South Approach Of 53rd St.)	5	SW 21st St, SW Kingsrow Rd	2
4	SW 21st St, SW Kingsrow Rd	4	NW Button Rd, NW 62nd St	2
5	SW Fairlawn Rd, SW 61st St	4	NW 46th St, NW Button Rd	1
6	NW 46th St, NW Button Rd	3	NE Sumner St, NE Sardou Ave	1
7	NE Sumner St, NE Sardou Ave	3	SW Auburn Rd, SW 29th St	1
8	SW Auburn Rd, SW 29th St	3	SW 93rd St, SW Topeka Blvd, SE 93rd St	1
9	NW 62nd St, NW Us 75 Hwy	3	NW Rochester Rd, NW 58th St	1
10	NW Button Rd, NW 62nd St	2	SE 29th St, SE Wittenberg Rd	1
11	SW 93rd St, SW Topeka Blvd, SE 93rd St	2	NW Redwood Dr, NW 46th St	1
12	NW Rochester Rd, NW 58th St	2	SW 25th St, SW Urish Rd	1
13	SE 29th St, SE Wittenberg Rd	2	SW 53rd St, SW Burlingame Rd	1
14	NW Redwood Dr, NW 46th St	2	SW South Pointe Dr, SW 61st St	1
15	SE Berryton Rd, SE 45th St, SE West Edge Rd	2	SE 45th St, SE Croco Rd	1
16	SE Shawnee Heights Rd, SE 45th St	2	SE 45th St, SE Minnesota Ave	1
17	SE 45th St, SE Maryland Ave	2	SE 45th St, SE Gemstone Ln	1
18	SW 61st St, SW Auburn Rd	2	SE Shawnee Heights Rd, SE 89th St	1
19	NE 46th St, NE K4 Access Hwy	2	SE Croco Rd, SE Sycamore Dr, SE 10th St	1

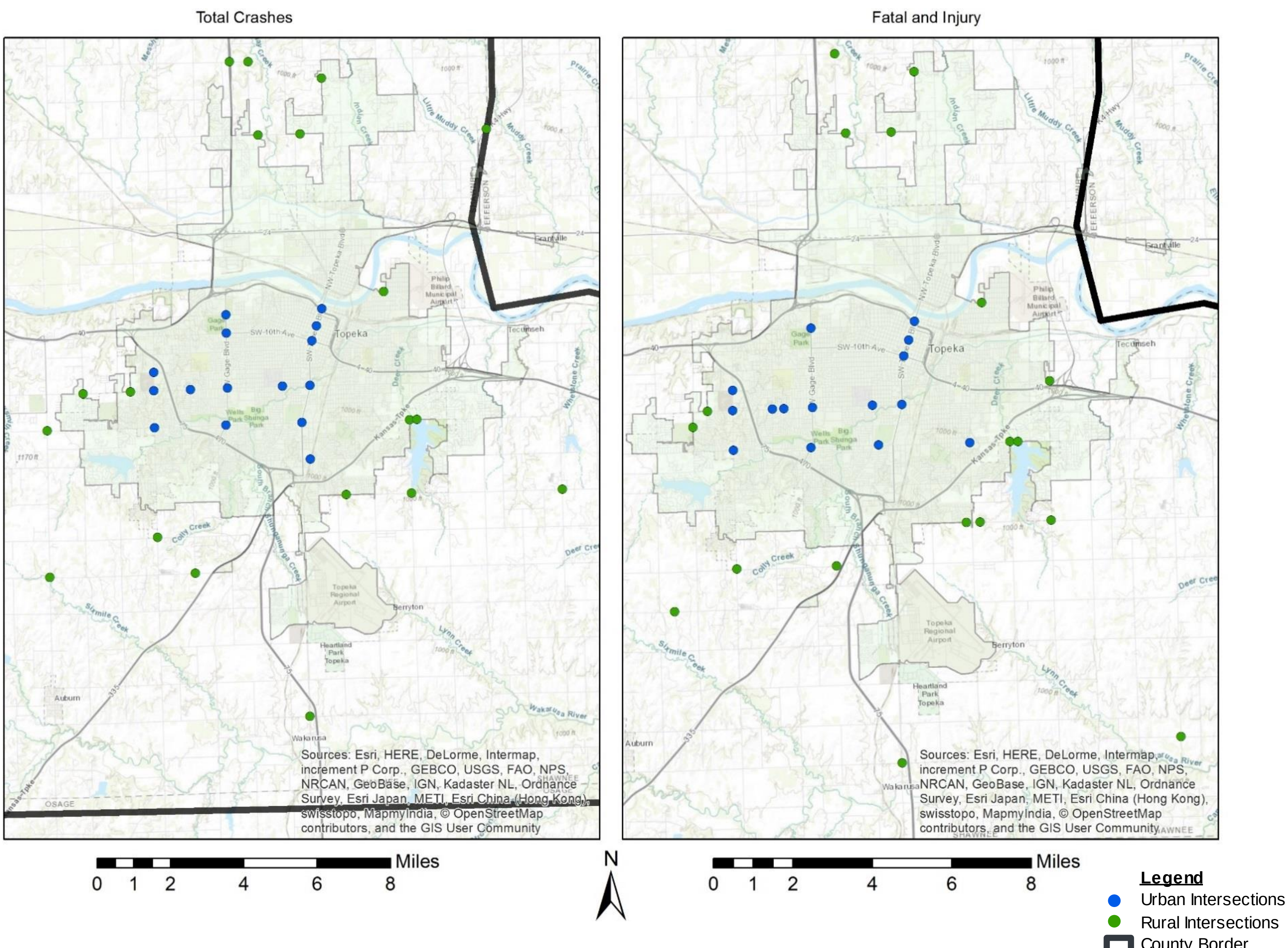


Figure 56. Top15 intersections with rear-end (total and fatal/serious injury) crashes in Shawnee County, 2010-2016

Table 30 and Table 31 show the segments with the most crashes per mile within Topeka and outside of the city limits, respectively. The 15 segments with the highest frequency of rear end crashes are shown in Figure 57.

Table 30. Roadway segments with the highest frequency of rear-end crashes in the City of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	44	18.94	SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	12	5.17
2	17th Street 3-Lane Channelized	SW Place Ave.	SW Mulvane St.	0.3103	22	10.13	SE California Avenue 4-Lane Divided	SE 28th St.	S of SE 24th St.	0.4602	9	2.79
3	SW Fairlawn 5-Lane	SW 22nd Plaza	SW 19th Terrace	0.421	29	9.84	Gage Bld. 4-Lane	S of SW Holly Lane	S of SW 15th St.	0.2152	4	2.66
4	Gage Blvd. 4-Lane	South of SW Emland Dr.	EB I-70 Off-Ramp	0.1602	11	9.81	SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	8	2.53
5	SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	28	8.84	SW Fairlawn 5-Lane	SW 22nd Plaza	SW 19th Terrace	0.421	7	2.38
6	21st Street 4-Lane	SW Morningside Road	East of SW James St.	0.3606	21	8.32	17th Street 3-Lane Channelized	SW Plass Ave.	SW Mulvane St.	0.3103	5	2.3
7	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	29	8.31	SW Montara Parkway 2-Lane Divided	RR X-ing	SW Topeka Blvd.	0.0656	1	2.18
8	NW Topeka Blvd 3-Lane	S of Calvary Lutheran Church Access	South of NW 43rd St.	0.0699	4	8.18	SE California Avenue 4-Lane Undivided	S of 24th St.	N of SE 22nd St.	0.3329	5	2.15
9	Gage Blvd. 4-Lane	North of SW 10th St.	South of SW 6th Ave.	0.4298	24	7.98	SE Adams Street 4-Lane Divided	S of SW 29th St.	S of SE 28th St.	0.134	2	2.13
10	21st Street 4-Lane	West of SW Lincoln St.	East of SW Fillmore St.	0.3387	18	7.59	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	7	2
11	S Kansas Ave 5-Lane	S of SW 29th St.	N of SW 29th St.	0.1038	5	6.88	SE California Avenue 5-Lane	Dillons Access	SE 28th St.	0.0739	1	1.93
12	SW Wanamaker 5-Lane	SW 30th Terrace	SW Westport Dr.	1.9188	92	6.85	NW Rochester Road 3-Lane (NB 3, SB 1)	Dillons / Walmart Access	North Walmart Access	0.075	1	1.91
13	Gage Blvd. 5-Lane	S of SW 21st St.	SW Holly Lane	0.6516	30	6.58	SW Washburn Avenue 4-Lane Undivided	SW Hampton St.	S of SW 19th St.	0.1508	2	1.89

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
14	Gage Blvd. 4-Lane	S of SW 25th St.	S of SW 21st St.	0.4639	21	6.47	SW Burlingame Road 4-Lane Divided	S of SW 29th St.	S of SW Knollw ood Dr.	0.1528	2	1.87
15	SE California Avenue 4-Lane Undivided	S of SE 24th St.	N of SE 22nd St.	0.3329	15	6.44	SW 4th Street 6-Lane Divided	SE Monroe St.	SE Madison St.	0.0792	1	1.8

Table 31. Roadway segments with the highest frequency of rear-end crash types <u>outside</u> the city limits of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW 61st Street 3-Lane	SW Wanamaker Rd.	E of Main Access to Washburn Rural H.S. Parking Lot	0.314	11	5	SW University Blvd 2-Lane Undivided	Around Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	1	1.54
2	SW University Blvd 2-Lane Undivided	Around Curve to the West of SW Topeka Blvd.	SW Topeka Blvd.	0.093	2	3.07	SW 29th Street 3-Lane	West of SE Aquarius Drive	East of SE Aquarius Drive	0.1152	1	1.24
3	SW Wanamaker 3-Lane	SW 61st St.	S of Jay Shideler Elementary School South Access	1.3031	28	3.07	SW 61st Street 3-Lane	SW Wanamaker Rd.	E of Main Access to Washburn Rural H.S. Parking Lot	0.314	1	0.45
4	SE Croco Road 2-Lane Divided	South of SE Sycamore Dr.	North of SE Sycamore Dr.	0.1032	1	1.38	SE45th Street 2-Lane Undivided	East of SE East Edge Rd.	West of SE Paw nee Drive	0.4588	1	0.31
5	SW 29th Street 3-Lane	West of SE Aquarius Dr.	East of SE Aquarius Dr.	0.1152	1	1.24	SW Wanamaker 3-Lane	SW 61st St.	S of Jay Shideler Elementary School South Access	1.3031	2	0.22
6	NW 46th Street 2-Lane Undivided	NW Kendall Dr.	NW Rochester Rd.	0.722	6	1.19	21st Street - 3-Lane	SW Indian Hills Rd.	W of Urish Rd.	0.7052	1	0.2

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
7	14th Street 2-Lane Undivided	Private Drive 0.27 Miles West of SW Auburn Rd. (City of Auburn)	N Hanover St. (City of Auburn)	0.4957	4	1.15	NW 46th Street 2-Lane Undivided	NW Kendall Drive	NW Rochester Rd.	0.722	1	0.2
8	SE 45th Street 3-Lane	SE Croco Rd.	Third Private Driveway	0.1396	1	1.02	SW 29th Street 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	4	0.19
9	SW 61st Street 2-Lane Undivided	E of Main Access to Washburn Rural H.S. Parking Lot	West of SW Lewelling Rd.	1.6159	7	0.62	SW 61st Street 2-Lane Undivided	E of Main Access to Washburn Rural H.S. Parking Lot	West of SW Lewelling Rd.	1.6159	2	0.18
10	SW 29th Street 2-Lane	East of SW Croco Rd.	SE Shawnee Heights Rd.	3.0465	12	0.56	SE California Avenue 2-Lane Undivided	SE 53rd St.	SE 45th St.	1.0006	1	0.14
11	SW 6th Avenue 3-Lane	W of Security Benefit Access	West of Governor's Lake Parking Lot Access	0.2916	1	0.49	NW Topeka Blvd 2-Lane Undivided	NW 46th St.	NW 94th Rd.	5.9973	5	0.12
12	21st Street - 3-Lane	SW Indian Hills Rd.	W of Urish Rd.	0.7052	2	0.41	SW Urish Road 2-Lane Undivided	SW Huntoon St.	SW Murray Hill Rd.	1.4082	1	0.1
13	NW Topeka Blvd 2-Lane Undivided	NW 46th St.	NW 94th Rd.	5.9973	15	0.36	SW 65th Street 2-Lane Undivided	SW Lewelling Rd.	SW West-view Rd.	1.5049	1	0.09
14	SE45th Street 2-Lane Undivided	East of SE East Edge Rd.	West of SE Pawnee Dr	0.4588	1	0.31	SW 85th Street 2-Lane Undivided	N Hanover St. (City of Auburn)	SW Wanamaker Rd.	2.7525	1	0.05
15	SW Huntoon Street 2-Lane Undivided	SW Urish Rd.	E of SW Pin Oak Parkway	0.4987	1	0.29	SE Shawnee Heights Road 2-Lane Undivided	SE 45th St.	US-40	4.0114	1	0.04

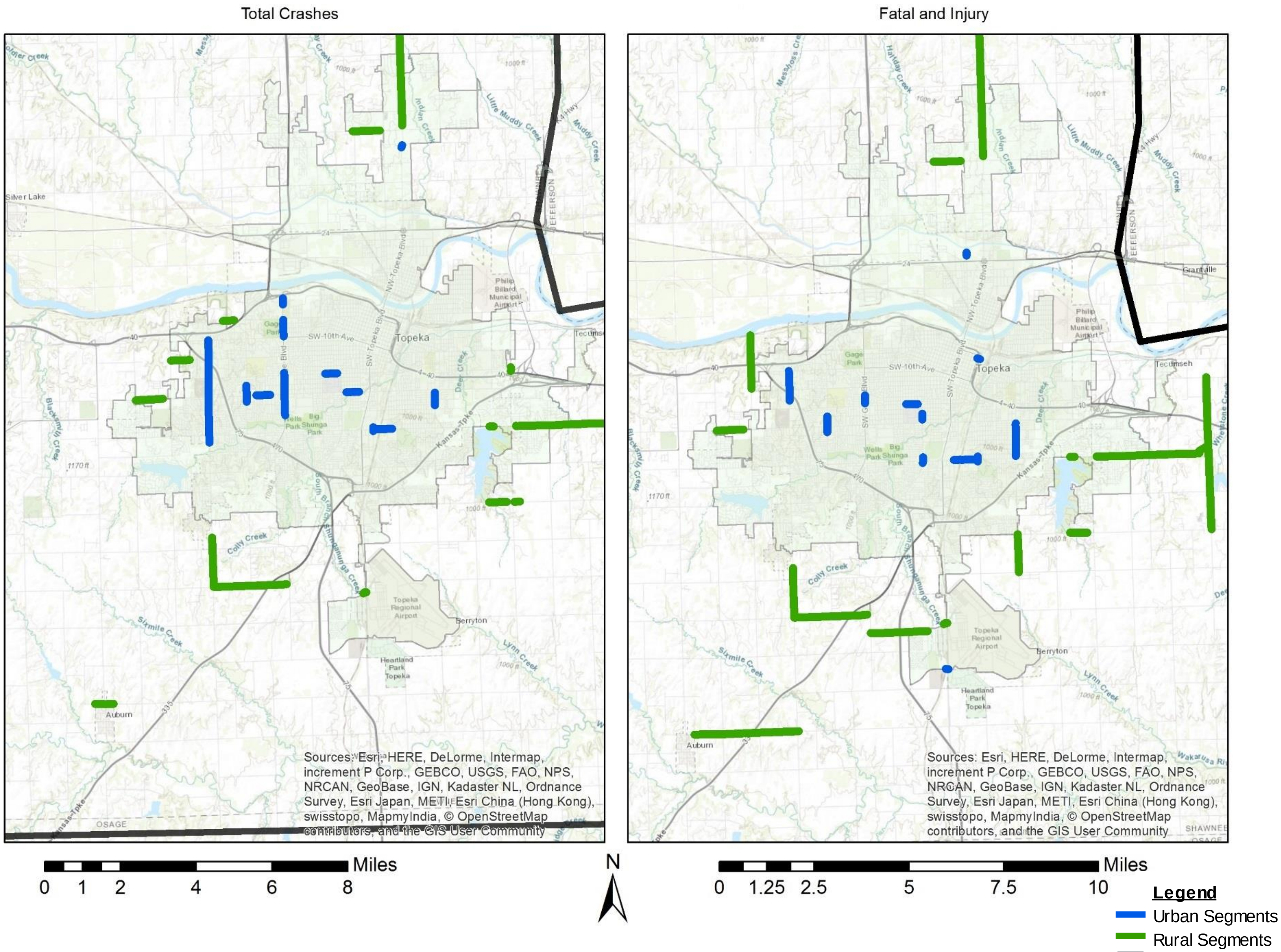


Figure 57. Top 15 segments with rear-end (total and fatal/serious injury crashes) in Shawnee County, 2010-2016

3. PLAN DEVELOPMENT PROCESS

3.1. OVERSIGHT, STAKEHOLDERS, AND PUBLIC INPUT

The development of the Plan was managed by the Metropolitan Topeka Planning Organization (MTPO) who established a Core Team for oversight including additional staff from the MTPO, City of Topeka and Shawnee County, KS. Monthly calls with the Core Team were held to discuss the status of the Plan. The Core Team members have the authority to implement recommendations from the Plan with support from the City/MTPO Policy Board, MTPO Technical Advisory Committee, Topeka City Council and Shawnee County Commission.

Members of the Core Team included:

- Carlton Scroggins (MTPO / City of Topeka) – Project Manager
- Taylor Ricketts (MTPO / City of Topeka)
- Bill Fiander (MTPO / City of Topeka)
- Jason Peek (City of Topeka)
- Brian Faust (City of Topeka)
- Terry Coder (City of Topeka) / Kristina Ericksen (City of Topeka)
- Curt Niehaus (Shawnee County)

Early in the process, an Advisory Committee was established with a diverse group of key local stakeholders representing each of the "5-Es" of Safety. Each of these representatives is an expert in their field and represents an agency or organization that has its own transportation safety goals either in the Topeka/Shawnee County region or statewide. Advisory Committee meetings were held during the development of the Plan on February 26, 2018, June 11, 2018, September 27, 2018 and November 5, 2018.

Members of the Advisory Team included:

- Eric Nichol (KDOT)
- Mike Spadafore (KDOT)
- Edwin Rothrock (Topeka Metro)
- Andy Fry (Topeka Community Cycle Project / Topeka Metro)
- SGT Gary Ludolph (Topeka Police Dept.)
- LT Harold Tillman (KHP Troop B Topeka)
- Lisa Hecker (Program Consultant, KDOT)
- Jim Green (Emergency Management Coordination, City of Topeka)
- Alex Wiebel (Kansas Traffic Safety Resource Office)
- Amanda Horner (Kansas Traffic Safety Resource Office)

One open house public meeting was held during the development of the project to inform the public about the Plan, obtain their concerns for transportation safety, and allow them to provide initial feedback towards the Plan development.

The open house public meeting was held on July 31, 2018 at the Topeka City offices, 620 SW Madison Street, 1st Floor Conf. Room (Holliday Room) from 11:00 am to 1:00 pm (12 attendees) and then again from 5:00 pm to 7:00 pm (9 attendees). A presentation was given about the Plan followed by a number of stations including a representative from the Kansas Traffic Safety Resource Office (KTSRO) with information pamphlets, member of the consultant team who could pull up specific intersections or roadway segments included in the analysis and several tables of maps of the Topeka / Shawnee County area for the public to mark areas of concern.

Prior to the public meetings, a public survey was posted on Survey Monkey via the MTPO Plan website to obtain input on locations where there was a concern with transportation safety including intersections and roadway segments both inside outside of the City of Topeka. The survey also focused on obtaining attitudes towards a variety of subjects involving transportation safety for drivers, pedestrians, bicyclists and transit users. A station was also set-up at the open house so that the public could complete the public survey while attending. A press release was distributed to the local press prior to the open house public meeting inviting the public to attend Figure 58 as well as complete the online public survey. Over 300 participants completed the public survey. shows the results of question 10 which asked for the top three transportation safety priorities as it relates to decreasing transportation related injuries and fatalities. The top four selections were distracted driving, intersections, pedestrians/bicyclists and speed. A summary of the results of the public survey is available in the Appendix to the Plan.

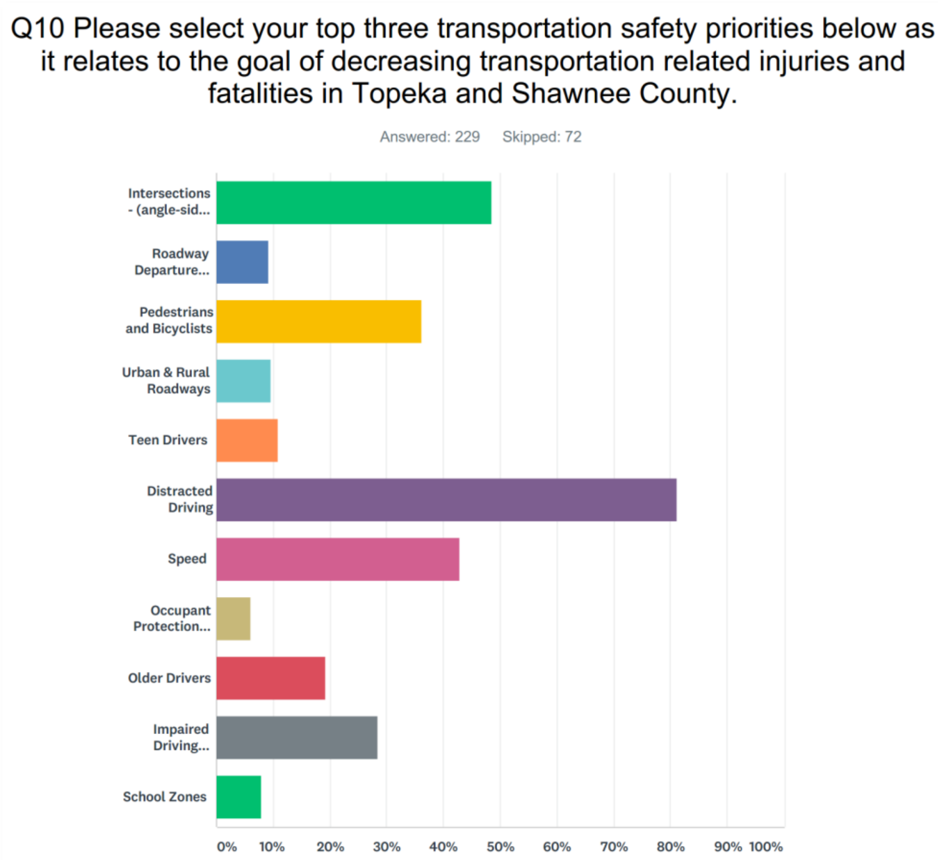


Figure 58. Public survey responses - top three transportation safety priorities

3.2. IDENTIFICATION OF SAFETY COUNTERMEASURES

Many different disciplines are concerned with roadway safety including educators, engineers, law enforcement, emergency services personnel, and policy makers. Efforts to improve safety can overlap all these disciplines. Rather than focusing on only one countermeasure category, such as engineering, a safety plan should include a comprehensive approach of all the elements of the safety system in order to have a greater impact in reducing crashes and fatalities.

The Project Advisory Committee met in the fall of 2018 to focus on developing potential countermeasures for each of the four Emphasis Areas. Each Emphasis Area Team was led by a member of the consultant team to facilitate the discussion. Each Advisory Committee member was specifically selected for participation in a certain Emphasis Area based on their interest and expertise in the topic (see Table 32).

Table 32. MTPO Transportation Safety Plan: Emphasis Area Teams

Intersections	Pedestrians & Bicyclists	Distracted Driving	Speed
Facilitator: David Church, WSP	**Facilitator: Jay Aber, WSP (supported by Lisa Shofstall, WSP)**	**Facilitator: Janelle Clayton, Merge Midwest Engineering**	**Facilitator: Jessica Hutton, MRI Global**
Kristi Ericksen (City of Topeka), 785-368-3029, kericksen@topeka.org	Andy Fry (Topeka Community Cycle Project / Topeka Metro), 785-730-8629, afry@topekametro.org	Lisa Hecker (Program Consultant, KDOT), 785-296-0845, Lisa.Hecker@ks.gov	Sgt. Gary Ludolph (Topeka Police Dept.), gludolph@topeka.org
Jason Peek (City of Topeka), 785-368-3801, jpeek@topeka.org	Mike Spadafore (KDOT), 785-296-4907, Mike.Spadafore@ks.gov	Jim Green (Emergency Management Coordinator, City of Topeka),785-368-1942, jegreen@topeka.org	Bill Fiander (MTPO / City of Topeka), 785-368-3008, bfiander@topeka.org
Carlton Scroggins (MTPO / City of Topeka), 785-368-3014, cscroggins@topeka.org	Taylor Ricketts (MTPO / City of Topeka), 785-368-1607, tricketts@topeka.org	LT Harold Tillman (KHP Troop B (Topeka)), Harold.Tillman@ks.gov	Eric Nichol (KDOT), 785-296-1244, eric.nichol@ks.gov
Barry Beagle (Shawnee County), 785-291-5410, Barry.Beagle@snco.us	Edwin Rothrock (Topeka Metro), 785-730-8625, erothrock@topekametro.org	Kansas Traffic Safety Resource Office (KTSRO) – (Alex Wiebel, Amanda Horner or Norraine Wingfield)	Brian Faust (City of Topeka), 785-368-3842, bfaust@topeka.org

Following the meeting, the consultant team summarized the discussion within each Emphasis Area Team and utilized this information in developing focused countermeasures for potential implementation as presented in Section 4 of this report.

4. EMPHASIS AREAS

4.1. INTERSECTIONS

4.1.1. CRASH ANAYLSIS

Table 33 shows the frequency of intersection/intersection-related crashes and non-intersection-related crashes by severity level. Table 34 shows these frequencies as percentages of total crashes by severity level. Intersection-related crashes make up about 46 percent of total crashes and 55 percent of injury crashes, but only 34 percent of fatal crashes. Because the overall number of fatalities is fairly low, the percentages of fatalities shown in each category would be expected to have much more variance over time than injury crashes, PDO crashes, or total crashes.

Table 35 shows the breakdown of intersection and intersection-related crashes by severity level. The most common intersection crash types are angle crashes and rear-end crashes. These two crash types make up over 80 percent of both total and fatal-and-injury intersection and intersection-related crashes. Angle crashes are the most severe, accounting for over two-thirds of total intersection-related fatalities and over half of the intersection-related injury crashes. Not surprisingly, multi-vehicle crashes are more than 10 times more common than single-vehicle crashes at and around intersections.

Table 33. Frequency of crashes by location type and severity level

Accident Location	Fatal crashes	Injury crashes	Total Crashes
Intersection and intersection-related crashes	23	3061	10,889
Non-intersection-related crashes	45	2484	12,702
TOTAL	**68**	**5,545**	**23,591**

Table 34. Percent of each severity level by location type

Accident Location	Fatal crashes	Injury crashes	Total Crashes
Intersection and intersection-related crashes	33.8	55.2	46.2
Non-intersection-related crashes	66.2	44.8	53.8
TOTAL	**100.0**	**100.0**	**100.0**

Table 35. Intersection and intersection-related crash by crash type and severity level

Accident Class	Fatal crashes	Injury crashes	Total Crashes
Multi-vehicle crashes	**20**	**2,664**	**10,048**
Rear-end	2	881	3,664
Angle – side impact	15	1,620	5,371
Head-on	2	99	260
Sideswipe – opposite direction	1	22	139
Sideswipe – same direction	0	36	489
Backed into	0	2	104
Other	0	1	3
Unknown	0	3	18
Single-vehicle crashes	**3**	**397**	**841**
Collision with fixed object	0	82	368
Collision with parked motor vehicle	0	10	82
Collision with pedestrian	2	111	115
Collision with pedalcycle	0	127	133
Collision with animal	0	1	14
Collision with railway train	0	0	1
Collision with other object	0	4	17
Other non-collision	0	16	53
Overturned	1	44	53
Unknown	0	2	5
TOTAL	**23**	**3,061**	**10,889**

To address one-quarter of intersection crashes (2,722 out of 10,889), the top 46 intersections, based on crash frequency, would need to be alleviated. To address one-third of the fatal and injury crashes (1,017 out of 3,084), the top 67 intersections, based on crash frequency, would need to be alleviated. These crash frequencies show that the crashes at intersections are widely distributed around the network, rather than clustered at a few problematic intersections, and that more cost-effective treatments implemented at many intersections might be more beneficial than making large investments at a few locations.

4.1.2. HIGH PRIORITY LOCATIONS

The top 15 intersections for both total and fatal and injury crashes within the City of Topeka are shown in Table 36. The same information for crashes occurring outside the city limits of Topeka is shown in Table 37. For the top 15 locations for angle, rear-end and roadway departure crashes (fixed object) at intersections, both inside and outside the City of Topeka, see Section 2.5. As discussed previously, crash rates were not calculated due to restraints in the available volume data.

Table 36. Intersections with the highest frequency of all crash types in the City of Topeka, 2010-2016

Rank	Intersection	Total Crashes	Intersection	F&Is
1	SW Gage Blvd, SW 21st St	101	SW 10th Ave, SW Topeka Blvd	28
2	SW Fairlawn Rd, SW 21st St	90	SW Huntoon St, SW Gage Blvd	26
3	SW 29th S, SW Fairlawn Rd	89	SW 6th Ave, SW Topeka Blvd	25
4	SW Washburn Ave, SW 21st St	89	SW Fairlawn Rd, SW 21st St	25
5	SW Wanamaker Rd, SW 21st St	84	SW Lane St, SW 10th Ave	25
6	SW 10th Ave, SW Topeka Blvd	82	SE 21st St, SE Adams St	24
7	SW 6th Ave, SW Topeka Blvd	82	SW 29th St, SW Fairlawn Rd	22
8	SW Gage Blvd, SW 29th St	81	SW Gage Blvd, SW 21st St	21
9	SW Huntoon St, SW Gage Blvd	77	SW Gage Blvd, SW 6th Ave	21
10	SW 17th St, SW Wanamaker Rd	76	SE 15th St, SE Adams St	20
11	SW 10th Ave, SW Gage Blvd	72	SW Wanamaker R, SW 21st St	20
12	SW Gage Blvd, SW 6th Ave	71	SW Huntoon St, SW Fairlawn Rd	20
13	SW 29th S, SW Topeka Blvd	71	SW 17th St, SW Wanamaker Rd	20
14	SW 37th St, S Kansas Ave	64	SW Gage Blvd, SW 29th St	19
15	SW 19th Ter, SW Wanamaker Rd, SW Westridge Mall	63	SW 29th St, SW Topeka Blvd	18
16			SW Huntoon St, SW Topeka Blvd	18

Table 37. Intersections with the highest frequency of all crash types outside the city limits of Topeka, 2010-2016

Rank	Intersection	Total Crashes	Intersection	F&Is
1	SW Indian Hills Rd, SW 21st St	20	SW 61st St, SW Auburn Rd	9
2	SE 29th St, SE West Edge Rd	17	SW Auburn Rd, SW 29th St	8
3	SW Auburn Rd, SW 29th St	15	SE Croco Rd, SE 61st St	5
4	SW 61st St, SW Auburn Rd	13	SE 29th St, SE West Edge Rd	4
5	SW 93rd St, SW Topeka Blvd, Se 93rd St	9	NW 39th St, NW Green Hills Rd	4
6	SW Roundabout Rd, SW Wanamaker Rd	9	SW 93rd S, SW Topeka Blvd, SE 93rd St	4
7	SW Wanamaker Rd, SW 61st St	9	SW Burlingame Rd, SW 57th St	4
8	SE 45th St, SE Adams St	8	SW Roundabout Rd, SW Wanamaker Rd	4
9	SE Croco Rd, SE 61st St	7	SE Berryton Rd, SE 53rd St	3
10	SE 37th St, SE Tecumseh Rd	7	NW Button Rd, NW 62nd St	3
11	SW Huntoon St, SW Urish Rd	7	SW Wanamaker Rd, SW 61st St	3
12	SW Topeka Blvd, SE Gary Ormsby Dr, SW Gary Ormsby Dr	7	SW Indian Hills Rd, SW 21st St	3
13	SW Burlingame Rd, SW 57th St	6	SE 45th St, SE Adams St	3
14	SE Berryton Rd, SE 53rd St	5	SE Paulen Rd, SE 37th St	3
15	SE Paulen Rd, SE 37th St	5	SE Paulen Rd, SE 53rd St	3
16	SE Paulen Rd, SE 53rd St	5	NW Button Rd, NW 62nd St	3
17	NW 46th St, NW Button Rd	5		
18	SE Berryton Rd, SE 45th St, SE West Edge Rd	5		
19	SW 53rd St, SW Auburn Rd	5		
20	SW Fairlawn Rd, SW 61st St	5		

The intersections with the highest frequency of all crash types are shown in Figure 59. Many of the intersections with the most total crashes are also included in the fatal and serious injury list. Generally, these intersections are the locations with the most vehicles.

For additional information regarding crashes involving intersections (angle, rear-end and roadway departure), see Section 2.5.

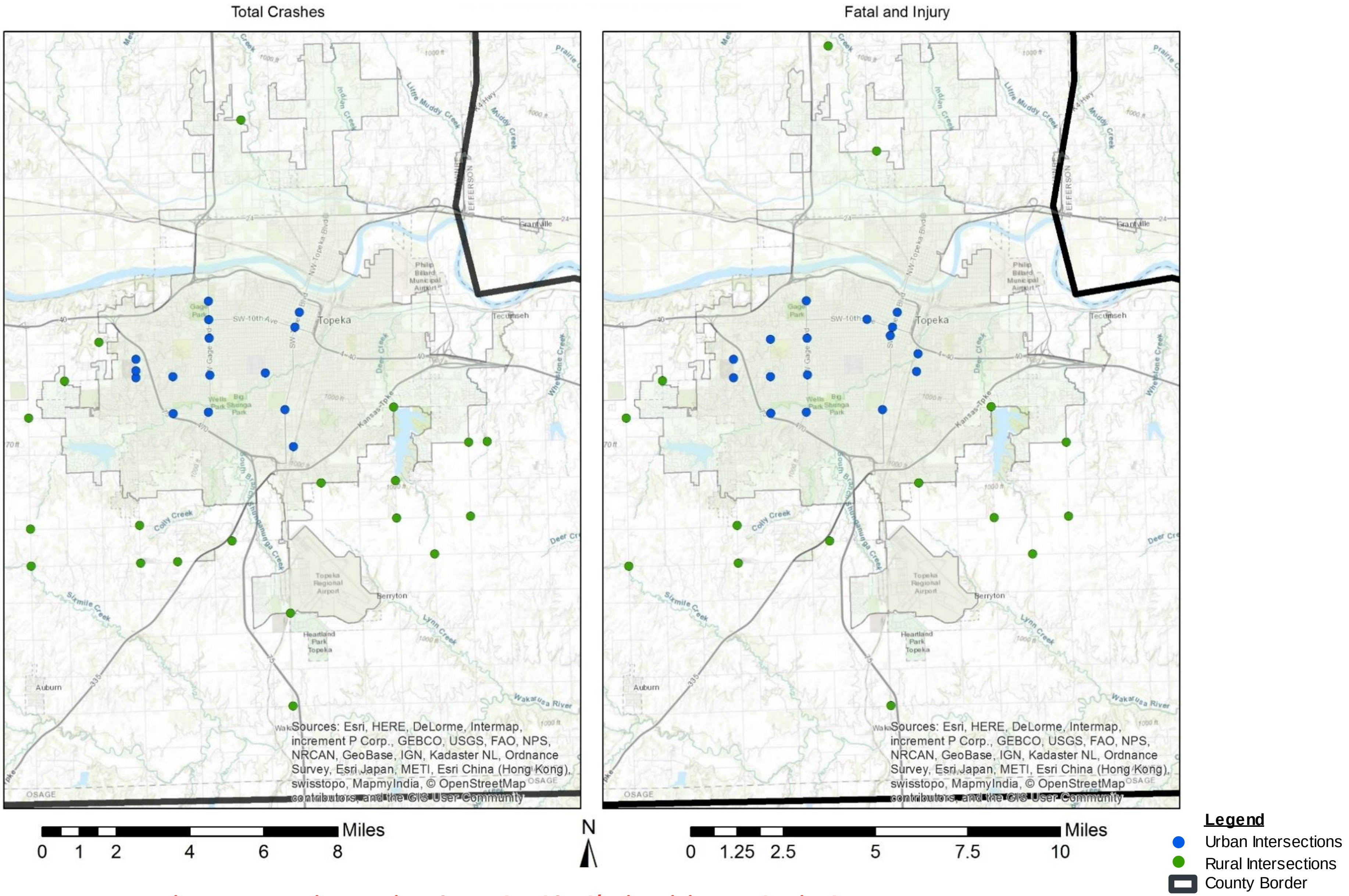


Figure 59. Top 15 intersections for total and fatal/serious injury crashes in Shawnee County, 2010-2016

4.1.3. PERFORMANCE MEASURES

Angle side-impact crashes at intersections, between 2010 and 2016, have resulted in 15 fatal crashes, 1,620 injury crashes and 5,371 total crashes (which is approximately half of all crashes, 53% of injury crashes and 65% of fatality crashes at intersections).

The performance indicator is to reduce the trend of fatality and injury intersection related angle-side impact crashes by 50 crashes for a 5-year average by 2024.

4.1.4. COUNTERMEASURES

Many different disciplines are concerned with roadway safety including educators, engineers, law enforcement, emergency services personnel, and policy makers. Efforts to improve safety can overlap all these disciplines. Rather than focusing on only one countermeasure category, such as engineering, a safety plan should include a comprehensive approach of all the elements of the safety system in order to have a greater impact in reducing crashes and fatalities.

During an Advisory Committee meeting, personnel from each category were invited to brainstorm potential countermeasures for each emphasis area. Table 38 below summarizes the countermeasures identified for addressing crashes at intersections. Detailed information about each countermeasure is listed following the table.

Table 38. Intersection Crash Countermeasures

INTERSECTION CRASH COUNTERMEASURES				
EDUCATION	**ENGINEERING**	**ENFORCEMENT**	**EMERGENCY SERVICES**	**EXECUTIVE (POLICY)**
Safe driving awareness through public service announcements* $	Road Safety Audit program* $$	Perform strategic enforcement at intersections with safety issues by working with local law enforcement agencies $	Work with emergency services to identify potential "bottlenecks" in the transportation system $$ +	Vision Zero* $$
S.A.F.E. (Seatbelts Are For Everyone) Program* $	Roadway configuration review* $ +			
Develop education material for new intersection types and new traffic control devices $	Implement countermeasures at stop sign controlled intersections that are focused on Speed Differential Management $$ +			
	Implement Safety Performance Evaluation & Planning (Policy) as relates to reduction of angle crashes at intersections. $$ +			
	Implement systemic low-cost countermeasures for reducing crashes at traffic signal-controlled intersections $$ +			
	Construct traditional and alterative intersection types which reduce the number of conflict points $$$$			

*Over-arching strategies for all categories
Relative Cost to Implement and Operate: $ Low, $$ Moderate, $$$ Moderate to High, $$$$ High
+ Has a CMF associated with it

4.1.4.1 EDUCATION

- Distracted driving awareness through PSA's
    - Action Plan - Coordinate with Kansas Traffic Safety Resource Office (KTSRO) on target PSA's in the Topeka / Shawnee County Area
- SAFE (Seatbelts Are For Everyone) program for high schoolers overall safety and in the area schools (https://www.ktsro.org/safe)
    - 2018 Shawnee County participating schools included Silver Lake, Rossville, Seaman, Washburn Rural and Shawnee Heights (Note: Hayden has participated in the past; however, when they lost their School Resource Officer (SRO) with the Sheriff's Department, they lost their local enforcement sponsor). Laura Moore with S.A.F.E. has tried several times to reach out to Hayden, but hasn't had any luck.
        - Shawnee Heights High School Safe Video https://youtu.be/5u_Xrbeb97g?list=UUeRi7bRgjBOi1R2qVzMngcA
        - Rossville High School SAFE Videos:
            - 2014 - https://youtu.be/vgQHS_P1fzo
            - 2016 - https://youtu.be/mX51UDBxI0A
- Educate the public how to effectively use auxiliary lanes for both left and right-turns.
- Develop education material for new intersection types and new traffic control devices, flashing yellow-arrow, lead pedestrian interval, Rectangular Rapid Flashing Beacons (RRFB), Hybrid Pedestrian Signs (PHB), Zipper Merge, etc.
    - Action Plan – Kansas University Transportation Center (KUTC) develop training through the Kansas Local Transportation Assistance Program (LTAP) focused on new intersection types and traffic control devices to local municipalities. The Kansas Traffic Safety Resources Office (KTSRO) to develop driver education material focused on new intersection types and traffic control devices to the public.

4.1.4.2 ENGINEERING

- Implement Safety Performance Evaluation & Planning (Policy) as relates to reduction of angle crashes at intersections. These measures can include Access Management Plan, Traffic Impact Studies, Local Road Safety Plans, Road Safety Audits, Complete Streets Design Guidelines, Traffic Calming Policies, etc.
    - Action Plan –
        - Continue to maintain the MTPO Transportation Safety Plan (2019)
        - Continue to maintain the Topeka and Shawnee County Complete Streets Design Guidelines (2019)

- Continue to require Traffic Impact Studies for new developments as well as redevelopment resulting in a change in access use
- Review current City policy on Traffic Calming in residential areas
- Initiate a Road Safety Audit process to include in the design process to develop safer roadways
- Develop an Access Management Plan for use in the Topeka / Shawnee County region

- Implement systemic low-cost countermeasures for reducing crashes at traffic signal-controlled intersections, such as: reflective back plates, countdown timers, APS push buttons, lead pedestrian interval, improved vehicle detection, and improved signal phasing/timing plans.

  - Action Plan:
    - Review traffic signal yellow clearance and all-red clearance intervals
    - Install retroreflective backplates around intersections. (This has a CMF of 0.85, meaning this leads to a 15% reduction in crashes)
    - Identify un-warranted traffic signals and evaluate other intersection alternatives
    - Consider protected left-turn phasing when left-turns are not aligned to see past the opposing queue.
    - Implement "Flashing Yellow Arrows" for permissive left-turns
    - Install bicycle sensors at signalized intersections (loops or other types of detectors)
    - Retrofit pedestrian signal heads with countdown timers and include in new installations
    - Coordinate signalized corridors during peak hours
    - Consider what level of adaptive traffic signals the City desires
    - Consider pedestrian timing on signals (separate pedestrian phase, pedestrian scramble, leading pedestrian phase, no pedestrian phase until left-turn phase has cleared)
    - Install bike signals when utilizing "cycle tracks"

- Implement countermeasures at stop sign controlled intersections that are focused on Speed Differential Management such as: improving intersection sight-distance, implementing traffic calming measures at intersections or along corridors, rural intersection conflict warning system (ITS), and adding auxiliary turn lanes to move slower speed traffic out of the higher speed traffic lanes.

- Construct traditional and alternative intersection types which reduce the number of conflict points such as: right-in/right-out, ¾ access (right-in/right-out/left-in), modern roundabouts, Displaced Left-turn, Median U-

Turn (MUT), Restricted Crossing U-Turn (RCUT), Diverging Diamond Interchanges (DDI), and Quadrant Roadway.

- Action Plan - This involves evaluating design alternatives to determine whether a signal, roundabout or other control is best suited for the location based on safety, efficiency and estimated cost.

4.1.4.3 ENFORCEMENT

- Perform strategic enforcement at intersections with safety issues by working with City of Topeka Police Department and Shawnee County Sherriff Department to identify and target intersections in their area with a risk of serious crashes and identify resources to provide targeted enforcement.

    - Action Plan - Promote Automated Enforcement of Red Light Running and Speed Zones. Consider avoiding the pitfalls of targeting the driver's license associated with the license plate and focus instead on the license plate itself – like parking tickets and toll collection.

4.1.4.4 EMERGENCY SERVICES (EMS)

- Work with emergency services to identify potential "bottlenecks" in the transportation system and develop countermeasures to alleviate those "bottlenecks" towards the goal of improved response time.

4.1.4.5 EXECUTIVE POLICY

- The City of Topeka and Shawnee County elected officials can initiate an automated Red Lighting Running and Speed Zone "pilot" project before adopting an enforceable automated enforcement program.

- Work with the City Council and the Topeka / Shawnee County community adopt a "Vision Zero" Policy with the goal of eliminating traffic deaths and serious injuries. Below is a link to the Vision Zero information for the City of Columbia, MO:

- https://www.como.gov/city-manager/city-columbia-vision-zero/

4.2. SPEED

The National Highway Traffic Safety Administration (NHTSA) reports that over the past two decades, approximately one-third of all fatal crashes each year involve speeding. Speeding includes both exceeding the posted speed limit as well as driving too fast for conditions (such as on wet, snowy, or icy pavement). Speeding is a form of aggressive driving and can sometimes be correlated with driving under the influence of alcohol or drugs.

Speeding has a number of consequences beyond tickets, including:

- Greater potential for loss of vehicle control
- Increased crash severity, especially when vulnerable road users are involved
- Increased time required for reaction and breaking; longer breaking distance
- Reduced effectiveness of occupant protection equipment
- Increased fuel consumption

While speed is an important contributing factor to many crashes, it is also a difficult statistic to track. After a crash, officers generally must rely on the testimony of the people involved in the crash and witnesses to the crash, and limited physical evidence near the scene to determine whether an involved driver was speeding and whether that speed contributed to the crash. Officers trained in crash reconstruction can evaluate the crash scene to estimate the vehicle's speed at the time of the crash, but these reconstructions are time consuming, expensive, and require substantial expertise, and therefore are typically only conducted for a sample of fatal crashes. Because it is often difficult to assess the speed of vehicles prior to the crash without a reconstruction, speed may go under-reported as a contributing factor to crashes. We can only analyze speed as a contributing factor using the information included by the officer on the crash report, but it is important to keep in mind that speed plays a role in crash outcomes whether or not it is included in the crash report.

4.2.1. CRASH ANAYLSIS

Speed-related crashes made up just over five percent of the total crashes that occurred in Shawnee County from 2010 through 2016. However, nearly 20 percent of all fatal crashes were reported as involving a driver either exceeding the posted speed limit or traveling too fast for conditions. Table 39 shows these speed-related crashes broken down by accident class and severity level. A majority of speed-related crashes are single-vehicle collisions, and these are most commonly collisions with fixed objects (such as trees and utility poles). Collisions with fixed objects tend to be the most severe speed-related crashes; 8 of the 13 speed-related fatal crashes and 11 of the 15 serious injury crashes were of this crash type. Among speed-related crashes involving more than one vehicle, rear-end and angle crashes are the most common, together representing 37 percent of speed-related crashes.

Table 39 indicates that only one pedestrian collision was coded as being related to speed, and no collisions with bicycles were coded this way in the associated crash reports. However, the speed of the vehicle involved in such collisions plays a primary role in the severity of the injuries sustained by the pedestrian or cyclist. Even when drivers are abiding by the speed limit, higher speeds result in more deadly crashes for vulnerable road users. For this reason, lower posted speed limits, along with other design features to reinforce the need for lower speeds, may be appropriate in areas with frequency pedestrian and bicycle traffic.

Table 39. Speed-related crashes in Shawnee County from 2010 through 2016 by accident class and severity.

	Accident Class	Fatal	Serious Injury	Minor Injury	PDO Crashes	Total F&I Crashes	Total Crashes
Multi-vehicle Crashes	Angle - Side Impact	1	1	37	115	39	154
	Backed Into	0	0	1	1	1	2
	Head On	1	2	11	16	14	30
	Rear End	1	1	53	228	55	283
	Sideswipe: Opposite Direction	0	0	1	15	1	16
	Sideswipe: Same Direction	0	0	3	13	3	16
	Unknown	0	0	0	1	0	1
	All Multi-Vehicle	***3***	***4***	***106***	***389***	***113***	***502***
Single-vehicle Crashes	Collision with Fixed Object	8	11	119	394	138	532
	Collision with Other Object	0	0	2	4	2	6
	Collision with Parked Motor Vehicle	0	1	5	72	6	78
	Collision with Pedestrian	0	0	1	0	1	1
	Other Non-Collision	1	0	4	9	5	14
	Overturned	1	3	23	19	27	46
	All Single-Vehicle	***10***	***15***	***154***	***498***	***179***	***677***
Total		***13***	***19***	***260***	***887***	***292***	***1,179***

Figure 60 shows the distribution of fatal and injury speed-related crashes by driver age. The youngest category of drivers, age 14 to 21 account for the largest percentage of these serious speed-related crashes. These drivers often lack the experience to choose an appropriate speed for the conditions they are driving in and may be more likely to lose control of their vehicle when driving too fast for those conditions. This data highlights the importance of educating young drivers on the risks of speeding and on the importance of modifying driving speed to suit the conditions they are driving in, even when that means driving below the posted speed limit.

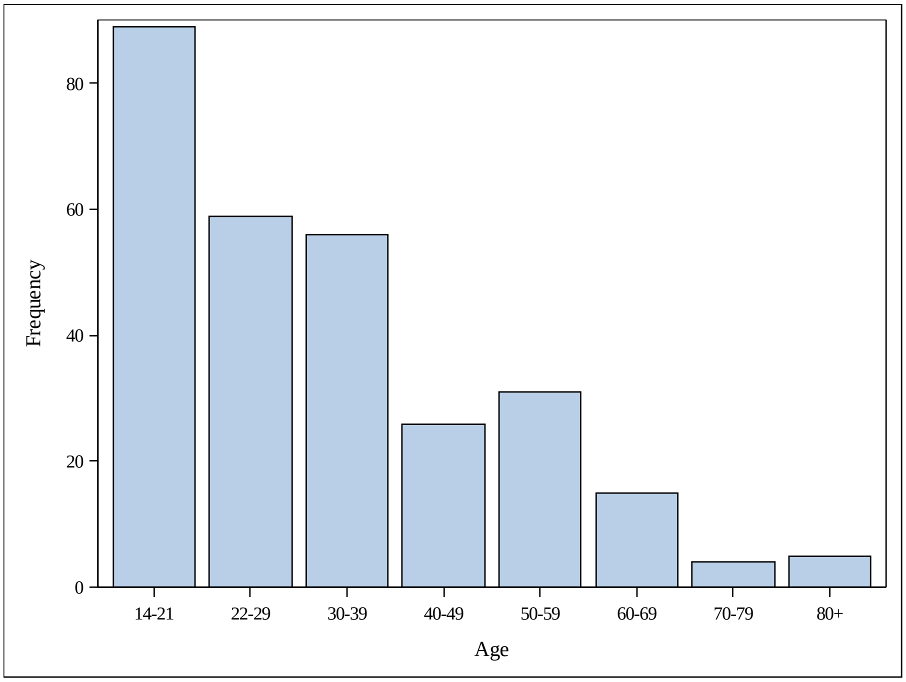


Figure 60. Distribution of fatal and injury speed-related crashes by driver age.

Figure 61 shows the distribution of fatal and injury speed-related crashes by time of day. The data show that speed-related crashes are most common in the 7 to 8 am time period, closely followed by the hours between 3 and 8 pm. This makes sense, as these are the hours when traffic volumes are the highest. During the morning peak, many drivers choose to speed in order to reach their work or school destination on time in the mornings. The evening hours represent the times when young people are often driving between school, home, work, sporting events, and other activities. These are also the hours when workers are rushing to get home to their families.

Figure 62 shows the percentage and number of speed-related fatal and injury crashes that occur on roads of each category of posted speed limit. The largest portion of these crashes occur on 30 mph roads (40 percent), followed by 40 mph roads (24 percent) and then 35 mph roads (18 percent). The category "other" includes speed limits of 50 and 55 mph. In general, most of the vehicle miles travel occur on city streets posted at 30, 35, or 40 mph, and most of the crashes in the county are occurring on these roads. Speed-related crashes are no exception. These data show, however, that countermeasures aimed at reducing speeding behaviors should be focused on the roadways where the most drivers are traveling rather than on the roadways where drivers are driving the fastest.

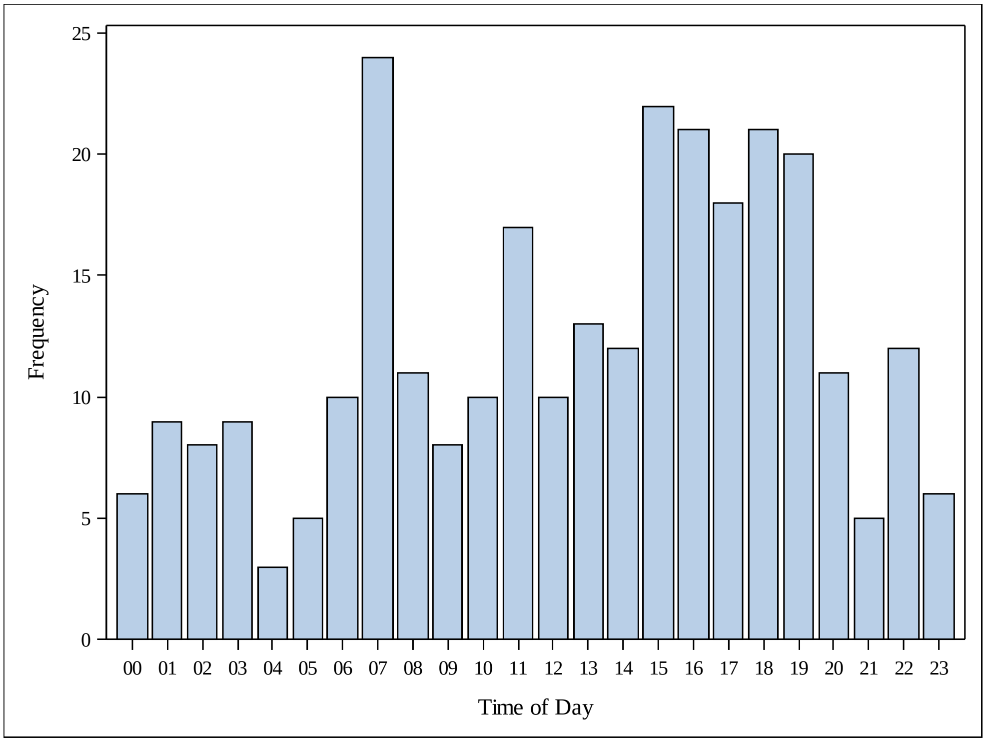


Figure 61. Distribution of fatal and injury speed-related crashes by time of day.

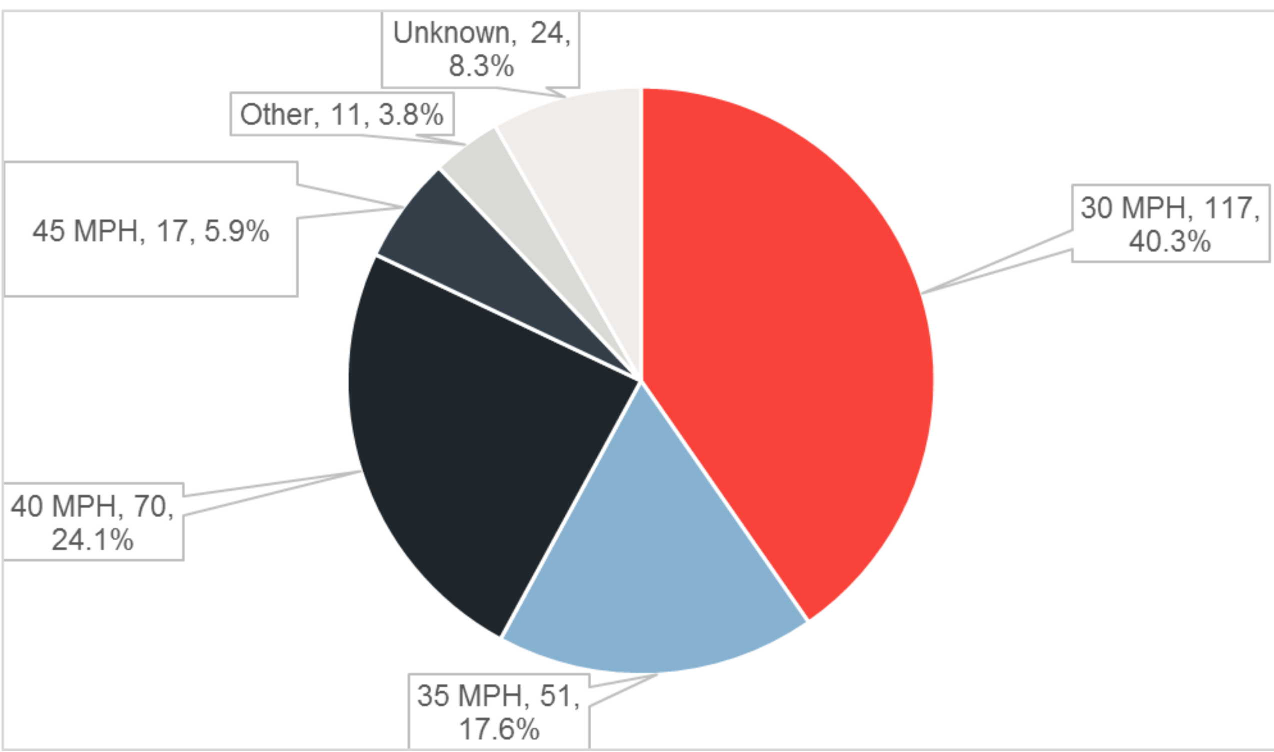


Figure 62. Distribution of fatal and injury speed-related crashes by posted speed limit.

4.2.2. HIGH PRIORITY LOCATIONS

Figure 63 shows the location of all speed-related crashes in Shawnee County for which location information was available in the crash database between the years 2010 and 2016. Figure 64 shows the same information, but is zoomed in on Topeka. Each dot represents a speed-related crash, and the dots are color-coded by severity: red are fatal crashes, orange are injury crashes, and yellow are property-damage-only crashes. These two maps indicate that speed-related crashes are distributed across the city and county.

Generally, crashes occurring the rural areas on roads with higher speed limits and involve vehicles traveling at higher rates of speed. Most speed-related crashes, however, are occurring at lower speeds in and around the city of Topeka. The broad distribution of crashes around the map indicate that speeding treatments focused only on a few roadway segments or intersections will have less impact than treatments that can impact the choices drivers make as they travel around the entire roadway network. Ensuring that roadway and roadside design consistently reinforces the appropriate travel speed around the city and county will give drivers a clearer understanding of what speeds are appropriate in specific roadway environments.

Targeted speed enforcement should be moved around the city and county, but used most frequently in locations where vulnerable road users are present and where crashes of any type are frequent. Speed reduction has the potential to reduce the risk and severity of all types of crashes

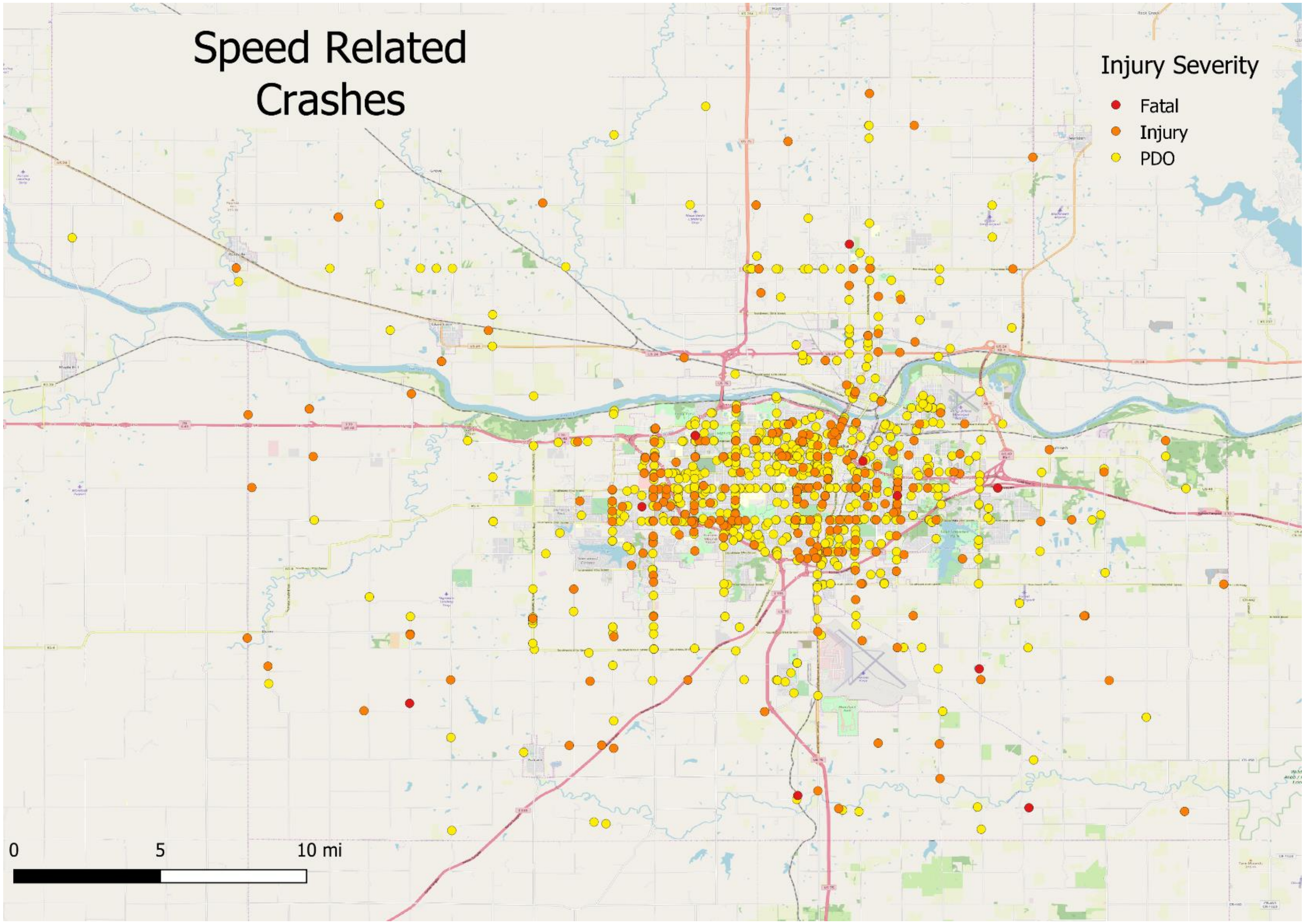


Figure 63. Map of speed-related crashes in Shawnee County in 2010 through 2016 by severity.

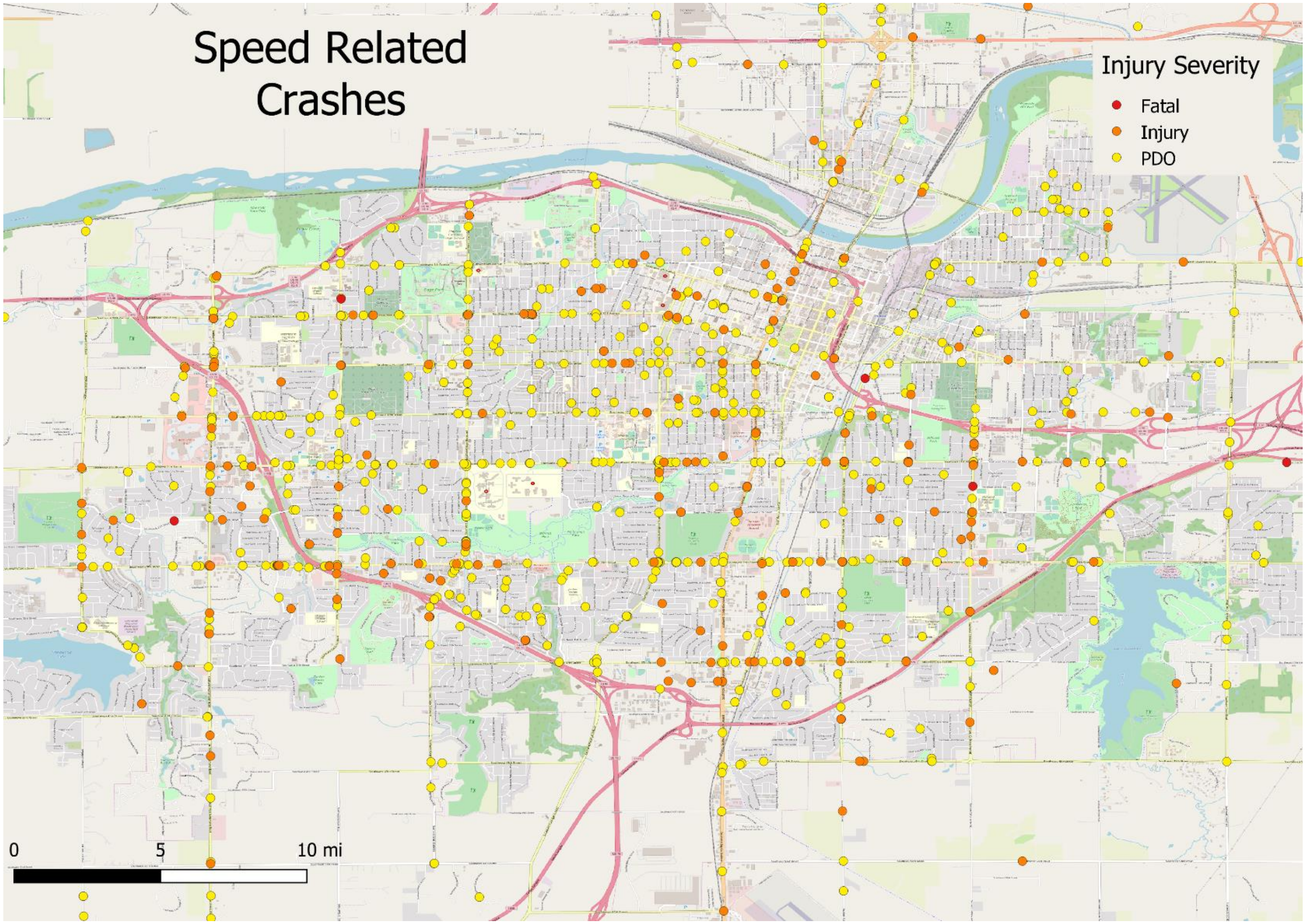


Figure 64. Map of speed-related crashes in and around Topeka from 2010 through 2016 by severity.

4.2.3. PERFORMANCE MEASURES

The performance indicator is to reduce the trend of fatality and injury "speed" related crashes by 25% for a 5-year average by 2024.

4.2.4. COUNTERMEASURES

Research has shown that crashes are more likely on a given roadway segment when the speed variance among drivers increases—that is, the potential for crashes goes up when some drivers are driving faster and some drivers are driving slower. The speed variance can have more of an impact on crash risk than the speed itself, which means that a situation in which some drivers are driving 5 mph over the speed limit, while others are driving 5 mph under, and still others are driving all the speeds in between can create more crash risk than a situation in which all drivers are uniformly traveling about 5 mph over the speed limit. This implies that to reduce crashes, it is important to make sure all drivers understand what speed is safe and expected on the roads they are driving, and to tailor the roadway design to fit this expectation.

While speed variance is an important issue, exceeding the speed limit or traveling too fast for conditions is also important to address. Higher speeds lead to more severe collisions when a vehicle strikes another vehicle or fixed object (such as a tree or utility pole). In addition, the higher the travel speed, the less time the driver has to react and brake for unexpected conditions in the roadway. Higher speeds can also lead to loss of vehicle control. And, higher speeds are especially deadly for vulnerable road users such as pedestrians and cyclists. Therefore, countermeasures and policies should be aimed both at slowing down traffic in areas with vulnerable road users and at intersections, where vehicles must cross paths, and at making speeds more uniform on roadway segments.

Engineering countermeasures for slowing traffic in urban areas, where higher volumes of vehicles, pedestrians, and cyclists make crashes more likely, involve a range of traffic calming designs and traffic control measures. Roadway design principals can also be tailored to the design the roadway towards self-enforcing speeds—that is, the design of the road communicates to drivers what the appropriate travel speed is, and the posted speed limits match drivers' expectations of the appropriate speed for the design of the road.

Education is also an important component of reducing excessive speeds. Helping drivers understand the consequences of speeding from a young age is critical in creating a safe driving population. Enforcement can be used to help educate drivers on speed expectations as well by creating a disincentive for speeding that is stronger than the incentive to arrive as the destination more quickly.

Policies that emphasize the shared use of roadways by accommodating non-motorized travel (pedestrians, bicyclists, and others), delivery vehicles, and emergency service vehicles, along with passenger cars and trucks, can help indicate to drivers that they are only one group of users in a shared space and must be respectful of other users by maintaining a slow speed and being observant of others on the roadway.

Several specific countermeasures aimed at reducing speed or speed variance are listed in the Table 40. The tables include a relative cost for each treatment and an indication of whether one or more crash modification factors are available for the treatment in FHWA's CMF Clearinghouse. These countermeasures are described in more detail following the table.

Table 40. Speed Related Crash Countermeasures

SPEEDING				
EDUCATION	**ENGINEERING**	**ENFORCEMENT**	**EMERGENCY SERVICES**	**EXECUTIVE (POLICY)**
Safe driving awareness through public service announcements * $	Traffic calming through lane narrowing $$	Targeted speed enforcement $	Work with emergency services to identify potential "bottlenecks" in the transportation system $$ +	Follow existing complete streets policy $
Simulators in a safe environment $	Supplemental pavement markings $$	Training on speed enforcement for LEOs $		Vision Zero * $$
	Speed limit and speed advisory signs $	Speed-activated variable message signs $$		
	Signal timing adjustments for slower progression $$	Decoy law enforcement vehicles $		
	Road Safety Audit program* $$			
	Roadway configuration review* $ +			

*Over-arching strategies for all focus areas
Relative Cost to Implement and Operate: $ Low, $$ Moderate, $$$ Moderate to High, $$$$ High
+ CMFs available for this countermeasure

4.2.4.1 EDUCATION

Education is a critical component to reducing speed-related crashes. Many drivers believe they are driving at a safe speed as long as they are traveling within 10 mph of the posted speed limit. Many drivers also believe that the only consequence of speeding is a ticket, in the unlikely situation that they are caught speeding. In order to curb this belief, drivers need to learn the risks of speeding, including creating a shorter distance for perceiving and reacting to a need to stop or change course, increase distance required to brake, increased crash severity, increased likelihood of fatality for pedestrians and cyclists that may be struck in a collision, and increased difficulty maintaining control of the vehicle, especially in adverse weather conditions. Such education can be conducted through the following types of over-arching traffic safety strategies, which can address other traffic safety concerns in addition to speeding:

- Public service announcements on radio, streaming data services, and social media
- Targeted to specific audiences (such as young drivers)
- Targeted during specific times (such as during winter weather events)
- Traffic simulators to demonstrate shorter time available for perception and reaction and longer required braking distance
- Used in driver training schools
- Used at community events

4.2.4.2 ENGINEERING

There are a number of engineering countermeasures that have been used to help reduce driving speeds on a given segment of roadway or at specific intersections. These countermeasures generally use roadway and roadside design to change the driver's perception of what an appropriate driving speed should be and bring attention to the fact that drivers need to be especially aware of other roadway users. Making the desired travel speed obvious to drivers through roadway and roadside design can reduce the variance in speed among drivers, reducing the likelihood of collisions. The 2019 Topeka and Shawnee County Complete Streets Design Guidelines describes the function and user groups associated with a variety of facility types. This document provides guidance on which facility types should encourage slower traffic speeds, and which facility types should be design specifically with pedestrians and cyclists in mind. Many speed-reduction countermeasures support the design guidelines provided in this document. Topeka also has a traffic calming policy which allows for neighborhoods to request a speed study and traffic calming treatments for their local streets under certain conditions.

Engineering speed-reduction treatments include:

- Traffic calming by providing narrower lanes. A number of specific treatments are considered to provide traffic calming benefits by narrowing motor-vehicle lanes, including:
  - Bulb-outs
  - Neckdowns
  - On-street parking
  - Bike lanes
  - Narrower lanes with edgeline striping
- Supplemental pavement markings (urban / rural)
  - In-lane messages (SLOW XX MPH, SCHOOL ZONE, etc)
  - Transverse bars (often used on intersection approaches)
- Transverse rumble strips (rural only)
  - Often used in on intersection approaches
  - Decreasing space between sets of rumble strips can create the perception of increasing speed, encouraging drivers to reduce speed
- Signal timing for slower progression through signalized corridors
- Additional speed signing
  - More frequent posted speed limit signs
  - Curve/turn warning signs with advisory speeds

  - School zone speed signs
  - Speed activated LED advisory speed signs
  - Speed activated portable variable messages signs (for example, "SLOW DOWN" message appears when speeding is detected)
- Roadway safety audit. These are not specific to speed-related crashes, but should always include an evaluation of any evidence of speed-related crashes (tire skid marks, for example) as well as for design elements that may be sending the wrong message about the appropriate driving speed.
- Roadway configuration review. A thorough review of the roadway design elements can indicate whether the roadway features generally align with the roadway design speed, or if the design elements send mixed signals to the driver about the speed they should be traveling. When most elements are designed for a higher design speed, but one design element requires a lower speed, drivers may have difficulty assessing an appropriate speed.

Roadway designers and traffic engineers should be cautioned that driving speeds, roadway and roadside design elements, and crashes are all correlated. Some roadway features that work to lower speeds may also be associated with higher crash rates. Roads with a high number of access points, for example, tend to have lower average speeds as drivers slow to make turns or to wait for cars in front of them to make turns. However, a high number of access points results in high number of conflict points where collisions can occur. Some research has indicated that roads with lower average speeds actually experience higher crash rates for this reason. This research does not indicate that roadway agencies should encourage higher speeds to reduce crashes, of course, but rather to be mindful that the design of the road should match the posted speed limit and that lower speeds should be expected and encouraged in areas with features correlated with higher crash rates.

4.2.4.3 ENFORCEMENT

Because speed-related crashes tend to be distributed around the entire roadway network and are related to driver behavior, targeted enforcement is an important tool in encouraging drivers to travel at appropriate speeds. Some enforcement-based countermeasures for speed-related crashes include:

- Target speed enforcement on specific segments and intersections, especially those with a high number of crashes of any crash type and those where pedestrians and cyclists are frequently present.
- Increase certification/training for officers to use radar so that they can write speeding tickets and defend them in court.
- Define areas for increased speed awareness, such as near schools, locations with limited sight distance, and where pedestrians and cyclists are common.
- Park unmanned law enforcement vehicles in areas where speed reduction is desired to give the illusion that officers are monitoring speeds in that area.
- Use portable message signs to alert drivers when they are speeding. Some stakeholders have indicated that signs that report the detected speed to drivers may encourage even more speeding (to see how high they can go), so speed-activated messages such as "SLOW DOWN" or "SPEED LIMIT ENFORCED" may be more beneficial.
- Perform strategic enforcement on roadway segments with safety issues by working with City of Topeka Police Department and Shawnee County Sherriff Department to identify and target roadway segments in their area with a risk of serious "speed related" crashes and identify resources to provide targeted enforcement.

  - Action Plan - Promote Automated Enforcement of Speed Zones. Consider avoiding the pitfalls of targeting the driver's license associated with the license plate and focus instead on the license plate itself – like parking tickets and toll collection.

4.2.4.4 EMERGENCY SERVICES (EMS)

The emergency services countermeasure for speeding is the same as it is for other crash types:

- Work with emergency services to identify potential "bottlenecks" in the transportation system and develop countermeasures to alleviate those "bottlenecks" towards the goal of improved response time.

4.2.4.5 EXECUTIVE POLICY

The countermeasures for speed-related crashes that fall into the executive (policy) category are detailed below.

- Reference and implement the guidance provided in the 2019 Topeka and Shawnee County Complete Streets Design Guidance document.

- The City of Topeka and Shawnee County elected officials can initiate an automated speed enforcement "pilot" project before adopting an enforceable automated speed enforcement program.

- The City of Topeka and Shawnee County elected officials can adopt an ordinance to become a "Vision Zero" community (must meet the following criteria):
  - A clear goal of eliminating traffic fatalities and severe injuries has been set.
  - The Mayor has publicly, officially committed to Vision Zero.
  - A Vision Zero plan or strategy is in place, or the Mayor has committed to doing so in clear time frame.
  - Key city departments (including police, transportation and public health) are engaged.

4.3. DISTRACTED DRIVING

4.3.1. CRASH ANAYLSIS

Distracted driving is anything that takes the driver's attention away from the task of safe driving. Some examples of distracted driving include talking or texting on a cell phone, adjusting a radio, using a navigation or entertainment system, eating and drinking, and talking with another passenger in the vehicle. According to the National Highway Traffic Safety Administration, 3,166 people were killed by distracted driving in 2017. (Administration, 2018) The National Highway Safety Council states that "Every day, at least nine Americans die and 100 are injured in distracted driving crashes." (Council, 2019)

Sometimes distraction is marked on the crash report as a contributing circumstance for the crash. However, it is often difficult for a reporting officer to know if the driver was distracted leading up to the crash. Distraction can play a part in contributing circumstances such as failure to yield the right of way, inattention (general sense), disregarded traffic signs, signals, or markings, reckless/careless driving, other distraction in or on vehicle, and unknown circumstances. As shown in Figure 65, distracted driving could have been a factor in 4 of the top 6 contributing circumstances for total crashes.

At a glance

Contributing Circumstances

Note: 90 different contributing circumstances were noted in the reports for Total Crashes with a % above 0.00%.

TOTAL CRASHES

	Category	Contributing Circumstance	%
1	Driver	Inattention (general sense)	20.3
2	Driver	Failed to yield the right of way	19.0
3	Driver	Followed too closely	11.6
4	Driver	Too fast for conditions	5.7
5	Driver	Unknown	5.3
6	Driver	Disregarded traffic signs, signals, or markings	5.1
7	Driver	No contributing circumstance	4.5
8	Driver	Improper lane change	3.9
9	Driver	Under the influence of Alcohol	3.8
10	Driver	Improper backing	3.7
11	Environment	Animal: domestic or wild	3.6
12	Driver	Made improper turn	3.5
13	Driver	Red light running (disregarded traffic signal)	2.7
14	Driver	Reckless / Careless driving	2.1
15	Driver	Avoidance or Evasive action	2.0
16	Driver	Other distraction in or on vehicle	2.0
17	Roadway	Icy or slushy	1.4
18	Driver	Over correction / Over steering	1.2
19	Environment	Rain, mist, or drizzle	1.1
20	Driver	Exceeded posted speed limit	1.0

Figure 65. Contributing Circumstances

As shown on Figure 66, of the crash data analyzed for this study, distracted driving made up approximately 24 percent of total crashes, 24 percent of fatal and injury crashes, and approximatley 10 percent of fatal crashes.

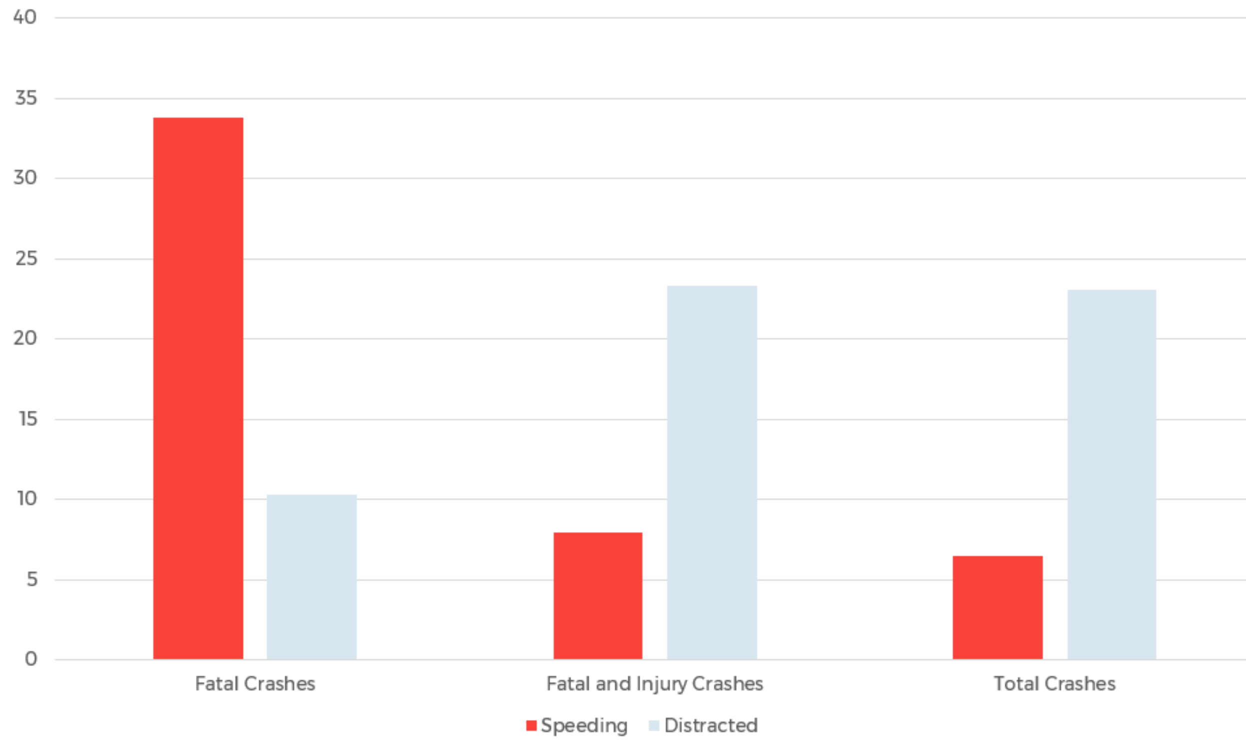


Figure 66. Percent of Crashes that Involve Speeding and Distraction

4.3.2. HIGH PRIORITY LOCATIONS

Potential distractions for drivers are present all throughout Topeka and Shawnee County. General locations which may have more potential distractions, and may benefit from enforcement of distractive driving include:

- Active work zones
- School areas
- Corridors with high pedestrian and bicycle activity

4.3.3. PERFORMANCE MEASURES

The performance indicator is to reduce the trend of fatal and injury crashes involving distracted drivers by 10% for a 5-year average by 2024.

4.3.4. COUNTERMEASURES

Table 41 below summarizes the countermeasures identified to address distracted driving crashes. As would be expected, most of the countermeasures for distracted driving fall into the education and executive categories since they relate to changing driving behavior. Detailed information about each countermeasure can be found following the table.

Table 41. Distracted Driving Crash Countermeasures

DISTRACTED DRIVING				
EDUCATION	ENGINEERING	ENFORCEMENT	EMERGENCY SERVICES	EXECUTIVE (POLICY)
Safe driving awareness through public service announcements * $	Road Safety Audit program* $$	"Dummy Cars" * $	Work with emergency services to identify potential "bottlenecks" in the transportation system $$ +	Vision Zero * $$
S.A.F.E. (Seatbelts Are For Everyone) Program * $	Roadway configuration review* $ +			Distracted driving ordinance $
Dynamic Message Signage ("Put Phone Down" Message) $$	Rumble strips $$ +			Kansas Negligent Driving bill $
Friendly school competition programs $	Rural intersection conflict warning system $$ +			
Simulators in a safe environment $				

*Over-arching strategies for all focus areas
Relative Cost to Implement and Operate: $ Low, $$ Moderate, $$$ Moderate to High, $$$$ High
+ CMFs available for this countermeasure

4.3.4.1 EDUCATION

The countermeasures for distracted driving that fall into the education category are detailed below.

- Safe driving awareness through public service announcements (PSA's)
    - Coordinate with the Kansas Traffic Safety Resource Office (KTSRO) on target PSA's in the Topeka / Shawnee County Area. The PSA's can include topics such as the consequences of distracted driving, driving skills, drowsing driving, speed and aggression, and impaired driving.
    - Advertisements on Channel 4 (Public Access TV) using AAA crash statistics for the state of Kansas as well as national statistics.
    - Social Media: post PSA's on an additional medium to reach more of the target audience.
        - Younger Drivers – Twitter, Instagram, YouTube
        - 30+ Drivers – Facebook, Twitter

- Education on new intersection types and traffic control devices – when new and innovative types of geometrics or traffic control improvements are introduced, education of their benefits and how to use them are important to help the public understand why they are beneficial. Educational announcements can be added in the above-mentioned PSA mediums for things such as roundabouts, restricted access types of improvements (see Intersections), rectangular-rapid flashing beacons (RRFB's), flashing yellow arrows for left-turns, and pedestrian hybrid beacons (HAWK's).

    - Education on the dangers of distracted driving – Paul Atchley is a professor at the University of South Florida in the Department of Psychology (previously a Psychology Professor at the University of Kansas) and gives engaging and passionate presentations on the dangers of distracted driving and what distractions do to our brains while we are driving.
    http://psychology.usf.edu/faculty/patchley

    - S.A.F.E. (Seatbelts Are For Everyone) program
        - A peer-to-peer program that is run by teenagers that focuses on restraint compliance through education, positive rewards and enforcement with the goal of increasing seat belt usage among students while providing strong traffic safety messages. In 2018 Shawnee County participating schools included Silver Lake, Rossville, Seaman, Washburn Rural and Shawnee Heights. https://www.ktsro.org/safe

    - Dynamic Message Sign (DMS) with "Put phone down" message
        - Can utilize a combination of portable DMS that can be moved around the city and county, and permanent DMS on I-70 / I-470 / US-75. Will need to coordinate with

KDOT ITS Unit for safety messages in the Topeka / Shawnee County metropolitan area.

- Friendly school competition programs
  - Competitions can be conducted in slow speed areas, or parking areas. Competitions can include "Get caught – pay a dollar" or "Give a dollar" if the driver is not on the phone. Funds raised for "pay a dollar" type competitions could be used to fund safety awareness programs.

- Simulators in a safe environment

- Multiple types of simulators are available that can help teach safety principals. Many are mobile and can be brought on-site to a school.
  - Don't Text and Drive Mobile Simulator Unit: A small bus simulator out of Cherokee County in southeast Kansas. It has video game-like simulators and has the kids test being distracted by music and their phones. The bus remains stationary. It is best for high school and college age kids. The location requires a power supply to operate and the simulator has been set up in hotel parking lots and campuses. https://www.facebook.com/CKSOtheSEAT

  - Kohl's Safe Teen VT Touch Simulator: A desktop simulator with pedals and a steering wheel to simulate driving while distracted. https://www.viachristi.org/patients-and-visitors/kohls-safe-teens

  - Ford County Sheriff's Office F.A.C.T. Program (Fatal Vision, Child Passenger Safety, Texting While Driving) A mobile trailer is equipped to instruct the community about the dangers of driving while under the influence of drugs and alcohol, learning the precautions needed to care for child passengers in regards to their seat belts and car seats, and the dangers of texting while driving. https://www.facebook.com/FACTProgram/?hc_ref=SEARCH&fref=nf

4.3.4.2 ENGINEERING

The countermeasures for distracted driving that fall into the engineering category are detailed below.

- Road Safety Audit Program
  - A road safety audit is the examination of an existing or future road or intersection by an independent, multidisciplinary team that identifies opportunities for safety improvements for all road users. Audits can be targeted to areas with known safety issues.

- Roadway configuration review when improvements or new design are needed
  - Different geometric configurations should be considered in any improvement or new design project. Options to consider include:
    - Road Diets:

      (1) reducing from four-lanes to three-lanes (with two-way left-turn lane and bike lanes, or on-street parking) (CMF = 0.53 in suburban area)

      (2) reducing from five-lanes to four-lanes with raised median channelization and left-turn or right-turn lanes at intersections. (CMF's available dependent on the specific improvement)
    - Roadway Expansion:

      (3) Four-lane to five-lane roadways with parallel bike and pedestrian infrastructure (CMF's available dependent on the specific improvement)
    - Incorporate Intersection Control Evaluation (ICE) into intersection design projects to objectively screen alternatives and identify an optimal geometric and traffic control solutions for an intersection.
- Rumble strips (CMF = 0.785 in rural areas)
  - Transverse rumble strips can be placed in advance of stop-controlled intersections in targeted areas where noncompliance is an issue.
- Rural intersection conflict warning systems (CMF = 0.519 in rural areas)
  - Systems the use vehicle detectors to alert motorists of conflicting vehicles on an adjacent approach with signs and flashers.

4.3.4.3 ENFORCEMENT

The countermeasures for distracted driving that fall into the enforcement category are detailed below.

- Deploy "dummy patrol cars" in areas where enforcement is needed. A patrol car is parked in a safe location with a mannequin behind the wheel to imitate an officer monitoring the traffic.

4.3.4.4 EMERGENCY SERVICES (EMS)

The countermeasures for distracted driving that fall into the emergency services category are detailed below:

- Work with emergency services to identify potential "bottlenecks" in the transportation system and develop countermeasures to alleviate those "bottlenecks" towards the goal of improved response time.

4.3.4.5 EXECUTIVE POLICY

The countermeasures for distracted driving that fall into the executive (policy) category are detailed below.

- Vision Zero
  - The City of Topeka and Shawnee County elected officials can adopt an ordinance to become a "Vision Zero" community (must meet the following criteria):
    - A clear goal of eliminating traffic fatalities and severe injuries has been set.
    - The Mayor has publicly, officially committed to Vision Zero.
    - A Vision Zero plan or strategy is in place, or the Mayor has committed to doing so in clear time frame.
    - Key city departments (including police, transportation and public health) are engaged.
- "Distracted Driving" Ordinance
  - Some states have distracted driving laws including prohibiting all drivers from using hand-held cell phones while driving, prohibiting all cell phone use for novice drivers or school bus drivers, or banning text messaging. Examples can be found at: https://www.ghsa.org/state-laws/issues/Distracted-Driving
- Kansas Negligent Driving Bill (Senate Bill 441)
  - The Committee on Ways and Means sponsored the bill and was introduced to the Senate on March 7, 2018. It was referred to the Committee on Transportation on March 8, 2018 and died in committee on May 4, 2018.

4.4. PEDESTRIANS AND BICYCLISTS

4.4.1. CRASH ANAYLSIS

Pedestrians and bicyclists are more at risk for injury when involved in crashes with motor vehicles because they have no protection to absorb the energy of the crash. For this reason, they are often referred to as vulnerable road users. In urban and suburban settings, where walking and biking are more popular modes of travel, pedestrian and bicycle crashes can be of particular concern. Nationally, pedestrians accounted for approximately 15 percent of total roadway fatalities in 2015. During the same year, bikes accounted for approximately 2 percent of total roadway fatalities. These numbers have been steadily rising since at least 2006, so many transportation agencies are looking for ways to address these crash types.

At this time, neither the City of Topeka nor Shawnee County have accurate pedestrian volume data within the MTPO area. Pedestrian count data may be collected in a similar fashion along key trails and sidewalk corridors. However, in the downtown core of Topeka, it may be more useful to obtain pedestrian data via providers who access to smart-phone location data as a "passive" way to see where pedestrians are traveling in the MTPO region[2]. The MTPO is currently collecting bicycle counts once a year at specific locations within the city limits of Topeka. Obtaining data from the Topeka Bikeshare Project may also be useful to obtain volume and location of shared-use bicycles. The MTPO is in process of updating the Topeka Bikeways Master Plan and will continue to collect bicycle volumes as they implement bicycle infrastructure.

Table 42 shows the number of pedestrian and bicycle crashes in Shawnee County by severity level during 2010 to 2016, as well as the percent of the total number of crashes for each severity level. While pedestrian and bicycle crashes make up only two percent of total crashes, they account for 17.6 percent of fatal crashes in the county. This is in line with what is being seen nationally. Table 43 shows these same figures, but considers only the crashes that were labeled as intersection or intersection-related crashes. It shows that pedestrian and bicycle crashes are less frequent at intersections than at non-intersection locations. For pedestrians, this often means that crashes are occurring at mid-block crossings (marked or unmarked). For bikes, crashes tend to be more common as bicyclists are riding along the roadway.

Table 42. Pedestrian and bicycle crashes by severity level

Crash Type	Fatal	% of fatal crashes	Injury	% of injury crashes	Total	% of total crashes
Collision with Pedestrian	9	13.2	259	4.7	273	1.2
Collision with Pedalcycle	3	4.4	202	3.6	214	0.9

Table 43. Intersection-related pedestrian and bicycle crashes by severity level

Crash type	Fatal	% of fatal crashes	Injury	% of injury crashes	Total	% of total crashes
Collision with Pedestrian	2	8.7	111	3.6	115	1.1
Collision with Pedalcycle	0	0.0	127	4.1	133	1.2

4.4.2. HIGH PRIORITY LOCATIONS

4.4.2.1 PEDESTRIANS

The intersections with the most pedestrian crashes in the City of Topeka are shown in Table 44. No "intersection related" pedestrian crashes occurred outside of the city limits of Topeka in rural areas. Figure 67 show the geographical location of these intersections. The fatality and serious injury crashes are shown on this map as they are identical to the total crash map since almost all of these crashes result in an injury or fatality.

[2] Emerging Data Mining for Pedestrians and Bicyclist Monitoring: A Literature Review Report, Kyuhyun Lee, Texas A&M Transportation Institute, Ipek N. Sener, Ph.D., Texas A&M Transportation Institute, September 2017 https://www.vtti.vt.edu/utc/safe-d/wp-content/uploads/2018/04/UTC-Safe-D_Emerging-Data-Mining-for-PedBike_TTI-Report_26Sep17_final.pdf

Table 44. Intersections with the highest frequency of pedestrian crashes in the City of Topeka, 2010-2016

Rank	Top F&I Intersection	F&I Crashes
1	SW Topeka Blvd, SW 5th St	4
2	SW 12th St, SW Jackson St	3
3	SW Orchard St, SW 6th Ave	3
4	SW 10th Ave, SW Topeka Blvd	2
5	SE 15th St, SE Adams St	2
6	SW Washburn Ave, SW 12th St	2
7	SW Wanamaker Rd, SW 21st St	2
8	SE California Ave, SE 25th St	2
9	NW Topeka Blvd, NW Paramore St	2
10	SW Gage Blvd, SW Lydia Ave	2
11	SE Monroe St, SE 6th Ave	2
12	SE Quincy St, SE 8th Ave	2
13	SW 5th St, SE 5th St, S Kansas Ave	2
14	SW Lincoln St, SW 10th Ave	2
15	SW 17th St, SW Wanamaker Rd	2

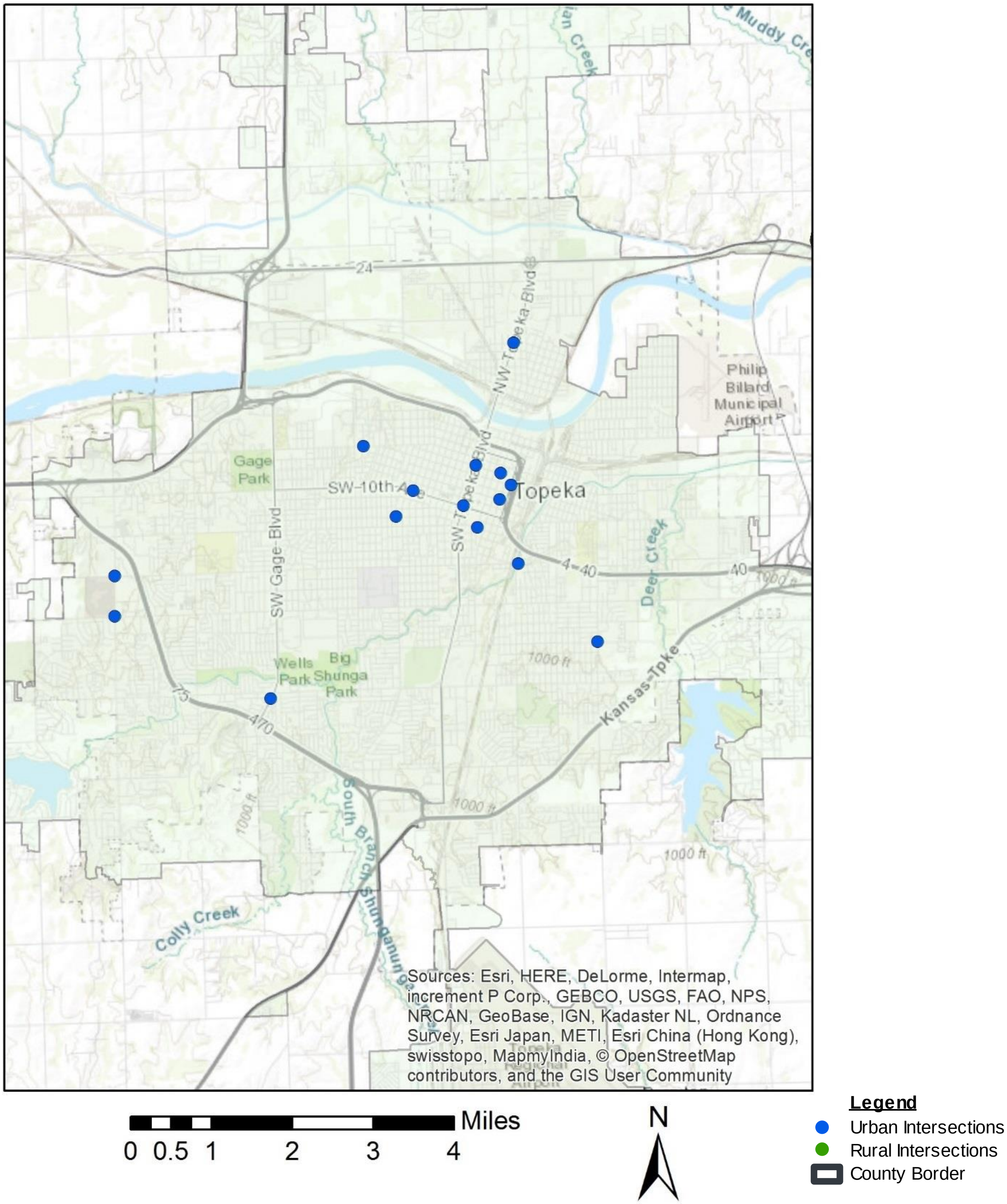


Figure 67. Top 15 intersections with vehicle to pedestrian (fatal/serious injury) crashes in Shawnee County, 2010-2016

The segments with the most crashes per mile are organized in Table 45 for segments within Topeka, and Table 46 for crashes outside the City. Figure 68 shows the mapped location of the segments with the highest frequency of pedestrian crashes.

Table 45. Roadway segments with the highest frequency of pedestrian crashes in the City of Topeka, 2010-2016

Rank	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SW 3rd St. 2-Lane Divided	E of SW Tyler St.	SW Harrison St.	0.0886	1	1.61
2	NW Rochester Rd 4-Lane Divided	US-24 Highway	Dillons / Walmart Access	0.1493	1	0.96
3	S Kansas Ave 5-Lane	SE 13th St.	SE 10th Ave.	0.3044	2	0.94
4	SW Huntoon Street 3-Lane (2 EB, 1 WB)	SW Seabrook Ave.	SW Gage Blvd.	0.1548	1	0.92
5	SW 10th Avenue 5-Lane	SW Polk St.	SW Topeka Blvd.	0.1620	1	0.88
6	SW 6th Avenue 4-Lane Undivided	SW MacVicar Ave.	SW Lindenwood Ave.	0.3311	2	0.86
7	21St Street 4- Lane	W of SW Lincoln St.	E of SW Fillmore St.	0.3387	2	0.84
8	SE Rice Road 2-Lane Undivided	SE 10th St.	Fire Station #2 Entrance	0.4535	2	0.63
9	NW Morse Street 4-Lane Undivided	NW Topeka Blvd.	NW Central Ave.	0.2523	1	0.57
10	SE Croco Road 3-Lane (2 NB, 1 SB)	SE Cypress Dr.	South of SE Sycamore Dr.	0.2528	1	0.57
11	SE 6th Avenue 2-Lane Undivided	SE Chandler St.	SE Swygart St.	0.6063	2	0.47
12	SW 7th Street 2-Lane Undivided	SW Topeka Blvd.	S Kansas Ave.	0.3248	1	0.44
13	SE California Avenue 4-Lane Undivided	S of SE 24th St.	S of SE 21st St.	0.3329	1	0.43
14	SW 8th Avenue 2-Lane Undivided	SW Summit Ave.	SW Horne St.	0.3572	1	0.40
15	SW 12th Street 4-Lane Divided	SW Harrison St.	E of SW Quincy St.	0.3624	1	0.39

Table 46. Roadway segments with the highest frequency of pedestrian crash types outside the city limits of Topeka, 2010-2016

Rank	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SE Gary Ornsby Drive 3-Lane (2 EB, 1 WB)	SE Bob Hertzen Way (Heartland Park)	East of Adams St. (Heartland Park)	0.6557	1	0.22
2	NW Button Road 2-Lane Undivided	NW 46th St.	NW 62nd St.	2.0037	1	0.07
3	SW Auburn Road 2-Lane Undivided	SW 109th St.	K-4 Highway	10.6039	2	0.03
4	NW Topeka Blvd 2-Lane Undivided	NE 46th St	NE 94th Rd.	5.9973	1	0.02

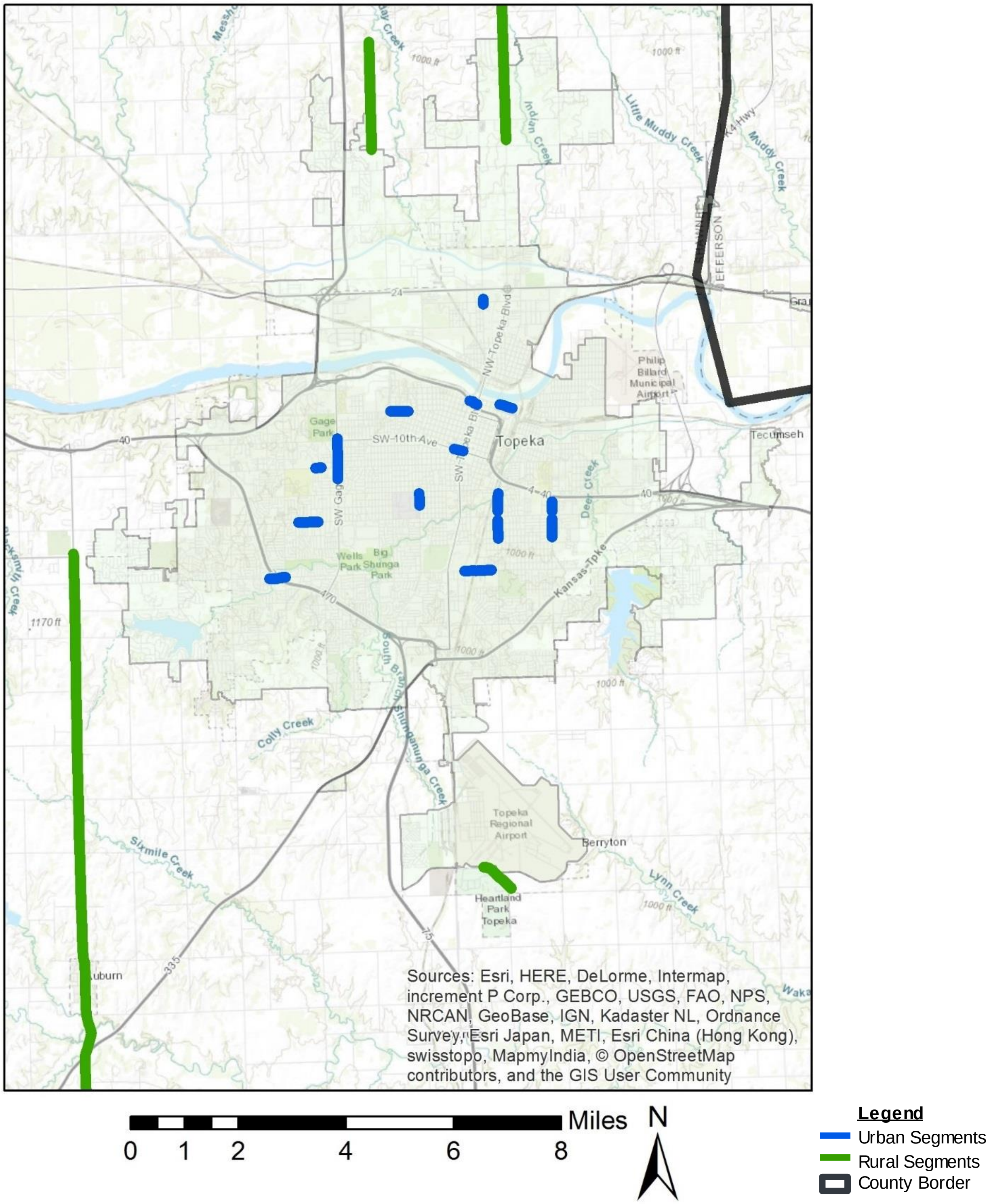


Figure 68. Top 15 segments with vehicle to pedestrian (fatal/serious injury) crashes in Shawnee County, 2010-2016

4.4.2.2 BICYCLES

Over 95 percent of all bicycle crashes with vehicles result in an injury or fatality, and three cyclists have died during the seven-year study period. The total and F&SI annual crashes are shown in Figure 69 and Figure 70, respectively. For both total as well as fatal and serious injury crashes, there is an upward trend in crash frequency, even though in 2014 there was a substantial decrease (zero fatal & serious injury crashes). This upward trend is likely due to an increase in cyclist activity in the City of Topeka.

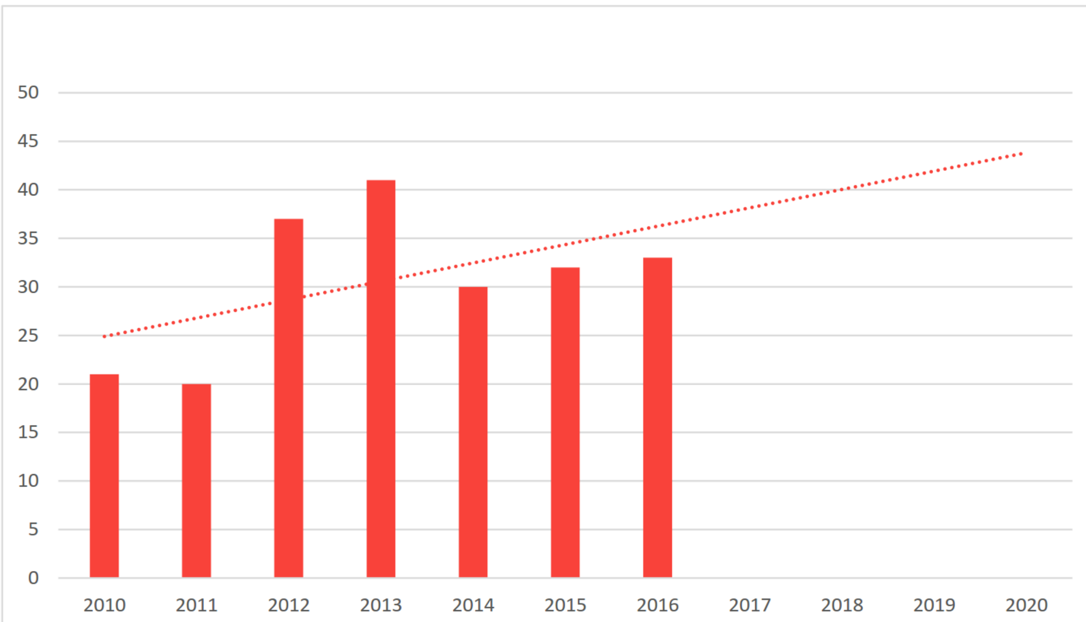


Figure 69. Total vehicle to bicycle crashes in Shawnee County, 2010-2016

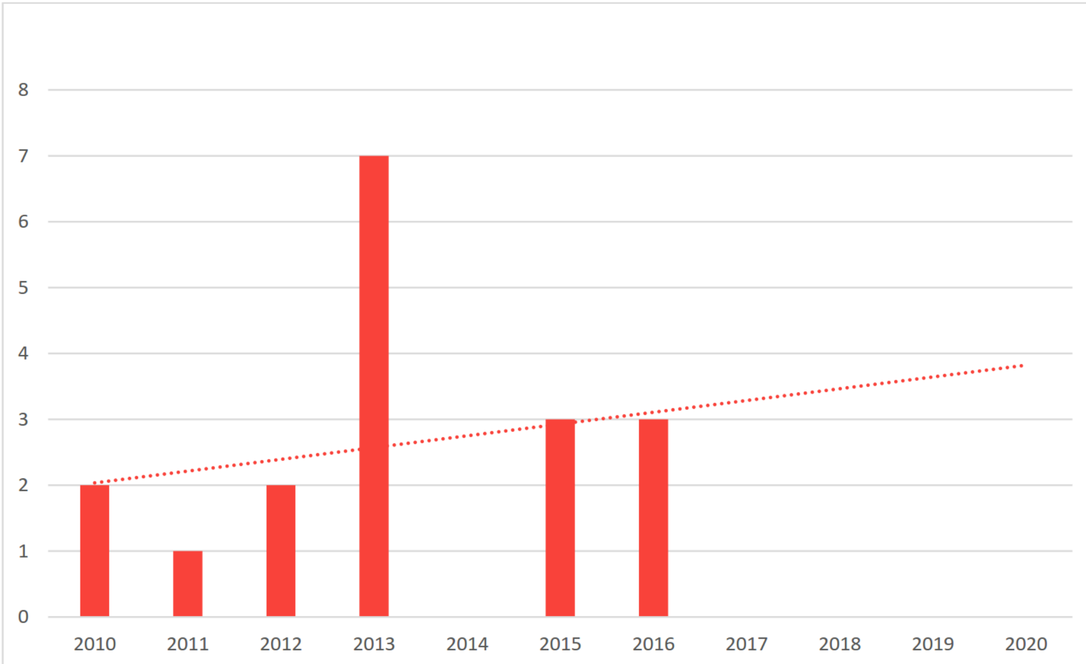


Figure 70. Fatal and serious injury bicycle crashes in Shawnee County. 2010-2016

The only intersection related bicycle crash occurred at the intersection of SW Burlingame Road & SW 57th Street, which is located outside of the city limits of Topeka. Roadway segments with the highest density of bicycle related crashes are shown in Table 47 for crashes within Topeka's city limits, and in Table 48 outside of those limits. These top segments are mapped in Figure 71. The fatality and serious injury crashes are shown on this map as they are identical to the total crash map since almost all of these crashes result in an injury or fatality. Most of the bicycle crashes within the City are along urban arterial roadways.

Table 47. Roadway segments with the highest frequency of bicycle crashes in the City of Topeka, 2010-2016

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	NW Tyler Street 2-Lane Divided	NW Lyman Rd.	200 ft N of NW Lyman Rd.	0.0931	1	1.53	NW Tyler Street 2-Lane Divided	NW Lyman Rd.	200 ft N of NW Lyman Rd.	0.0931	1	1.53
2	SW Huntoon Street 3-Lane	SW Burnett Rd.	SW McCallister Ave.	0.1071	1	1.33	SW Huntoon Street 3-Lane	SW Burnett Rd.	SW McCallister Ave.	0.1071	1	1.33
3	W 1st Avenue 4-Lane Divided	E of SW Polk St.	SW Topeka Blvd.	0.1593	1	0.9	W 1st Avenue 4-Lane Divided	E of SW Polk St.	SW Topeka Blvd.	0.1593	1	0.9
4	SW 10th Avenue 5-Lane	SW Polk St.	SW Topeka Blvd.	0.162	1	0.88	SW 10th Avenue 5-Lane	SW Polk St.	SW Topeka Blvd.	0.162	1	0.88
5	SE California Avenue 4-Lane Undivided	S of SE 24th St.	N of SE 22nd St.	0.3329	2	0.86	SE California Avenue 4-Lane Undivided	S of SE 24th St.	N of SE 22nd St.	0.3329	2	0.86
6	SE California Avenue 5-Lane	SE 21st St.	S of SE 13th St.	0.1766	1	0.81	SE California Avenue 5-Lane	SE 21st St.	S of SE 13th St.	0.1766	1	0.81
7	SE Quincy 4-Lane Divided	SE 10th Ave.	SW 8th Ave.	0.2104	1	0.68	SW Washburn Avenue 5-Lane	S of SW 19th St.	S of SW 17th St.	0.2193	1	0.65
8	SW Washburn Avenue 5-Lane	S of SW 19th St.	S of SW 17th St.	0.2193	1	0.65	NE Crane Street 3-Lane	NE Quincy St.	NE River Rd.	0.2484	1	0.58
9	NE Crane Street 3-Lane	NE Quincy St.	NE River Rd.	0.2484	1	0.58	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	2	0.57
10	SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	2	0.57	SW 29th Street 4-lane w/turn lanes	W of SW McClure Rd.	SW Fairlawn Rd.	0.3047	1	0.47
11	SW 29th Street 4-lane w/turn lanes	W of SW McClure Rd.	SW Fairlawn Rd.	0.3047	1	0.47	SE Adams Street 4-Lane Undivided	S of SE Jefferson St.	S of SE 17th St.	0.3218	1	0.44

Rank	Top Total Segments	From	To	Segment length (mi)	Total Crashes	Crashes per year per mile	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
12	SE Adams Street 4-Lane Undivided	S of SE Jefferson St.	S of SE 17th St.	0.3218	1	0.44	SW 6th Avenue 4-Lane Undivided	SW MacVicar Ave.	SW Linden-wood Ave.	0.3311	1	0.43
13	SW 6th Avenue 4-Lane Undivided	SW MacVicar Ave.	SW Lindenwood Ave.	0.3311	1	0.43	SE Adams Street 4-Lane Undivided	S of SE 24th St.	S of SE Pioneer Way	0.3345	1	0.43
14	SE Adams Street 4-Lane Undivided	S of SE 24th St.	S of SE Pioneer Way	0.3345	1	0.43	21st Street 4-Lane	SW Morning-side Rd.	E of SW James St.	0.3606	1	0.4
15	21st Street 4-Lane	SW Morning-side Rd.	E of SW James St.	0.3606	1	0.4	Gage Blvd. 5-Lane	S of SW 15th St.	N of SW 10th St.	0.7505	2	0.38

Table 48. Roadway segments with the highest frequency of bicycle crash types outside the city limits of Topeka, 2010-2016

Rank	Top F&I Segments	From	To	Segment length (mi)	F&I Crashes	F&I Crashes per year per mile
1	SE45th Street 2- Lane Undivided	E of SE East Edge Rd.	W of SE Pawnee Dr.	0.4588	1	0.31
2	SE Tecumseh Road 2-Lane Undivided	SE 53rd St.	SE 45th St.	1.0021	1	0.14
3	NW Carlson Road 2-Lane Undivided	W 1st St.	NW 42nd Terrace	1.9880	1	0.07
4	SW 53rd Street 2-Lane Undivided	SW Valencia Rd.	SW Burlingame Rd.	8.4841	1	0.02

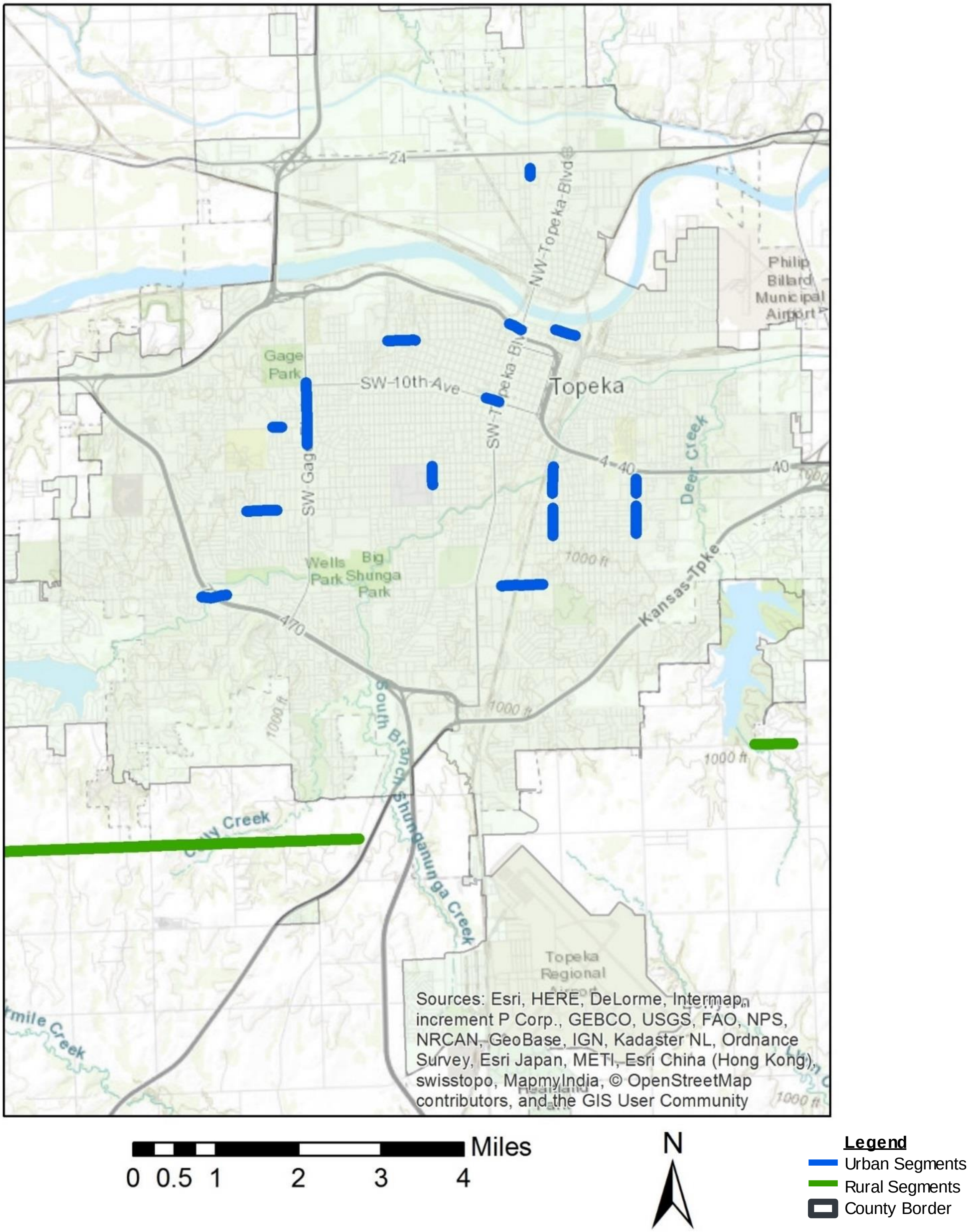


Figure 71. Top 15 segments for vehicle to bicycle (fatal/serious injury) crashes in rural Shawnee County, 2010-2016

4.4.3. PERFORMANCE MEASURES

The performance indicator is to reduce the trend of pedestrian injuries and fatalities, resulting from crashes, by 20% for a 5-year average by 2024.

The performance indicator is to reduce the trend of bicycle related injuries and fatalities, resulting from crashes, by 20% for a 5-year average by 2024.

4.4.4. COUNTERMEASURES

Many different disciplines are concerned with roadway safety including educators, engineers, law enforcement, emergency services personnel, and policy makers. Efforts to improve safety can overlap all these disciplines. Rather than focusing on only one countermeasure category, such as engineering, a safety plan should include a comprehensive approach of all the elements of the safety system in order to have a greater impact in reducing crashes and fatalities.

During stakeholder meetings, personnel from each category were invited to brainstorm potential countermeasures for each emphasis area. Table 49 below summarizes the countermeasures identified for pedestrians and bicyclists. Detailed information about each countermeasure can be found following the table.

Table 49. Pedestrian and Bicyclist Crash Countermeasures

PEDESTRIANS AND BICYCLISTS				
EDUCATION	**ENGINEERING**	**ENFORCEMENT**	**EMERGENCY SERVICES**	**EXECUTIVE (POLICY)**
Safe driving awareness through public service announcements* $	Road Safety Audit program* $$	"Dummy Cars"* $	Work with emergency services to identify potential "bottlenecks" in the transportation system $$ +	Vision Zero* $$
S.A.F.E. (Seatbelts Are For Everyone) Program* $	Roadway configuration review* $ +			Enhance City "Traffic Calming" program from 2005 $
Bike helmet giveaways and educational campaigns $$	Implement lead pedestrian intervals at signalized intersections $ +			Implement a data collection program that includes pedestrian and cyclists in traffic counts $
	Construct dedicated pedestrian and bicycle infrastructure $$$$ +			Update "City Bicycle Master Plan" $$
	Install rectangular rapid flashing beacons (RRFB's) and high visibility crosswalks at unsignalized pedestrian crossings $$$ +			Use benefit-to-cost analyses and road safety audits to prioritize bicycle and pedestrian safety for CIP budgeting $
*Over-arching strategies for all categories Relative Cost to Implement and Operate: $ Low, $$ Moderate, $$$ Moderate to High, $$$$ High + Has a CMF associated with it				

4.4.4.1 EDUCATION

The countermeasures for pedestrian and bicyclists that fall into the education category are detailed below.

- Safe driving awareness through public service announcements (PSA's)
  - Coordinate with the Kansas Traffic Safety Resource Office (KTSRO) on target PSA's in the Topeka / Shawnee County Area. The PSA's can include topics such as the consequences of distracted driving, driving skills, drowsing driving, speed and aggression, and impaired driving.

   - Advertisements on Channel 4 (Public Access TV) using AAA crash statistics for the state of Kansas as well as national statistics.

   - Social Media: post PSA's on an additional medium to reach more of the target audience.
      - Younger Drivers – Twitter, Instagram, YouTube
      - 30+ Drivers – Facebook, Twitter

   - Education on new intersection types and traffic control devices – when new and innovate types of geometrics or traffic control improvements are introduced, education of their benefits and how to use them are important to help the public understand why they are beneficial. Educational announcements can be added in the above-mentioned PSA mediums for things such as roundabouts, restricted access types of improvements (see Intersections), rectangular-rapid flashing beacons (RRFB's), flashing yellow arrows for left-turns, and pedestrian hybrid beacons (HAWK's).

   - Education on the dangers of distracted driving – Paul Atchley is a professor at the University of South Florida in the Department of Psychology (previously a Psychology Professor at the University of Kansas) and gives engaging and passionate presentations on the dangers of distracted driving and what distractions do to our brains while we are driving.
     http://psychology.usf.edu/faculty/patchley

- S.A.F.E. (Seatbelts Are For Everyone) program

  A peer-to-peer program that is run by teenagers that focuses on restraint compliance through education, positive rewards and enforcement with the goal of increasing seat belt usage among students while providing strong traffic safety messages. In 2018 Shawnee County participating schools included Silver Lake, Rossville, Seaman, Washburn Rural and Shawnee Heights. https://www.ktsro.org/safe

- Bike helmet giveaways and educational campaigns to educate the public on how to safely share the road. Examples include:
   - Partner with Safe Kids Kansas. https://www.safekids.org/walkingsafelytips
   - Sponsor a "Helmet Fair" where public safety officials hand out bike helmets for children, inspect bicycles, and provide information on the rules of the road, bicycle safety tips, and bike trail etiquette.
   - Brain Injury Association of Kansas and Greater KC. http://biaks.org/brain-injury-prevention-kansas.htm

4.4.4.2 ENGINEERING

The countermeasures for pedestrian and bicyclists that fall into the engineering category are detailed below.

- Road Safety Audit Program

  - A road safety audit is the examination of an existing or future road or intersection by an independent, multidisciplinary team that identifies opportunities for safety improvements for all road users. Audits can be targeted to areas with known safety issues.
- Roadway configuration review when improvements or new design are needed
  - Different geometric configurations should be considered in any improvement or new design project. Options to consider include:
    - Road Diets:
      (1) reducing from four-lanes to three-lanes (with two-way left-turn lane and bike lanes, or on-street parking) (CMF = 0.53 in suburban area)
      (2) reducing from five-lanes to four-lanes with raised median channelization and left-turn or right-turn lanes at intersections. (CMF's available dependent on the specific improvement)
    - Roadway Expansion:
      (1) Four-lane to five-lane roadways with parallel bike and pedestrian infrastructure (CMF's available dependent on the specific improvement)
    - Incorporate Intersection Control Evaluation (ICE) into intersection design projects to objectively screen alternatives and identify an optimal geometric and control solutions for an intersection.
- Implement lead pedestrian intervals at signalized intersections (CMF = 0.87 in urban and suburban areas) as a system-wide low-cost safety improvement where pedestrian signals are present
  - A lead pedestrian interval gives the pedestrian a "head start" to enter the crosswalk before the corresponding green vehicular signal is activated, enhancing the visibility of pedestrians in the intersection.
- Construct dedicated pedestrian and bicycle infrastructure
  - Construct sidewalks or shared-use paths (CMF = 0.75) for pedestrians in urban areas.
  - Construct protected bike lanes or shared-use paths (CMF = 0.75) on major streets and bike boulevards on local streets for cyclists in urban areas.
    (1) Construct shoulders or shared-use paths for pedestrians and bicyclists in rural areas. (CMF's available dependent on the specific improvement)
- Install rectangular rapid flashing beacons (CMF = 0.526) and high visibility crosswalks (CMF = 0.6) at unsignalized pedestrian crossings.

4.4.4.3 ENFORCEMENT

The countermeasures for pedestrian and bicyclists that fall into the enforcement category are detailed below.

- Deploy "dummy patrol cars" in areas where enforcement is needed. A patrol car is parked in a safe location with a mannequin behind the wheel to imitate an officer monitoring the traffic.

4.4.4.4 EMERGENCY SERVICES (EMS)

The countermeasures for pedestrian and bicyclists that fall into the emergency services category are detailed below:

- Work with emergency services to identify potential "bottlenecks" in the transportation system and develop countermeasures to alleviate those "bottlenecks" towards the goal of improved response time.

4.4.4.5 EXECUTIVE POLICY

The countermeasures for pedestrian and bicyclists that fall into the executive (policy) category are detailed below.

- Vision Zero
  - The City of Topeka and Shawnee County elected officials can adopt an ordinance to become a "Vision Zero" community (must meet the following criteria):
    - A clear goal of eliminating traffic fatalities and severe injuries has been set.
    - The Mayor has publicly, officially committed to Vision Zero.
    - A Vision Zero plan or strategy is in place, or the Mayor has committed to doing so in clear time frame.
    - Key city departments (including police, transportation and public health) are engaged.
- Enhance City "Traffic Calming" program from 2005
  - Install proactively based on data and safety audits and not based solely on citizen applications.
  - Make it part of regular maintenance to reduce the overall cost.
- Implement a data collection program which includes pedestrians and cyclists in traffic counts.
- Update "Topeka Bikeways Master Plan" (anticipated to be updated in 2019)
  - Include more protected bicycle lanes.
- Use benefit-to-cost analyses and road safety audits to prioritize bicycle and pedestrian safety for CIP budgeting.
  - Prioritize low-cost and high-benefit treatments such as high-visibility crosswalks, RRFB's, sidewalks, protected bicycle lanes, and lead pedestrian intervals.

4.5. SUMMARY OF EMPHASIS AREAS AND PERFORMANCE MEASURES

4.5.1. EXISTING CRASH LOCATIONS FOR EMPHASIS AREAS

To provide an overall view of where each of the emphasis areas (Intersections, Speed, Distracted Driving, Pedestrian and Bicyclist) has historically existed, heat maps for each were created based on the crash frequencies provided in the 2010-2016 crash database (Figure 72 - Figure 76).

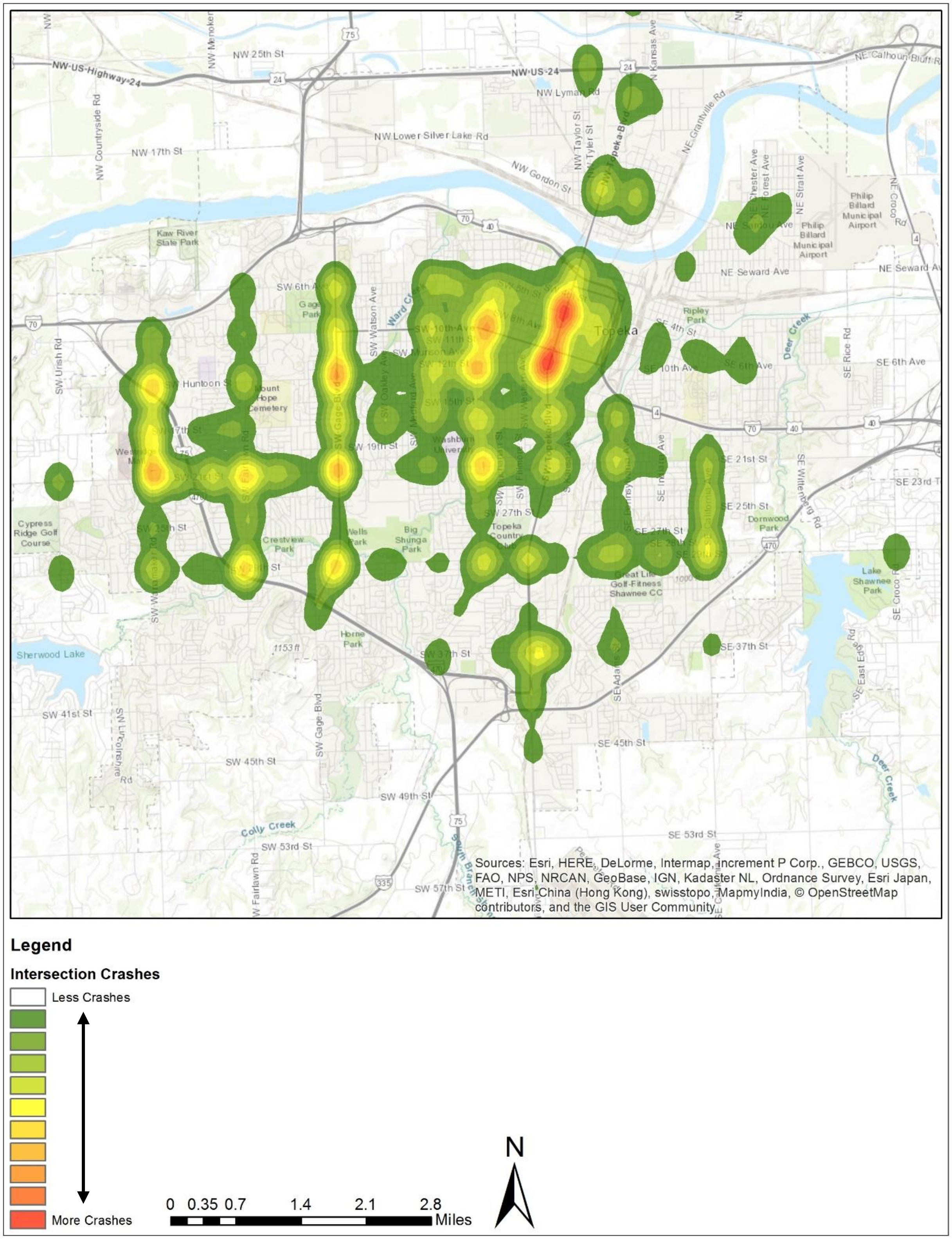


Figure 72. Heat map of intersection-related crashes (2010-2016)

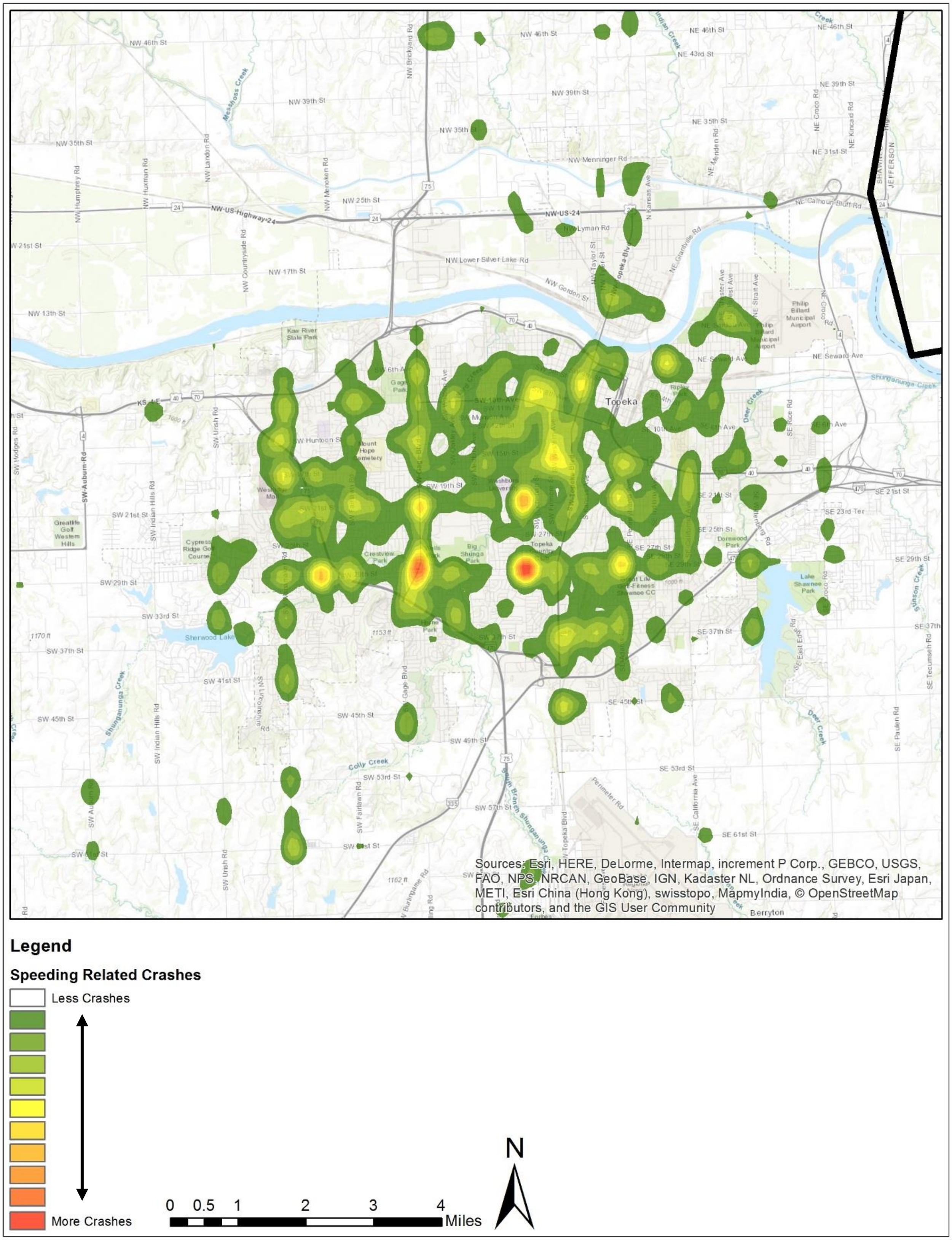


Figure 73. Heat map of speed-related crashes (2010-2016)

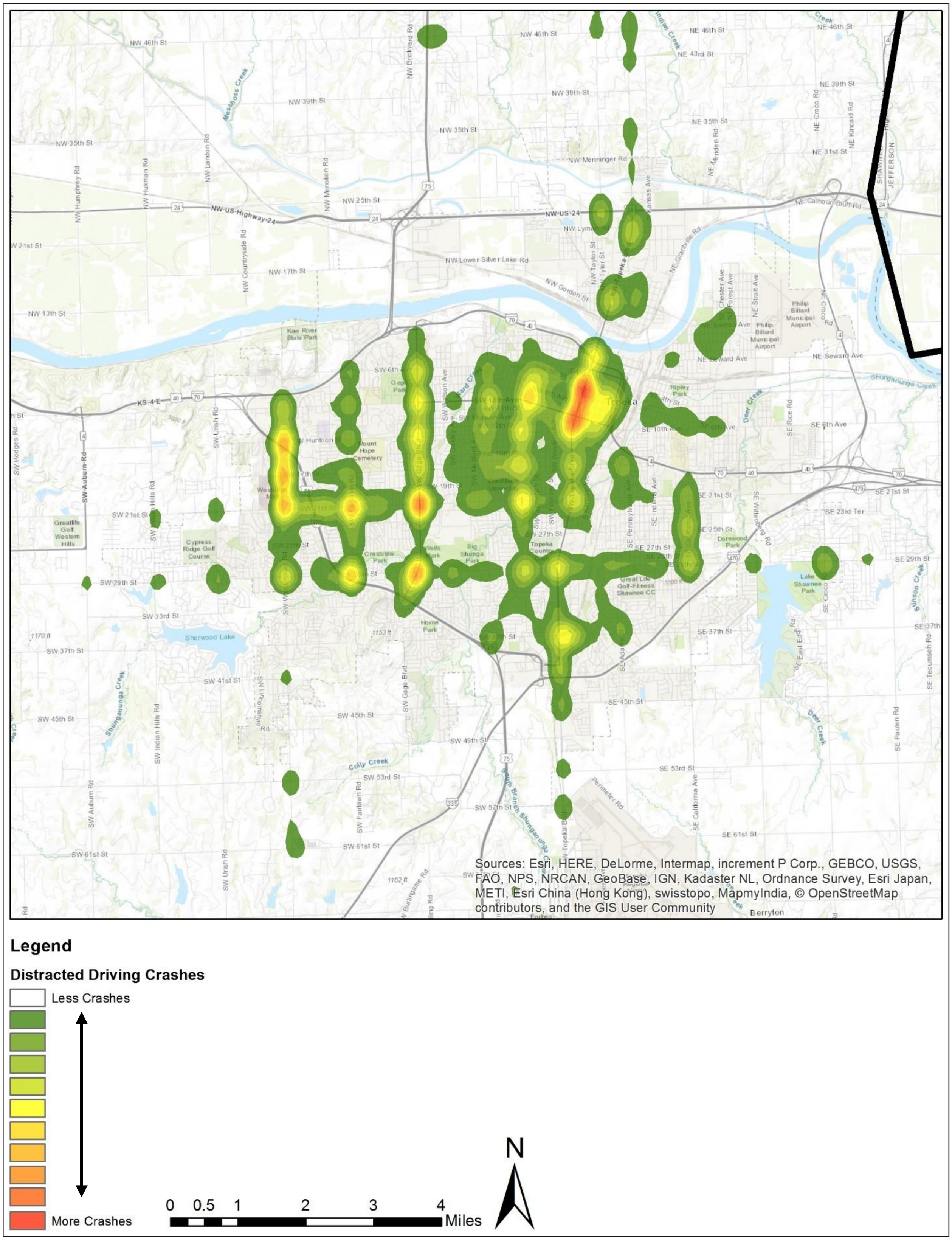


Figure 74. Heat map of distracted driving-related crashes (2010-2016)

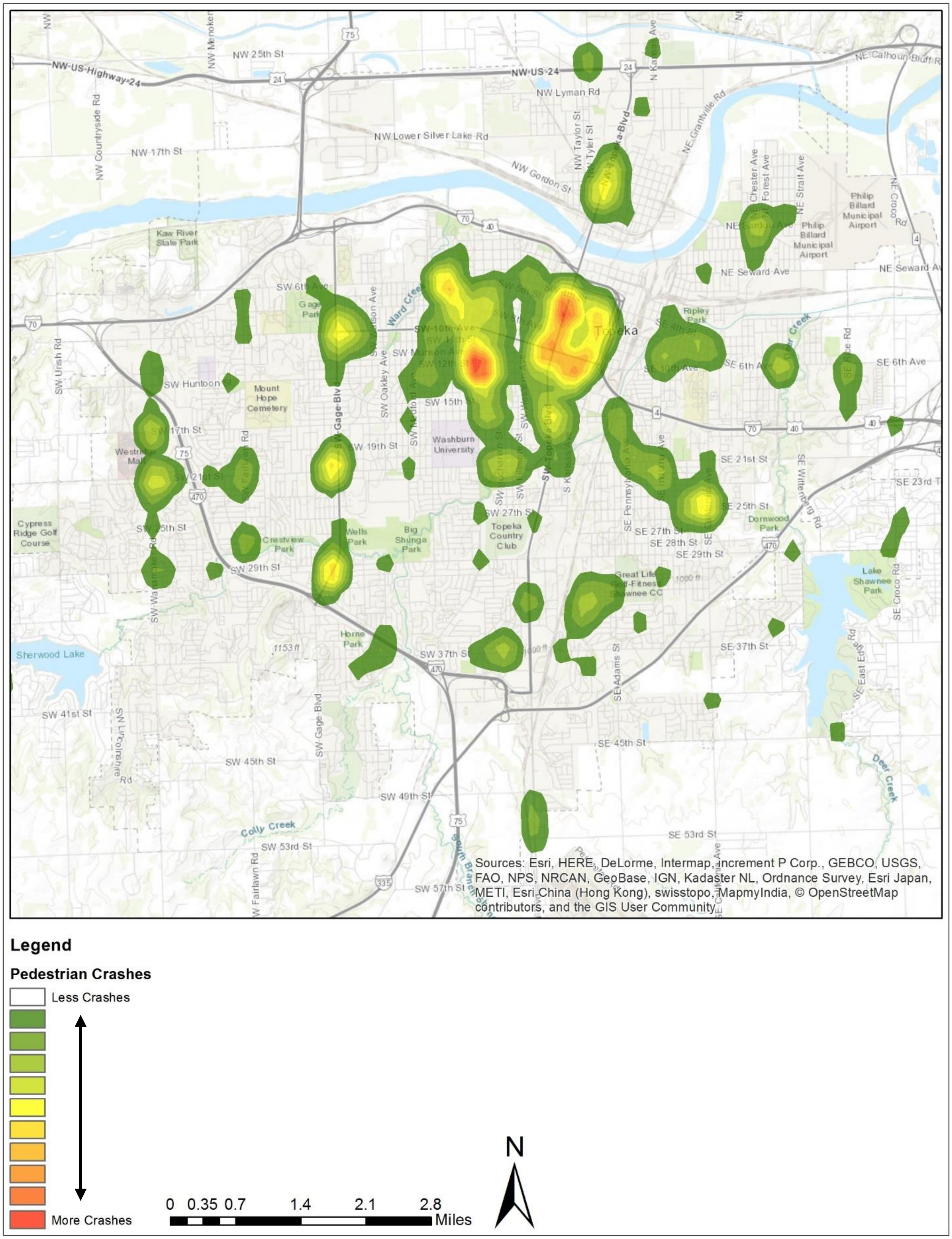


Figure 75. Heat map of crashes involving pedestrians (2010-2016)

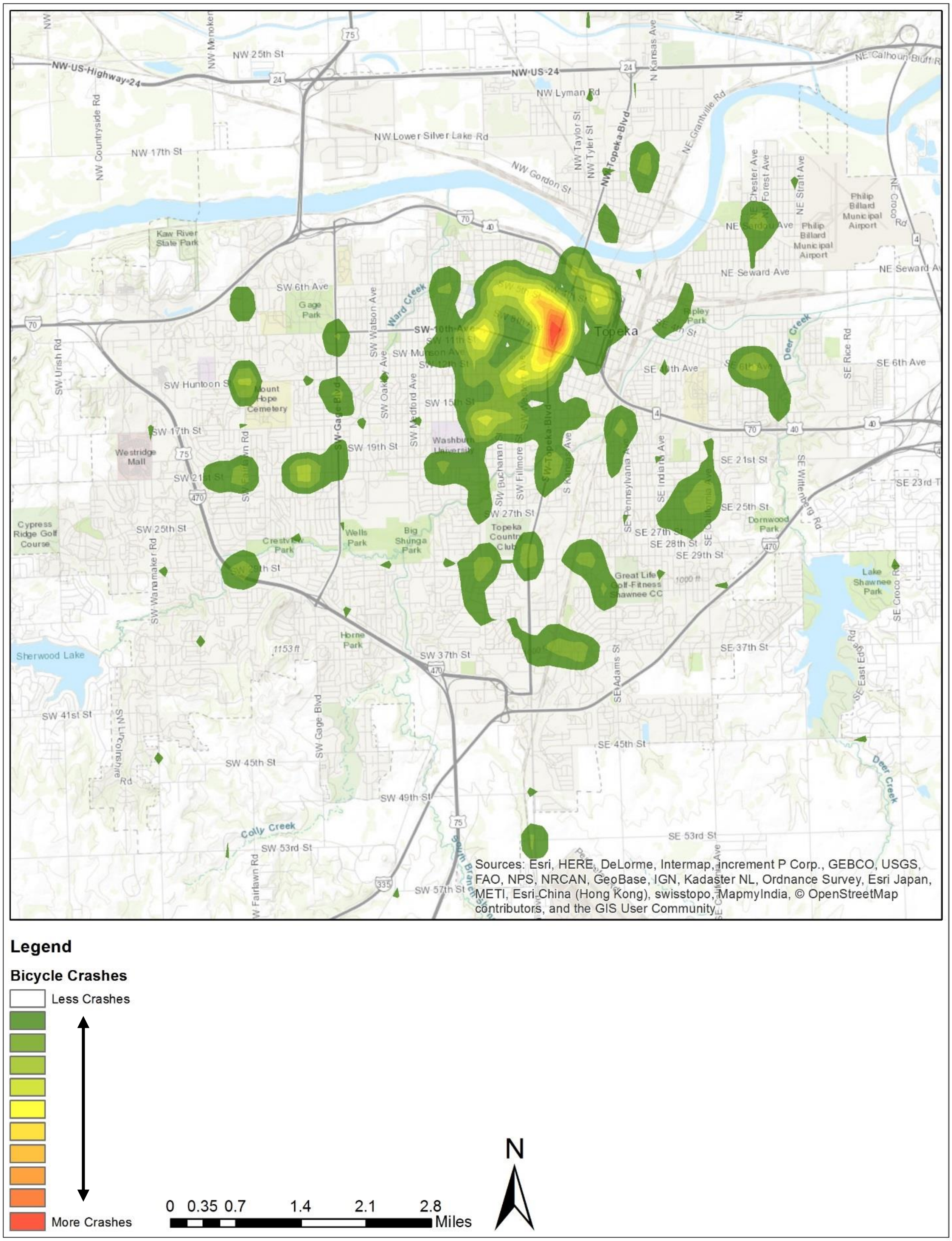


Figure 76. Heat map of crashes involving bicycles (2010-2016)

4.5.2. EMPHASIS AREAS OVERLAPS BY LOCATION

Table 50 and Table 51 provide lists of intersections and roadway segments in the City of Topeka/Shawnee County that rank high across all emphasis areas (Intersections, Speed, Distracted Driving, Pedestrian & Bicyclist).

Table 50. Intersections with Emphasis Area Overlap

Top Intersections – Emphasis Areas Overlap	Jurisdiction
SW Topeka Blvd, S 5th St	City of Topeka
SW 12th St, SW Jackson St	City of Topeka
SW Orchard St, SW 6th Ave	City of Topeka
SW Topeka Blvd, SW 8th Ave	City of Topeka
SW 10th Ave, SW Topeka Blvd	City of Topeka
SW Huntoon St, SW Gage Blvd	City of Topeka
SW Fairlawn Rd, SW 21st St	City of Topeka
SW 6th Ave, SW Topeka Blvd	City of Topeka
SW Lane St, SW 10th Ave	City of Topeka
SE 21st St, SE Adams St	City of Topeka
SW 29th St, SW Fairlawn Rd	City of Topeka
SW Gage Blvd, SW 21st St	City of Topeka
SW Gage Blvd, SW 6th Ave	City of Topeka
SW Wanamaker Rd, SW 21st St	City of Topeka
SW 17th St, SW Wanamaker Rd	City of Topeka
SW Huntoon St, SW Fairlawn Rd	City of Topeka
SE 15th St, SE Adams St	City of Topeka
SW Gage Blvd, SW 29th St	City of Topeka
SW 29th St, SW Topeka Blvd	City of Topeka
SW Washburn Ave, SW 21st St	City of Topeka
SW 29th St, SW Wanamaker Rd	City of Topeka
SW Topeka Blvd, SW 21st St	City of Topeka
SW Westover Rd, SW 17th St, SW Oakley Ave	City of Topeka
SW 61st St, SW Auburn Rd	Shawnee County
SW Auburn Rd , SW 29th St	Shawnee County
SE 29th St, SE West Edge Rd	Shawnee County
SE Croco Rd, SE 61st St	Shawnee County

Table 51. Roadway Segments with Emphasis Area Overlap

Top F&I Segments	From	To	Segment length (mi)	Jurisdiction
SW Wanamaker 4-Lane Divided	SW Huntoon St.	SW Westport Dr.	0.3319	City of Topeka
SW Huntoon Street 3-Lane (2 EB, 1 WB)	SW Woodhull St.	SW Gage Blvd	0.1548	City of Topeka
SW Wanamaker 5-Lane	SW Huntoon St.	SW 10th Ave.	0.4525	City of Topeka
SW 29th Street 4-Lane	S Kansas Ave.	SE Madison St.	0.4988	City of Topeka
SW Wanamaker 5-Lane	SW 30th Terrace	SW Westport Dr.	1.9188	City of Topeka
NW Rochester Road 3-Lane (NB 3, SB 1)	Dillons / Walmart Access	North Walmart Access	0.0750	City of Topeka
SE California Avenue 4-Lane Divided	Walgreens Access South of SW 29th St.	Dillons Access	0.1000	City of Topeka
SE California Avenue 4-Lane Divided	SE 28th St.	South of SE 24th St.	0.4602	City of Topeka
SE Adams Street 4-Lane Divided	S of SE 29th St.	N of SE 29th St.	0.1340	City of Topeka
SW Washburn Avenue 4-Lane Undivided	SW Hampton St.	North of SW 20th St.	0.1508	City of Topeka
SW Fairlawn 5-Lane	SW 22nd Plaza	SW 19th Terrace	0.4210	City of Topeka
SW 61st Street 3-Lane	SW Wanamaker Rd.	East of Main Access to Washburn Rural H.S. Parking Lot	0.3140	Shawnee County
SW Wanamaker 3-Lane	SW 61st St.	South of Jay Shideler Elementary School South Access	1.3031	Shawnee County
NW 46th Street 2-Lane Undivided	NW Kendall Dr.	NW Rochester Rd.	0.7220	Shawnee County
SE45th Street 2-Lane Undivided	East of SE East Edge Rd.	West of SE Pawnee Dr.	0.4588	Shawnee County

4.5.3. SUMMARY OF PERFORMANCE MEASURES

INTERSECTION EMPHASIS AREA PERFORMANCE MEASURES:

Angle side-impact crashes at intersections, between 2010 and 2016, have resulted in 15 fatal crashes, 1,620 injury crashes and 5,371 total crashes (which is approximately half of all crashes, 53% of injury crashes and 65% of fatality crashes at intersections).

The performance indicator is to reduce the trend of fatality and injury intersection related angle-side impact crashes by 50 crashes for a 5-year average by 2024.

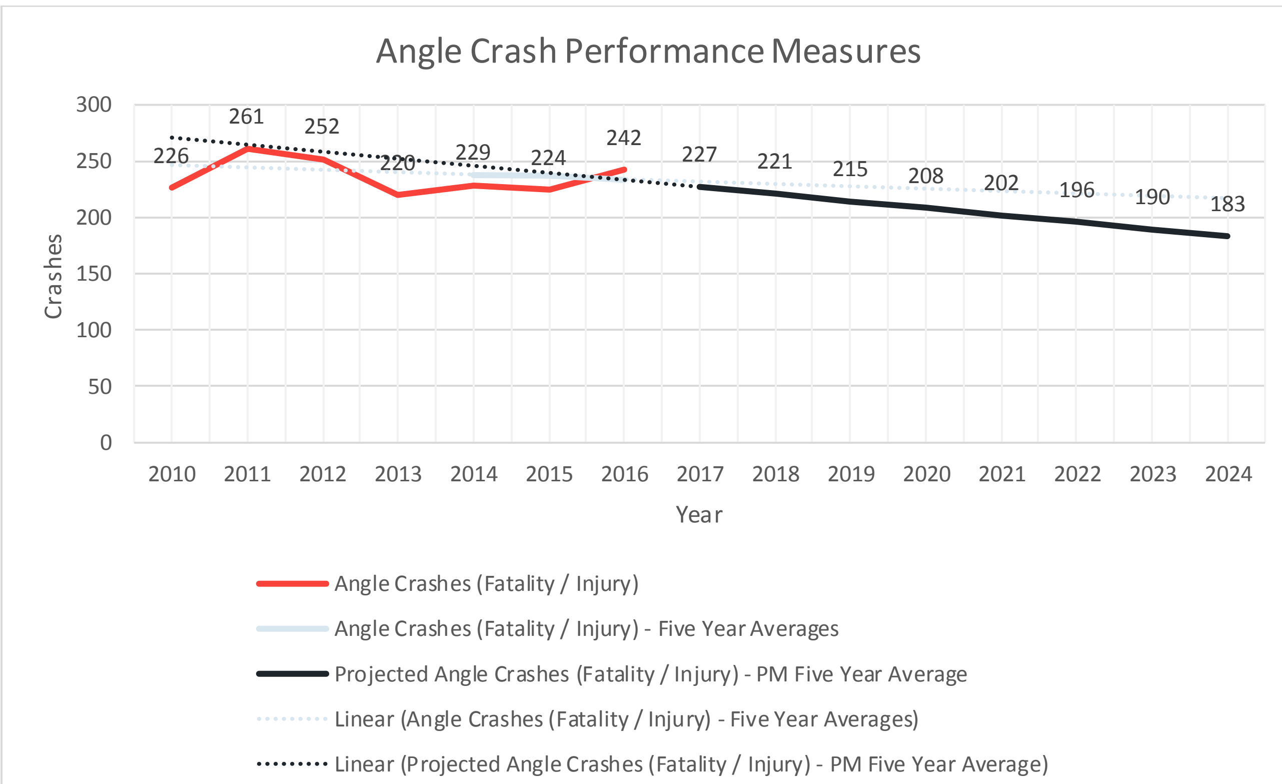


Figure 77. Angle-Side Impact Crash Performance Measures (2017 – 2024)

SPEED EMPHASIS AREA PERFORMANCE MEASURES:

The performance indicator is to reduce the trend of fatality and injury "speed" related crashes by 25% for a 5-year average by 2024.

Note: The slope of the five year averages line is steeper than the projected speed crashes (fatality/injury) line. We anticipate that the five year averages line will flatten over time and approach the projected speed crashes line (fatality/injury).

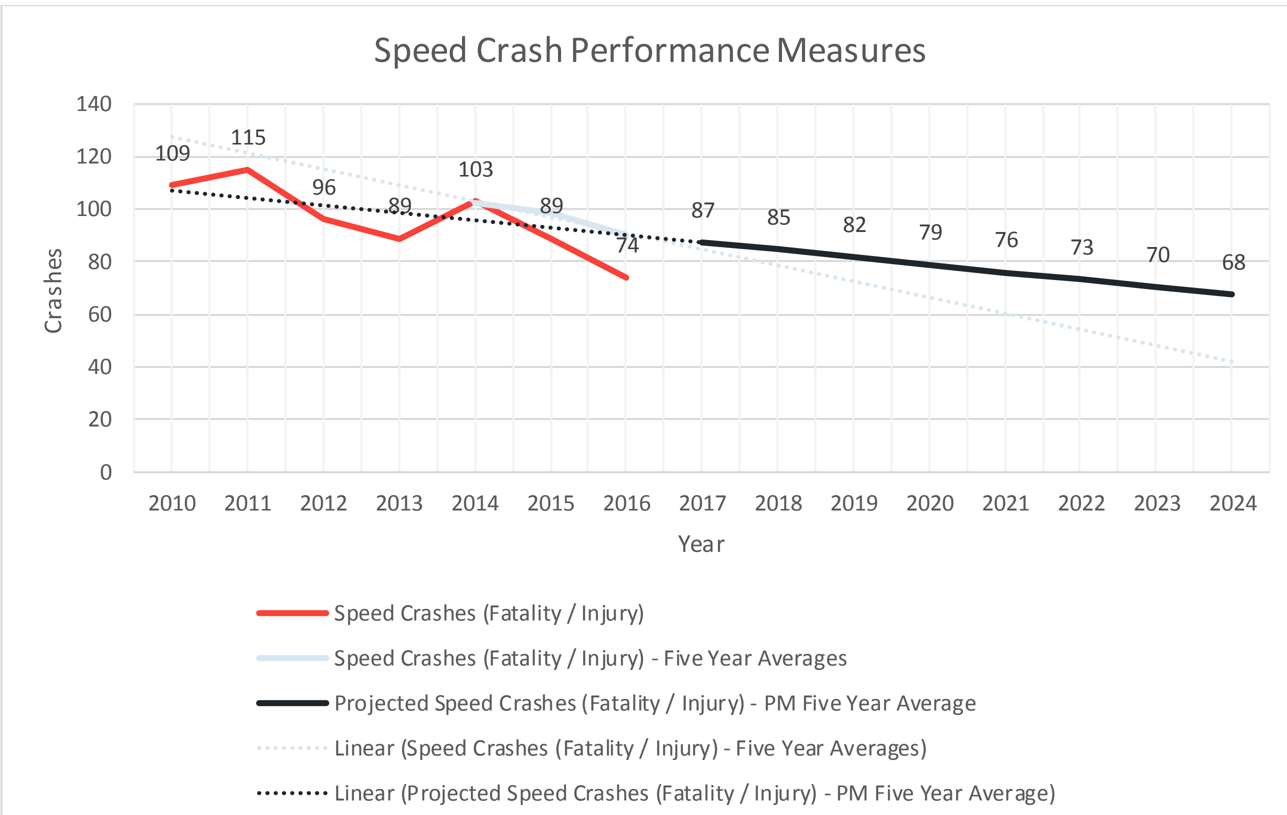


Figure 78. Speed Crash Performance Measures (2017 – 2024)

DISTRACTED DRIVING EMPHASIS AREA PERFORMANCE MEASURES:

The performance indicator is to reduce the trend of fatal and injury crashes involving distracted drivers by 10% for a 5-year average by 2024.

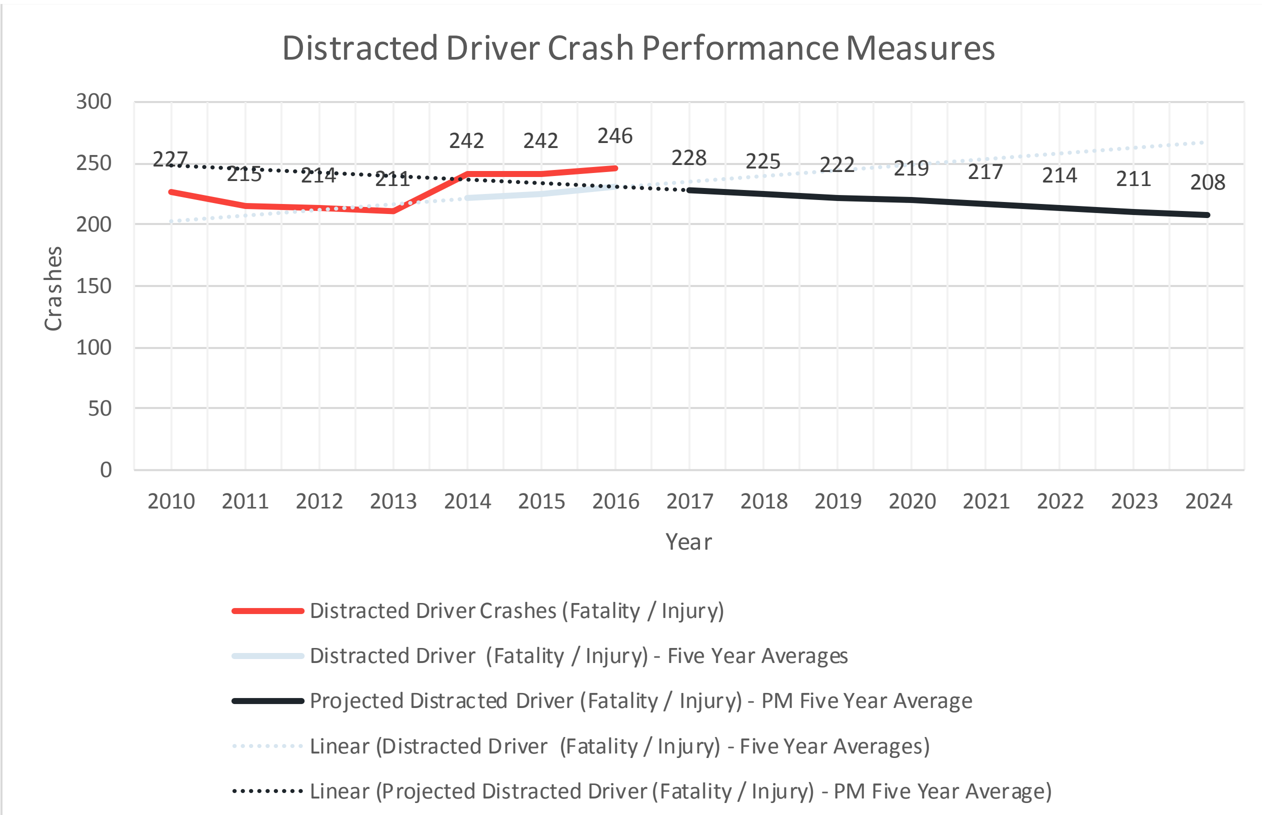


Figure 79. Distracted Driving Related Crash Performance Measures (2017 – 2024)

PEDESTRIANS AND BICYCLISTS EMPHASIS AREA PERFORMANCE MEASURES:

The performance indicator is to reduce the trend of pedestrian injuries and fatalities, resulting from crashes, by 20% for a 5-year average by 2024.

The performance indicator is to reduce the trend of bicycle related injuries and fatalities, resulting from crashes, by 20% for a 5-year average by 2024.

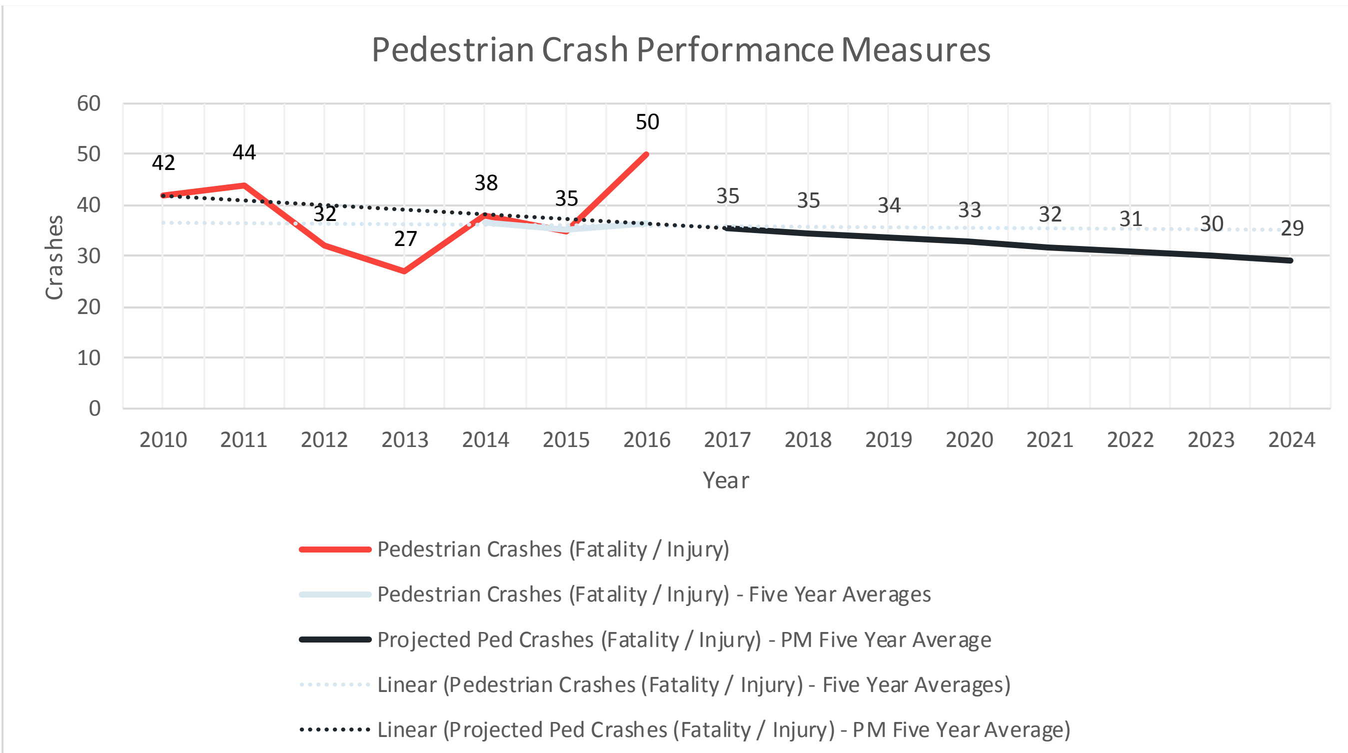


Figure 80. Pedestrian Crash Performance Measures (2017 – 2024)

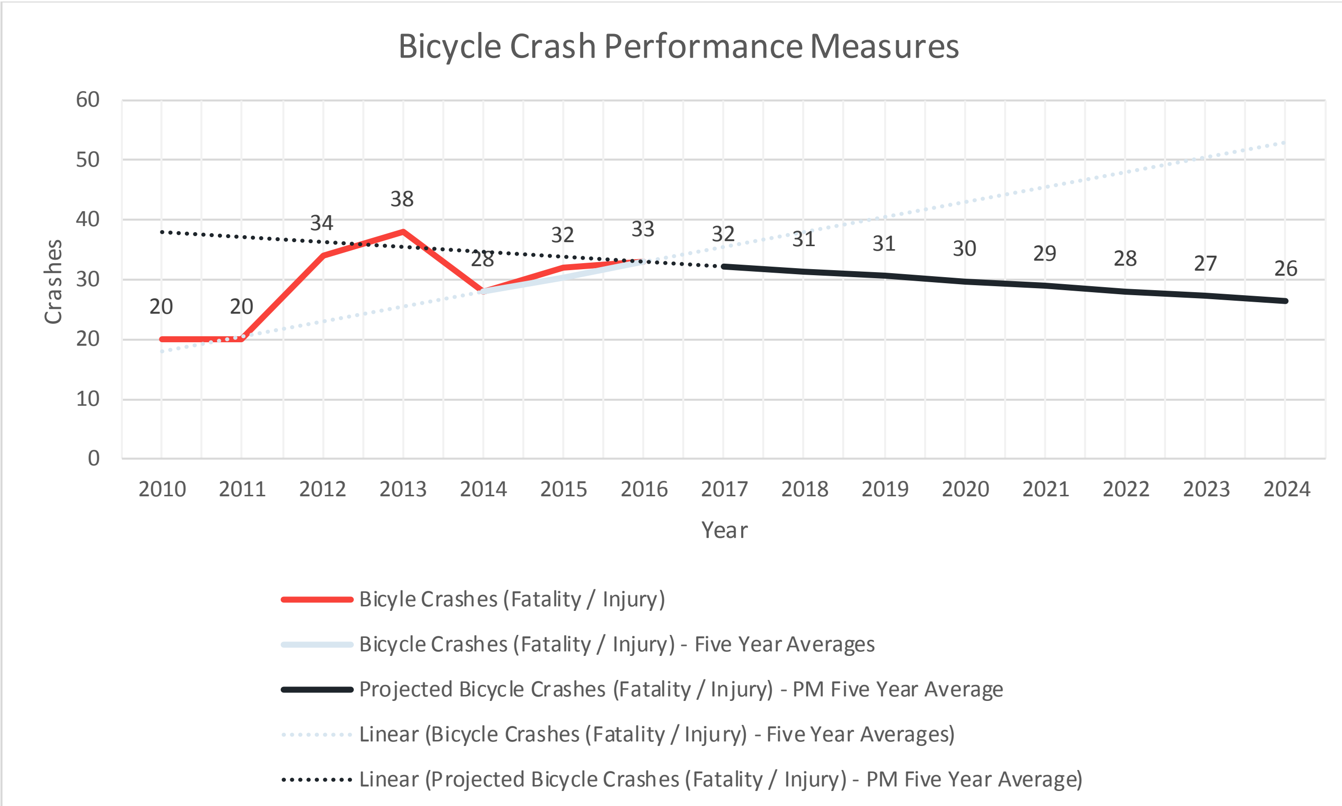


Figure 81. Bicycle Crash Performance Measures (2017 – 2024)

5. PLAN IMPLEMENTATION

Implementing the Plan is the key to reaching the goal of reducing injury and fatality crashes in the MTPO Region. The countermeasures developed for each Emphasis Area are both reasonable and implementable. Developing the right strategy for implementation will result in success. There will need to be support from elected officials, professional staff with the City of Topeka and Shawnee County, and commitment from the public to support the countermeasures for a common purpose while reflecting on their own habits when driving, walking or biking. One option for the City of Topeka and Shawnee County to consider is to become a Vision Zero community.

5.1. STEPS TO PRIORITIZE IMPLEMENTATION OF LOCATIONS

This plan, and subsequent plan updates, should be utilized to assist the City of Topeka, Shawnee County and the MTPO in selecting prioritized locations to implement safety countermeasures. The steps for prioritizing implementation of safety countermeasures at specific locations include:

1. **Review high crash areas against current CIP projects** – compare the list of high crash intersections and roadway segments with current CIP projects. Include the appropriate safety countermeasures within those projects that will directly address specific identified crash patterns.

2. **Crash frequency versus crash rates** – crash frequency is focused on the number and severity of crashes during a certain time period. This plan focused on crashes between 2010 and 2016 (seven-year period). Crash rates measure the number of crashes per million vehicle miles (MVM) traveled for roadway sections and number of crashes per ten-million entering vehicles (TMEV) for intersections. The number of crashes at intersections or along roadway segments is a function of exposure – the volume of pedestrians, bicycles, and vehicle traffic traveling through the area. When volumes of pedestrians, bicycles or vehicles is unavailable or inconsistent throughout the transportation network, crash frequencies are an acceptable method of performing crash analysis.

3. **Develop lists of priority locations for Future CIPS** - compare the list of high crash intersections and roadway segments with future planned CIP projects. Consider initiating safety projects in the future CIP that will address specific crash patterns at an intersection or along a roadway segment.

4. **Include the appropriate safety countermeasures** - Include the appropriate safety countermeasures within those projects that will directly address specific identified crash patterns in support of the plan.

5.2. ADDING COUNTERMEASURES INTO PROGRAMMED CONSTRUCTION AND MAINTENANCE PROJECTS

When the City of Topeka and Shawnee County Capital Improvement Plan (CIP) is being updated, the MTPO Transportation Safety Plan should be reviewed to help identify potential Capital Improvement Projects for improving safety at intersections or roadway corridors. The Plan, and supporting crash analysis spreadsheets/GIS files, should be reviewed to see if intersections or roadway sections with high frequency crashes are included within the boundaries of projects of CIP projects. Perform a cost-to-benefit analysis based on the anticipated crash reduction during the life of the project against the initial cost of construction and ongoing maintenance.

An example of a high crash roadway section, identified through the development of the Plan, is an 830 ft section of SW Gage Blvd. in the vicinity of SW Emland Drive just south of the I-70 & Gage Blvd. interchange (Figure 82). This section of Gage Blvd. was identified as having the fourth highest number of rear-end crashes per year per mile (9.81) in the City of Topeka. Between 2010 and 2016 there were a total of 11 rear-end crashes in this short four-lane undivided section of SW Gage Blvd. Independent of this Plan, the City of Topeka had applied for, and was awarded, Federal Safety Funding from KDOT to construct northbound and southbound left-turn lanes.

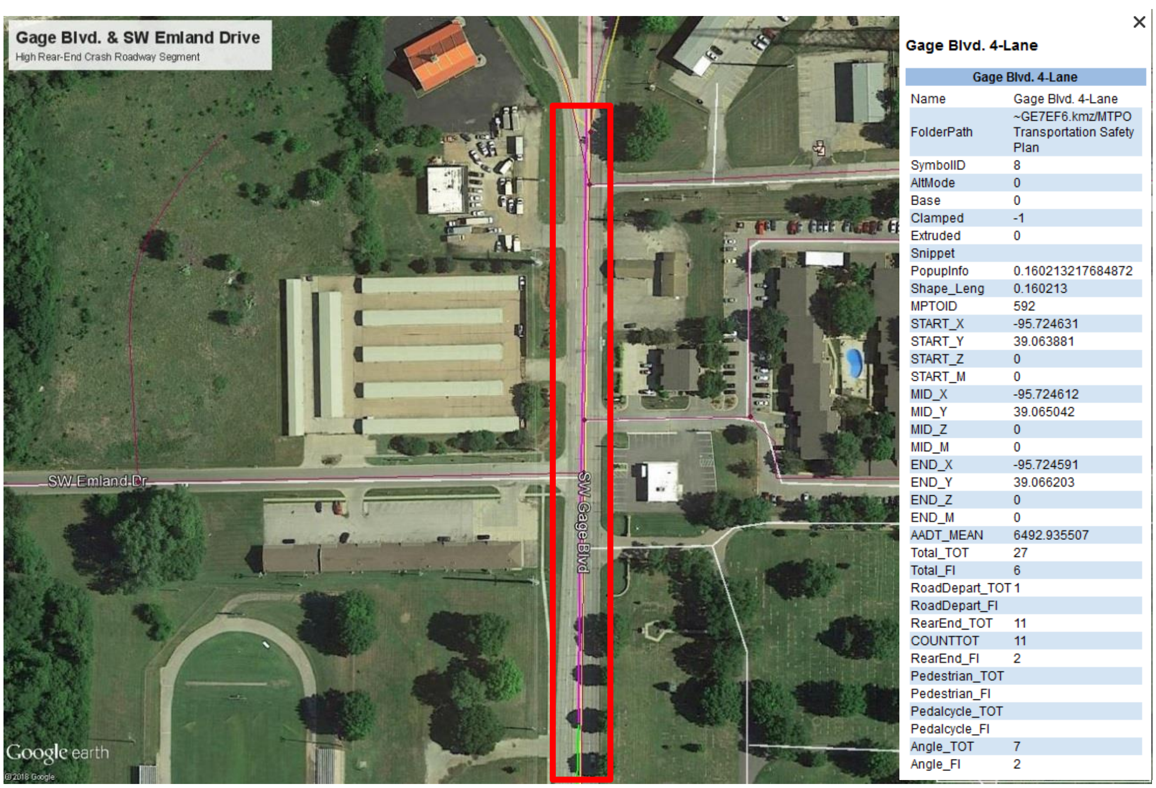


Figure 82. Gage Blvd. & Emland Drive, High Rear-End Crash Roadway Segment (830 ft)

Source: Google Earth

A second example is a traffic signals replacement project at the intersection of SW Topeka Blvd & SW 5th Street (Figure 83). The City of Topeka has identified the traffic signal at this intersection as needing replacement as part of their program to replace approximately two traffic signals per year in their CIP. In reviewing the Plan, this intersection has been identified as having the highest number of pedestrian crashes (4) in the City of Topeka between 2010 and 2016. As a result, the countermeasures for both intersections and pedestrians/bicyclist crashes were reviewed. This intersection is also located within a 2.7-mile segment of a five-lane section of SW Topeka Blvd. that is ranked as the 25th top roadway segment for rear-end crashes (5.4 rear-end crashes per year per mile) in the City of Topeka. Potential countermeasures to include in the project in order to improve pedestrian safety and reduce rear-end crashes include:

- Replace existing pedestrian signals with countdown pedestrian signals
- Implement a lead pedestrian interval when a push-button is activated at the traffic signal (CMF = 0.87 in urban and suburban areas) as part of a a system-wide low-cost safety improvement since pedestrian signals are present
- Assess "Flashing Yellow Arrows" for permissive left-turns (southbound). If lead pedestrian interval is not implemented, drivers will need to yield to pedestrians crossing during the permissive phase.
- Coordinate signalized corridors during peak hours

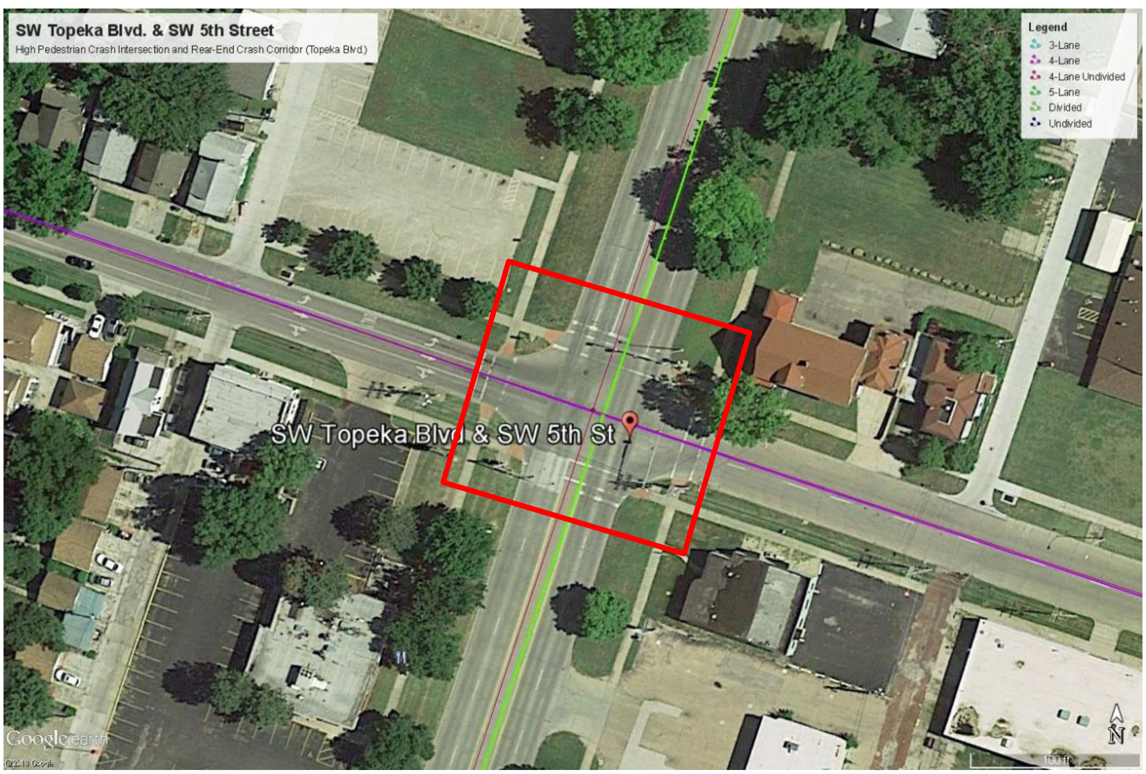


Figure 83. SW Topeka Blvd & SW 5th Street, High Pedestrian Crash Intersection

Source: Google Earth

These are examples of how to utilize the Plan to include effective countermeasures into CIP projects and help identify potential safety projects to be part of the CIP.

The City of Topeka's Capital Improvement Program (CIP) was adopted in April 2019 and contains programmed and approved with projects from 2020 to 2029. Table 52 lists programmed transportation related infrastructure projects programmed through 2024. Table 53 lists future projects planned between 2025 and 2029. Table 54 lists transportation infrastructure related projects currently programmed in the Shawnee County CIP.

Table 52. City of Topeka CIP (2020-2024)

			Capital Improvement Budget			Capital Improvement Plan		
Description / Location	**From**	**To**	**Adopted 2020**	**Adopted 2021**	**Adopted 2022**	**Adopted 2023**	**Adopted 2024**	**5-Year Total**
Infill Sidewalk / Ped Master Plan 2020	N/A	N/A	$600,000	$600,000	$600,000	$600,000	$600,000	$3,000,000
Neighborhood Infrastructure Program	N/A	N/A	$2,030,000	$2,030,000	$2,030,000	$2,030,000	$2,030,000	$10,150,000
NW Tyler Street	NW Beverly Street	NW Paramore Street					$100,000	$100,000
Replacement of Medians	N/A	N/A					$300,000	$300,000
South Kansas Avenue	1st Street	6th Street				$150,000	$50,000	$200,000
SW 10th Avenue	SW Fairlawn Road	SW Wanamaker Road	$2,955,000	$2,655,000				$5,610,000
SW 10th Avenue	SW Wanamaker Road	SW Gerald Lane		$150,000	$50,000	$1,365,000		$1,565,000
SW Fairlawn Road	23rd Street	29th Street					$300,000	$300,000
SW Huntoon Street	SW Executive Drive	SW Urish Road				$350,000	$250,000	$600,000
SW Urish Road	SW 21st Street	SW 29th Street				$450,000	$350,000	$800,000
SW Wanamaker Road / SW Huntoon Street / I-470 Ramps	N/A	N/A	$1,125,000	$2,100,000	$1,000,000			$4,225,000
SW Gage Blvd. - I-70 to 6th Street	37th Street	45th Street	$100,000	$2,400,000				$2,500,000
Wayfinding Signs - Package B	N/A	N/A	$250,000					$250,000
Citywide Infrastructure Program 2020	N/A	N/A	$250,000	$250,000	$250,000	$250,000	$250,000	$1,250,000

			Capital Improvement Budget			Capital Improvement Plan		
Description / Location	**From**	**To**	**Adopted 2020**	**Adopted 2021**	**Adopted 2022**	**Adopted 2023**	**Adopted 2024**	**5-Year Total**
Complete Streets Program 2020	N/A	N/A	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
Downtown Traffic Signal Coordination	N/A	N/A	$290,000					$290,000
Traffic Signal Replacement Program 2020	N/A	N/A	$885,000	$885,000	$885,000	$885,000	$885,000	$4,425,000
Traffic Signal LED Upgrade Program	N/A	N/A	$80,000	$80,000	$80,000			$240,000
Traffic Safety Program	N/A	N/A	$220,000	$220,000	$220,000	$220,000	$220,000	$1,100,000
GPS Based Automobile Vehicle Location and Preemption System	N/A	N/A	$150,000	$150,000	$50,000	$50,000		$400,000
12th Street (2-lanes)	Gage Blvd.	Kansas Avenue	$650,000	$4,250,000	$4,250,000	$3,780,000		$12,930,000
Huntoon (2-lanes)	Gage Blvd.	SW Harrison Street				$100,000	$400,000	$500,000
SE California Avenue	SE 37th Street	SE 45th Street	$500,000	$250,000	$5,250,000			$6,000,000
SW 17th Street	MacVicar Avenue	I-470		$850,000	$500,000	$4,450,000	$4,450,000	$10,250,000
Pavement Preventative Maintenance Program	N/A	N/A	$3,330,000					$3,330,000
Bikeways Master Plan 2020	N/A	N/A	$500,000		$500,000		$500,000	$1,500,000
ADA Sidewalk Ramp Program	N/A	N/A	$300,000	$300,000	$300,000	$300,000	$300,000	$1,500,000
Curb & Gutter Replacement Program	N/A	N/A	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$7,500,000
NW Tyler Street	NW Lyman Road	NW Beverly Street	$349,333	$159,333	$1,689,334			$2,198,000
Pavement Management Rehabilitation and Reconstruction Program	N/A	N/A	$11,500,000	$10,000,000	$9,600,000	$9,300,000	$8,300,000	$48,700,000

			Capital Improvement Budget			Capital Improvement Plan		
Description / Location	**From**	**To**	**Adopted 2020**	**Adopted 2021**	**Description / Location**	**From**	**To**	**Adopted 2020**
S. Kansas Avenue	10th Street	17th Street					$250,000	$250,000
S. Topeka Blvd.	21st Street	29th Street				$100,000	$1,580,000	$1,680,000
S. Topeka Blvd.	29th Street	37th Street					$220,000	$220,000
SE 29th Street	Kansas Avenue	Adams Street					$220,000	$220,000
SE Quincy	6th Street	8th Avenue	$300,000					$300,000
SE Quincy	8th Avenue	10th Avenue			$90,000	$50,000	$860,000	$1,000,000
Sidewalk Repair Program	N/A	N/A	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
Street Contract Prevantative Maintenance Program (Micro-Surfacing)	N/A	N/A		$2,000,000	$2,000,000	$2,000,000	$2,000,000	$8,000,000
SW 29th Street	Topeka Blvd.	Burlingame Road				$75,000		$75,000
SW Gage Blvd.	I-70	6th Street				$75,000	$860,000	$935,000
Alley Repair Program 2020	N/A	N/A	$250,000	$250,000	$250,000	$250,000	$250,000	$1,250,000

Table 53. City of Topeka Future Projects (2025-2029)

Description / Location	From	To	Department	Estimated Year	Estimated Cost
NW Tyler Street	NW Beverly Street	NW Paramore Street	Public Works	2025	$1,450,000
SW 29th Street	Topeka Blvd.	Burlingame Road	Public Works	2025	$900,000
SW Huntoon Street	SW Executive Drive	SW Urish Road	Public Works	2025	$3,400,000
S. Kansas Avenue	10th Street	17th Street	Public Works	2025 - 2026	$2,000,000
S. Topeka Blvd.	29th Street	37th Street	Public Works	2025 - 2026	$2,280,000
SE 29th Street	Kansas Avenue	Adams Street	Public Works	2025 - 2026	$2,280,000
SW Fairlawn Road	23rd Street	29th Street	Public Works	2025 - 2026	$2,700,000
SW Urish Road	SW 21st Street	SW 29th Street	Public Works	2025 - 2026	$4,900,000
SE Adams Street	37th Street	45th Street	Public Works	2025 - 2027	$6,000,000
South Kansas Avenue	1st Street	6th Street	Public Works	2025 - 2027	$14,800,000
SW 17th Street	MacVicar Avenue	I-470	Public Works	2025 - 2027	$4,400,000
SW 21st Street	I-470 Bridges	Fairlawn Road	Public Works	2025 - 2027	$2,300,000
Huntoon (2-lanes)	Gage Blvd.	SW Harrison Street	Public Works	2025 - 2028	$11,240,000
ADA Sidewalk Ramp Program	N/A	N/A	Public Works	2025 - 2029	$1,500,000
Alley Repair Program 2020	N/A	N/A	Public Works	2025 - 2029	$1,250,000
Bike Lanes on SW 6th Avenue and SW 10th Street on Bridges over I-70	N/A	N/A	Public Works	2025 - 2029	$500,000
Bikeways Master Plan	N/A	N/A	Public Works	2025 - 2029	$1,500,000
Citywide Infrastructure Program	N/A	N/A	Public Works	2025 - 2029	$1,250,000
Complete Streets Program	N/A	N/A	Public Works	2025 - 2029	$500,000
Curb & Gutter Replacement Program	N/A	N/A	Public Works	2025 - 2029	$7,500,000
Infill Sidewalk / Ped Master Plan 2020	N/A	N/A	Public Works	2025 - 2029	$3,000,000
Neighborhood Infrastructure Program	N/A	N/A	Public Works	2025 - 2029	$12,250,000
Pavement Management Rehabilitation and Reconstruction Program	N/A	N/A	Public Works	2025 - 2029	$50,000,000
Sidewalk Repair Program	N/A	N/A	Public Works	2025 - 2029	$500,000
Street Contract Preventative Maintenance Program (Micro-Surfacing)	N/A	N/A	Public Works	2025 - 2029	$10,000

Description / Location	**From**	**To**	**Department**	**Estimated Year**	**Estimated Cost**
Traffic Safety Program	N/A	N/A	Public Works	2025 - 2029	$1,100,000
Traffic Signal Replacement Program	N/A	N/A	Public Works	2025 - 2029	$4,425,000
S. Kansas Avenue	17th Street	19th Street	Public Works	2026 - 2027	$1,500,000
SW 6th Avenue	Wanamaker Road	Museum Drive	Public Works	2026 - 2027	$1,500,000
S. Topeka Blvd.	15th Street	21st Street	Public Works	2026 - 2028	$4,900,000
S. Topeka Blvd.	37th Street	49th Street	Public Works	2026 - 2028	$5,500,000
SW Indian Hills Road	21st Street	29th Street	Public Works	2026 - 2029	$6,000,000
SW 29th Street	Fairlawn Road	Wanamaker Road	Public Works	2027 - 2029	$6,100,000
SW 37th Street	Scapa Place	Burlingame Road	Public Works	2027 - 2029	$3,700,000
Union Pacific Railroad Pedestrian Crossing - N. Kansas Ave. in NOTO	N/A	N/A	Public Works	2027 - 2029	$1,300,000

Table 54. Shawnee County CIP (August 2019)

Improvement Type	Major Roadway	Minor Street	From	To	Description	Department	Project Category	Project Type	Project Phase	Total Funding	Fiscal Year
County Road Replacement	NW 46th Street	N/A	NW Button Road	NW Rochester Road	2023- Design; 2024 - Right-of-Way, Utility Adjustment	Public Works	Infrastructure	Roads	Planning	$731,000	FY 2023, FY 2024
County Road Replacement	SE 45th Street	N/A	SE California	SE Berryton Road	2021- Design 2022- Right-of-Way, Utility Adjustment 2023- Construction, Construction Engineering, Contingencies	Public Works	Infrastructure	Roads	Planning	$4,393,000	FY 2021, FY 2022, FY 2023,
County Road Replacement	SE 45th Street	N/A	SE Berryton Road	SE East Edge Road	2020- Right-of-Way, Utility Adjustment 2021- Construction, Construction Engineering, Contingencies	Public Works	Infrastructure	Roads	Design	$3,640,200	FY 2020, FY 2021,
County Road Replacement	SE 45th Street	N/A	SE East Edge Road	SE Croco Road	2024 - Design	Public Works	Infrastructure	Roads	Planning	$100,000	FY 2024
County Traffic Signal Upgrade	S. Topeka Blvd.	University Blvd.	N/A	N/A	2020- Design, Construction, Contingencies	Public Works	Infrastructure	Other	Design	$77,710	FY 2020
Sidewalk / Trails	N/A	N/A	N/A	N/A	Where possible, connect trail systems to community and regional parks to support a network of trails throughout the county. Work toward the established goal of 150 miles of trails.	Parks & Recreation	Open Space	Maintenance	Construction	$2,000,000	FY 2021, FY 2023

5.3. COUNTERMEASURE SELECTION AND IMPLEMENTATION

Transportation safety countermeasures can vary in effectiveness depending on crash type, traffic volume, roadway type, operating speed, user demographics and other factors. The list of potential countermeasures identified for each Emphasis Area were selected based on the Advisory Committee's knowledge of the Topeka/Shawnee county area, the effectiveness of the countermeasures, and the potential for implementation. With a diverse group of Advisory Committee Members, each has knowledge and experience involving their specific areas of expertise.

Engineering related countermeasures can generally be aligned with crash mitigation factors (CMF) as presented in the Highway Safety Manual (HSM), 2010 Edition or in the CMF Clearinghouse. The CMF Clearinghouse is constantly updated with new research involving the effectives of safety countermeasures[3].

Countermeasures should be selected based on effectiveness (anticipated crash reduction), financial resources of the agency to implement, calculate benefit-to-cost for each countermeasure (as appropriate), the level of acceptance of the traveling public as well as political support for that countermeasure. For example, it is determined that an older signalized intersection with a high frequency of angle-side impact and rear-end crashes is recommended by City/County staff for conversion to a single lane modern roundabout. For that countermeasure to be implemented, the following determination must be followed:

- A single-lane modern roundabout must be effective in reducing angle-side impact crashes and rear-end crashes
- The agency must have the financial resources to design and construct the single-lane modern roundabout
- Determine if the traveling public is supportive of the proposed countermeasure
- Determine if there is political support for implementing the countermeasure from elected officials (City Council or County Commission)
-

The traveling public's feedback is an important factor in deciding certain improvement types; however, it is not the only factor. Sometimes decisions need to be made by the agency and elected officials in the benefit of public health and wellbeing.

3 CMF Clearinghouse, http://www.cmfclearinghouse.org/

Initially focusing on planning related and low to medium-cost systemic safety improvements can build early successes. An implementation schedule for this plan includes:

SHORT TERM (1 – 5 YEARS)

- Develop a "Vision Zero" Policy towards becoming a Vision Zero City (Executive Policy)
- Implement a "Distracted Driving" ordinance (Executive Policy)
- Support the Kansas Negligent Driving bill (Executive Policy)
- Update "Topeka Bikeways Master Plan" (Executive Policy) – *In Process*
- Safe driving awareness through public service announcements (Education)
- Support the S.A.F.E. (Seatbelts Are For Everyone) Program in local high/middle schools (Education)
- Develop education material for new intersection types and new traffic control devices (Education)
- Bike helmet giveaways and educational campaigns (Education)
- Initiate roadway configuration reviews (Engineering)
- Initiate a Road Safety Audit program (Engineering)
- Enhance City "Traffic Calming" program from 2005 (Engineering)
- Dynamic Message Signage ("Put Phone Down" Message) (Education)
- Friendly school competition programs (Education)
- Simulators in a safe environment (Education)
- Implement a data collection program that includes pedestrian and cyclists in traffic counts (Executive Policy)
- Implement systemic low-cost countermeasures for reducing crashes at traffic signal-controlled intersections (Engineering)
  - Implement lead pedestrian intervals at signalized intersections as a system-wide low-cost safety improvement where pedestrian signals are present

MEDIUM TERM (5 – 7 YEARS)

- Implement Safety Performance Evaluation & Planning (Policy) as relates to reduction of angle crashes at intersections (Engineering)
- Perform strategic enforcement at intersections with safety issues by working with local law enforcement agencies (Enforcement)
- Work with emergency services to identify potential "bottlenecks" in the transportation system

LONG TERM (7 – 10 YEARS)

- Implement countermeasures at stop sign controlled intersections that are focused on Speed Differential Management (Engineering)
  - Rumble strips (centerline / shoulder)

    — Rural intersection conflict warning system
- — Construct traditional and alterative intersection types which reduce the number of conflict points (Engineering)
- — Construct dedicated pedestrian and bicycle infrastructure per the Topeka Bikeways Master Plan (Engineering)
- — Install rectangular rapid flashing beacons (RRFB's) and high visibility crosswalks at unsignalized pedestrian crossings (Engineering)

5.4. VISION ZERO POLICIES

"Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe — and now it's gaining momentum in major American cities"[4].

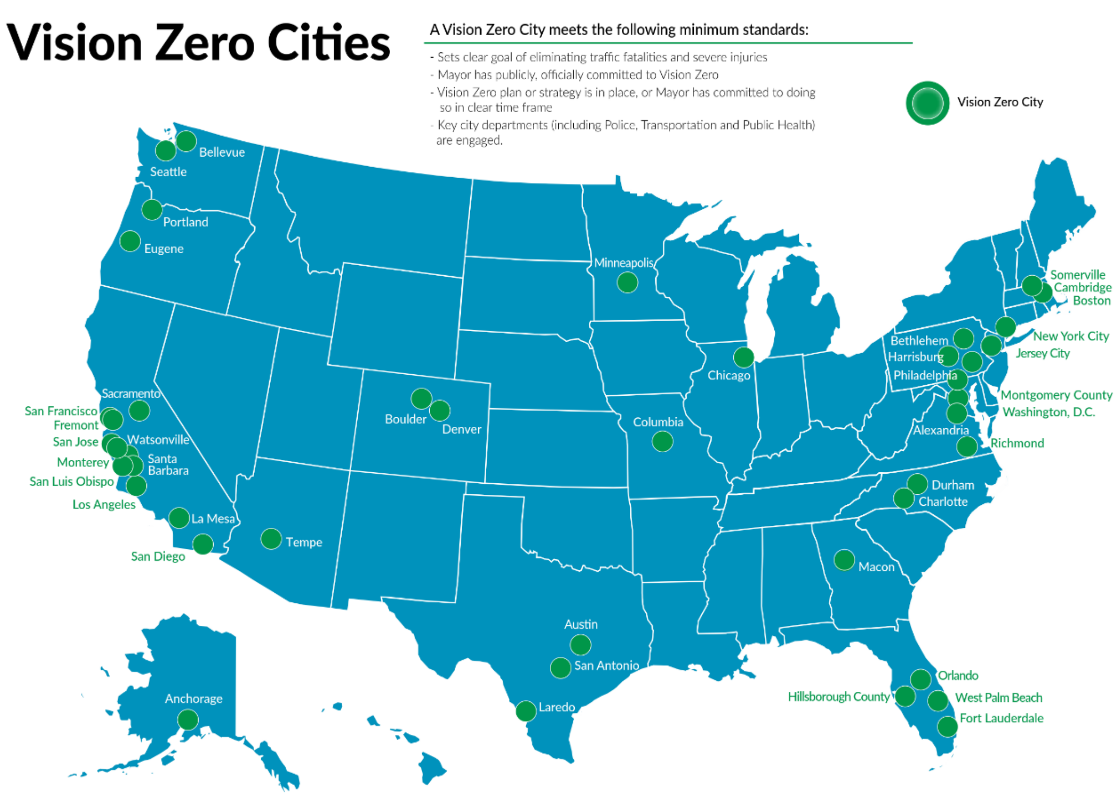


Figure 84. Vision Zero City U.S. map: https://visionzeronetwork.org/

[4] Vision Zero Network, What is Vision Zero?: https://visionzeronetwork.org/about/what-is-vision-zero/

As stated shared the Vision Zero Network webpage, *"Vision Zero starts with the ethical belief that everyone has the right to move safely in their communities, and that system designers and policy makers share the responsibility to ensure safe systems for travel.*

Vision Zero is a significant departure from the status quo in two major ways:

1. *Vision Zero recognizes that people will sometimes make mistakes, so the road system and related policies should be designed to ensure those inevitable mistakes do not result in severe injuries or fatalities. This means that system designers and policymakers are expected to improve the roadway environment, policies (such as speed management), and other related systems to lessen the severity of crashes.*
2. *Vision Zero is a multidisciplinary approach, bringing together diverse and necessary stakeholders to address this complex problem. In the past, meaningful, cross-disciplinary collaboration among local traffic planners and engineers, policymakers, and public health professionals has not been the norm. Vision Zero acknowledges that many factors contribute to safe mobility -- including roadway design, speeds, behaviors, technology, and policies -- and sets clear goals to achieve the shared goal of zero fatalities and severe injuries.*

Communities that want to succeed at Vision Zero need to acknowledge that business as usual is not enough and that systemic changes are needed to make meaningful progress.

Committing to Vision Zero takes the following strategies:

- *Building and sustaining leadership, collaboration, and accountability – especially among a diverse group of stakeholders to include transportation professionals, policymakers, public health officials, police, and community members;*
- *Collecting, analyzing, and using data to understand trends and potential disproportionate impacts of traffic deaths on certain populations;*
- *Prioritizing equity and community engagement;*
- *Managing speed to safe levels; and*
- *Setting a timeline to achieve zero traffic deaths and serious injuries, which brings urgency and accountability, and ensuring transparency on progress and challenges".*

Most Vision Zero cities are located on the coasts with a few in the central region of the United States. Columbia, Mo is the closest Vision Zero City followed by Denver, CO, Boulder, CO, Minneapolis, MN, Chicago, IL and Austin, TX (Figure 84). The minimum criteria needed to become a Vision Zero City including the following criteria:

- A clear goal has been set about eliminating traffic fatalities and severe injuries.
- The Mayor has publicly, officially committed to Vision Zero.
- A strategy is in place, or the Mayor has committed to doing so in clear time frame.
- Key city departments (including police, transportation and public health) are engaged.

5.5. IDENTIFYING SAFETY CHAMPIONS AND ADVOCATES (INTERNAL AND EXTERNAL)

In order to successfully select and implement specific transportation safety countermeasures, as described in the Plan, forming an official MTPO Transportation Safety Advisory Committee is recommended. Identifying a “Champion” that will facilitate the Committee meetings, help establish the Vision and Purpose of the Committee, schedule ongoing meetings, distribute updated crash and safety data, and hold members accountable is critical to the implementation of the Plan. This Champion is an advocate for Transportation Safety and has the drive and perseverance to help change the transportation safety culture in the MTPO Region. Suggested agencies to be involved in an ongoing MTPO Transportation Safety Advisory Committee, representing the “5-E’s” of Safety, include (less than 20 members):

- MTPO Planning
- City of Topeka Public Works/Engineering and Planning
- Shawnee County Public Works/Engineering and Planning
- Kansas Department of Transportation (KDOT) Engineering/Planning
- Topeka Metro staff
- Topeka Community Cycle Project
- Topeka Policy Department
- Shawnee County Sheriff’s Department
- Kansas Highway Patrol (KHP)
- City of Topeka Emergency Management
- Kansas Traffic Safety Resource Office (KTSRO)
- Shawnee County Health Department
- Stormont-Vail Hospital or University of Kansas Health System – St. Francis Campus

Meetings would be scheduled on a quarterly basis (three months) the first year to make decisions and move forward with the Plan implementation with annual meetings to follow. The annual meetings would review the five-year rolling average crash information, status of implementation of countermeasures, review performance measures, modify Emphasis Areas and potential countermeasures based on current/future needs and act as the Advisory Committee for future updates to the Plan.

6. MEASURING PROGRESS

The most effective way to measure progress, in relation to any goal, is to regularly access whether countermeasures are being implemented by the appropriate agencies and evaluate the results of those changes within a reasonable timeframe. The MTPO should evaluate crash data on an annual basis to assess progress in each of the Emphasis Areas, as well as progress on countermeasure implementation. Emphasis Areas and countermeasures will be reassessed in the Plan if it is determined that **1)** substantial progress in that area has been made or **2)** the countermeasures and approaches being applied aren't showing the expected level of crash reductions. If substantial progress has been made, and the safety culture is positive and sustainable, then a new Emphasis Area should be selected.

6.1. COUNTY-WIDE CRASH TRENDS OVER TIME

County-wide crash trends are managed at a higher level over time. It is recommended that a five-year moving average be utilized to measure county-wide crash trends rather than a year-by year comparison.

6.2. EMPHASIS AREA CRASH TRENDS OVER TIME

The Project Advisory Committee selected the following Emphasis Areas for the Plan to focus on:

— Intersections
— Speed
— Distracted Driving
— Pedestrian and Bicyclist

Emphasis Area crash trends are managed at a detailed level over time. It is also recommended that a five-year moving average be utilized to measure Emphasis Area crash trends rather than a year-by year comparison.

Potential future Emphasis Areas include:

- Roadway Departure (fixed object in urban and rural areas) - Roadway departures leading to collisions with fixed objects were the third most common crash type in Shawnee County, and was the crash type with the most fatal crashes of any single class. Most roadway departure crashes (83%) are not associated with intersections.
- Urban & Rural Arterials – Urban and rural arterials in the MTPO area were identified as high frequency corridors when analyzing all crashes, angle-side impact, rear-end and roadway departure crashes.
- Teen Drivers - The youngest category of drivers, age 14 to 21 account for the largest percentage of these serious speed-related crashes. These drivers often lack the experience to choose an appropriate speed for the conditions they are driving in and may be more likely to lose control of their vehicle when driving too fast for those conditions.

6.3. UPDATING THE PLAN

A reasonable schedule for updating the Plan is on a five-year cycle. That will provide additional five-year moving averages when reviewing each performance measure and allow time for implementation of countermeasures as well as a few years of "after" data. The ongoing Advisory Committee utilized to maintain the Plan should also be involved when there is need for an update. The county-wide crash trends should be updated as crash trends for each Emphasis Area. Emphasis Areas should be reassessed based on level of crash reductions in support of the goal and whether the safety culture is self-sustaining. Adjust the use of certain countermeasures if they are challenging to implement or not as effective as anticipated. Continue to work towards the goal of zero fatal and serious injury crashes by the timeframe established in "Vision Zero".

6.4. MEASURES OF A SUCESSFUL PLAN

A successful plan should be measured by the extent of progress gained over time towards your performance measure goals and making the appropriate adjustments. If over a ten-year period the MTPO is able to add new emphasis areas to the Plan, that is a positive sign of a successful plan.

Engaging with the public through ongoing transportation safety surveys, asking similar questions, can also measure the change in public perception on this subject over time. If you see a definite shift in the culture of the MTPO community regarding transportation safety, that is a key measure of a successful plan.

6.5. DATA NEEDS

A minimum of seven years of geospatially enabled crash data should be obtained from the Kansas Department of Transportation (KDOT), the City of Topeka and Shawnee County, whichever is the most useable for the analysis. Roadway features data including number of lanes, level of access control, divided or undivided, presence of auxiliary lanes, speed limit, annualized traffic volumes, intersection type, presence of streetlighting, pedestrian crossings, pedestrian volumes, bicycle volumes and other geospatially enabled data should also be available.

If the MTPO is considering utilizing AASHTOWare's Safety Analyst software, purchased by KDOT for statewide use, both the crash data and roadside features data needs to be compatible with the use of Safety Analyst. A minimum set of data elements required to use Safety Analysist includes[5]:

6.5.1. ROADWAY SEGMENT CHARACTERISTICS DATA

— Segment number
— Segment location (in a form that is linkable to crash locations)
— Segment length (mi)
— Area type (rural/urban)
— Number of through traffic lanes (by direction of travel)
— Median type (divided/undivided)
— Access control (freeway/nonfreeway)
— Two-way vs. one-way operation
— Traffic volume (AADT)

6.5.2. INTERSECTION CHARACTERISTICS DATA

— Intersection number
— Intersection location (in a form that is linkable to crash locations)
— Area type (rural/urban)
— Number of intersection legs
— Type on intersection traffic control
— Major-road traffic volume (AADT)
— Minor-road traffic volume (AADT)

6.5.3. RAMP CHARACTERISTICS DATA (AS APPROPRIATE)

— Ramp number
— Ramp location (in a form that is linkable to crash locations)
— Area type (rural/urban)
— Ramp length (mi)

[5] Safety Analyst, Data Requirements, AASHTOWare: http://www.safetyanalyst.org/datareq.htm

— Ramp type (on-ramp/off-ramp/freeway-to-freeway ramp)
— Ramp configuration (diamond/loop/directional/etc.)
— Ramp traffic volume (AADT)

6.5.4. CRASH DATA

— Crash location
— Date
— Collision type
— Severity
— Relationship to junction
— Maneuvers by involved vehicles (straight ahead/left turn/right turn/etc.)

7. WORKS CITED

U.S. DOT NHTSA Traffic Safety Facts (October 2018):
https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603

National Safety Council:
https://www.nsc.org/road-safety/get-involved/distracted-driving-awareness-month?utm_campaign=Driving+Safety+Dist-Driving&utm_source=adwords&utm_term=distractions%20while%20driving&utm_medium=ppc&hsa_cam=283297839&hsa_ad=273366172725&hsa_net=adwords&hsa_acc=3965156914&hsa_grp=27598407519&hsa_tgt=kwd-296519373319&hsa_ver=3&hsa_src=g&hsa_kw=distractions%20while%20driving&hsa_mt=b&gclid=EAIaIQobChMIvqPmoPjF4QIVg-DICh047gEnEAAYAiAAEgIE0vD_BwE

NHTSA Speeding:
https://www.nhtsa.gov/risky-driving/speeding

FHWA Traffic Calming ePrimer: https://safety.fhwa.dot.gov/speedmgt/traffic_calm.cfm

Topeka and Shawnee County Complete Streets Design Guidelines:
https://s3.amazonaws.com/cot-wp-uploads/wp-content/uploads/planning/MTPO/TSC_CompleteStreets.pdf

Topeka Traffic Calming Policy: https://s3.amazonaws.com/cot-wp-uploads/wp-content/uploads/publicworks/TrafficEngineering/TRAFFIC_CALMING_POLICY.pdf

FHWA Self-enforcing Roadways:
https://www.fhwa.dot.gov/publications/research/safety/17098/17098.pdf

8. ADDITIONAL RESOURCES

- Vision Zero Network - https://visionzeronetwork.org/
- AASHTO Highway Safety Manual - http://www.highwaysafetymanual.org/Pages/default.aspx
- Crash Modification Factors Clearinghouse - http://www.cmfclearinghouse.org/
- U.S. DOT, FHWA, Office of Safety, Proven Safety Countermeasures: https://safety.fhwa.dot.gov/provencountermeasures/
- TRB Special Report 300, Achieving Traffic Safety Goals in the United States; Lessons from Other Nations (2011) - http://onlinepubs.trb.org/onlinepubs/sr/sr300.pdf
- Kansas Traffic Safety Resource Office (KTSRO) - https://www.ktsro.org/
- Kansas Strategic Highway Safety Plan - https://www.ksdot.org/bureaus/burTrafficSaf/reports/kshs.asp
- FHWA Pedestrian and Bicycle Safety - https://safety.fhwa.dot.gov/ped_bike/
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (2017) https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/guide_to_improve_uncontrolled_crossings.pdf
- FHWA Speed Management Safety - https://safety.fhwa.dot.gov/speedmgt/
- FHWA Intersection Safety - https://safety.fhwa.dot.gov/intersection/
- U.S. DOT Distracted Driving - https://www.transportation.gov/tags/distracted-driving
- FHWA Work Zone Safety - https://safety.fhwa.dot.gov/wz/resources/fhwasa03012/
- NHTSA Teen Driving - https://www.nhtsa.gov/road-safety/teen-driving
- FHWA Roadway Departure Safety - https://safety.fhwa.dot.gov/roadway_dept/

9. APPENDIX

- MTPO Transportation Safety Plan - Public Survey Summary
- "9 Components of a Strong Vision Zero Commitment" – Vision Zero Network