Bloomington/Monroe County
Metropolitan Planning Organization

2014 Crash Report

Calendar Years 2012 through 2014

October 2015

BLOOMINGTON • MONROE COUNTY
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Executive Summary

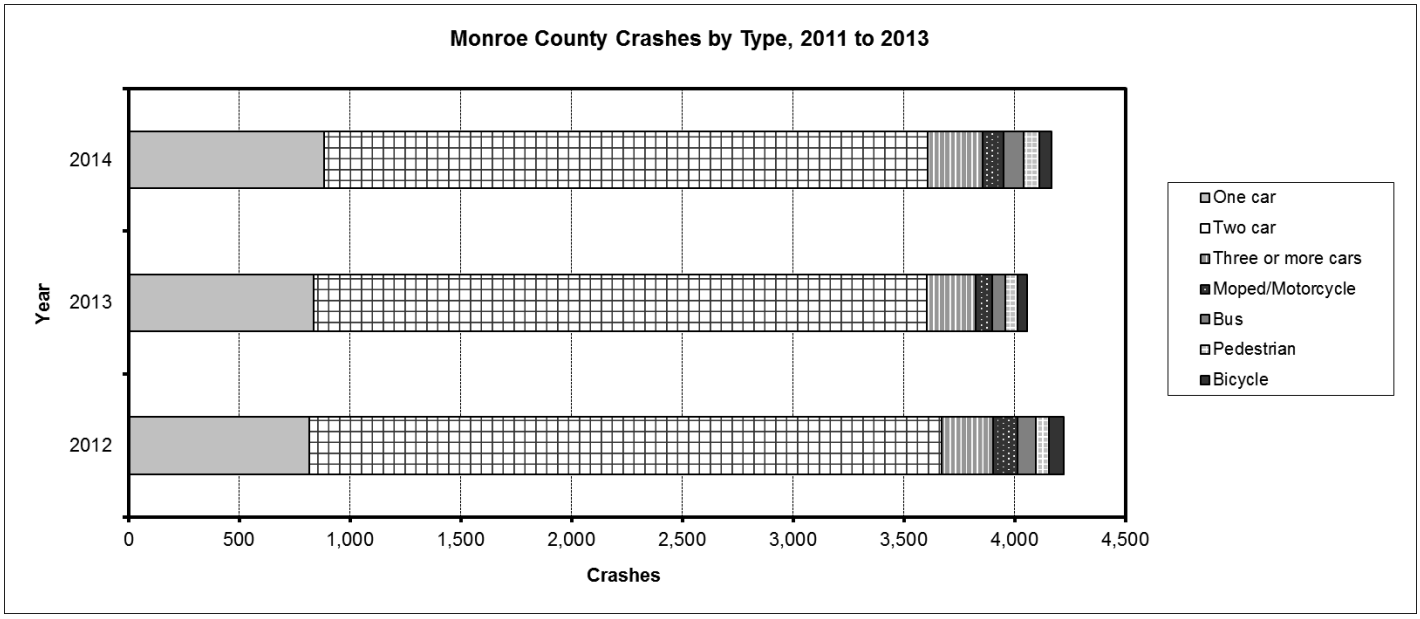
The current version of the Bloomington/Monroe County Metropolitan Planning Organization (MPO) Crash Report continues the MPO's effort to provide a thorough analysis of the causes and trends of crashes in Monroe County. This year's report includes crash data from 2012 to 2014.

This report has been compiled to provide information to the Citizen's Advisory Committee, Technical Advisory Committee, and Policy Committee of the MPO. Additionally, the report will be available to local government agencies, Indiana University, and the general public through the MPO website and the office of the Bloomington Planning Department.

A summary of the crash trends reported within Monroe County is provided below to highlight general information on crash data within Monroe County. In the following sections, detailed tables, charts, and summaries are provided to highlight information on the frequency, severity, and other related characteristics of crashes that occurred from 2012 to 2014. Additionally, the appendix contains information and analysis that may be of interest to some readers.

Summary of Crash Trends from 2012 to 2014

A total of 12,448 crashes were reported between 2012 and 2014 (Table 1). This figure represents a 2% increase from the previous period, as reported in last year's crash report (12,195 crashes from 2011 to 2013). Just over 80% of the total crashes reported in Monroe County involved no injuries (property damage or unknown), and the rest reported various levels of severity in injuries sustained.



A further breakdown of the total 12,448 crashes provides useful insights into trends involving pedestrians, bicyclists, buses, mopeds/motorcycles, and crashes that resulted in fatalities. Over the course of the three years analyzed, there were 24 fatalities (Table 4), somewhat more than the 22 fatalities reported from 2011 to 2013. Of the 24 fatalities, the greatest number (10) resulted from single-car crashes, eight were from multiple-car crashes, three involved mopeds/motorcycles, and three involved a pedestrian. As has been the case for each of the prior nine years, there were no fatalities involving a bicycle or a bus.

The time distribution of crashes continues to follow a predictable pattern. The greatest number of crashes occurred during weekday rush hours between 4:00 P.M. and 6:00 P.M., with an average slightly greater than 1 crash per hour (Figure 3). The weekend also follows a predictable pattern in terms of frequency of crashes, but the crash rate has a more even

distribution through the day and early evening hours. Between the hours of 7:00 PM and 4:00 AM, the weekend experiences a higher crash frequency than during the week. Friday continued to have the highest number of crashes overall, while Sunday had the lowest number of crashes (Figure 4).

State highways are prominently featured in the list of intersections with the highest crash frequency, or total number of crashes over the time period (Table 2). This could be attributable to several factors, but higher traffic volumes and speeds on these roads are the primary factors. The intersection at State Road 37 & W 3rd St topped the list, followed by State Road 45/46 Bypass & E 10th St then State Road 37 & W Bloomfield Rd. Because these intersections continue to exhibit high numbers of crashes from year to year, safety analysis and possible improvements should be considered. Locations that show a high number of crashes, but do not involve state managed highways, should also be considered for safety improvements through the MPO's Highway Safety Improvement Program (Table A1).

The leading cause of crashes during the study period was once again failure to yield right of way with 2,392 incidents (Table 5). Other leading causes include following too closely, following too closely, and unsafe backing. These causes can be addressed through law enforcement and education efforts as well as through physical improvements. Running off the right side of the road and speeding in adverse weather present opportunities for physical safety improvements, such as guard rails, rumble strips, and interactive signage. These types of improvements should be explored further to reduce crashes.

Bicycle and pedestrian crashes are an important consideration due to a relatively high number of non-motorized trips in the area, and the sensitivity to injury of individuals using these modes. It is well understood that when compared to other types of crashes, those involving bicyclists and pedestrians are much more likely to result in a fatality or incapacitating injury. Therefore, reducing the frequency of these crashes is a priority. The intersection of E 7th St & Jordan Ave had the highest number of bicycle crashes, and warrants further investigation.

Introduction

Mobility continues to be a defining aspect of life in the United States and around the world. Investment in transportation infrastructure has led to new opportunities for trade, travel, recreation, relocation, and economic growth. The BMCMPO receives approximately $3.1 million per year of federal transportation funding allocated from the Indiana Department of Transportation to invest in our local transportation network. Despite this continued investment, the effectiveness of our transportation system is undermined by human, economic, and financial costs attributable to motor vehicle crashes.

Motor vehicle crashes are a significant cause of death, injury, property loss and productivity loss in the United States. Data for 2012 shows that unintentional accidents were the 5th leading cause of death overall, and of the 127,792 total unintentional accident-related deaths reported, 38,251 (30%) are attributed to transportation.[1] While it may not be possible to completely eliminate motor vehicle crashes, gaining a better understanding of their causes can help transportation planners and engineers reduce their frequency and severity. This report attempts to characterize the motor vehicle crashes in Monroe County, Indiana, providing the basis for informed transportation policies and infrastructure investments.

The annual Crash Reports demonstrate that motor vehicle crashes contribute to a significant loss of life, property, and productivity in Monroe County. Through continued efforts in crash reporting and analysis, a better understanding of crash trends will be attained. From this information, targeted infrastructure investments should further improve safety on roads within the county. Therefore, the purpose of this report is twofold. First, the report provides a consistent and straightforward means to disseminate annual crash data which can be utilized by any interested individual or organization. Second, the report provides another tool for civil engineers, transportation planners, and local policy makers to use when considering mitigation strategies aimed to reduce the frequency and severity of transportation related crashes. Specifically, the Indiana Department of Transportation and the BMCMPO require Local Public Agencies (LPAs) to use crash data as part of the Highway Safety Improvement Program (HSIP). This program provides federal funding to target areas with high incidences of crashes. It is the overall goal of HSIP to reduce the number of fatal and incapacitating injury crashes. Through annual reporting and analysis, effective mitigation strategies can be implemented to further curtail crashes within Monroe County.

This report focuses on a three year period from 2012 to 2014. By focusing on a longer time horizon, random variations in annual crashes do not unduly influence the trends reported. For instance, annual variations in bicycle and pedestrian crashes, fatalities and incapacitating injuries, and location-specific crashes can be significant, even though there may not be an actual change in the likelihood of those crashes. By using a three-year window, identified trends are more likely to be meaningful. However, results from 2014 alone are often highlighted to provide a snapshot of the most recent year.

[1] Centers for Disease Control, National Center for Health Statistics. National Vital Statistics Reports – Deaths: Final Data for 2012. Volume 63, Number 9. http://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_09.pdf. Accessed on September 17, 2015.

Methodology and Data Considerations

The data for the Bloomington/Monroe County Crash Report originates from the "Automated Report and Information Exchange System" (ARIES) of the Indiana State Police. This system contains crash data from police reports since 2003. The police report data is organized by collisions, units (vehicles), and individuals. These entities are related to one another by a field in each table (Master Record Number), but can also be analyzed independently. It is possible to retrieve information regarding collisions (e.g., where and when did the greatest number of crashes occur?), vehicles involved (e.g., how many crashes involved bicycles?), and individuals involved (e.g., how old were the crash victims?). It is also possible to perform more complex analyses using attributes from each of these entities (e.g., which location had the most elderly crash victims?).

As with any database, the validity of conclusions resulting from the data is contingent upon accurate and complete data entry. Lack of information from hit-and-run collisions, confusion surrounding alternate names of roads (e.g., Country Club Drive, Winslow Road), misspelled or mis-entered street names, GPS errors, and incomplete data entry undoubtedly introduce some error into the results of this report. Therefore, results should not be interpreted rigidly.

A significant effort was made to correct data errors and validate results. It is important to note that the methodology was improved for this report. Consequently, some minor inconsistencies may be evident when comparing crash reports from different years. Therefore, it should be understood that the most recently issued crash report reflects the best and most accurate crash information. Regardless of methodological changes and slight differences between reports, the overall findings of this report are consistent with those of past years.

Collisions were categorized for analysis based on the type and severity of the crash. If the crash included a moped, motorcycle, bus, bicyclist or pedestrian, it was classified as a "moped/motorcycle", "bus", "bicycle" or "pedestrian" crash, accordingly, regardless of the number of vehicles involved. If the crash involved only motor vehicles, the "crash type" classification was based on the number of cars: one car, two cars, or three or more cars. The "severity" classification of a collision was based on the most severe injury that resulted from the crash. For example, if a crash resulted in a fatality as well as a non-incapacitating injury, the severity of the crash was classified as "Fatal Injury." Most data methods used in the report are self-explanatory.

Collisions were analyzed using available geographic, road inventory, and traffic count data. Individual crashes were located based on the reported geographic coordinates, which were available for more than 94% of all records. A crash frequency was determined for each intersection by tabulating the total number of crashes that occurred within a 250-ft radius of the center of the intersection. Crash rates were determined from available traffic counts conducted by the City of Bloomington, Monroe County, and the Indiana Department of Transportation, utilizing standard adjustments and engineering judgment as necessary.

When reading the report, it is important to understand the distinction between "crashes" and "individuals." The term "crash" is used when the characteristics of the crash itself are under consideration, whereas the terms "individual" and "fatality" are used when the focal point is the people involved. For example, the "Fatal Injury" column of Table 1 ("Crash by Type and Severity, 2012-2014") shows how many crashes resulted in a fatal injury in 2011, but it would be incorrect to interpret this column as the number of fatalities in 2011 (Table 6, Table 8), since more than one fatality can result from a single crash.

Analysis

Crash Characteristics

This section provides a summary of crash characteristics in Monroe County, including the type and severity of crashes from 2012-2014. These factors reflect trends in the overall safety of the transportation system.

In 2014, a total of 4,167 motor vehicle crashes were reported in Monroe County (Table 1). Of these, eight resulted in one or more fatalities, while one-hundred sixty-two caused incapacitating injuries. For the vast majority of crashes (3,335), no injuries were reported. Two-car crashes were the most common, comprising 65% of the total. One-car crashes and those involving three or more cars were also common, accounting for 21% and 6% of total crashes reported, respectively. Crashes involving a pedestrian, cyclist, moped/motorcycle, or bus were much less frequent.

Crashes types vary widely in the likelihood resulting injury. As shown in Figure 1, crashes involving a pedestrian, cyclist, or a moped/motorcycle were much more likely to involve injury than other types of crashes. Figure 2 shows that these three crash types account for just 5% of all crashes, but 17% of all injury crashes.

Table 1. Crashes by Type and Severity, 2012-2014

	Crash Type	Severity				Annual Total	Percent of Annual
		Fatal Injury	Incapacitating Injury	Non-incapacitating	No injury/unknown		
2012	One car	4	18	136	660	818	19.4%
	Two car	1	32	462	2359	2854	67.6%
	Three or more cars	1	5	91	135	232	5.5%
	Bus	0	1	4	75	80	1.9%
	Bicycle	0	5	51	10	66	1.6%
	Moped/Motorcycle	2	19	65	25	111	2.6%
	Pedestrian	1	10	45	6	62	1.5%
	Total	**9**	**90**	**854**	**3,270**	**4,223**	**100.0%**
	Percent of Annual Total	**0.2%**	**2.1%**	**20.2%**	**77.4%**	**100.0%**	
2013	One car	0	20	118	700	838	20.7%
	Two car	1	35	381	2351	2768	68.2%
	Three or more cars	2	7	75	134	218	5.4%
	Bus	0	0	2	56	58	1.4%
	Bicycle	0	2	35	9	46	1.1%
	Moped/Motorcycle	1	10	50	16	77	1.9%
	Pedestrian	0	5	45	3	53	1.3%
	Total	**4**	**79**	**706**	**3,269**	**4,058**	**100.0%**
	Percent of Annual Total	**0.1%**	**1.9%**	**17.4%**	**80.6%**	**100.0%**	
2014	One car	3	27	115	737	882	21.2%
	Two car	3	45	353	2325	2726	65.4%
	Three or more cars	0	9	81	159	249	6.0%
	Bus	0	0	12	82	94	2.3%
	Bicycle	0	8	40	8	56	1.3%
	Moped/Motorcycle	0	16	58	18	92	2.2%
	Pedestrian	2	12	48	6	68	1.6%
	Total	**8**	**117**	**707**	**3,335**	**4,167**	**100.0%**
	Percent of Annual Total	**0.2%**	**2.8%**	**17.0%**	**80.0%**	**100.0%**	
3-Year	**Total**	**21**	**286**	**2,267**	**9,874**	**12,448**	
	Percent of 3-Year Total	**0.2%**	**2.3%**	**18.2%**	**79.3%**	**100.0%**	

Figure 1. Crash Type by Severity, 2012-2014

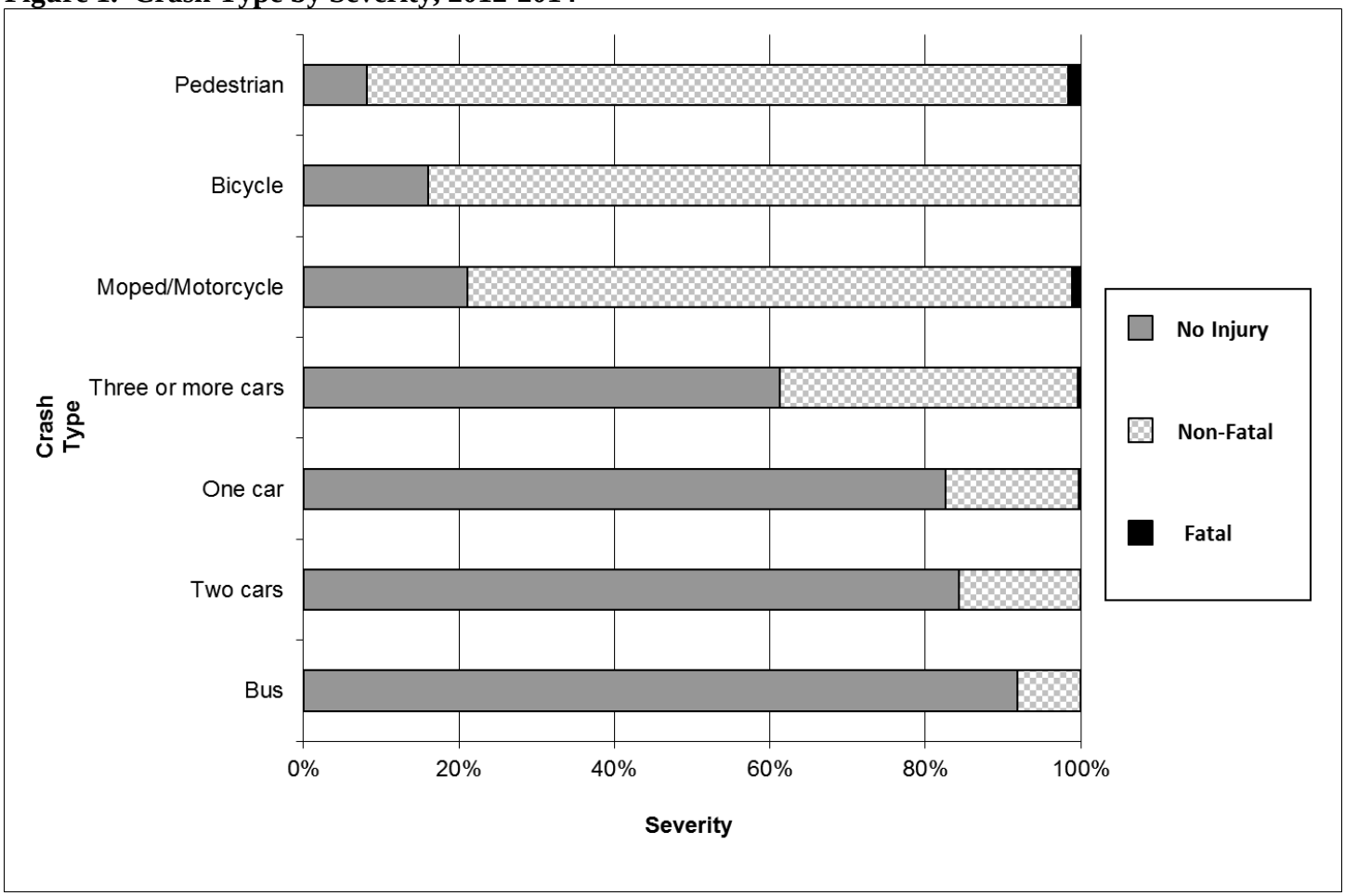
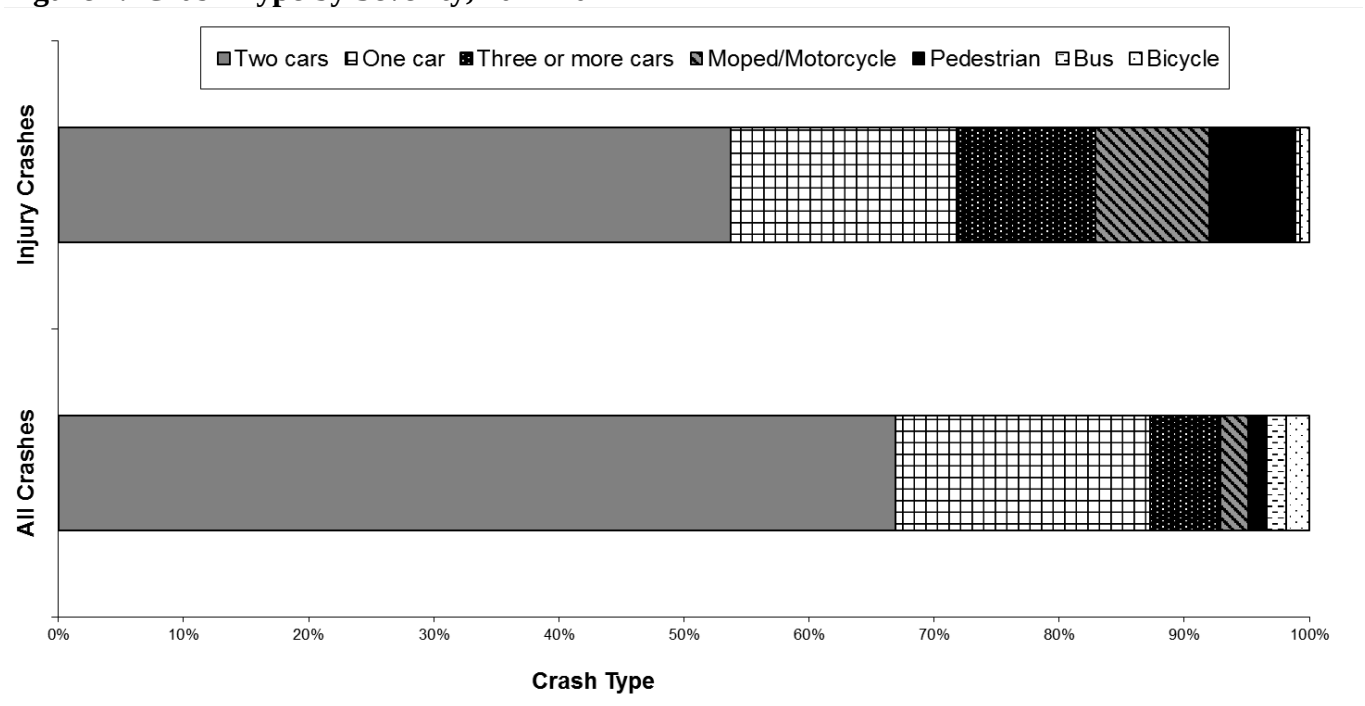


Figure 2. Crash Type by Severity, 2012-2014



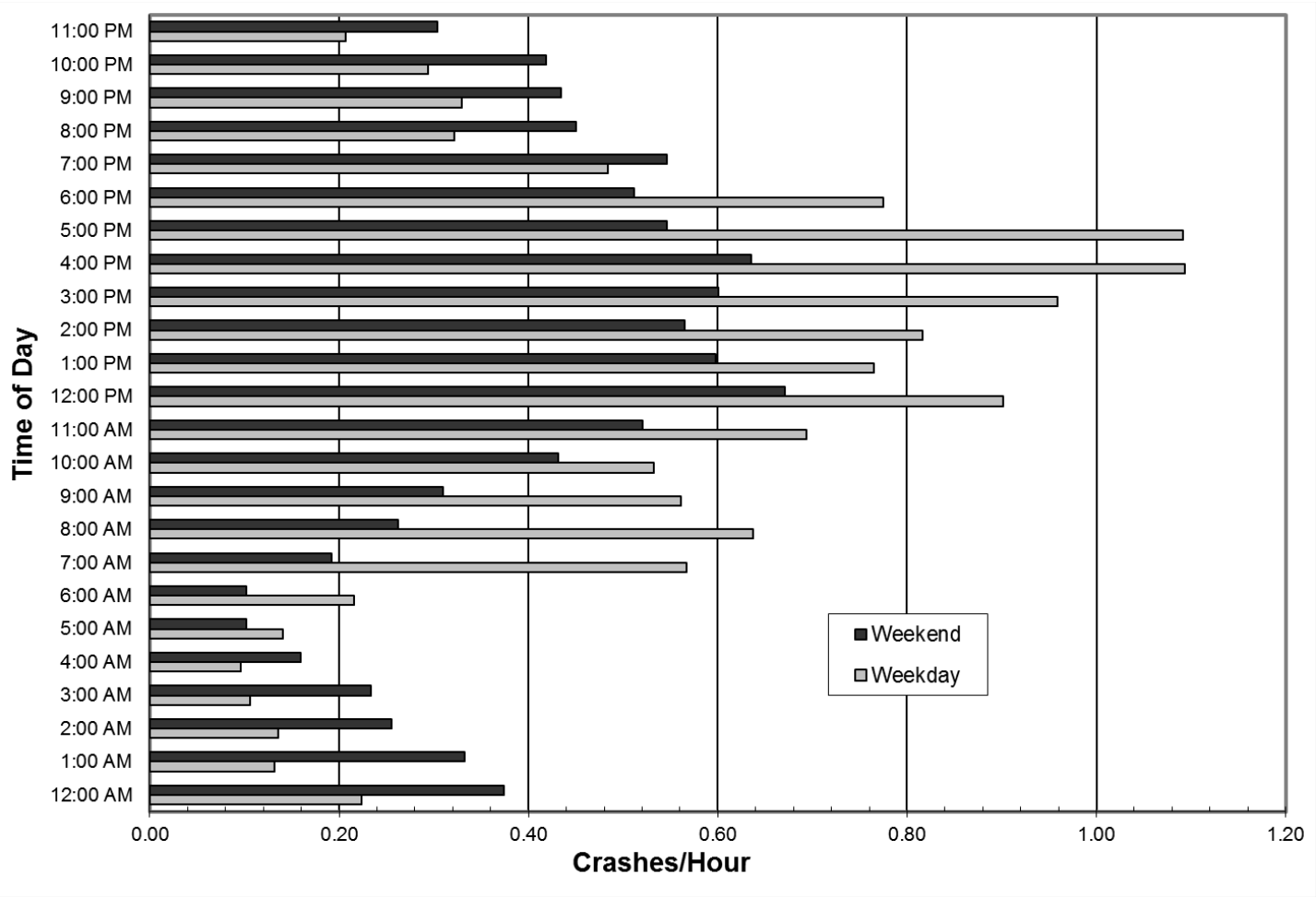
Time of Crashes

This section summarizes the number of crashes by hour and day. Information relating to the timing of crashes can be used by law enforcement agencies and emergency responders for planning purposes. Additionally, decision makers may use this information in an attempt to reduce peak crash times.

On weekdays, the number of crashes typically peaked in conjunction with the morning rush hour, 7:00 AM to 9:00 AM, and then increased gradually throughout the day until peaking again in conjunction with the evening rush hour, 4:00 PM to 6:00 PM. The late afternoon was the most likely time for a crash to occur, with more than one per hour.

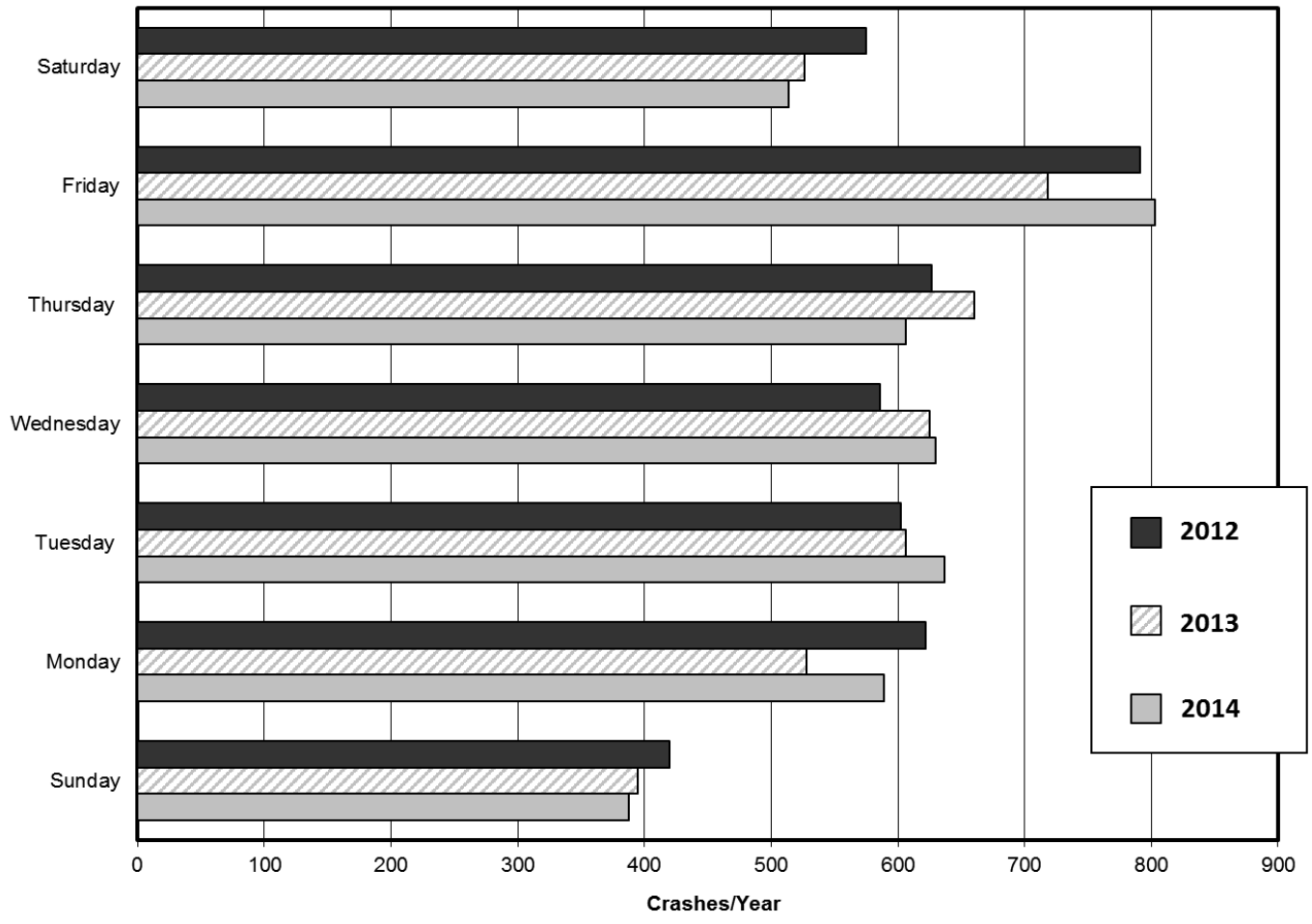
The hourly distribution of crashes for the weekend was less varied than for the work week. Crashes in the late evening and early morning were much more common during the weekend, and rush hour peaks were not as prevalent as on weekdays. During the study period, a greater number of crashes occurred on Fridays than on any other day and the fewest crashes occurred on Sundays (Figure 4).

Figure 3. Crashes by Time of Day, 2012-2014 [2]



[2] Hours shown represent the beginning of the hour. For example, "12:00 AM" represents the time period from 12:00 AM to 12:59 AM.

Figure 4. Crashes by Day of Week, 2012-2014



Crash Locations

This section addresses the spatial distribution of crashes in Monroe County in order to highlight problematic intersections. Two methods are used. First, all of the intersections in Monroe County are ordered based on the total number of crashes that occurred at each location over the 3-year period. The top 50 intersections in Monroe County with the highest crash totals are listed in Table 2. Second, the highest crash total locations are ranked based on crash rate, or the total number of crashes divided by the total number of entering vehicles over the time period (Table 3). Third, the highest crash total locations are ranked based on the overall severity of crashes that occurred at each location (Table 4). Analyzing crash totals, crash rates, and crash severity can help transportation planners, engineers, and officials to identify locations that may have hazardous geometric or operational deficiencies.

In the most recent year, 2014, the intersection with greatest crash number of crashes was State Road 37 & W 3rd St, where 36 crashes were reported (Table 2). This same intersection had the greatest number crashes during the period from 2012 to 2014, with 116 reported crashes. The highest crash total locations have remained consistent over time, with 82% of the locations in Table 2 having appeared in the previous year's analysis, covering the period 2011 to 2013.

However, locations with a high crash total are not necessarily more hazardous than locations with a lower crash total. To account for the effect of traffic volume on the total number of crashes at a particular location, a normalized crash rate was calculated for each of the intersections in Table 2 (Table 3)[3]. The latest available traffic counts from INDOT, the City of Bloomington, and Monroe County were used to estimate the number of vehicles entering the intersection over the time period[4]. During the period from 2012 to 2014, the intersection with the greatest crash rate according to this analysis was State Road 45 & D Gillham Dr.

Finally, some locations may be prone to serious crashes that lead to personal injury and loss of life. To compare crash locations based on the seriousness of the crashes that occur there, fatal and personal injury crashes can be weighted relative to crashes that led to property damage only. A standard weighting scale was used to calculate a severity number for each of the intersections in Table 2 (Table 4)[5]. During the period from 2012 to 2014, the intersection with the greatest severity number was State Road 37 & W 3rd St, followed by State Road 37 & W Bloomfield Rd.

The methodology used in this report does not help identify locations which have a higher than expected crash total, crash rate, or severity index. Therefore, future reports should consider comparing intersections with similar operating characteristics. Additionally, a method to calculate a crash rate for every intersection in the network should be explored. These additional analyses will further aid transportation planners, engineers, and officials in effectively identifying hazardous locations, and securing funding to fix them.

[3] Crash Rate = N / ((Intersection_AADT) * 3 years * 365 days * 10^-6),
where N = total number of crashes from 2012 to 2014, and
where Intersection_AADT = sum of average annual daily traffic entering the intersection

[4] Traffic counts from obtained from the best available state and local sources.

[5] Severity Number = (Fatal Crashes * 12) + (Incapacitating Injury Crashes * 6) + (Non-Incapacitating Injury Crashes *3) + (Property Damage Only Crashes)

Table 2. Top 50 Crash Locations by Crash Total, 2012-2014

Crash Total Rank	Previous Rank	Intersection	Juris-diction	Year			3-Year Total
				2012	2013	2014	
1	1	State Road 37 & W 3rd St	IN	44	36	36	**116**
2	4	State Road 45/46 Bypass & E 10th St	IN	35	28	34	**97**
3	2	State Road 37 & W Bloomfield Rd	IN	35	32	27	**94**
4	5	State Road 46 & Pete Ellis Dr	IN	34	25	28	**87**
5	7	State Road 45 & S Gillham Dr	IN	26	26	33	**85**
6	3	State Road 46 & E 3rd St	IN	35	26	22	**83**
6	6	State Road 46 & S Kingston Dr	IN	43	16	24	**83**
8	11	State Road 37 & W Vernal Pike	IN	17	22	35	**74**
9	8	State Road 45 & S Liberty Dr	IN	24	23	20	**67**
10	13	State Road 45/46 Bypass & N Kinser Pike	IN	18	15	23	**56**
11	8	State Road 45 & S Curry Pike/S Leonard Springs Rd	IN	22	13	20	**55**
11	10	State Road 45/46 Bypass & N College Ave/N Walnut St	IN	17	16	22	**55**
13	25	State Road 48 & N Curry Pike	IN	17	17	20	**54**
14	20	State Road 37 & W Tapp Rd	IN	11	17	25	**53**
14	32	State Road 45 & N Pete Ellis Dr/N Range Rd	IN	18	17	18	**53**
16	11	State Road 48 & S Gates Dr	IN	13	15	24	**52**
16	19	E 10th St & N Union St	COB	15	23	14	**52**
18	13	S Walnut Street Pike & E Winslow Rd	COB	13	15	22	**50**
18	34	W 3rd St & S College Ave	COB	24	13	13	**50**
20	21	E 3rd St & S Fess Ave	COB	13	19	16	**48**
20	27	E 3rd St & S Swain Ave	COB	10	20	18	**48**
22	21	W Kirkwood Ave & N Walnut St	COB	18	14	14	**46**
22	21	W 4th St & S Walnut St	COB	14	18	14	**46**
24	18	E 17th St & N Jordan Ave	COB	8	20	16	**44**
24	15	W 10th St & N College Ave	COB	21	12	11	**44**
26	16	E 3rd St & S Jordan Ave	COB	12	17	14	**43**
26	-	W 2nd St & S College Ave	COB	15	13	15	**43**
26	16	State Road 48 & S Liberty Dr	IN	17	13	13	**43**
29	24	W 3rd St & N Walnut St	COB	22	10	10	**42**
30	-	E Grimes Ln & S Walnut St	COB	11	12	17	**40**
31	44	E Rhorer Rd & S Walnut Street Pike	MC	16	9	14	**39**
31	-	S Walnut St & W Country Club Dr/E Winslow Rd	COB	16	13	10	**39**
31	35	W 2nd St & S Patterson Dr	COB	8	14	17	**39**
31	32	W 7th St & N College Ave	COB	15	12	12	**39**
35	-	W Kirkwood Ave & N College Ave	COB	10	15	13	**38**
36	25	State Road 46 & S Smith Rd	IN	17	9	11	**37**
37	-	E 3rd St & S Highland Ave	COB	14	10	12	**36**
37	44	W 14th St & N Walnut St	COB	14	10	12	**36**
39	-	E 3rd St & S Washington St	COB	13	11	11	**35**
39	27	W Kirkwood Ave & N Rogers St	COB	16	12	7	**35**
39	44	State Road 45/46 Bypass & E 17th St	IN	9	12	14	**35**
39	39	E Kirkwood Ave & N Dunn St	COB	9	13	13	**35**
43	35	State Road 46 & N Smith Pike	IN	9	7	18	**34**
43	27	E 3rd St & S Woodlawn Ave	COB	11	9	14	**34**
43	-	W 8th St & N College Ave	COB	13	8	13	**34**
43	39	W 7th St & N Walnut St	COB	12	16	6	**34**
43	-	E 10th St & N Woodlawn Ave	COB	9	17	8	**34**
48	-	W 2nd St & S Rogers St	COB	6	15	12	**33**
48	35	E 10th St & N Jordan Ave	COB	15	10	8	**33**
48	41	E 10th St & N Sunrise Dr	COB	12	14	7	**33**
48	-	E 3rd St & S Dunn St	COB	9	9	15	**33**

Table 3. Top 50 Crash Locations by Crash Rate, 2012-2014

Crash Total Rank	Crash Frequency Rank	Intersection	Jurisdiction	3-Year Total	Crashes per Million Entering Vehicles
1	5	State Road 45 & S Gillham Dr	IN	85	**5.06**
2	6	State Road 46 & S Kingston Dr	IN	83	**3.81**
3	20	E 3rd St & S Swain Ave	COB	48	**3.24**
4	39	E Kirkwood Ave & N Dunn St	COB	35	**3.15**
5	4	State Road 46 & Pete Ellis Dr	IN	87	**3.11**
6	20	E 3rd St & S Fess Ave	COB	48	**2.91**
7	1	State Road 37 & W 3rd St	IN	116	**2.83**
8	2	State Road 45/46 Bypass & E 10th St	IN	97	**2.69**
9	3	State Road 37 & W Bloomfield Rd	IN	94	**2.68**
10	18	S Walnut Street Pike & E Winslow Rd	COB	50	**2.64**
11	16	E 10th St & N Union St	COB	52	**2.61**
12	24	W 10th St & N College Ave	COB	44	**2.38**
13	31	E Rhorer Rd & S Walnut Street Pike	MC	39	**2.35**
14	37	E 3rd St & S Highland Ave	COB	36	**2.34**
15	24	E 17th St & N Jordan Ave	COB	44	**2.30**
16	48	E 10th St & N Sunrise Dr	COB	33	**2.30**
17	37	W 14th St & N Walnut St	COB	36	**2.29**
18	22	W 4th St & S Walnut St	COB	46	**2.04**
19	22	W Kirkwood Ave & N Walnut St	COB	46	**1.98**
20	43	E 3rd St & S Woodlawn Ave	COB	34	**1.97**
21	6	State Road 46 & E 3rd St	IN	83	**1.96**
22	14	State Road 45 & N Pete Ellis Dr/N Range Rd	IN	53	**1.90**
23	48	E 3rd St & S Dunn St	COB	33	**1.89**
24	43	W 8th St & N College Ave	COB	34	**1.78**
25	9	State Road 45 & S Liberty Dr	IN	67	**1.76**
26	43	E 10th St & N Woodlawn Ave	COB	34	**1.70**
27	26	E 3rd St & S Jordan Ave	COB	43	**1.62**
28	31	W 7th St & N College Ave	COB	39	**1.62**
29	39	E 3rd St & S Washington St	COB	35	**1.57**
30	8	State Road 37 & W Vernal Pike	IN	74	**1.55**
31	26	W 2nd St & S College Ave	COB	43	**1.51**
32	35	W Kirkwood Ave & N College Ave	COB	38	**1.49**
33	18	W 3rd St & S College Ave	COB	50	**1.47**
34	43	W 7th St & N Walnut St	COB	34	**1.42**
35	31	W 2nd St & S Patterson Dr	COB	39	**1.40**
36	10	State Road 45/46 Bypass & N Kinser Pike	IN	56	**1.40**
37	36	State Road 46 & S Smith Rd	IN	37	**1.35**
38	13	State Road 48 & N Curry Pike	IN	54	**1.30**
39	11	State Road 45/46 Bypass & N College Ave/N Walnut St	IN	55	**1.29**
40	39	W Kirkwood Ave & N Rogers St	COB	35	**1.28**
41	11	State Road 45 & S Curry Pike/S Leonard Springs Rd	IN	55	**1.28**
42	16	State Road 48 & S Gates Dr	IN	52	**1.25**
43	29	W 3rd St & N Walnut St	COB	42	**1.16**
44	48	E 10th St & N Jordan Ave	COB	33	**1.15**
45	48	W 2nd St & S Rogers St	COB	33	**1.15**
46	14	State Road 37 & W Tapp Rd	IN	53	**1.11**
47	26	State Road 48 & S Liberty Dr	IN	43	**1.10**
48	39	State Road 45/46 Bypass & E 17th St	IN	35	**1.08**
49	31	S Walnut St & W Country Club Dr/E Winslow Rd	COB	39	**1.07**
50	30	E Grimes Ln & S Walnut St	COB	40	**0.88**
51	43	State Road 46 & N Smith Pike	IN	34	**0.87**

Table 4. Top 50 Crash Locations by Crash Severity, 2012-2014

Crash Severity Rank	Intersection	Juris-diction	Fatality	Incapacitating	Minor Injury	Property Damage Only	Severity Number
1	State Road 37 & W 3rd St	IN	0	2	30	84	**186**
2	State Road 37 & W Bloomfield Rd	IN	0	0	27	67	**148**
3	State Road 46 & S Kingston Dr	IN	0	0	26	57	**135**
4	State Road 37 & W Vernal Pike	IN	0	5	18	51	**135**
5	State Road 45/46 Bypass & E 10th St	IN	0	2	12	83	**131**
6	State Road 46 & Pete Ellis Dr	IN	0	0	18	69	**123**
7	State Road 46 & E 3rd St	IN	0	0	15	68	**113**
8	State Road 45/46 Bypass & N Kinser Pike	IN	1	0	20	35	**107**
9	State Road 45 & S Gillham Dr	IN	1	0	4	80	**104**
10	State Road 45 & S Liberty Dr	IN	0	2	10	55	**97**
10	State Road 48 & N Curry Pike	IN	0	3	14	37	**97**
10	S Walnut Street Pike & E Winslow Rd	COB	0	5	11	34	**97**
13	State Road 45/46 Bypass & N College Ave/N Walnut St	IN	0	1	18	36	**96**
14	W 4th St & S Walnut St	COB	0	3	14	29	**89**
15	State Road 45 & S Curry Pike/S Leonard Springs Rd	IN	0	1	13	41	**86**
16	State Road 45 & N Pete Ellis Dr/N Range Rd	IN	0	1	13	39	**84**
17	W 3rd St & S College Ave	COB	0	0	16	34	**82**
18	State Road 37 & W Tapp Rd	IN	0	0	14	39	**81**
19	W 2nd St & S Patterson Dr	COB	0	2	15	22	**79**
20	E 3rd St & S Jordan Ave	COB	0	0	14	29	**71**
21	State Road 48 & S Gates Dr	IN	0	0	9	43	**70**
22	E Grimes Ln & S Walnut St	COB	0	1	12	27	**69**
23	E 3rd St & S Fess Ave	COB	0	0	10	38	**68**
24	E 10th St & N Union St	COB	0	1	5	46	**67**
25	State Road 48 & S Liberty Dr	IN	0	1	9	33	**66**
25	State Road 46 & S Smith Rd	IN	0	1	12	24	**66**
27	E 3rd St & S Swain Ave	COB	0	0	8	40	**64**
27	E Rhorer Rd & S Walnut Street Pike	MC	0	1	10	28	**64**
29	E Kirkwood Ave & N Dunn St	COB	0	2	9	24	**63**
30	W 7th St & N College Ave	COB	0	1	9	29	**62**
31	E 10th St & N Jordan Ave	COB	0	0	14	19	**61**
32	W 2nd St & S College Ave	COB	0	0	8	35	**59**
32	W Kirkwood Ave & N College Ave	COB	0	1	8	29	**59**
34	State Road 45/46 Bypass & E 17th St	IN	0	1	9	25	**58**

Crash Severity Rank	Intersection	Juris-diction	Fatal	Incapacitating	Personal Injury	Property Damage Only	Severity Number
35	W 3rd St & N Walnut St	COB	0	1	5	36	**57**
36	W 10th St & N College Ave	COB	0	0	6	38	**56**
36	E 17th St & N Jordan Ave	COB	0	0	6	38	**56**
36	E 3rd St & S Highland Ave	COB	0	0	10	26	**56**
39	S Walnut St & W Country Club Dr/E Winslow Rd	COB	0	0	8	31	**55**
39	E 3rd St & S Washington St	COB	0	0	10	25	**55**
41	W Kirkwood Ave & N Walnut St	COB	0	0	4	42	**54**
42	E 3rd St & S Woodlawn Ave	COB	0	1	7	26	**53**
43	W 8th St & N College Ave	COB	0	1	6	27	**51**
44	W 14th St & N Walnut St	COB	0	0	7	29	**50**
44	E 10th St & N Woodlawn Ave	COB	0	0	8	26	**50**
46	W 7th St & N Walnut St	COB	0	0	6	28	**46**
47	W Kirkwood Ave & N Rogers St	COB	0	0	4	31	**43**
48	W 2nd St & S Rogers St	COB	0	0	4	29	**41**
48	E 10th St & N Sunrise Dr	COB	0	0	4	29	**41**
50	E 3rd St & S Dunn St	COB	0	0	3	30	**39**
51	State Road 46 & N Smith Pike	IN	0	0	2	32	**38**

Crash Factors

This section summarizes the primary crash factors from 2012 to 2014. An understanding of these causes informs infrastructure investments, enforcement activities, and educational efforts. For instance, unsafe speeds can be addressed by traffic enforcement and road design, while the tendency of motorists to drive off the road can be mitigated with a guardrail or rumble strips. Similarly, enforcement and education could reduce the number of crashes attributable to alcohol.

Table 5 shows the top 10 primary crash factors for 2012-2014, which account for over three-quarters of total crashes. Failure to yield right of way was once again the most common cause of crashes, contributing to nearly 2,400 crashes from 2012 to 2014. Following too closely and unsafe backing were also significant crash factors.

Table 5. Top 10 Primary Crash Factors by Severity, 2012-2014

Rank	Primary Factor	Severity				3-Year Total
		Fatal Injury	Incapacitating Injury	Non-Incapacitating Injury	No Injury/ Unknown	
1	Failure To Yield Right Of Way	2	72	610	1708	**2,392**
2	Following Too Closely	1	32	514	1485	**2,032**
3	Unsafe Backing	0	0	19	1353	**1,372**
4	Ran Off Road Right	5	49	226	743	**1,023**
5	Other	1	15	114	761	**891**
6	Speed Too Fast For Weather Conditions	0	12	71	443	**526**
7	Animal/Object In Roadway	0	4	32	466	**502**
8	Disregard Signal/Reg Sign	0	18	166	305	**489**
9	Improper Turning	0	7	37	425	**469**
10	Unsafe Lane Movement	0	5	43	375	**423**

Fatalities

This section provides a focused look at motor vehicle fatalities in Monroe County from 2012 to 2014. As with previous sections, the material presented here can be useful for enforcement, education, and decision-making.

In 2014 there were nine fatalities in Monroe County (Table 6). Of these, four resulted from crashes involving a single car, three resulted from crashes involving two cars, and two were pedestrians. Over the period from 2012 to 2014, the average annual number of fatalities per 100,000 residents was 5.6 for Monroe County. This figure is well below the U.S. average of 10.35 fatalities per 100,000 people for 2013[6].

An investigation of the causal factors leading to fatal crashes shows that running off the road to the right and veering left of the centerline are the most common cause of crashes leading to a fatality (Table 7).

Table 6. Fatalities by Crash Type, 2012-2014

Year	Crash Type						Total	Fatalities per 100,000 Population
	One car	Two cars	Three cars or more	Moped and Motorcycle	Bicycle	Pedestrian		
2012	6	1	1	2	0	1	**11**	**7.8**
2013	0	1	2	1	0	0	**4**	**2.8**
2014	4	3	0	0	0	2	**9**	**6.3**
Total	**10**	**5**	**3**	**3**	**0**	**3**	**24**	**5.6**

Table 7. Top Primary Crash Factors for Fatal Crashes, 2012-2014

Rank	Primary Factor	Fatal Injury	% of Total
1	Left Of Center	7	**33%**
2	Ran Off Road Right	5	**24%**
3	Pedestrian Action	3	**14%**
4	Failure To Yield Right Of Way	2	**10%**
5	Following Too Closely	1	**5%**
6	Unsafe Speed	1	**5%**
7	Obstruction Not Marked	1	**5%**
8	Other (Driver) - Explain In Narrative	1	**5%**
	Total	**21**	**100%**

[6] U.S. Department of Transportation, National Center for Statistics & Analysis. Fatality Analysis Reporting System, Web-Based Encyclopedia. http://www-fars.nhtsa.dot.gov/ Accessed on September 20, 2015.

Fatal Crash Locations

This section summarizes the locations for crashes that resulted in fatalities. From 2012 to 2014, there were 21 fatal crashes, which resulted in 24 fatalities. The locations of these fatal crashes are identified in Table 8. Location information will aid transportation planners and engineers to identify problematic locations. Fatalities are a major factor in determining HSIP funding eligibility (see the Table A1 in the appendix for more information).

Table 8. Fatal Crash Locations by Type, 2012-2014

Location	Juris-diction	Total Deaths	Number of Crashes				
			One Car	Two Cars	Three or More Cars	Moped or Motorcycle	Pedestrian
E Moores Pike & S Olcott Blvd	COB	1	0	0	0	1	0
E Rhorer Rd & S Nimit Dr	MC	1	0	0	0	0	1
N Kinser Pike & W Rosewood Dr	COB	1	1	0	0	0	0
N Moon Rd, from W Sand College Rd to County Line	MC	2	1	0	0	0	0
Old State Road 37 & S E Rhorer Rd	MC	1	1	0	0	0	0
Old State Road 46, from State Road 46 to N Brummetts Creek Rd	MC	1	0	1	0	0	0
S Victor Pike from W Fluck Mill Rd to W Tramway Rd	MC	3	1	0	0	0	0
State Road 446 from E Allens Creek Rd to S Chapel Hill Rd	IN	1	0	1	0	0	0
State Road 45 & S Gillham Rd	IN	1	0	1	0	0	0
State Road 45 from S Breeden Rd to E Church Rd (Greene County)	IN	1	0	0	1	0	0
State Road 45 from S Breeden Rd to S Burch/Stanford Rd	IN	1	0	0	1	0	0
State Road 45 from S Darrell Dr to S Dunlap Rd	IN	1	0	0	0	1	0
State Road 45/46 Bypass & Kinser Pike	IN	1	0	0	1	0	0
State Road 46 & N Fifth St	IN	1	0	0	0	0	1
State Road 46 & W Arlington Rd	IN	1	1	0	0	0	0
State Road 46 & W Flatwoods Rd	IN	1	0	1	0	0	0
State Road 46, from W Flatwoods Rd to W Chafin Chapel Rd	IN	1	0	1	0	0	0
State Road 48 from W Vernal Pike to W State Road 43	IN	1	0	0	0	1	0
W Beasley Dr & S Curry Pike	MC	1	0	0	0	0	1
W Howard Rd & N Starnes Rd	MC	1	1	0	0	0	0
W Popcorn Rd from S Rockport Rd to S Ketcham Rd	MC	1	1	0	0	0	0

Bicycle and Pedestrian Crashes

This section reports on the number of bicycle and pedestrian crashes in Monroe County from 2012 to 2014. Such crashes are an important consideration in Bloomington and Monroe County due to a relatively high number of non-motorized trips in the area. For instance, data from the 2013 American Community Survey indicates that 5.1% of commuters in Bloomington use a bicycle as their primary mode of transportation, while 14.7% walk[7]. The combined walking and biking commute rate ranks 7th among U.S. cities with a population of greater than 65,000 people. However, as described in this report, individuals using these modes of transportation are particularly vulnerable to injury.

In 2014, there were 56 reported crashes involving a cyclist and 68 involving a pedestrian (Table 1). This included twelve pedestrian and eight bicycle crashes that resulted in incapacitating injuries, and two pedestrian crashes that resulted in a fatality. During the period from 2012 to 2014, 351 pedestrian and bicycle crashes were reported, resulting in two pedestrian fatalities.

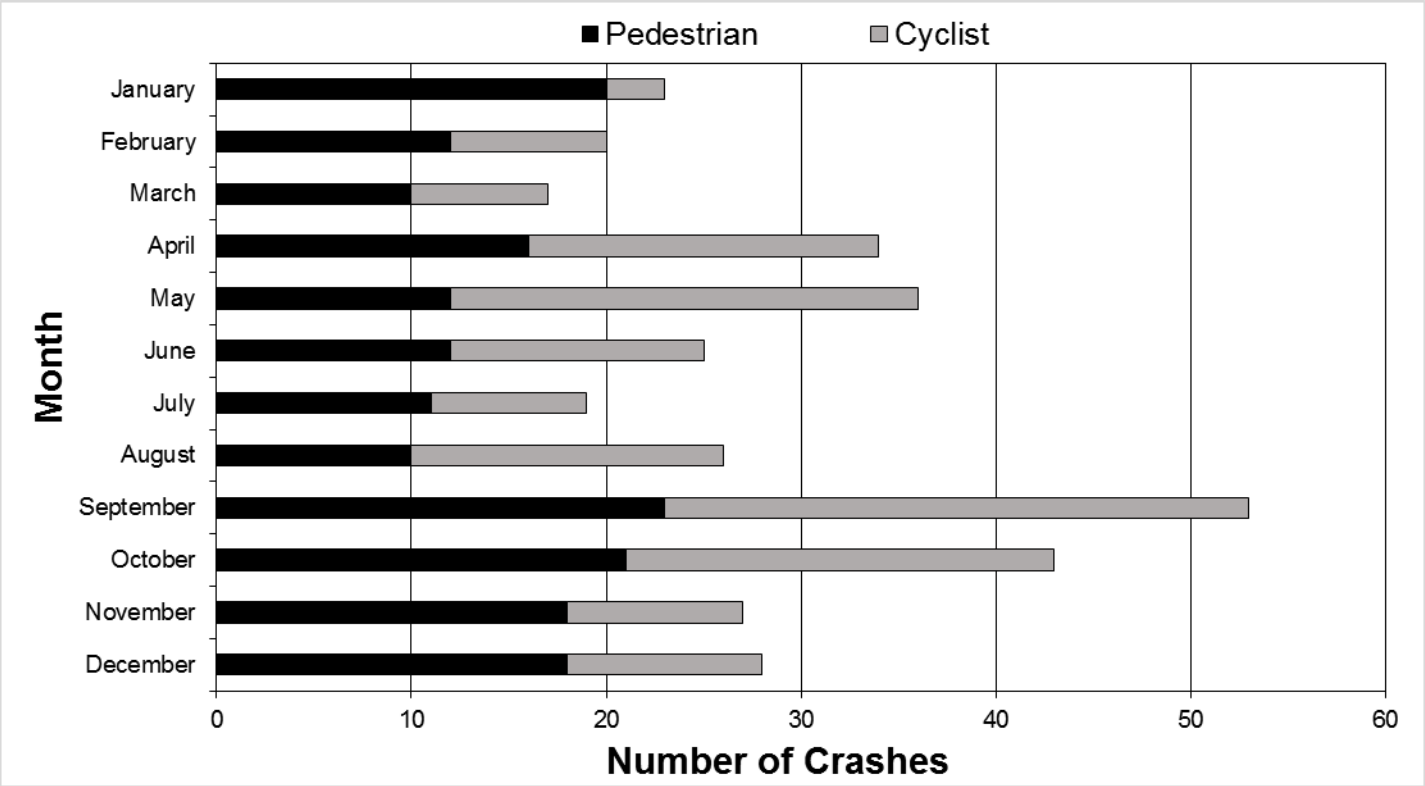
It is well understood that crashes involving these modes of transportation more often result in injury when compared with other crash types, therefore there is a need to reduce the frequency and severity of these crashes. Figure 5 shows that the frequency of bicycle and pedestrian crashes peaks each year in May and September. This information could be used by local agencies to help deploy enforcement and education strategies that will result in the greatest reduction in crashes.

Table 9. Top Bicycle and Pedestrian Crash Locations, 2012-2014

Intersection	Juris-diction	Crash Type		Total Bike+Ped	All Crashes
		Bicycle	Pedestrian		
E 7th St & N Jordan Ave	COB	10	4	14	22
E 2nd St & S Walnut St	COB	4	2	6	32
E Kirkwood Ave & N Dunn St	COB	3	2	5	35
W 2nd St & S College Ave	COB	0	4	4	43
E 3rd St & S Jordan Ave	COB	1	3	4	43
W Kirkwood Ave & N College Ave	COB	1	3	4	38
W Kirkwood Ave & S Walnut St	COB	2	2	4	46
N Jordan Ave, North of Drive to IU Music School	COB	3	1	4	16
W 6th St & N Morton St	COB	2	2	4	10
W 7th St & N College Ave	COB	1	3	4	39

[7] US Census Bureau. 2013 American Community Survey, 3-Year Estimate. http://www.census.gov/acs/

Figure 5. Bicycle and Pedestrian Crashes by Month, 2012-2014



Conclusion

This report has demonstrated a number of meaningful trends relating to motor vehicle crashes in Monroe County. The information should be used to inform transportation decision-making and, ultimately, lead to a safer, more efficient transportation system.

Some problem areas noted in this and past reports have already been improved or are in the process of being addressed, such as at many locations along the State Road 37/I-69 corridor. Improvements at the intersection of E Atwater Ave and S Henderson St which were completed in 2011 have resulted in a 54% reduction in crash frequency at that location, compared to the period from 2008 to 2010[8]. Evaluation of past and future crash data at these, and other, locations will further aid in implementing appropriate and effective mitigation strategies to reduce crashes.

This report has identified many locations that would require further study to see if physical improvements could be implemented to improve safety. Several intersections along State Roads (37, 45, 46, Bypass) continue to be problematic due to the sheer frequency of crashes. Due to jurisdictional boundaries at these locations, state and local officials, engineers, and staff will need to coordinate targeted safety improvements and reach agreements before any improvements can occur.

Data and analysis on other attributes are included within the report (e.g. bus, moped, motorcycle, fatalities, causes, locations, severity of crashes), providing additional information to identify trends and/or areas of concern. Information regarding spring and fall spikes in bicycle and pedestrian crashes should be used to inform education and enforcement strategies. Future versions of this report may consider a more detailed analysis of age- and alcohol-related factors. An improved understanding of these factors would help the community to better focus its efforts on reducing serious traffic injuries and their impact on our community, which is one of the primary purposes of this report.

In order to help identify locations which have a higher than expected crash total, crash rate, or severity index, future reports should consider comparing intersections with similar operating characteristics. Additionally, a method to calculate a crash rate for every intersection in the network should be explored. These additional analyses will further aid transportation planners, engineers, and officials in effectively identifying hazardous locations, and securing funding to fix them.

By identifying potentially problematic locations, this report has taken the first step to improving safety on our local roadways. It is expected that transportation planners, engineers, and local officials together will use this information to determine locations that need attention, and seek funding for necessary physical improvements or other means (enforcement, education) to improve safety.

[8] At this location, 37 crashes occurred from 2008 to 2010, while 17 crashes occurred from 2012 to 2014.

Appendix

Figure A1. Top 50 Total Crash Locations, 2012-2014

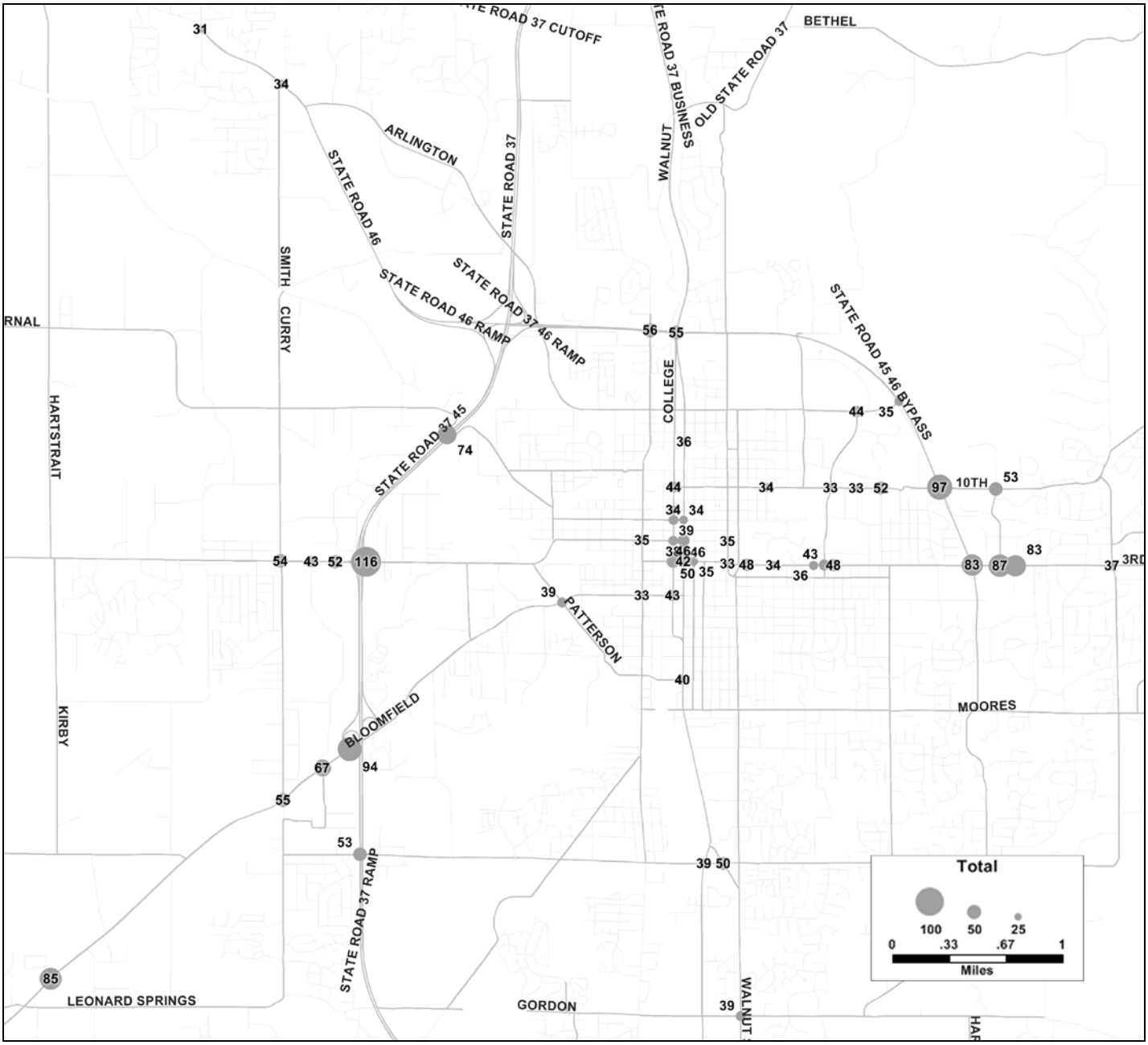


Figure A2. Fatal Crashes in Monroe County, 2012-2014

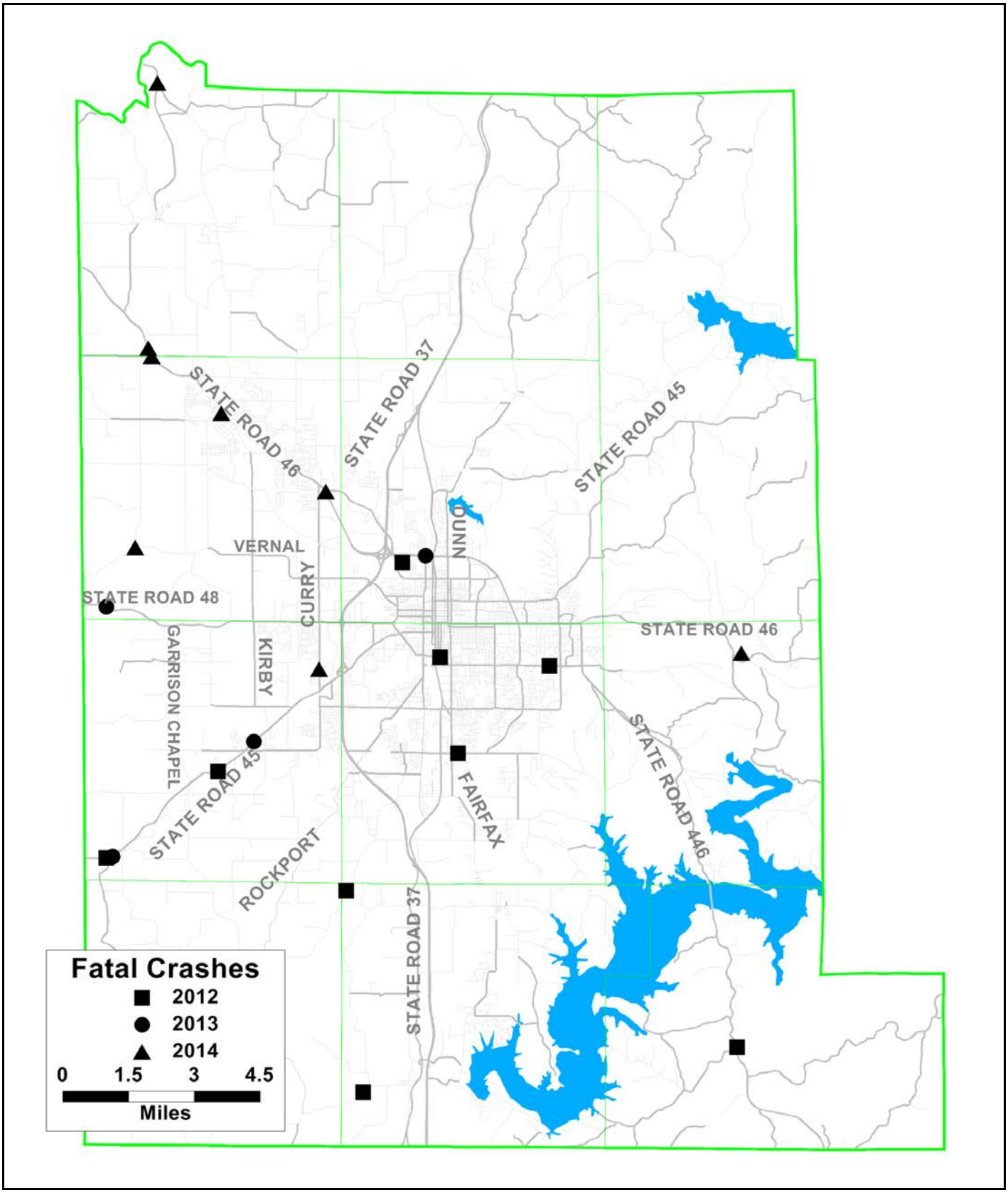


Figure A3. Fatalities by Gender and Crash Type, 2012-2014

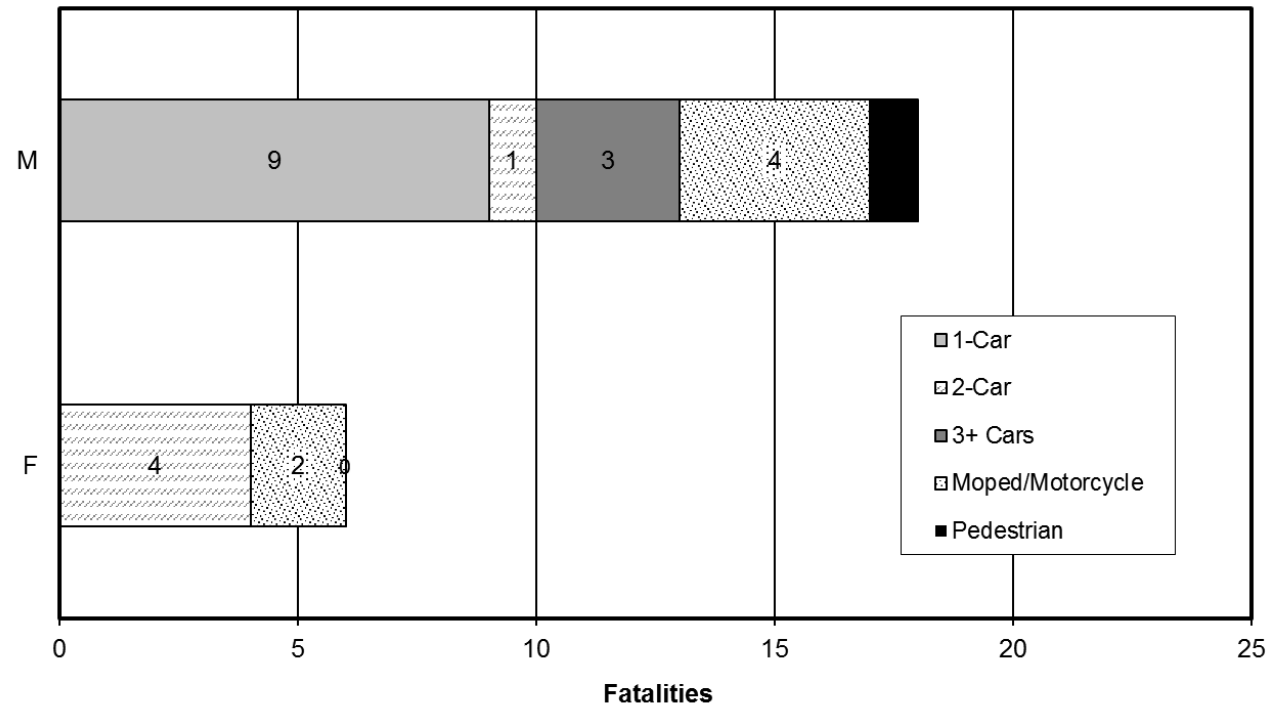
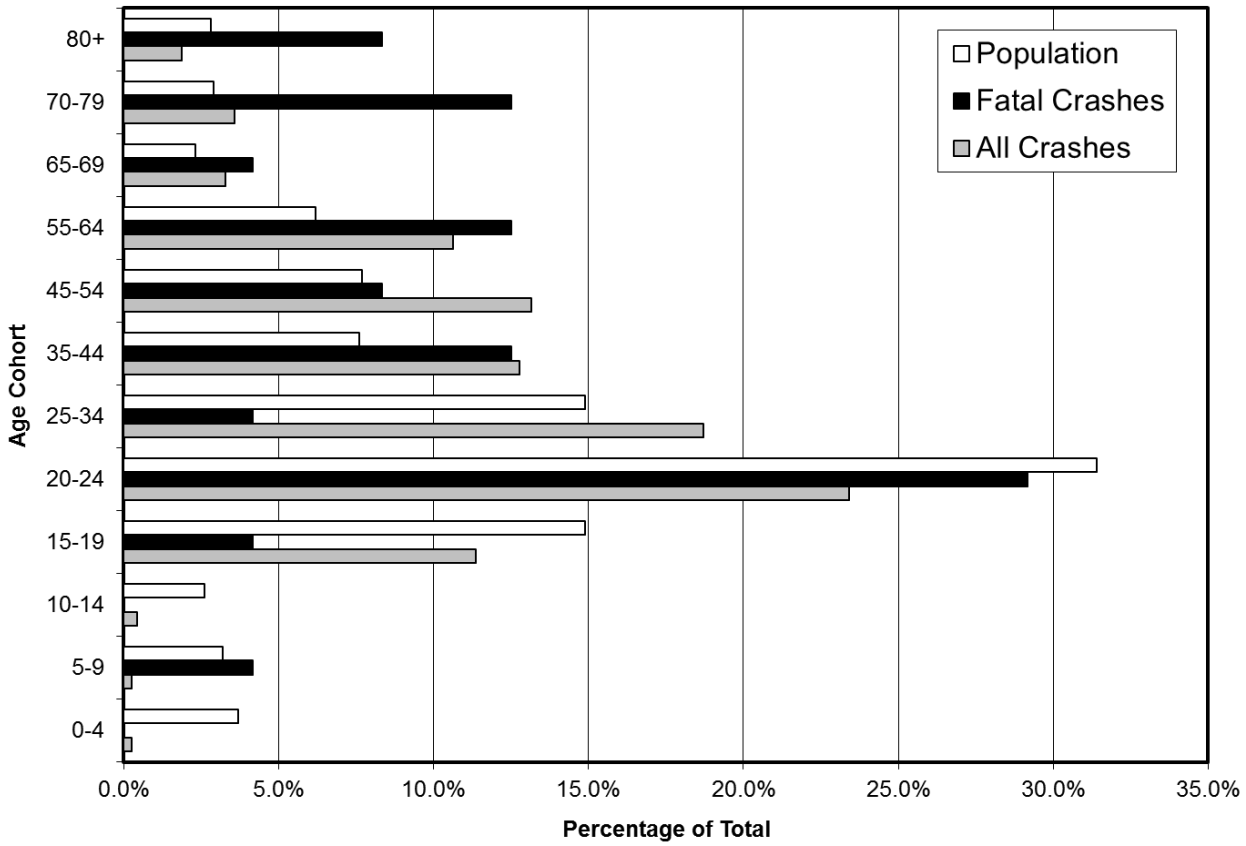


Figure A4. Portion of Individuals in All Crashes and Individuals Fatally Injured, by Age, 2012-2014[9,10]



[9] For the purposes here, individuals whose age was not reported were excluded from the total number of individuals.
[10] American Community Survey, 5-Year Estimate, 2007-2011

HSIP Eligibility List

The Highway Safety Improvement Program (HSIP) is a program that provides federal funding for areas with a high incidence of crashes, as identified through the annual crash reports. Emphasis is paid to locations which have a high frequency of crashes resulting in fatal or incapacitating injuries. The intent of the funding is to leverage effective safety improvements in a timely fashion to reduce the severity and frequency of crashes.

Table A1 is the list of intersection locations that are automatically eligible for HSIP funding. According to BMCMPO guidelines, there are three criteria that determine eligibility for HSIP funding. In order to be eligible, a location must be: 1) within the Urban Area of the BMCMPO, 2) exclusive of INDOT facilities, and 3) rank in the top 50 locations when locations are ordered first by the frequency of crashes resulting in fatal or incapacitating injury, and then by the frequency of crashes of any type.

Table A1. Eligible HSIP Locations, 2012-2014

Current Rank	Location	Juris-diction	Fatal or Incapacitating Injury Crashes	Total Crashes	Fatal	Any Injury
1	W 3rd St & S College Ave	COB	5	50	0	32%
2	W Kirkwood Ave & N Walnut St	COB	3	46	0	37%
3	N Curry Pike & W Vernal Pike	MC	3	31	0	19%
4	W Smithville Rd & S State Road 37	IN	3	19	0	37%
5	S Walnut St & W Country Club Dr/E Winslow Rd	COB	2	39	0	44%
6	E 17th St & N Walnut St	COB	2	30	0	20%
7	W 3rd St & S Patterson Dr	COB	2	28	0	32%
8	S State Road 37 & S Victor Pike	IN	2	25	0	24%
9	E 7th St & N Jordan Ave	COB	2	22	0	50%
10	S Curry Pike & W Roll Ave	MC	2	20	0	40%
11	W 2nd St & S Walker St	COB	2	19	0	37%
11	S Fairfax Rd & S Walnut Street Pike	MC	2	19	0	42%
13	W Bloomfield Rd & S Weimer Rd	COB	2	16	0	50%
14	W 17th St & W Arlington Rd/N Monroe St	COB	2	14	0	57%
15	W 11th St & N Rogers St	COB	2	10	0	50%
16	S Adams St & S Patterson Dr	COB	2	8	0	25%
17	W Flatwoods Rd & W State Road 46	IN	2	7	1	43%
18	E 10th St & N Union St	COB	1	52	0	12%
19	W 2nd St & S College Ave	COB	1	43	0	23%
20	W 3rd St & N Walnut St	COB	1	42	0	14%
21	E Grimes Ln & S Walnut St	COB	1	40	0	33%
22	W 2nd St & S Patterson Dr	COB	1	39	0	28%
22	E Rhorer Rd & S Walnut Street Pike	MC	1	39	0	26%
24	W Kirkwood Ave & N College Ave	COB	1	38	0	24%
25	W Kirkwood Ave & N Rogers St	COB	1	35	0	29%
26	E 10th St & N Woodlawn Ave	COB	1	34	0	21%
26	E 3rd St & S Woodlawn Ave	COB	1	34	0	24%
28	E 10th St & N Fee Ln	COB	1	31	0	10%
29	E 10th St & N Jefferson St	COB	1	29	0	14%
29	E 3rd St & S Grant St	COB	1	29	0	28%
31	W 17th St & N Kinser Pike/N Madison St	COB	1	28	0	32%
32	E 3rd St & E Morningside Dr	COB	1	27	0	19%
33	N Dunn St & N Old State Road 37	COB	1	26	0	35%
34	E 10th St & N Lincoln St	COB	1	25	0	12%
34	W 6th St & N College Ave	COB	1	25	0	12%
34	W 1st St & S College Ave	COB	1	25	0	28%
37	E 3rd St & S Park Ridge Rd	COB	1	24	0	29%
37	E Buick Cadillac Blvd & S College Mall Rd	COB	1	24	0	25%
39	W 3rd St & S Cory Ln	COB	1	22	0	45%
40	W 3rd St & S Landmark Ave	COB	1	21	0	29%
40	E 13th St & N Fee Ln	COB	1	21	0	19%
40	E 3rd St & S Overhill Dr	COB	1	21	0	19%
40	W Country Club Dr & S Rockport Rd & W Tapp Rd	COB	1	21	0	24%
44	E 17th St & N Fess Ave	COB	1	20	0	15%
44	E 3rd St & S Roosevelt St	COB	1	20	0	30%
44	S Curry Pike & W Doyle Ave	MC	1	20	0	25%
47	E 17th St & N Lincoln St	COB	1	18	0	28%
47	E 17th St & N Indiana Ave	COB	1	18	0	33%
49	E Longview Ave & N Pete Ellis Dr	COB	1	17	0	41%
49	E Atwater Ave & S Henderson St	COB	1	17	0	35%
49	W Kirkwood Ave & N Madison St	COB	1	17	0	29%