SOUTHERN ILLINOIS METROPOLITAN PLANNING ORGANIZATION (SIMPO) SAFETY STUDY

JUNE 17, 2019

PREPARED FOR:

SOUTHERN ILLINOIS MPO
3000 WEST DEYOUNG STREET
SUITE 800 B-3,
MARION, ILLINOIS 62959

PREPARED BY:

CRAWFORD, MURPHY & TILLY, INC.
2750 WEST WASHINGTON STREET
SPRINGFIELD, IL 62702

TABLE OF CONTENTS

APPENDICES

INTRODUCTION

This Final Report summarizes the background, methodology and recommendations of the Southern Illinois Metropolitan Planning Organization (SIMPO) Safety Study. This study evaluated crash data within the MPO from 2012-2018 to determine overrepresented crash types and identify high crash areas on the local roadway network. This study was conducted in coordination and would not be possible without the local knowledge and assistance provided by the SIMPO Technical Advisory Committee.

The first section of this report outlines the data sources used within the analysis, MPO-wide crash analysis and methodologies used in developing a priority ranking for high crash locations. The Appendix section of the report provides site specific analysis of the crash patterns and existing conditions at the priority locations. Safety countermeasures have been identified for each location, focusing on low cost improvements that have the potential to mitigate the high crash pattern.

STUDY AREA

The study area for the safety study consisted of the entire Carbondale Urbanized Area within the Southern Illinois Metropolitan Planning Organzaition (SIMPO) area. This area includes the cities of Carbondale, Cambira, Carterville, Herrin and Marion. Unincorporated within the MPO include Jackson and Williamson Counties. The MPO boundary is shown in **Figure 1**. As this safety study was driven by the need to focus on local roadway safety issues, only local, city or county-maintained roadways were included. State maintained routes were not included within the analysis.

DATA

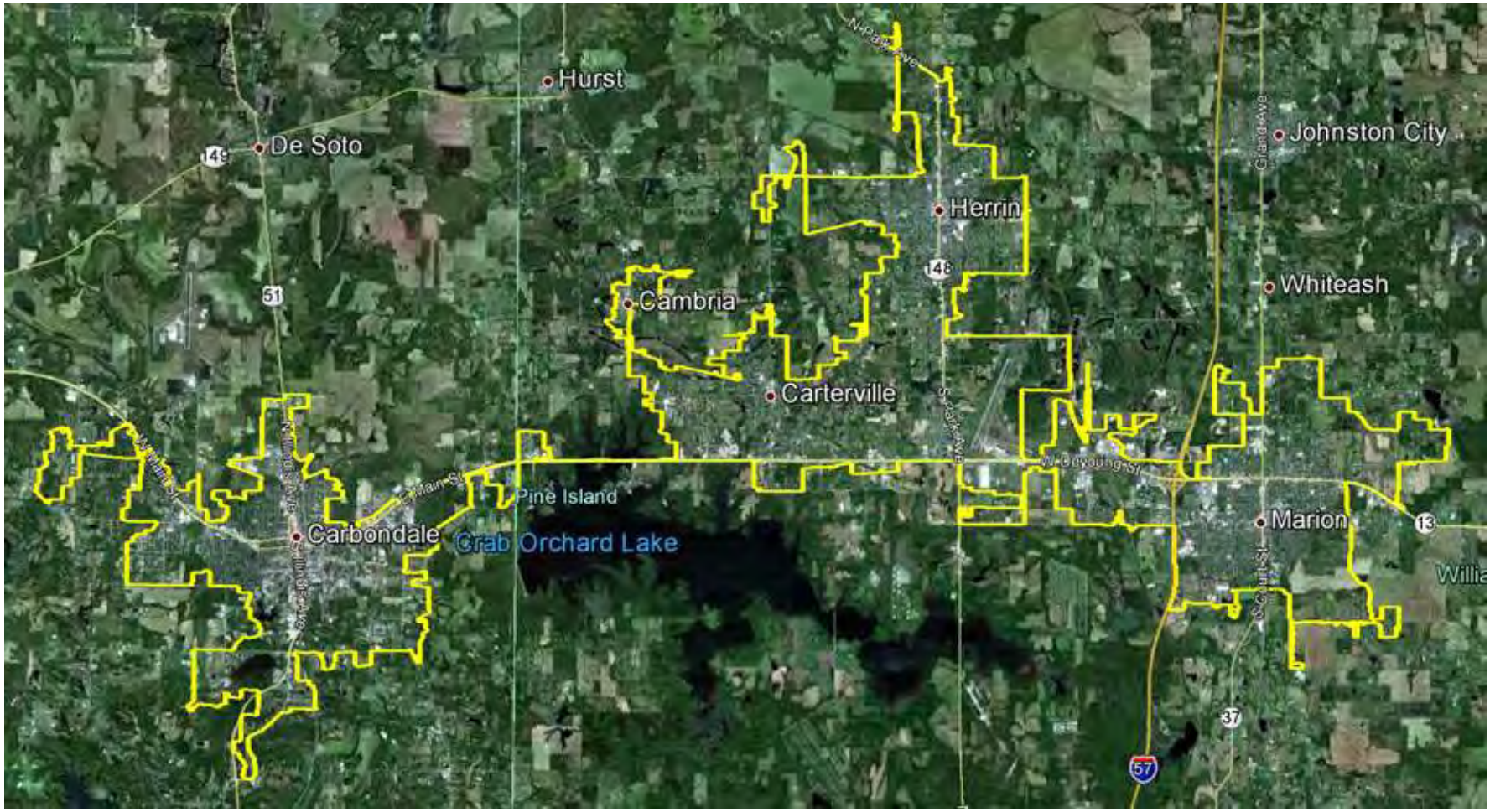
Crash data for the entire study area was provided by SIMPO. This data was provided in a Geographic Information System (GIS) shapefile with location data for each crash. The crash data was derived from the Illinoi DOT crash database. The crash database is compiled every year from the local and state police crash records submitted to the Illinois Department of Transportation (IDOT) Division of Traffic Safety. The crash data files contain information required to identify and analyze the crash records:

- crash ID
- street codes
- day of crash
- time of crash
- number of persons injured/ killed
- road feature
- road surface condition
- light condition
- type of collision
- direction
- maneuvers
- type of vehicle
- crash severity

One of the goals of the Federal Highway Administration and Illinois DOT is to address fatal and serious injury crashes. Crashes are categorized by injury severity, as K, A, B or C injury or Property Damage Only (PDO). The definition of each of these severities is summarized below.

1. Fatal Crash: A motor vehicle crash (single or multiple) that results in the death of one or more persons.

FIGURE 1: SIMPO STUDY AREA



2. Injury Crash: Any motor vehicle crash that results in one or more non-fatal injuries.
    - A-Injury (Incapacitating Injury): Any injury, other than a fatal injury, which prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred. Type A crashes includes severe lacerations, broken limbs, skull or chest injuries, and abdominal injuries.
    - B-Injury (Non-incapacitating Injury): Any injury other than a fatal or incapacitating injury, which is evident to observers at the scene of the crash. Includes lump on head, abrasions, bruises, minor lacerations.
    - C-Injury (Possible Injury): Any injury reported or claimed which is not either of the above injuries. It includes momentary unconsciousness, claims of injuries not evident, limping, complaint of pain, nausea, and hysteria.
3. PDO: Property-damage only crash.

Roadway data was pulled from the Illinois Roadway Information System (IRIS) database. In addition to the physical location of the roadway provided in a GIS shapefile, IRIS data provides basic information such as functional classification and roadway ownership. Additional information such as roadway width, Average Daily Traffic (ADT) and condition rating may be provided but primarily on state maintained roadways. This more detailed information was not available for the local roadways within the study area. The IRIS GIS shapefile also segments roadways based on logical roadway termini, such as intersections or changes in road classification. This segmentation was used as the basis for identification of high crash roadway segments.

CRASH ANALYSIS

Crash analysis was conducted to identify the priority locations within the MPO roadway system. This analysis was conducted using the entire crash database provided by SIMPO. This database included crashes from January 1, 2012 through July 26, 2018. **Figure 2** shows all crashes in the database in Williamson and Jackson Counties.

Prior to the identification of high crash locations area wide crash analysis was completed to determine emphasis areas within the MPO roadways that may be the focus of the safety efforts. CMT conducted data tree analysis for this determination as shown in **Figure 3**. Data Trees are a highly beneficial first step in determining roadway systems or crash types should be the primary concern focus area. The crash tree diagram in **Figure 3** shows a comparison of crashes on local roads vs state owned roadways. As shown in the figure, the total crash frequency, injury and fatality rates are similar for both local and state systems. However, when comparing the type of crash on the two systems, the state-maintained system is dominated by intersection and/or congestion related crashes with the highest frequency of crashes being rear end crashes.

Conversely, fixed object crashes are the most frequent crashes on the local system, with over two times the number of crashes as the state system. Fixed object crashes also represents the highest frequency of fatal crashes. The second most frequent type of fatal crashes on the local system was overturned crashes, with 15 fatal crashes, though only having 250 total crashes.

FIGURE 2: CRASH DATA 2012-2018

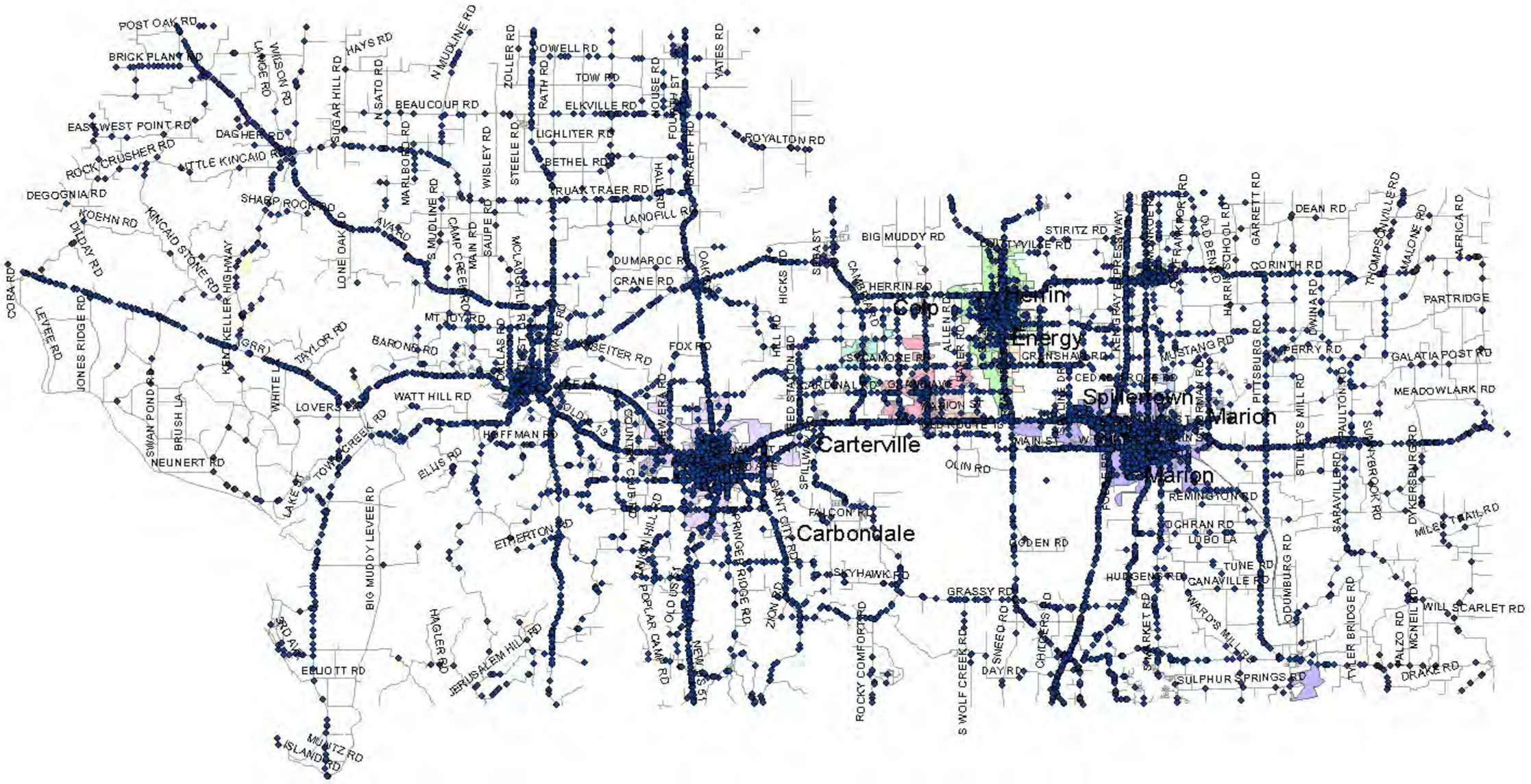
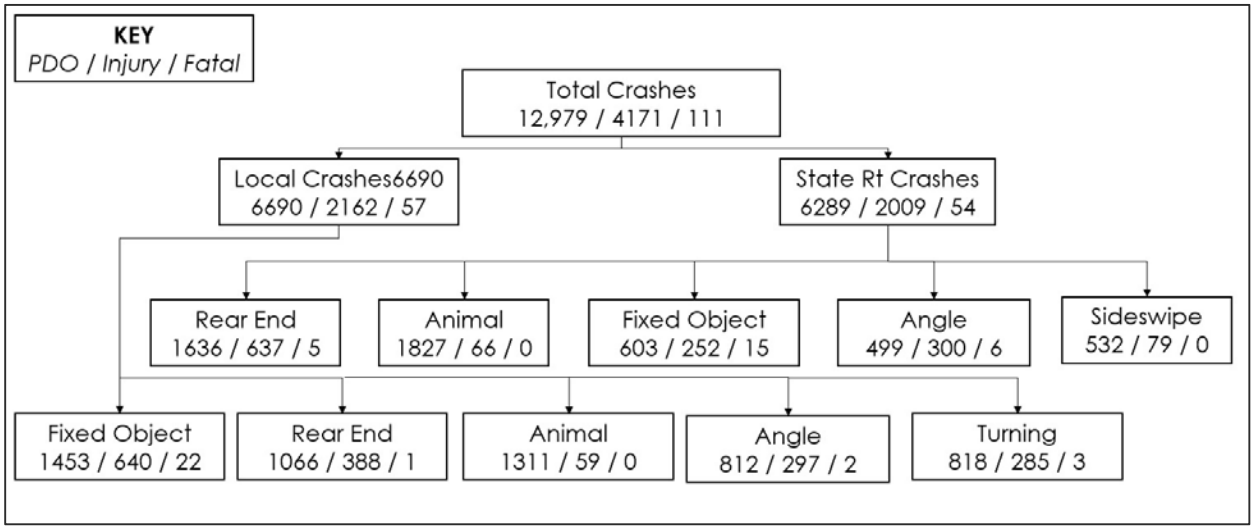


FIGURE 3: DATA TREE CRASH ANALYSIS



Crash data was also analyzed to identify other patterns within the crash data that may assist in the identification of priority locations. **Figure 4** shows the frequency of crashes by location. Williamson and Jackson Counties have comparable total crash and injury frequencies as the primary cities of Marion and Carbondale. However, it is noted that fatal crashes are significantly higher on the rural county roads than the city streets. This is likely due to the higher speeds associated with rural roads.

FIGURE 4: CRASH FREQUENCY AND SEVERITY BY LOCATION

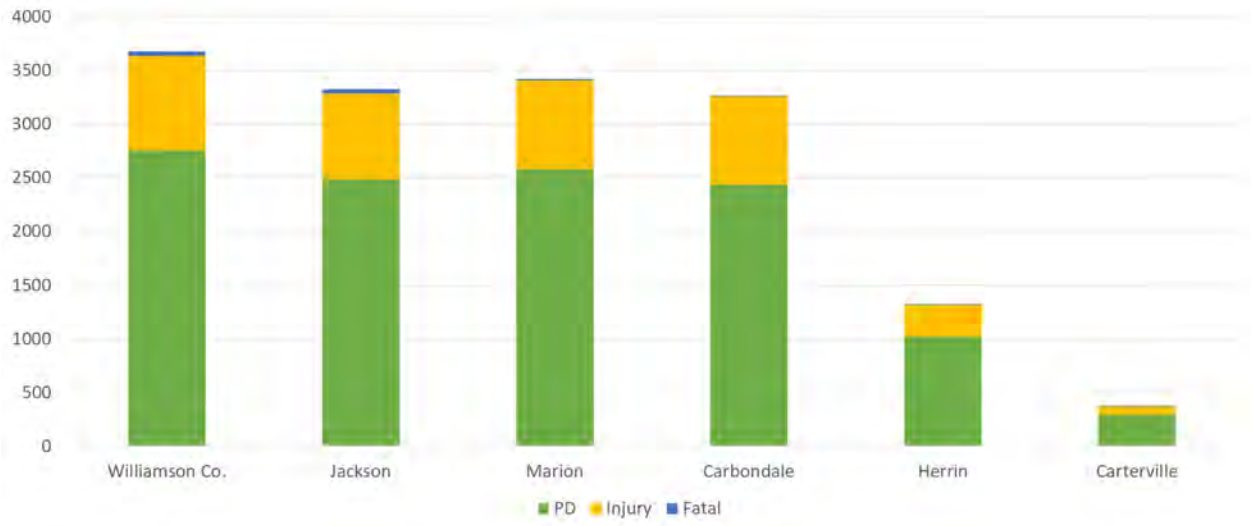
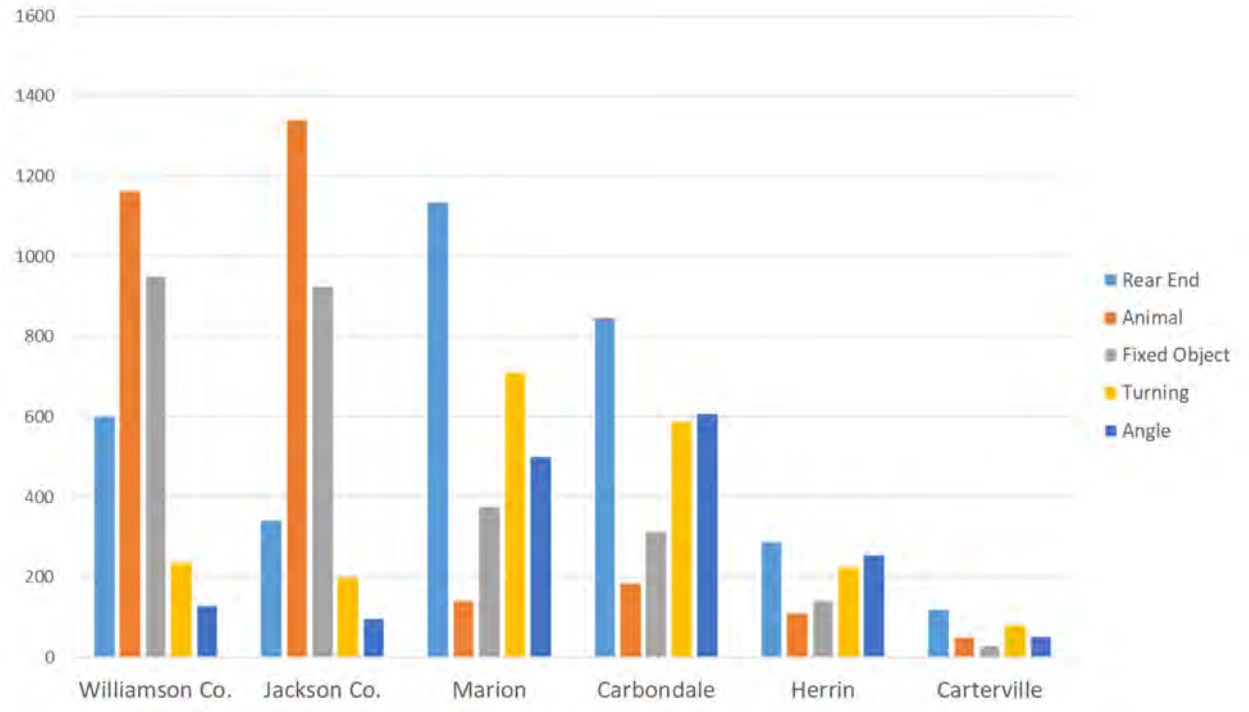


Figure 5 shows the changing crash types between each location. As expected, Animal and Fixed Object crashes are higher on county roads and intersection related crashes such as rear end and turning crashes are higher within cities.

FIGURE 5: CRASH FREQUENCY AND TYPE BY LOCATION



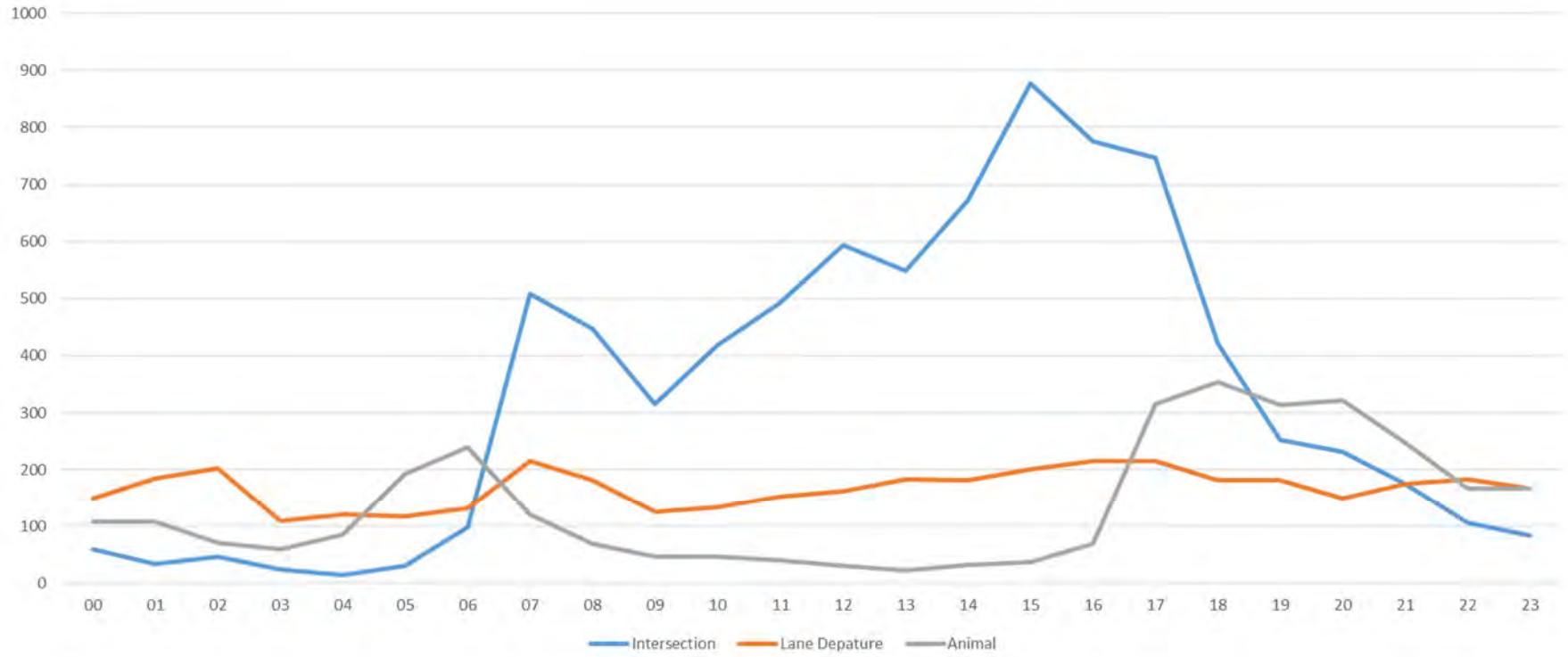
Crashes were also analyzed by time of day. For this analysis, crashes were categorized into 3 groups:

- Lane Departure which included fixed object, overturned, head on or opposite direction sideswipe
- Intersection Crashes which included rear end, angle and turning crashes
- Animal Crashes

Figure 6 shows the frequency of crashes by time of day for these crashes. As can be seen, intersection crashes follow traditional volume peaks with a small peak in the AM, increasing throughout the day and the highest peak correlating with the PM peak period. Conversely, lane departure crashes peak before the AM peak and after the PM peak, likely associated with the increased speed that is possible in the off-peak hours. Animal crashes remain relatively consistent throughout all time periods with a small increase around the AM and PM peak periods, likely attributed to the increase in exposure.

Due to the prevalence of Animal crashes and the lack of engineering solutions to these types of crashes, Animal crashes were removed from the dataset in determining the priority safety locations.

FIGURE 6: CRASH FREQUENCY AND TYPE BY TIME OF DAY



SITE SELECTION METHODOLOGY

A data driven approach was used to identify the priority locations for in depth review and the identification of safety countermeasures. Two types of locations were identified in this process, 1) Roadway Segments and 2) Intersections. Both segments and intersections were limited to local roadways as IDOT is responsible for reviewing safety performance of state-maintained roadways. Intersection locations were also limited to intersection of 2 or more local roadways, and did not include the intersection of local roads with state maintained roadways.

As identified above, intersection analysis included identifying all local-local roadway intersections. Crashes at intersections were identified by geo-reference, identifying all crashes within 300 feet of the centerline of the intersections.

Roadway segments were based on the underlying GIS layer segmentation. Segmentation is based on logical termini of the roadway section, such as intersections, or changes in typical section, functional classification etc. Lengths generally range from 0.5 miles to 1.5 miles in length.

An Equivalent Property Damage Only (EPDO) measure was used to rank each intersection and segment. The EPDO ranking addresses the need to focus on higher crash severities as opposed to locations with high crash frequency but low severity. The EPDO assigns a weight based on the crash severity. For the purposes of this analysis, a weight of 25 was used for fatal crashes and a weight of 10 for A Injury crashes. All other crashes were weighted as one (1). Equation 1 below shows the calculation to determine the EPDO which was used on all roadway segments and intersections. This methodology is consistent with the EPDO ranking used by the Illinois DOT Highway Safety Improvement Program (HSIP).

EQUATION 1: EPDO CRASH CALCULATION

$$\frac{(25)*(\#\text{ of FA}) + 10*(\#\text{ of AA}) + (\#\text{ of BA}) + (\#\text{ of CA}) + (\#\text{ of PDO})}{\text{Total Crashes}}$$

Where,

FA=Fatal crashes
AA=Crash where the most severe injury is an A injury
BA=Crash where the most severe injury is a B injury
CA=Crash where the most severe injury is a C injury
PDO=Property Damage Only

Once EPDO rankings were determined based on the crash data set, sites were also reviewed to determine if they met the Illinois DOT HSIP eligibility requirements. This requires having a minimum of 1 fatal crash or 2 Type A Injury crashes over a 5-year period. **Crashes were reviewed from the 5-year period from January 1, 2013 to December 31, 2017 for this review.**

CMT presented the initial safety analysis to the SIMPO Technical Advisory Committee (TAC) on November 5, 2018. The top 10 locations for both roadway segments and intersections were presented to the committee based on the initial data driven approach and initial field reviews of these sites. Based on input from the committee the priority list was refined. These adjustments were based on the following reasons.

1. Locations did not meet eligibility for IDOT HSIP funding assistance which requires a minimum of 1 fatal crash or 2 Type A injury crashes within the last 5-years.
2. Safety countermeasures were implemented within the last 3 years thus may have improved the safety performance in the future.
3. Locations initially identified as under local ownership were in fact under the jurisdiction of IDOT.

Areas of local concern were also identified by the committee for additional review by CMT. These locations and associated crashes were shown in **Table 1**. These locations were either 1) part of current safety projects being considered or underway or 2) areas of special concern from the public and/or local officials.

TABLE 1: LOCATIONS OF LOCAL CONCERN

LOCATION NAME	Total Crashes	Fatal	A Injury	B Injury	Jurisdiction
Intersection					
Main St and E Grand Road	3	0	0	2	Crainville
Greenbriar Road and Sycamore	12	0	0	2	Carterville
Skyline Drive at Crenshaw Road	27	0	1	7	Williamson Co
Segment					
Dillinger Road (West of Reed Station Road)	25	0	1	4	Jackson Co
North Wall Street (Main Street to Fisher Street)	39	0 *	1	7	Carbondale

* Denotes fatal crash in 2018 (outside of 5-year timeline)

The locations were not included in the final priority list for the following reasons:

- None of the additional locations were shown to meet eligibility for IDOT HSIP funding assistance which requires a minimum of 1 fatal crash or 2 Type A injury crashes.
- The crash frequency and severity were lower than the priority intersection locations

The segment of N. Wall Street from Main St. to Fisher Street would meet the IDOT eligibility requirement if the crash data was expanded to include a 2018 fatal crash. In addition, 1 Type 'A' crash has also been reported. This segment may place within the top 25 locations given these circumstances. However, the criteria used to prioritize crashes on the segment list (**Table 2**) focused on lane departure crashes -- the North Wall Street corridor experiences approximately 50 percent intersection related crashes and 50 percent fixed object crashes. The North Wall Street location was not included in the priority ranking unless directed otherwise by SIMPO.

FINAL PRIORITY LISTING

Based on the methodology presented above, the top 20 intersection locations and Top 20 Roadway segments were identified. **Tables 2 and 3** shows the highest priority locations for both location types. After the prioritization of intersection and roadway segments, the top 6 intersection locations and top 5 segment locations were identified for in depth crash analysis and field review. This information was used to identify potential safety countermeasures based on the FHWA's Proven Safety Countermeasures, the Highway Safety Manual, and the Manual on Uniform Traffic Control Devices (MUTCD).

TABLE 2: PRIORITY INTERSECTION LIST

	INTERSECTION NAME	Total Crash	INJ	FAT	Local Agency	Comments
1	17TH ST & E OUTER ROAD	101	40	0	MARION	Rank #1
2	E PLEASANT HILL RD & GIANT CITY RD	39	21	0	JACKSON CO	Rank #2
3	COUNTRY CLUB RD & OLD IL 13	34	35	0	MURPHYSBORO	Old IL13 IDOT maintenance
4	CARBON ST & W MAIN ST	67	20	0	MARION	Rank #3
5	DIVISION ST & W SYCAMORE ROAD	25	19	0	CARTERVILLE	LED stop sign installation after May 2015
6	MAIN ST & PIONEER CABIN DR	20	18	0	CRAINVILLE	Does not meet minimum IDOT criteria. Condition also may have changed since IL13 (per 12/7/18 email)
7	13TH ST & E. HERRIN ST	29	12	2	HERRIN	Rank #4
8	HALFWAY RD & W MAIN ST (OLD IL 13)	36	9	0	MARION	South leg (4th leg) added 2018 thus changing existing conditions
9	BANDYVILLE RD & E. HERRIN ST	15	13	0	WILLIAMSON CO.	IDOT maintenance begins east of 5th Street in Herrin
10	HALFWAY RD & WALTON WAY	37	17	0	WILLIAMSON CO.	Does not meet minimum IDOT criteria
11	E WALNUT ST & N GIANT CITY RD	35	17	0	CARBONDALE	East leg of intersection is Old IL13 and is IDOT maintenance responsibility
12	ALLEN RD & W. HERRIN ST	17	14	0	HERRIN	Combine with W Herron #4 segment
13	35TH ST & W HERRIN ST	22	12	1	HERRIN	Combine with W Herron #4 segment
14	E GRAND AVE & S BREHM LA	11	10	0	CARBONDALE	Does not meet minimum IDOT criteria
15	E MAIN FRONTAGE RD N & N GIANT CITY I	29	16	0	CARBONDALE	Rank #5
16	E PARK ST & LOGAN DR	17	10	0	CARBONDALE	
17	POPLAR ST & S POPLAR ST	18	7	0	CARBONDALE	
18	COMMANDER DR & I 57 NB TO MAIN ST	34	12	0	WILLIAMSON CO.	
19	CLARK TRAIL & E CLARK TRAIL	10	8	0	WILLIAMSON CO.	
20	CAMBRIA RD & CARDINAL RD	18	11	0	WILLIAMSON CO.	
21	BANDYVILLE RD & CRENSHAW RD	14	12	0	WILLIAMSON CO.	
22	E GRAND AVE & S WALL ST	55	14	0	CARBONDALE	Rank #6
23	E PLEASANT HILL RD & WARREN RD	12	5	1	CARBONDALE	
24	CHAUTAUQUA ST & McLAFFERTY RD	9	8	1	CARBONDALE	
25	MILL ST & S WALL ST	12	7	0	CARBONDALE	
26	CEDAR CREEK RD & OLD US 51	8	5	0	MAKANDA	
27	BAINBRIDGE TRAIL & MAIN ST	10	9	0	WILLIAMSON CO.	
28	CAMBRIA RD & DR SPRINGS RD	10	10	0	WILLIAMSON CO.	
29	17TH ST & E GRAND AVE	24	7	0	WILLIAMSON CO.	
30	17TH ST & CHAMPION DRIVE	36	14	0	WILLIAMSON CO.	
31	COMFORT DR & W MAIN ST	31	14	0	WILLIAMSON CO.	
32	RUSSELL & W MAIN ST	42	7	0	WILLIAMSON CO.	
33	E GRAND AVE & S GIANT CITY RD	30	8	0	CARBONDALE	

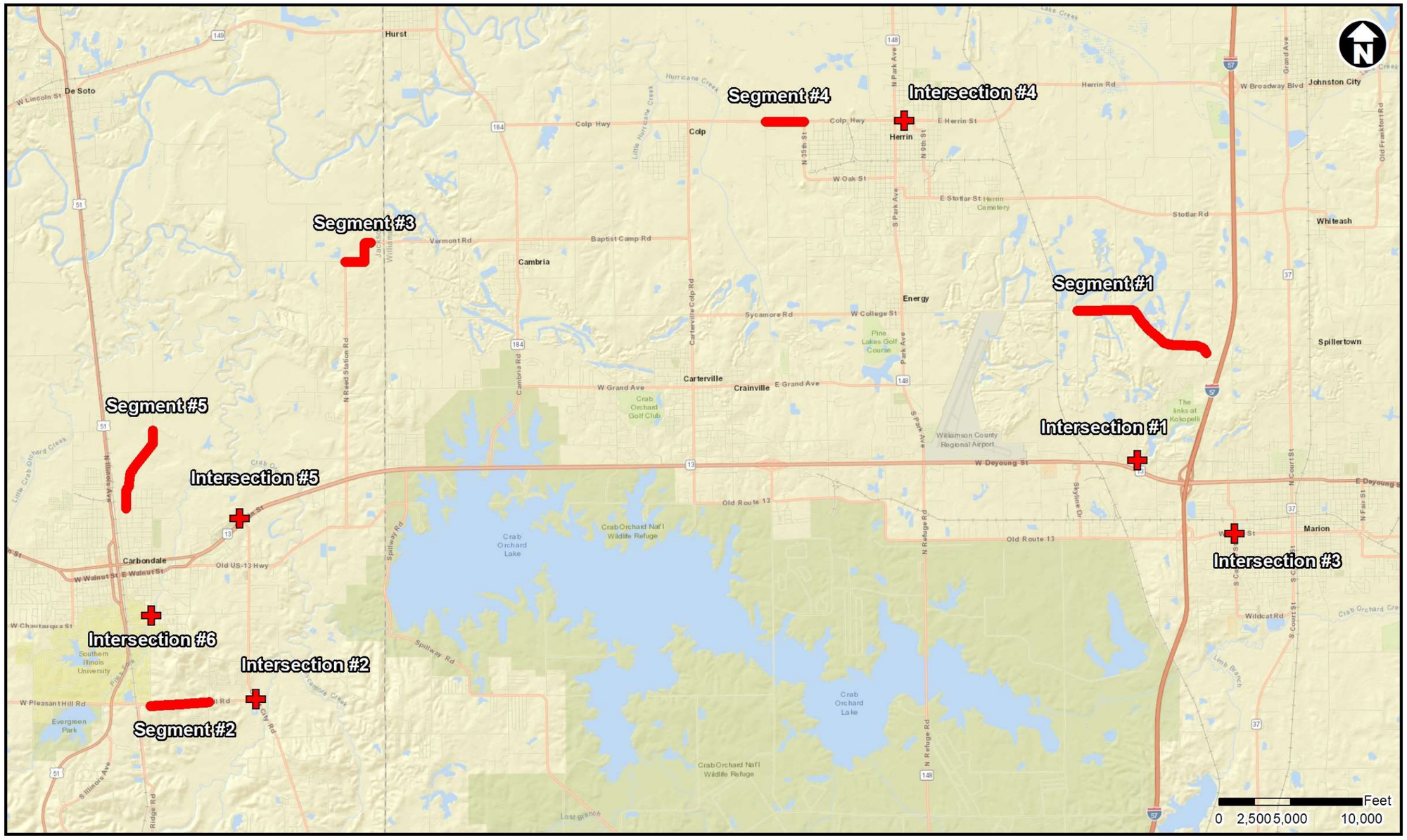
Denotes Location meets IDOT HSIP eligibility

TABLE 3: PRIORITY SEGMENT LIST

IDOT Rank	ROAD_NAME	BEG STA	END STA	TOWNSHIP_N	Total crash	INJ	FAT	Comments
1	CRENSHAW RD	0.40	1.95	WILLIAMSON CO	17	15	0	Rank #1 (expand to include Skyline Drive to Pease Rd)
2	E PLEASANT HILL RD	1.61	2.33	CARBONDALE Twp/ JACKSON CO	8	8	1	Rank #2 Wall Street to Warren Road
3	OLD IL 13	1.83	2.50	MURPHYSBORO	11	11	0	1000' west of Wides Road to Country Club. IDOT maintenance begins east of Wood Road
3	E PARK ST	1.02	1.42	CARBONDALE	9	10	0	Does not meet min IDOT threshold
5	E WALNUT ST	1.92	2.12	IDOT	4	3	1	Old IL13 IDOT jursidiction
6	OLD IL 13	2.87	3.47	MURPHYSBORO	11	5	0	Country Club to Wood Rd. IDOT maintenance begins east of Wood Road (east limits of priority segment)
7	VAUGHN RD	0.00	0.54	DESOTO Twp/ JACKSON CO	9	2	2	Rank #3 Reed Station Rd to 1000' west of Meridian Rd
7	E WALNUT ST	2.12	2.24	IDOT	4	2	1	Old IL13 IDOT jursidiction
9	PUMP HOUSE RD	0.00	0.75	MURPHYSBORO	10	5	0	Does not meet min IDOT threshold
9	OLD IL 13	1.04	1.14	MURPHYSBORO	9	5	0	Does not meet min IDOT threshold
9	SYCAMORE RD	0.00	0.75	WILLIAMSON CO	5	5	0	Does not meet min IDOT threshold
9	W. HERRIN ST	0.24	0.70	HERRIN	4	7	0	Rank #4 43rd Street/Allen Rd to 35th Street
13	N MARION ST	0.62	1.14	JACKSON CO	4	3	1	Rank #5 Fisher Street to Glade Lane
13	HAFER RD	0.54	1.01	WILLIAMSON CO	4	1	1	
13	WARREN RD	0.26	0.33	CARBONDALE	3	3	1	
13	E PLEASANT HILL RD	2.33	2.38	CARBONDALE	3	3	1	extend #2 location (above)
13	WARD'S MILL RD	0.00	1.92	COUNTY UNIT ROAD	2	1	1	
18	COUNTRY CLUB RD	1.04	2.04	MURPHYSBORO	15	5	0	
18	REED STATION RD	0.62	1.48	CARBONDALE	10	5	0	
18	BANDYVILLE RD	1.13	1.64	COUNTY UNIT ROAD	9	6	0	
18	OLD RT 13	2.63	2.75	CARBONDALE	5	4	0	
18	S 22ND ST	0.31	0.57	COUNTY UNIT ROAD	5	5	0	
18	E PARK ST	0.46	0.75	CARBONDALE	12	3	0	
18	DALLAS RD	0.00	0.70	SOMERSET	11	8	0	
18	STATE-SPILLERTOWN RD	0.00	0.75	COUNTY UNIT ROAD	8	3	0	
18	BOSKYDELL RD	1.25	3.11	MAKANDA	4	3	0	
27	IL 13 EB TO I57 NB	0.12	0.52	COUNTY UNIT ROAD	17	7	0	
27	S MARKET RD	0.13	1.61	COUNTY UNIT ROAD	17	6	0	
27	CRENSHAW RD	2.35	2.60	COUNTY UNIT ROAD	6	4	0	
27	COUNTRY CLUB RD	2.04	3.10	MURPHYSBORO	10	4	0	
31	IL 13 EB TO I57 NB	0.00	0.12	COUNTY UNIT ROAD	12	3	0	
31	17TH ST	0.25	0.29	COUNTY UNIT ROAD	7	3	0	
Denotes Location meets IDOT HSIP eligibility								

Countermeasures were also developed with a focus on low cost safety measures such as signing and striping. However, where appropriate or necessary higher cost countermeasure may be identified for consideration, if warranted by the scope and scale of the crash problem. **Appendices A1 through A6** include site-specific analysis and recommendations for each of the top intersection locations. **Appendices B1 through B5** include site-specific analysis and recommendations for each of the top segment locations.

FIGURE 7: PRIORITY STUDY LOCATIONS



SIMPO SAFETY STUDY

APPENDIX A1: WILLIAMSON CO PKWY AND 17TH STREET/ E. OUTER ROAD

CMT

Williamson County Parkway and 17th Street/ Outer Road Intersection

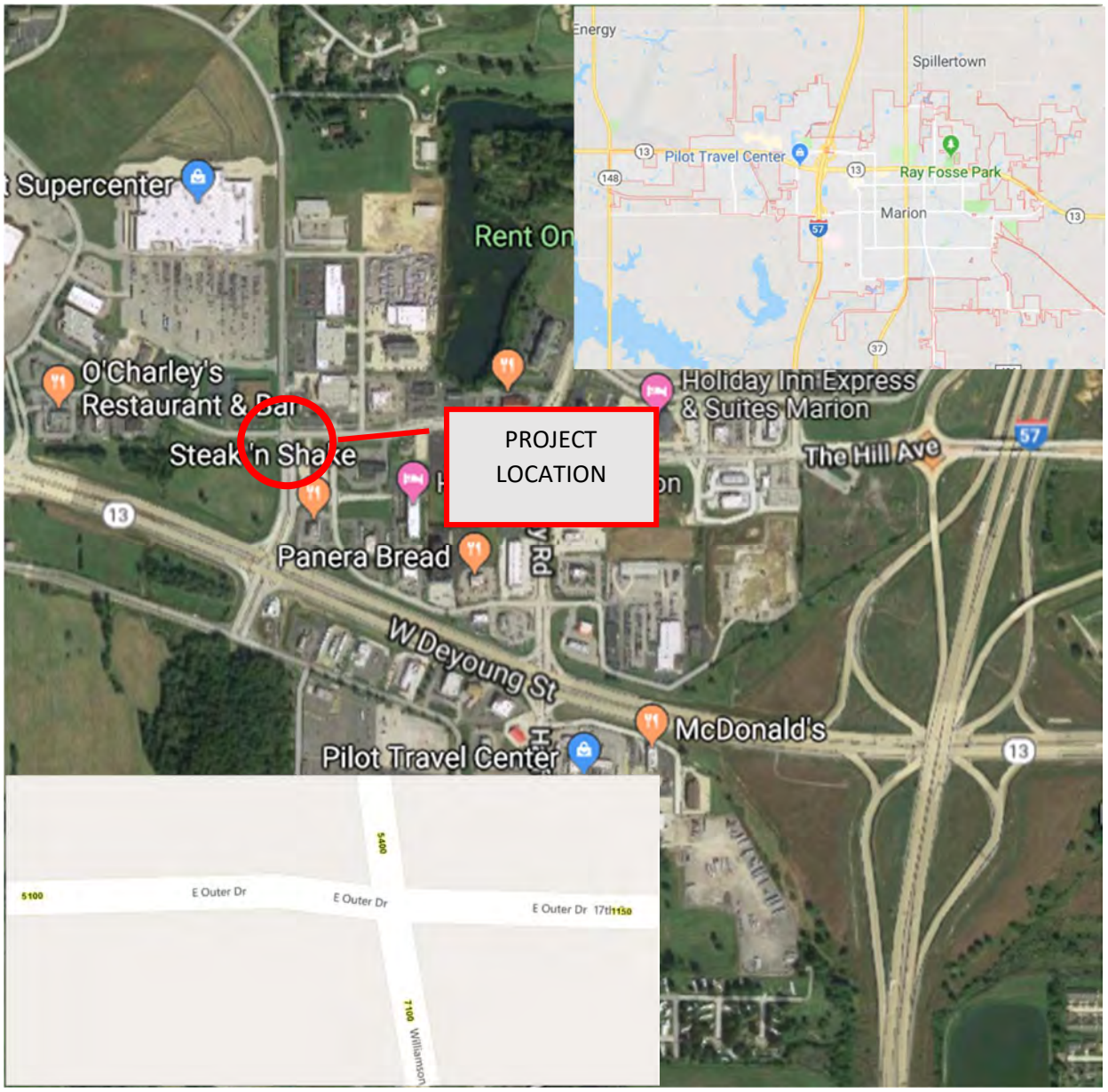
Intersection Priority #1

June 2019

INTRODUCTION

The Williamson County Parkway and 17th Street/ Outer Road intersection located within the City of Marion was identified as the top ranked intersection within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The 4-leg intersection is signalized.

PROJECT LOCATION



EXISTING CONDITIONS

The subject intersection is a 4-leg intersection that is signalized. The adjacent land use is comprised only of commercial property. The Outer Road and 17th Street corridor serves as a parallel route to IL Route 13. **Figure 1** is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

The traffic signal installation is a combination of overhead mounted signal heads (Williamson County Parkway) and ground mounted signal heads (Outer Road/ 17th Street). **Photo 1** shows the northbound approach of Williamson County Parkway. The red arrows indicate the location of the signal head locations for the side street approaches. The standard signal head position within the region is an overhead installation above the travel lane and are located on the far side of the intersection.

PHOTO 1: NB WILLIAMSON COUNTY PARKWAY

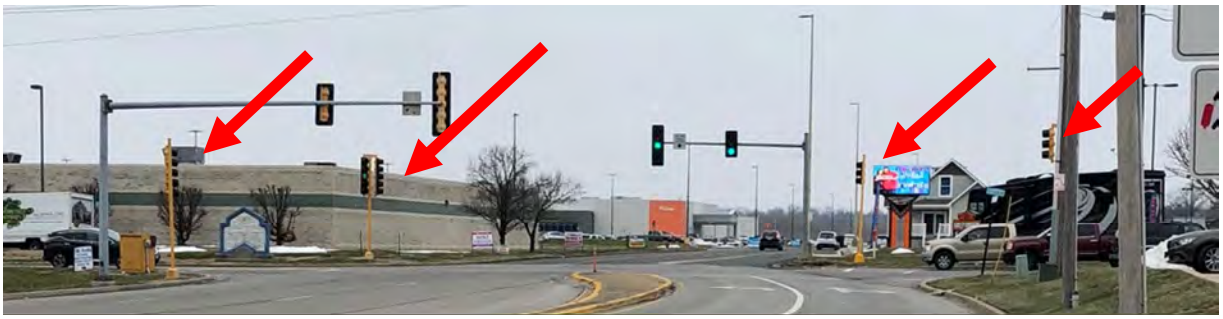


Figure 2 shows the position of vehicles in opposing left turn lanes on Williamson County Parkway. The available intersection sight distance (ISD) of approaching vehicles is reduced to 25 feet. The ISD for a posted speed of 30 MPH is 290 feet for a single unit delivery truck.

FIGURE 2: NB LEFT TURN SIGHT DISTANCE (PLAN VIEW)

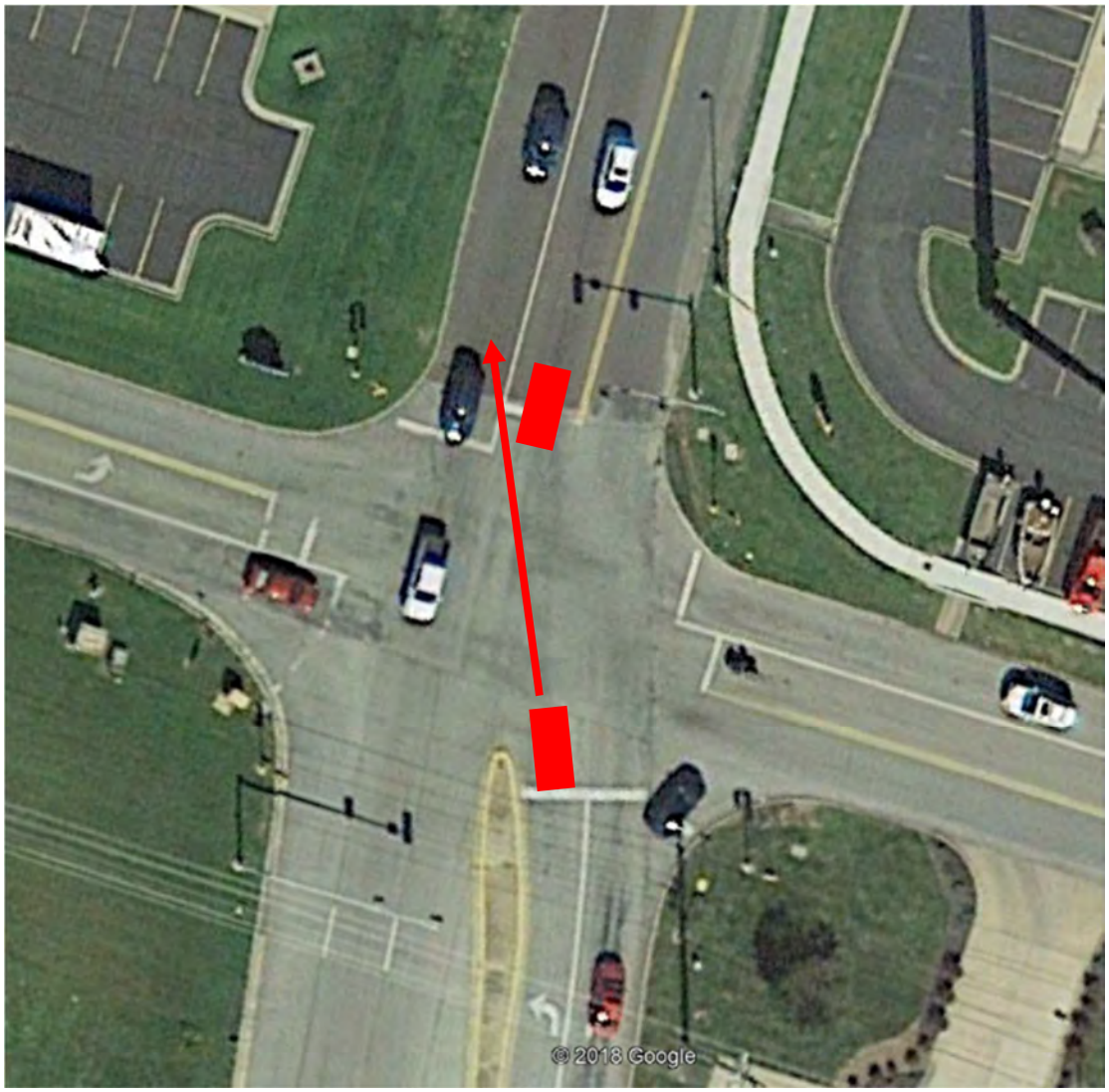


Figure 2 shows another constraint that may be a factor contributing to the safety performance of the intersection. The alignment of the northbound approach requires left turn movements to be completed from a position near the stop line. The intersection geometry is susceptible to sideswipe meeting crashes of opposing left turning vehicles on Williamson County Parkway. The protected/permissive signal phasing also contributes to the potential for sideswipe meeting crashes.

Photo 2 shows a perspective of a NB left turning vehicle. Vehicles in the southbound left turn lane would obstruct the view of northbound left turning vehicles.

PHOTO 2: NB LEFT TURN SIGHT DISTANCE (STREET VIEW)

Photo 3 shows rutting in the NE quadrant of the intersection. The curb radii are equal to 25 feet on all quadrants of the intersection. Photo 3 also shows the position of the side street stop lines being less than 10 feet from the edge of the cross street.

PHOTO 3: NE QUADRANT

SAFETY ANALYSIS

A total of 78 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 3**. The crash frequency is distributed evenly across all study years indicating that the normal variation of crashes over time does not occur within the study area.

The frequency of crashes by type on **Figure 4** shows a majority of crashes (55% or 43 crashes) are left turning crashes. The addition of angle crashes results in over 55 crashes (or 70 percent) of types typically corrected with signalization.

Figure 5 shows the distribution of crashes within the study area by severity. The fatal and injury crashes at the subject intersection represent 32 percent of the total crashes. **The injury crashes include 3 Type A crashes and 8 Type B crashes.** No fatalities occurred at the intersection within the time frame of the study.

Figure 6 shows the severity of crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. The highest left turn crashes were coded on the northbound approach. The northwest bound left turn crashes and westbound left turn crashes are combined to equal 22 left turning crashes.

Other left turn crashes may have occurred at driveways within the functional area of the intersection. For example, left turn crashes were coded as South with 2 locations: On Pavement (Roadway) suggesting a driveway related crash and Intersection which suggests occurring at the signalized intersection.

FIGURE 3: FREQUENCY OF CRASHES BY YEAR

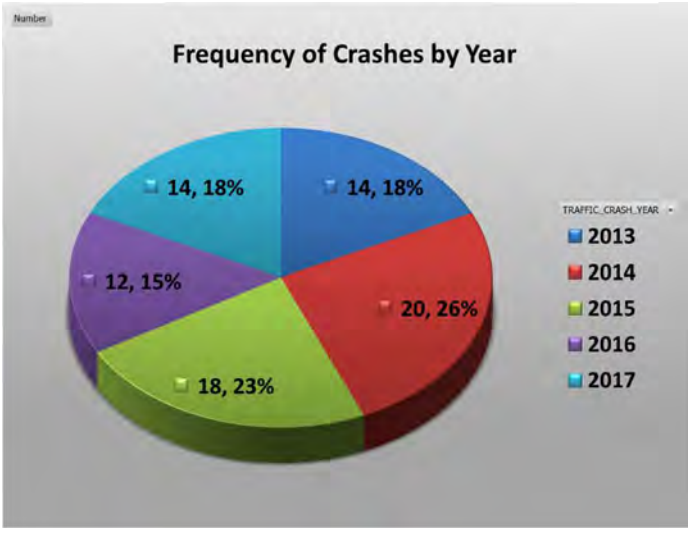


FIGURE 4: FREQUENCY OF CRASHES BY TYPE

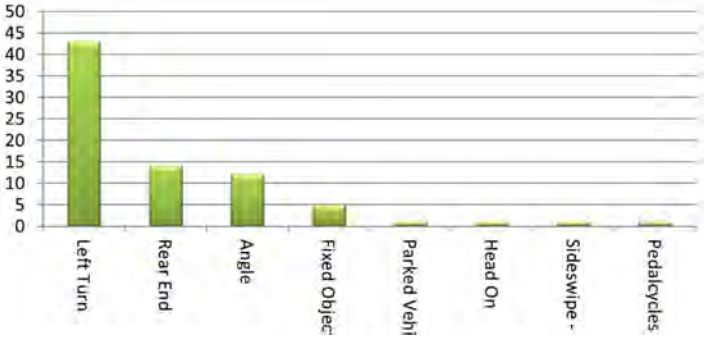
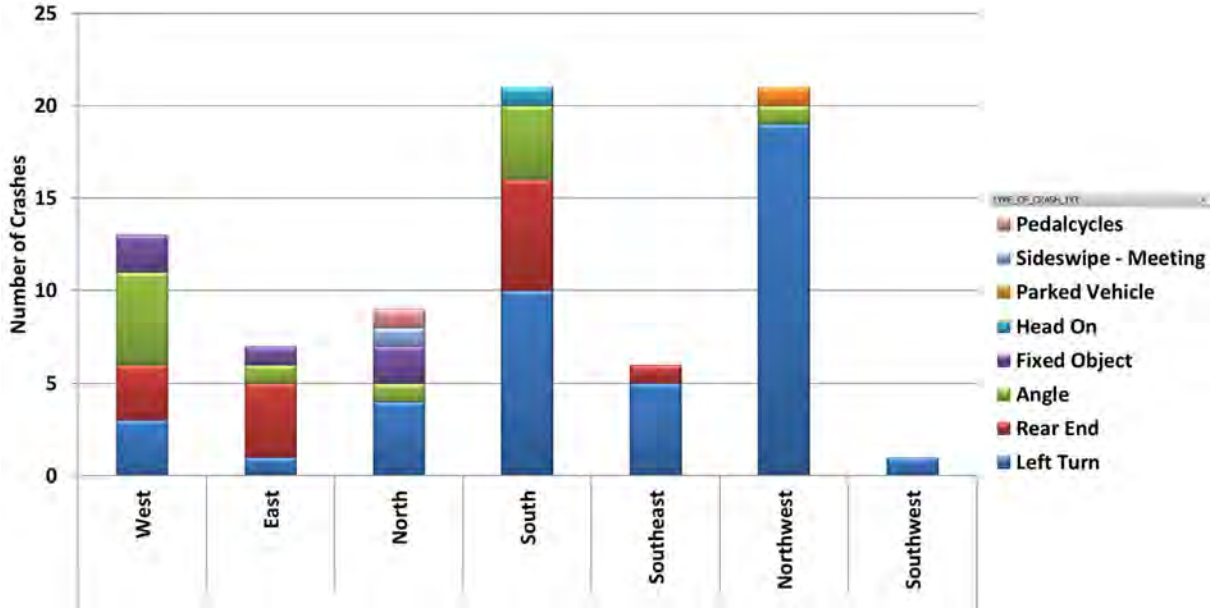


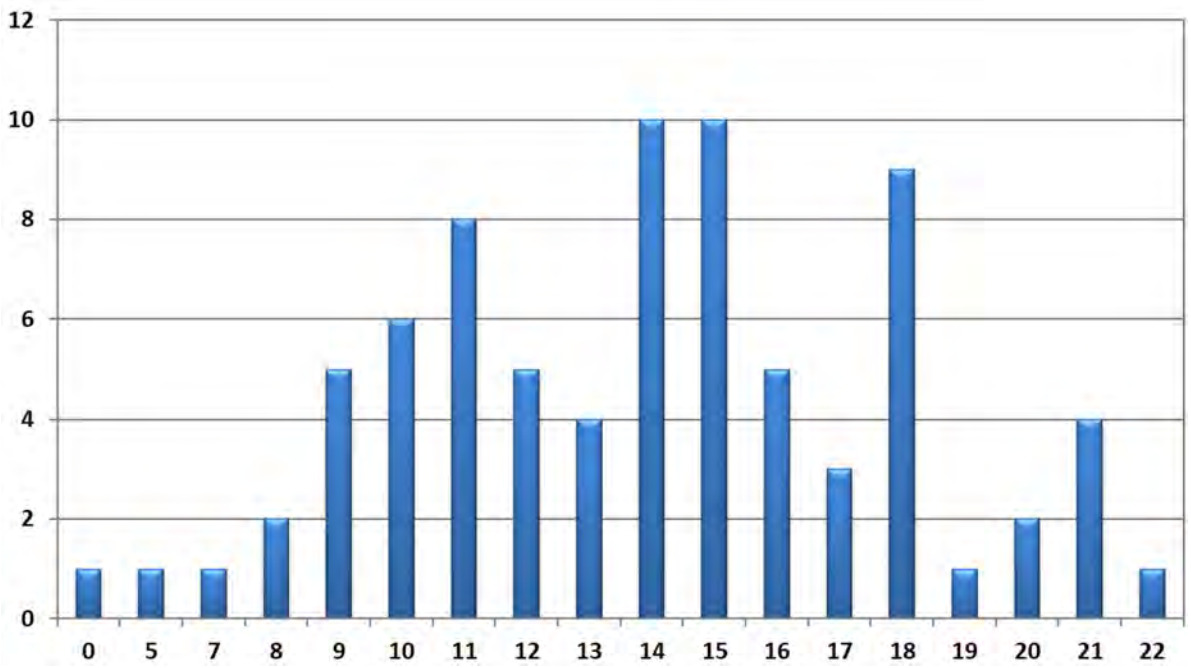
FIGURE 5: FREQUENCY OF CRASHES BY SEVERITY

FIGURE 6: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The crashes' frequency by time of day suggests that congestion is a contributing factor to the safety performance of the study area. **Figure 7** shows the distribution by time of day. The highest frequency of crashes occurs in the afternoon and PM peak time frames. A late AM peak is also evident which is typical of an area having commercial land uses.

FIGURE 7: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on traffic control not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – REALIGN NB APPROACH

The crash type having the greatest frequency (22 crashes or 28 percent) was attributed to the northbound left turn movement. Limited sight distance due to the alignment of the northbound approach is the primary contributing factor. Realignment of the northbound left turn lane is recommended to mitigate the left turn crashes at the signalized intersection. Capacity is expected to increase due to the reduced potential for sideswipe-meeting crashes of opposing left turn movements on Williamson County Parkway.

Figure 8 shows a conceptual plan of realigns the northbound left turn lane. The northbound lanes would be aligned to meet the roadway section north of 17th Street/ Outer Road. Design assumptions used to develop the conceptual plan include the following:

1. Design speed of 35 MPH used for horizontal alignment of Williamson County Parkway between IL Route 13 and 17th Street/ Outer Road.
2. No pavement widening
3. No reconstruction of the IL Route 13/Williamson County Parkway intersection

A crash modification factor (CMF) to remove a negative offset of a left turn movement can be expected to reduce all crashes by 34%.

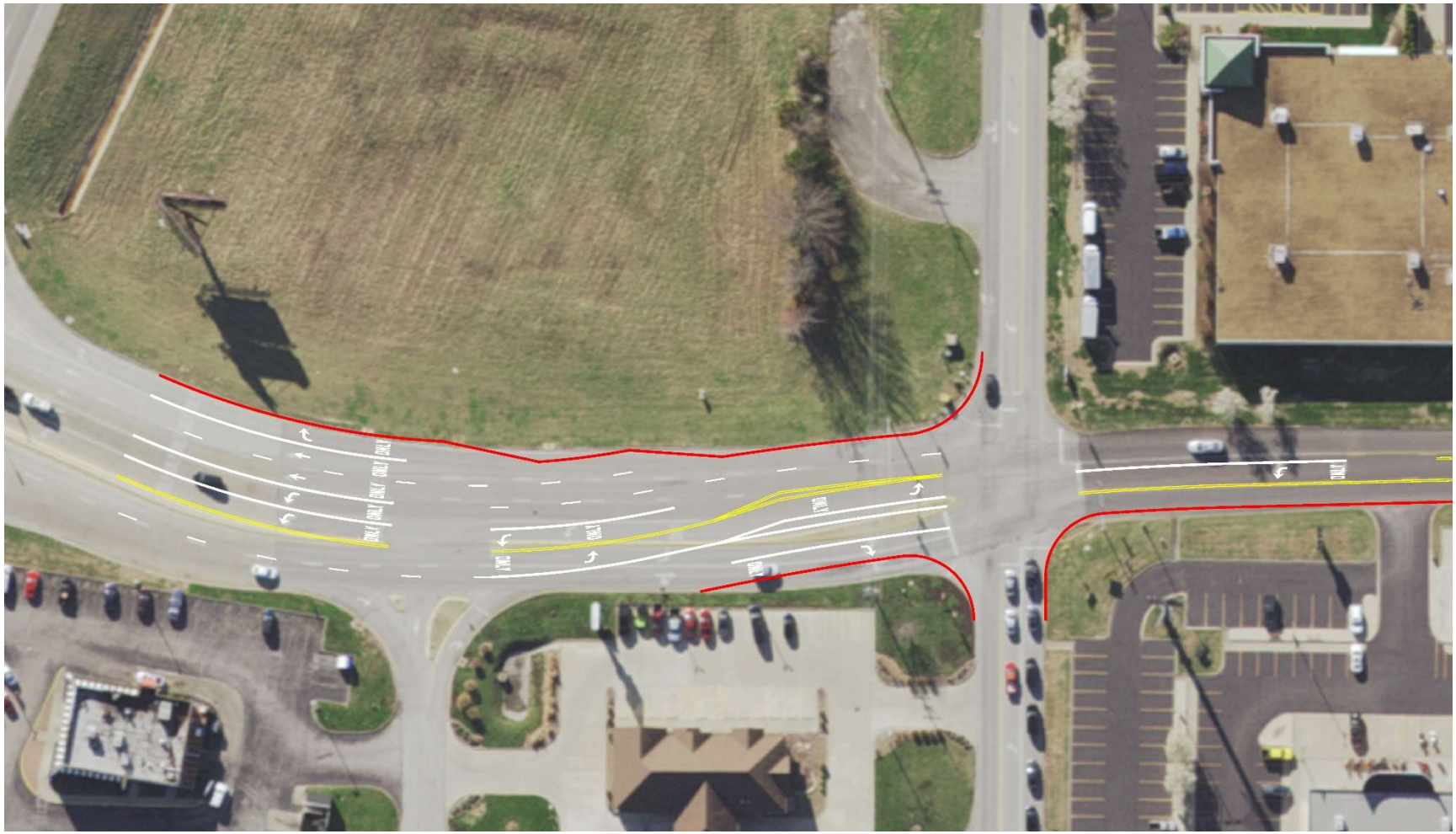
Realignment of the northbound left turn lane will enable a northbound right turn lane to be added to the 17th Street/ Outer Road intersection. The addition of the right turn lane is not based on a capacity rationale but rather the reduction of cost associated with removing existing pavement.

SHORT TERM COUNTERMEASURE – RECONSTRUCT TRAFFIC SIGNAL

The existing traffic signal uses a combination of overhead signal supports and ground mounted pedestals for signal head placement. The addition of signal supports on the 17th Street and Outer Road approaches is recommended to improve signal head visibility. Other countermeasures to include with the traffic signal reconstruction include the following:

- The reconstruction of the traffic signal would include the addition of backplates with reflective borders on the new signal heads. The backplates countermeasure is a proven safety countermeasure by FHWA that reduces all crashes on the east/west approaches by 15%.
- Setback stop lines to increase start up time and reduce conflicts during the clearance intervals. Recalculate clearance intervals based on final stop line locations.
- Increase turning radius on the NE quadrant of the intersection. The existing signal support is at risk of being damaged by over-tracking of truck trailers.

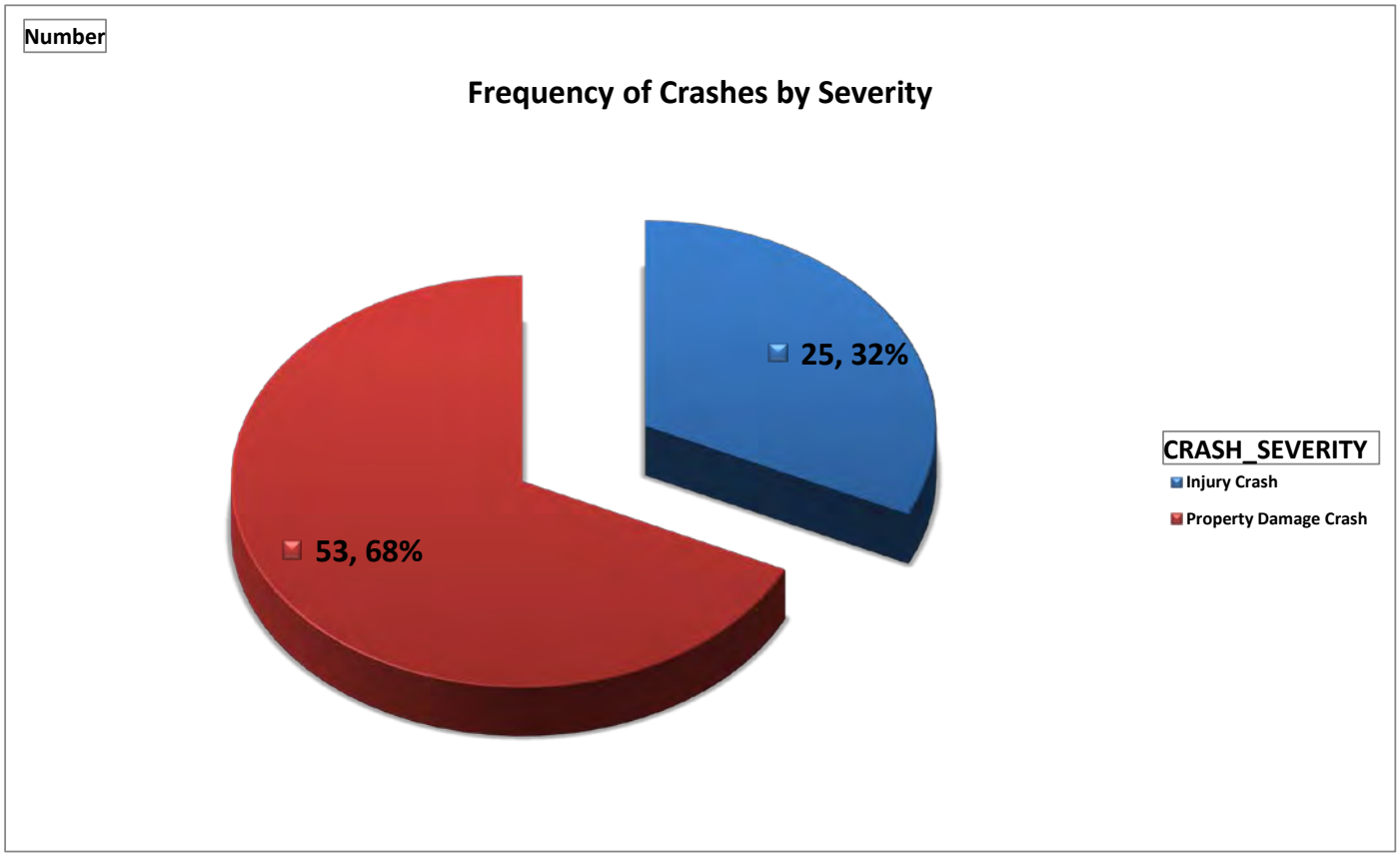
FIGURE 8: NB LEFT TURN LANE ALIGNMENT

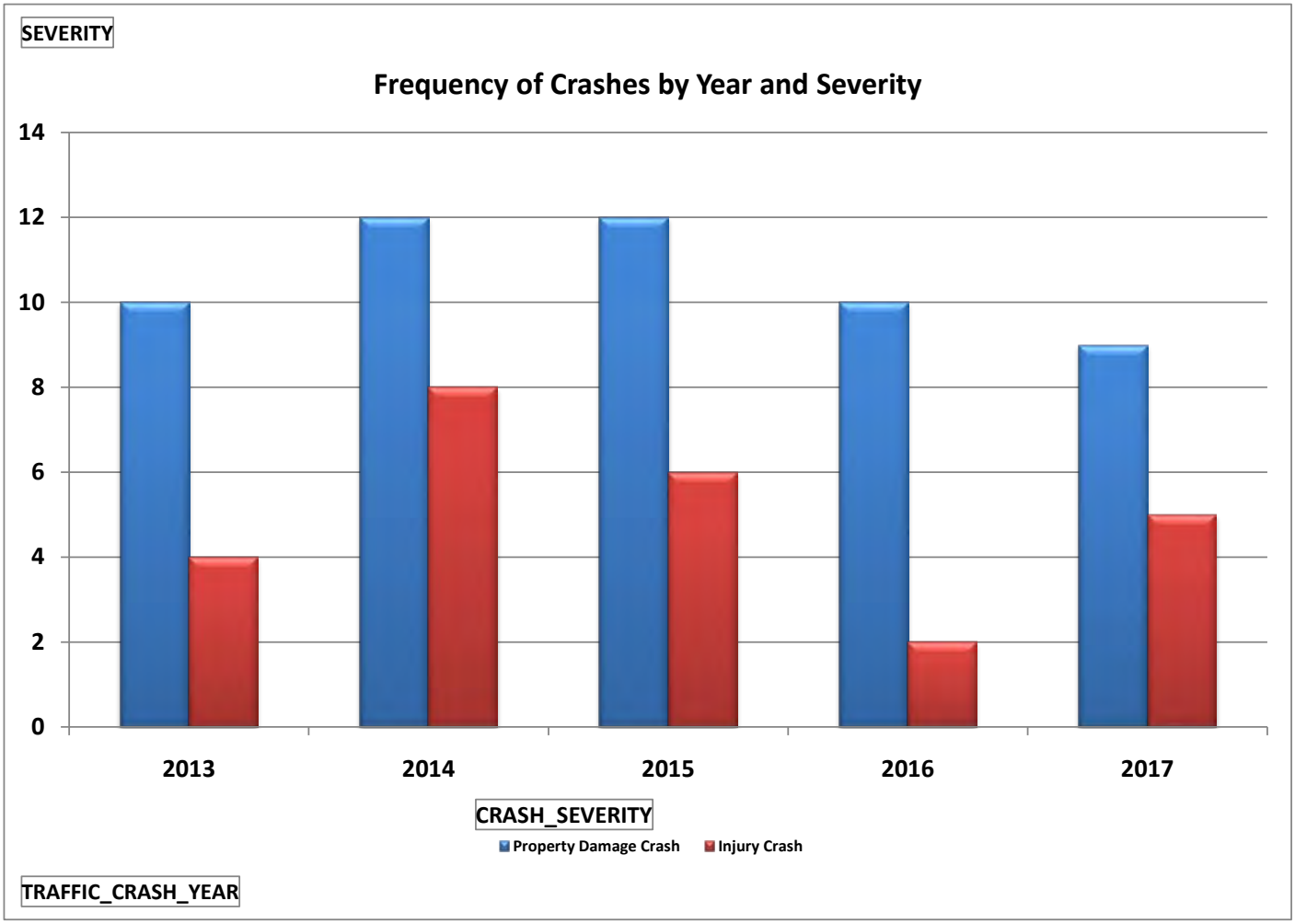


CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701068423	17	03	20	08	Mon	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	West	Straight Ahead	B-Injury
201701092779	17	04	19	14	Wed	1	1	0	Pedalcyclist	Cloudy/Overcast	Daylight	Dry	No Defects	Lane Use Marking	Marion	Other/Unknown	Passenger	North	Straight Ahead	On Pavement (Roadway)	N/A	N/A	N/A	B-Injury
201701121301	17	05	18	09	Thu	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Straight Ahead	Intersection	Pickup	North	Straight Ahead	A-Injury
201701141406	17	06	02	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701158772	17	06	25	14	Sun	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701131113	17	05	25	11	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	Intersection	Pickup	West	Turning Left	PD
201701204577	17	07	28	17	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701207021	17	08	15	18	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201701254322	17	09	29	16	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701267012	17	10	12	10	Thu	2	0	0	Turning	Cloudy/Overcast	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	West	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201701285460	17	10	29	11	Sun	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	South	Straight Ahead	Intersection	SUV	West	Turning Left	C-Injury
201701279188	17	10	20	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Turning Left	Intersection	Pickup	South	Straight Ahead	PD
201701307166	17	11	15	15	Wed	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701342511	17	12	19	14	Tue	2	1	0	Turning	Clear	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	C-Injury
201601071418	16	03	24	09	Thu	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Right	Intersection	Passenger	South	Slow/Stop - Left Turn	PD
201601042981	16	02	12	12	Fri	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	Northwest	Turning Left	Intersection	SUV	South	Straight Ahead	C-Injury
201601072730	16	03	27	14	Sun	2	0	0	Turning	Cloudy/Overcast	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Turning Left		Passenger	North	Straight Ahead	PD
201601059976	16	03	08	15	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	SUV	South	Straight Ahead	PD
201601087862	16	04	16	15	Sat	3	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601095753	16	04	26	13	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201601095994	16	04	23	11	Sat	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	C-Injury
201601114036	16	05	15	14	Sun	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601124002	16	05	26	11	Thu	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	Intersection	Passenger	Northwest	Turning Left	PD
201601136577	16	06	16	22	Thu	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	ctor With Semi-Tra	West	Turning Right	Off Pavement - Right				PD
201601237748	16	10	10	16	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201601241426	16	10	12	10	Wed	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	South	Straight Ahead	PD
201501108517	15	06	04	16	Thu	2	0	0	Sideswipe Opposite Direction	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	North	Backing	Other	Passenger	South	Backing	PD
201501085315	15	04	15	12	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Marion	Other/Unknown	SUV	West	Turning Right	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201501067405	15	04	03	11	Fri	2	0	0	Angle	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Passenger	West	Straight Ahead	PD
201501119811	15	06	19	18	Fri	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	South	Turning Left	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201501145818	15	07	23	11	Thu	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	A-Injury
201501172083	15	09	02	15	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	Southeast	Turning Left	Intersection	Pickup	North	Straight Ahead	PD
201501181931	15	09	10	19	Thu	2	1	0	Rear End	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	C-Injury
201501143705	15	07	24	15	Fri	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501205564	15	10	02	07	Fri	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	West	Straight Ahead	Intersection	Pickup	South	Straight Ahead	PD
201501233656	15	10	28	09	Wed	2	1	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	Southeast	Turning Left	Intersection	Passenger	North	Straight Ahead	C-Injury
201501295574	15	12	28	18	Mon	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201501276691	15	12	10	18	Thu	2	1	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Turning Left	Intersection	SUV	West	Straight Ahead	B-Injury
201501300172	15	02	13	18	Fri	2	0	0	Parked Motor Vehicle	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Pickup	Northwest	Turning Right	Other	Pickup	East	Parked	PD
201501210708	15	10	07	13	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Southeast	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501288540	15	12	23	17	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501317774	15	03	14	14	Sat	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	North	Turning Left		Pickup	South	Straight Ahead	C-Injury
201501407439	15	02	25	12	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501100748	15	05	22	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201400163669	14	03	20	08	Thu	2	0	0	Turning	Clear	Daylight	Dry	Worn Surface	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Right	On Pavement (Roadway)	SUV	West	Straight Ahead	PD
201400140644	14	03	10	13	Mon	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	C-Injury
201400130676	14	03	02	14	Sun	2	0	0	Rear End	Snow	Daylight	Snow or Slush	No Defects	Traffic Signal	Marion	Other/Unknown	Unknown	West	Straight Ahead	Intersection	Passenger	West	Slow/Stop In Traffic	PD
201400168088	14	03	22	05	Sat	2	1	0	Head On	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	Intersection	SUV	North	Straight Ahead	C-Injury
201400102489	14	02	07	15	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	On Pavement (Roadway)	SUV	South	Slow/Stop In Traffic	C-Injury
201400208993	14	08	09	12	Sat	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Pickup	Southeast	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201400248918	14	05	13	09	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Slow/Stop In Traffic	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	PD
201400249288	14	05	17	15	Sat	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	PD
201400094468	14	02	01	18	Sat	2	0	0	Turning	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201400296553	14	09	08	16	Mon	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Southwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201400352854	14	07	10	14	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400373767	14	08	17	20	Sun	2	1	0	Angle	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	South	Straight Ahead	C-Injury
201400371253	14	08	12	09	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Southeast	Turning Left	Intersection	SUV	North	Straight Ahead	PD
201400374806	14	08	19	15	Tue	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	West	Straight Ahead	B-Injury
201400390732	14	09	11	11	Thu	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Turning Left	Intersection	Van/Mini-Van	North	Straight Ahead	C-Injury
201400390663	14	09	11	21	Thu	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	PD
201400429711	14	11	09	00	Sun	1	1	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Straight Ahead	Off Pavement - Right				C-Injury
201400439514	14	11	26	14	Wed	2	0	0	Turning	Snow	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Van/Mini-Van	South	Straight Ahead	PD
201400427894	14	11	03	16	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Unknown	West	Unknown	Intersection	Passenger	South	Straight Ahead	PD
201400448265	14	12	09	18	Tue	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301052321	13	01	19	21	Sat	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Slow/Stop - Left Turn	Other	Passenger	East	Straight Ahead	PD
201301053941	13	01	21	13	Mon	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201301145773	13	06	19	21	Wed	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				PD
201301046551	13	01	12	17	Sat	2	0	0	Turning	Rain	Darkness, Lighted Road	Wet	No Defects	Stop Sign/Flasher	Marion	Normal	SUV	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201301045753	13	01	11	14	Fri	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Van/Mini-Van	West	Other	Off Pavement - Right				A-Injury
201301229546	13	10	23	10	Wed	1	0	0	Fixed Object	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	ctor With Semi-Tra	North	Turning Right	Off Pavement - Right				PD
201301075136	13	05	28	12	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Slow/Stop In Traffic	On Pavement (Roadway)	Pickup	East	Unknown	PD
201301361607	13	10	14	21	Mon	2	3	0	Turning	Clear	Darkness	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Turning Left	C-Injury
201301361145	13	10	13	15	Sun	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	Intersection	Passenger	West	Slow/Stop - Left Turn	PD
201301357589	13	10	01	18	Tue	2	1	0	Angle	Clear	Dusk	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	Northwest	Slow/Stop - Load/Unload	On Pavement (Roadway)	SUV	South	Straight Ahead	B-Injury
201301353209	13	10	04	15	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301408165	13	12	04	11	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Turning Left	Intersection	Van/Mini-Van	South	Straight Ahead	PD
201301415199	13	12	11	20	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	East	Slow/Stop In Traffic	Intersection	SUV	East	Slow/Stop In Traffic	PD

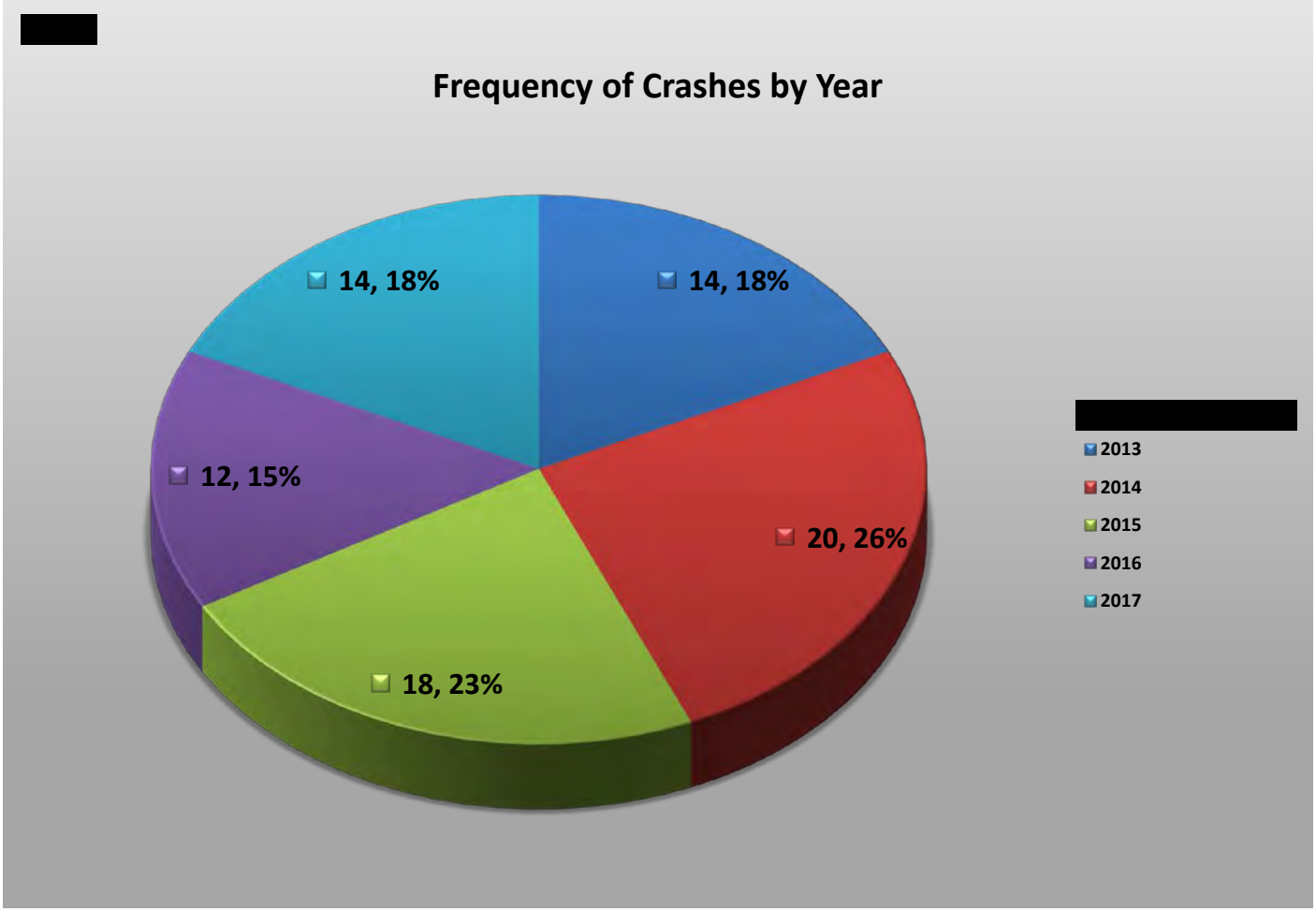
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201301415157	13	12	11	18	Wed	2	4	0	Turning	Other	Darkness, Lighted Road	Other	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	Southeast	Turning Left	Intersection	Passenger	North	Straight Ahead	B-Injury

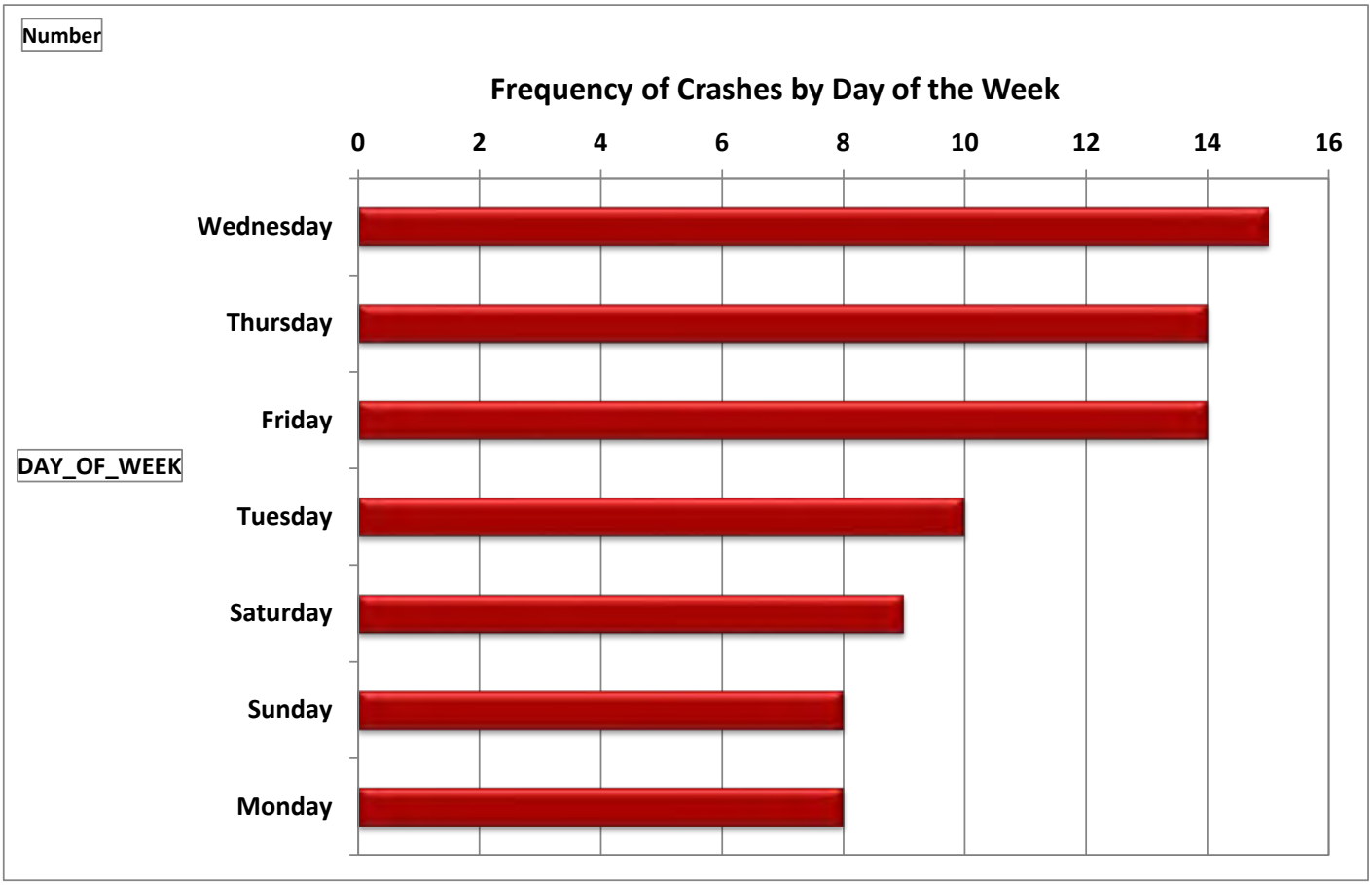
Intersection 01





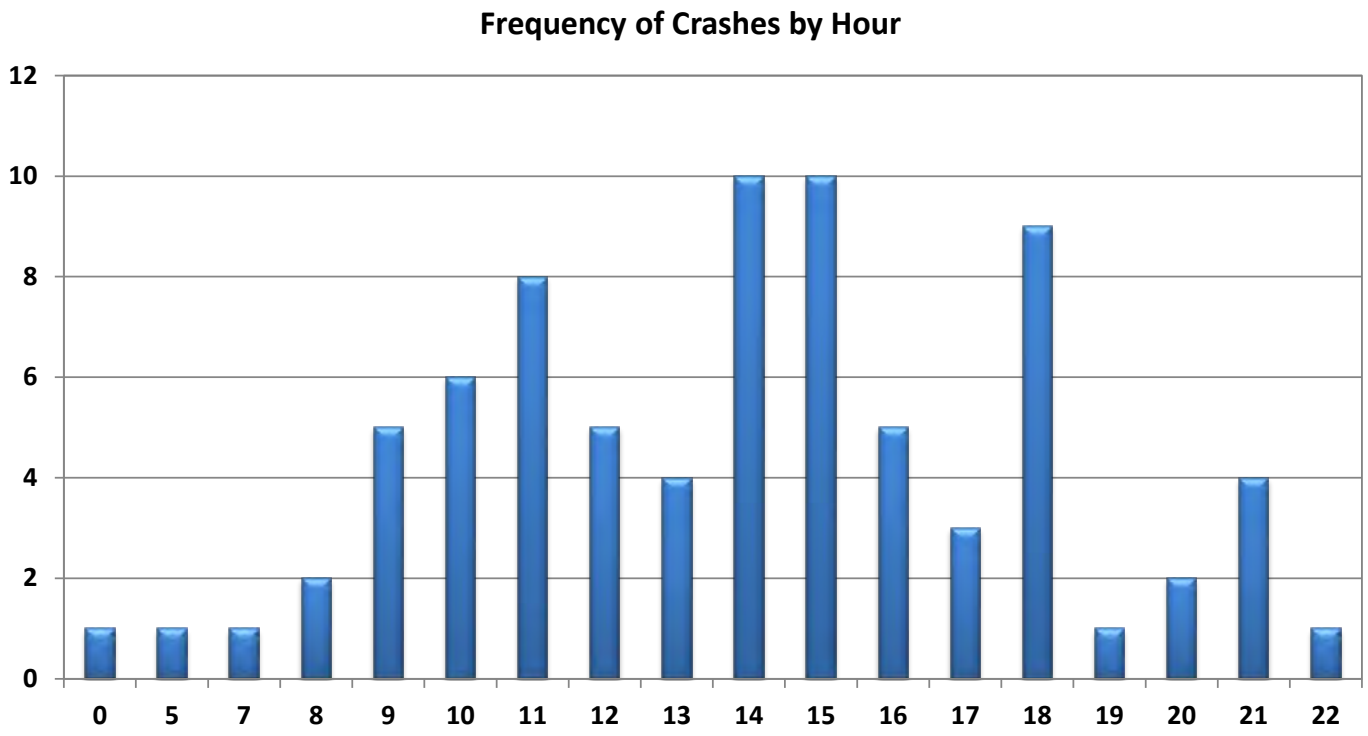
Intersection 01



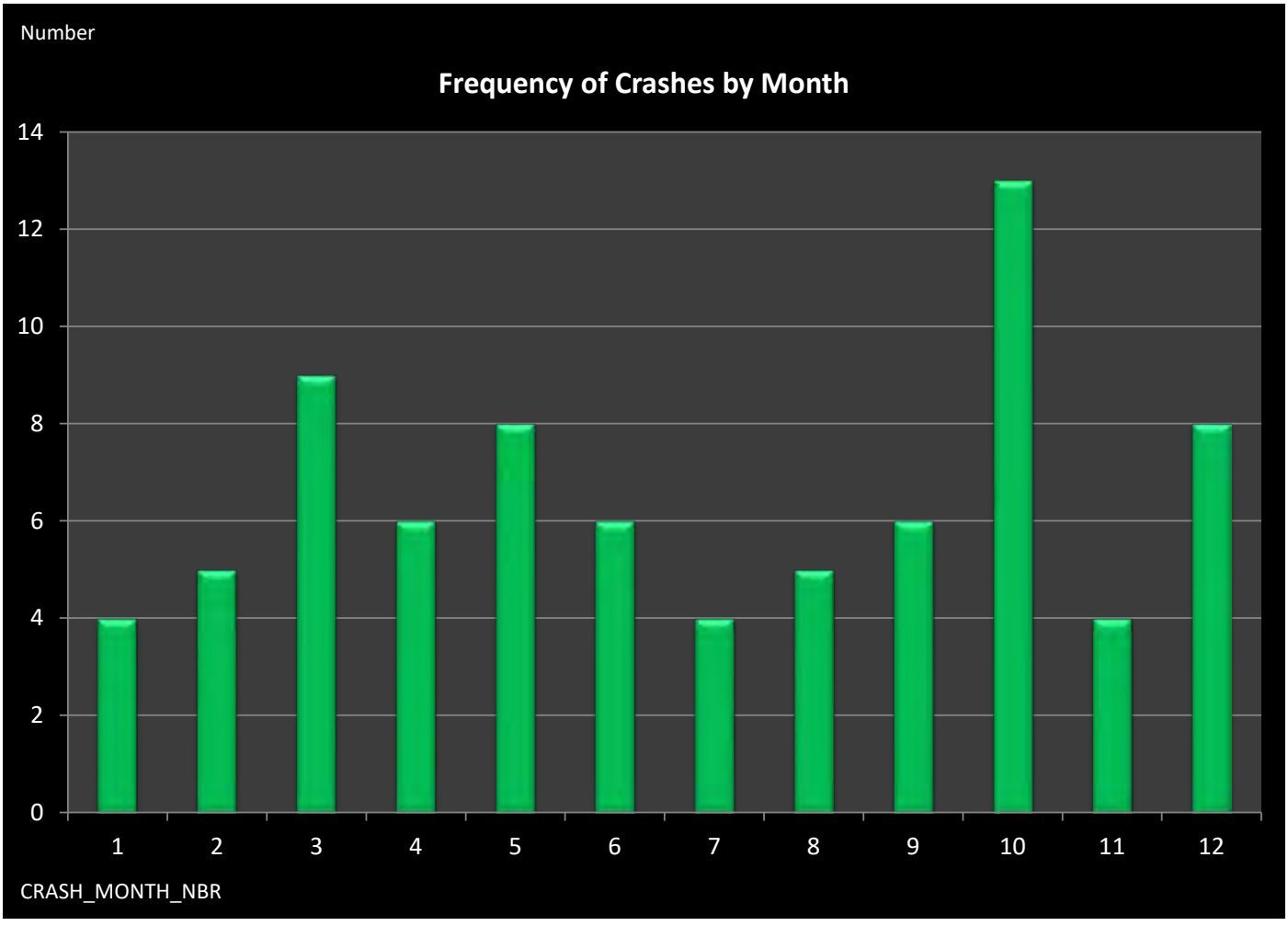


Intersection 01

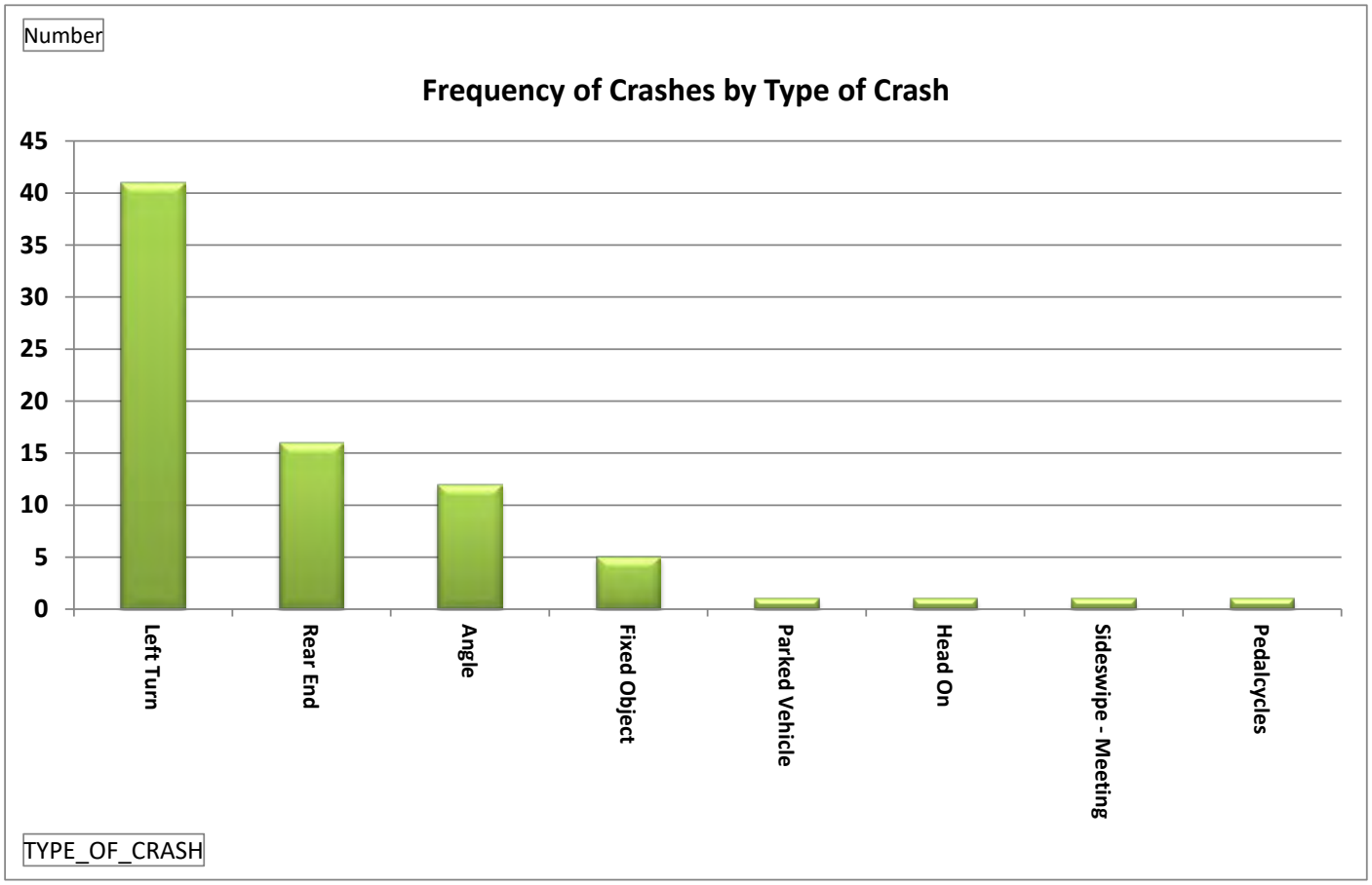
[redacted]

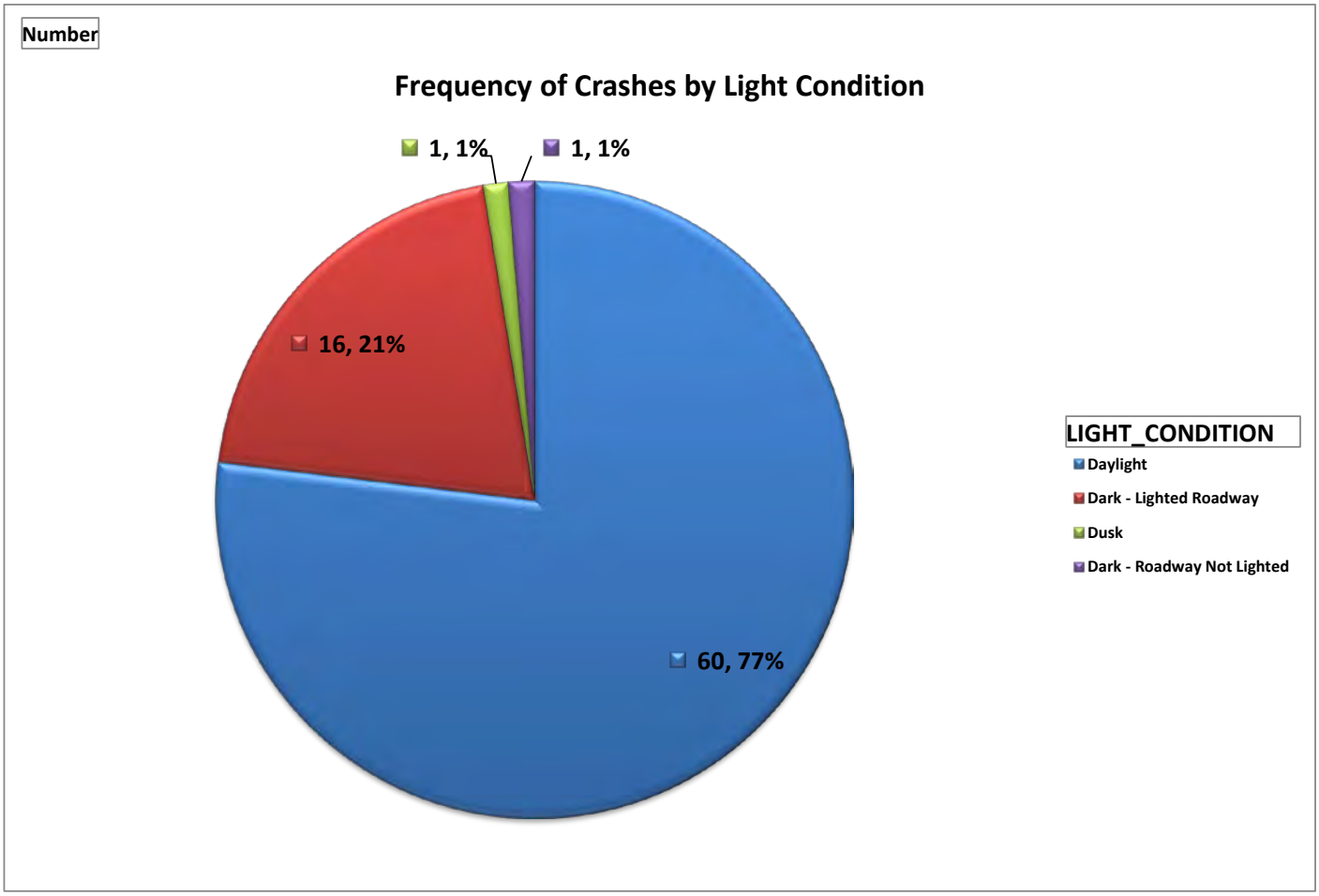


[redacted]

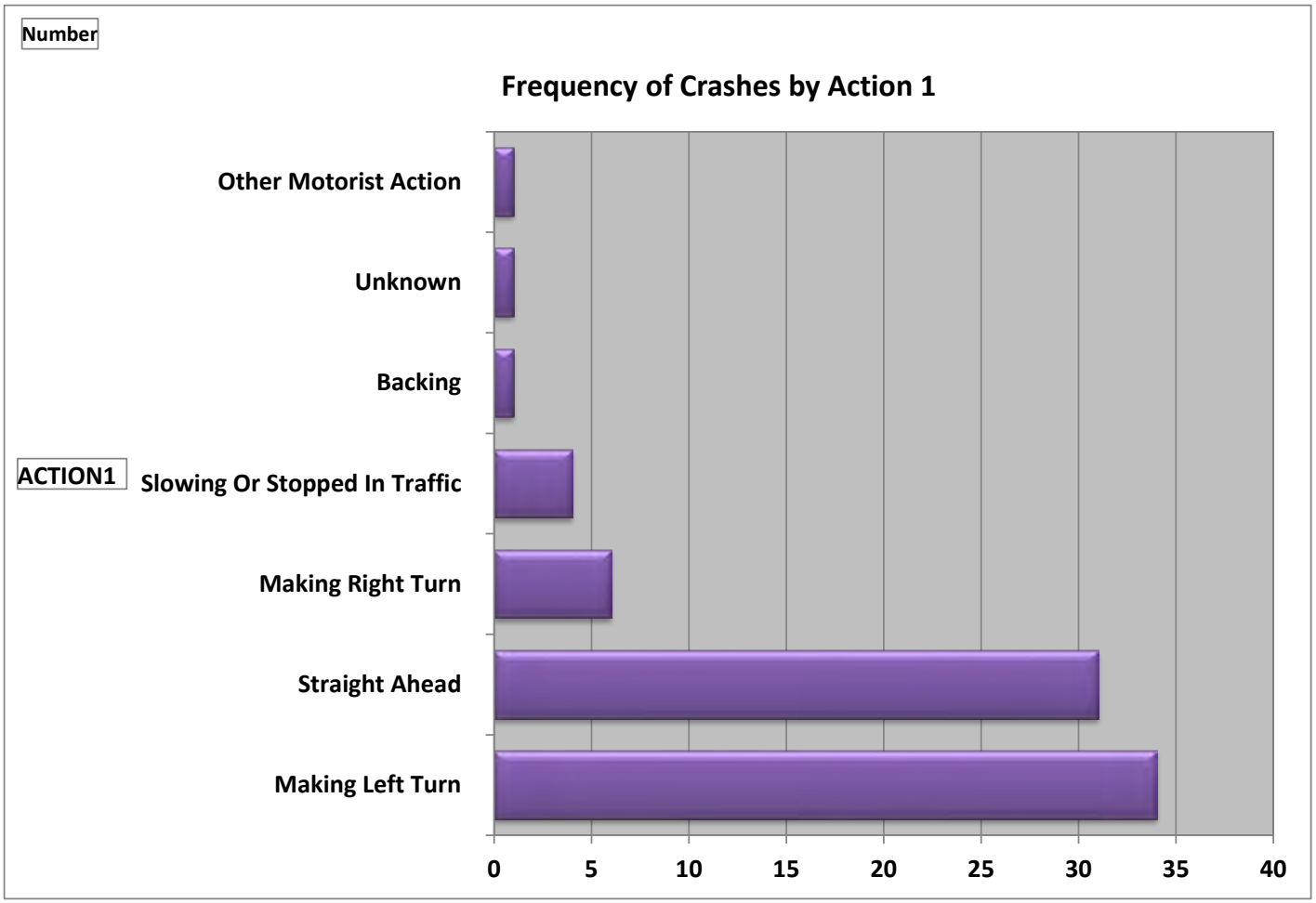


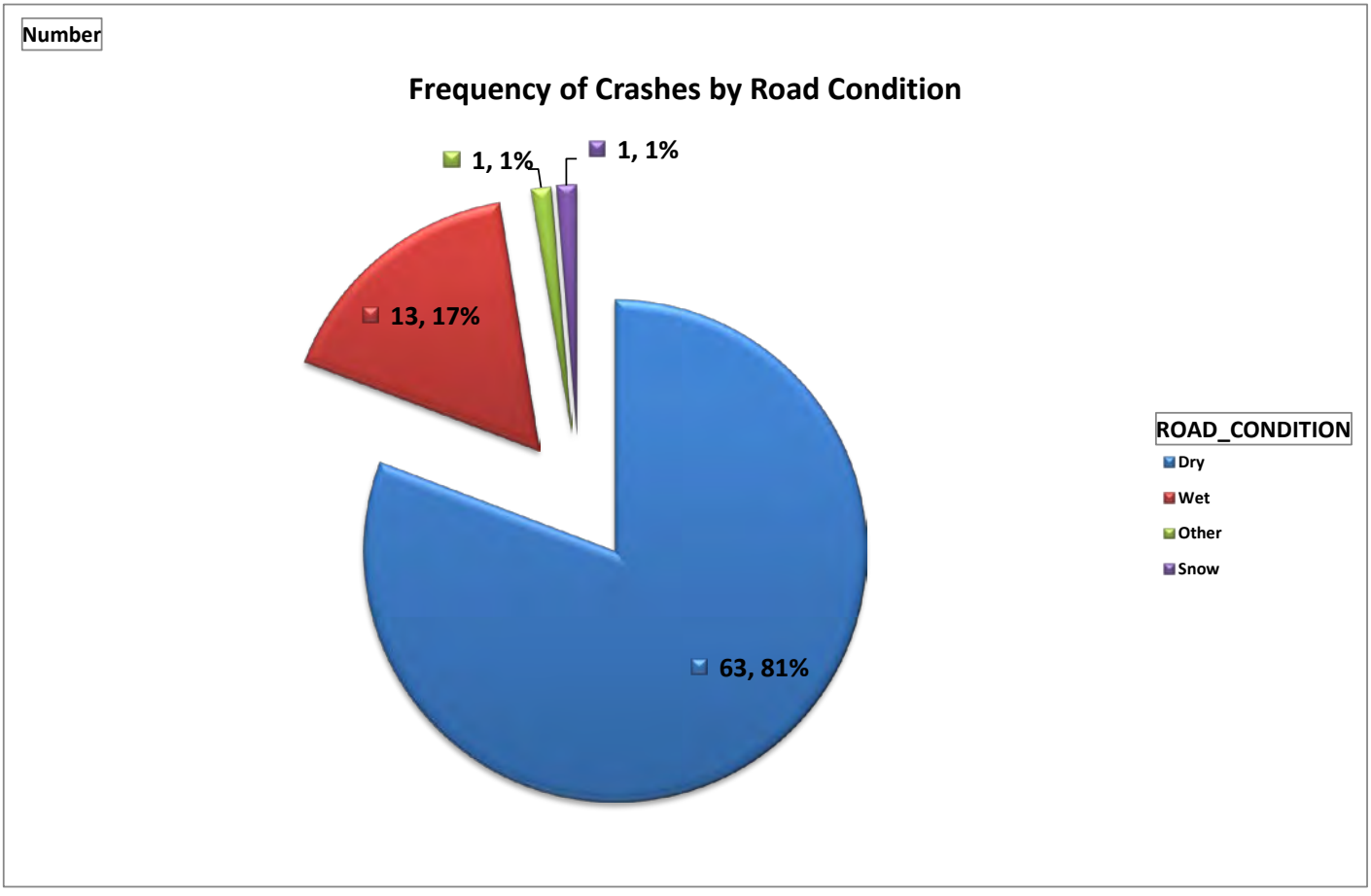
Intersection 01



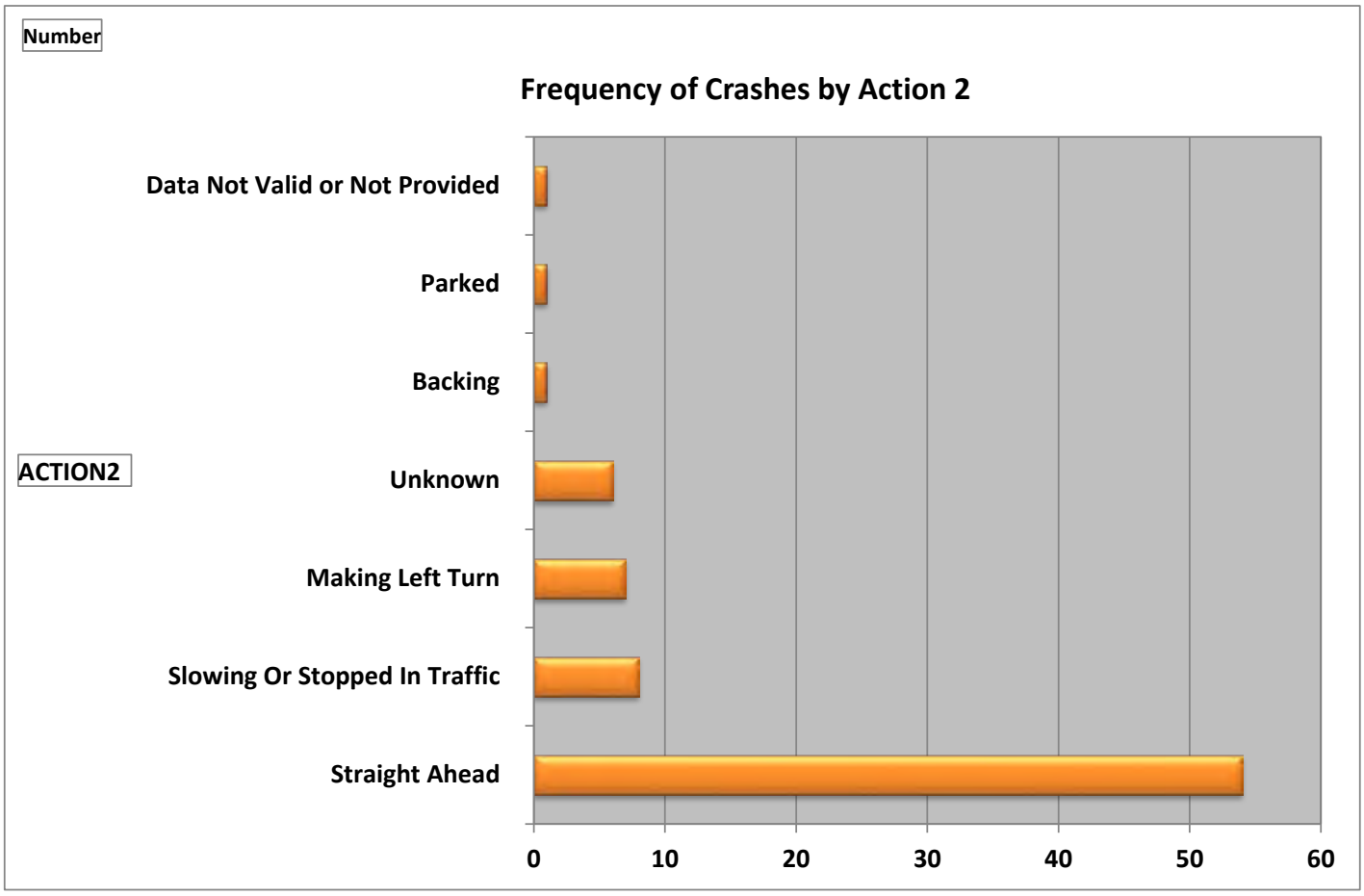


Intersection 01



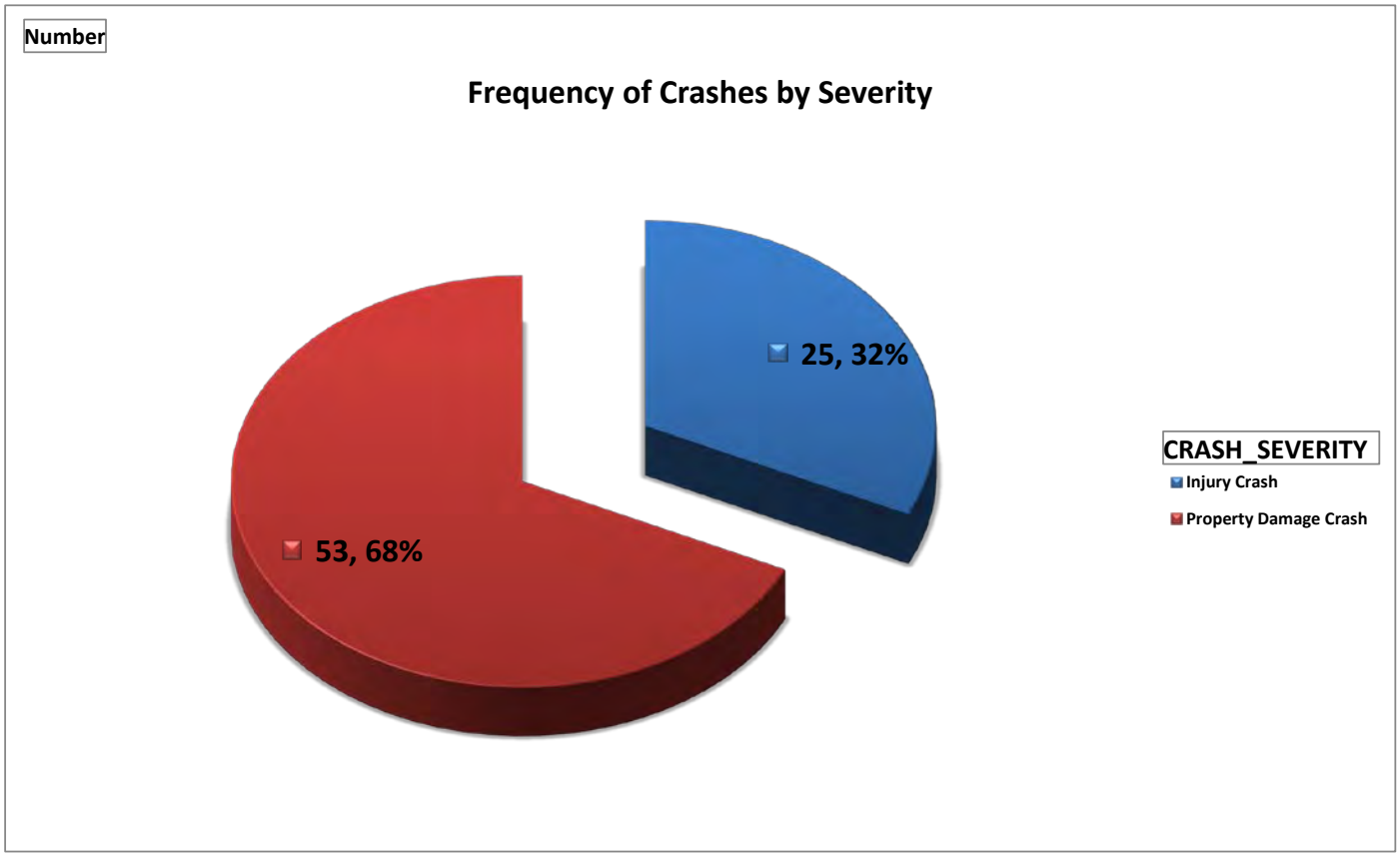


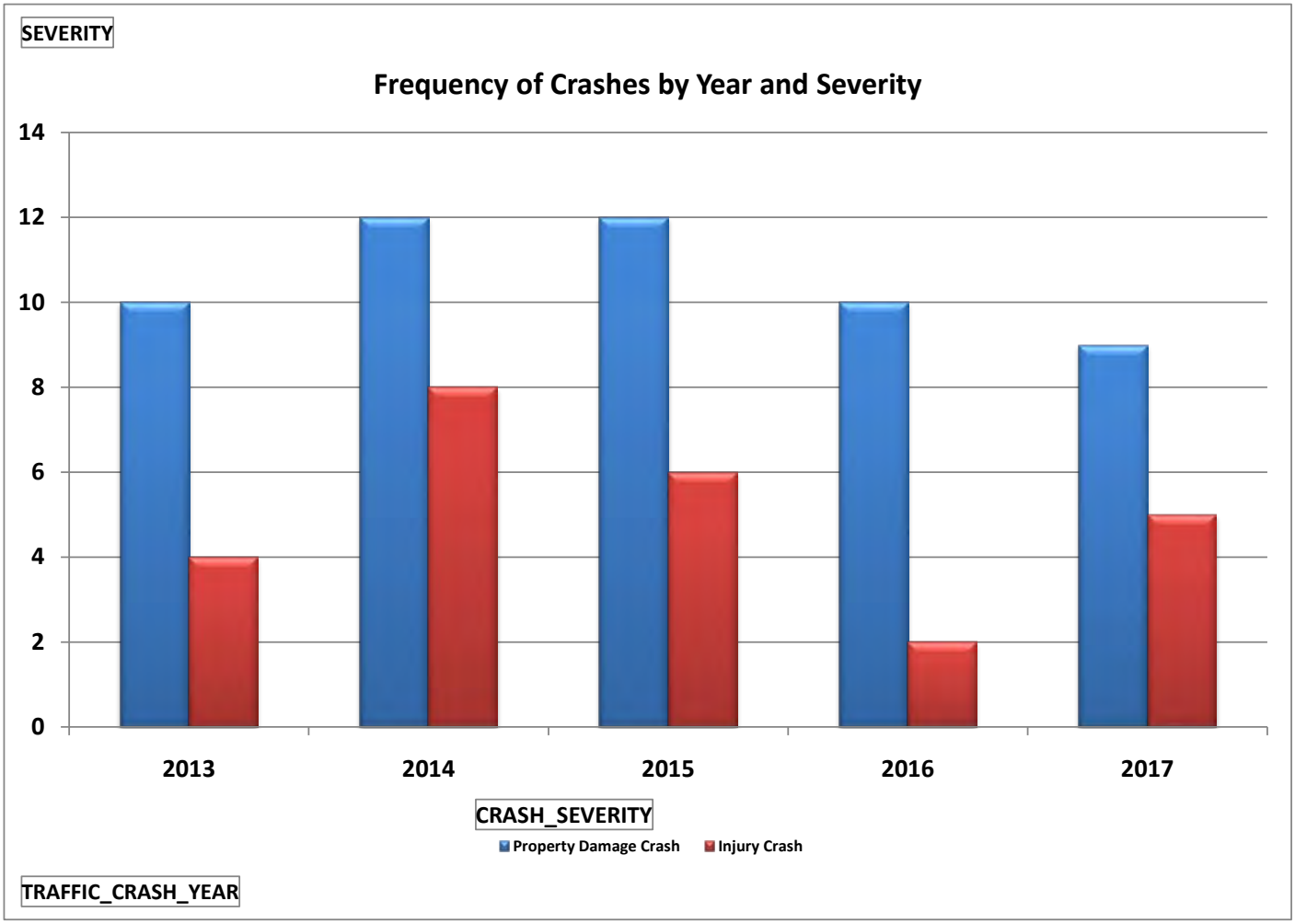
Intersection 01



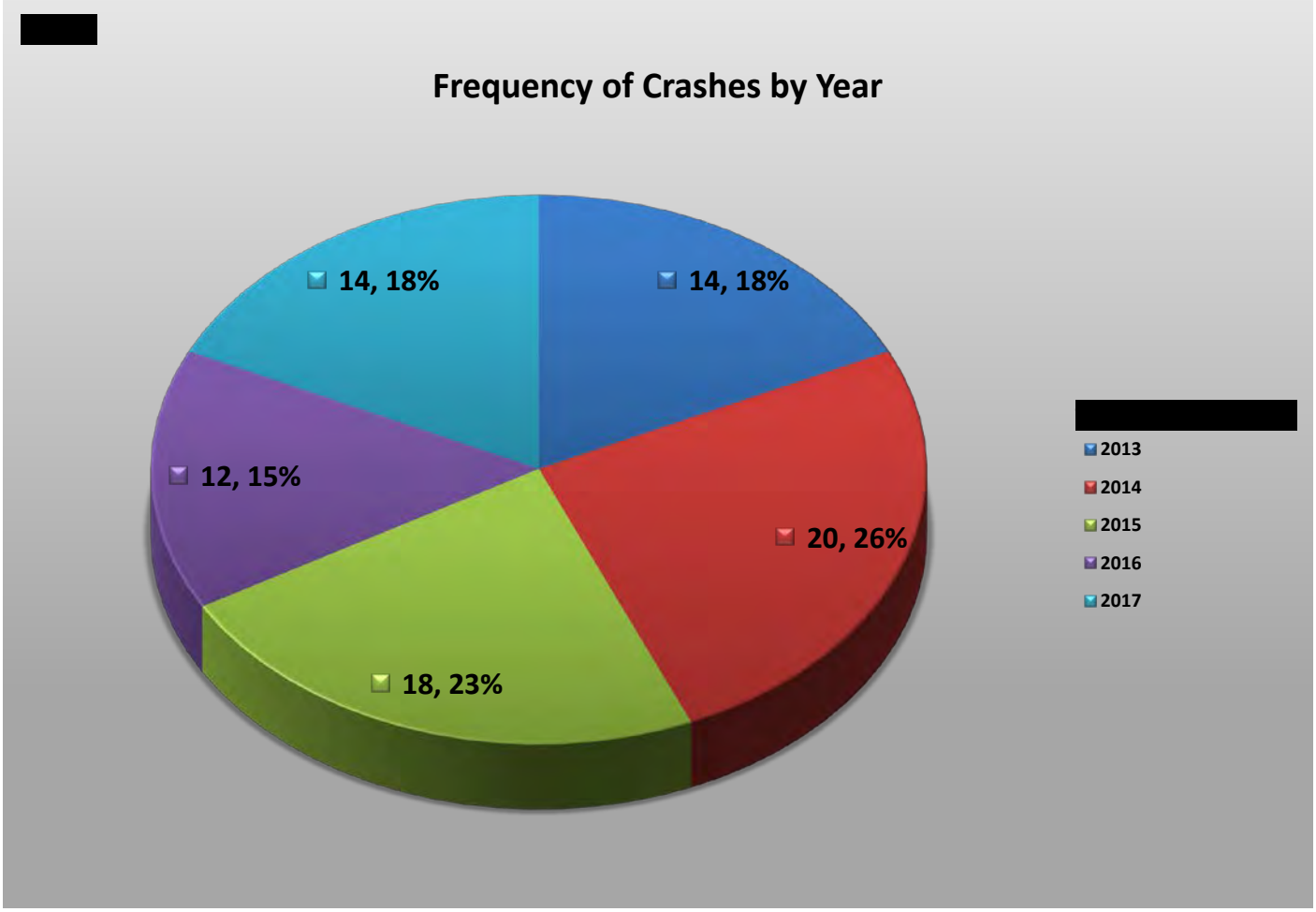
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701068423	17	03	20	08	Mon	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	West	Straight Ahead	B-Injury
201701092779	17	04	19	14	Wed	1	1	0	Pedalcyclist	Cloudy/Overcast	Daylight	Dry	No Defects	Lane Use Marking	Marion	Other/Unknown	Passenger	North	Straight Ahead	On Pavement (Roadway)	N/A	N/A	N/A	B-Injury
201701121301	17	05	18	09	Thu	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Straight Ahead	Intersection	Pickup	North	Straight Ahead	A-Injury
201701141406	17	06	02	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701158772	17	06	25	14	Sun	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701131113	17	05	25	11	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	Intersection	Pickup	West	Turning Left	PD
201701204577	17	07	28	17	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701207021	17	08	15	18	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201701254322	17	09	29	16	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201701267012	17	10	12	10	Thu	2	0	0	Turning	Cloudy/Overcast	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	West	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201701285460	17	10	29	11	Sun	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	South	Straight Ahead	Intersection	SUV	West	Turning Left	C-Injury
201701279188	17	10	20	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Turning Left	Intersection	Pickup	South	Straight Ahead	PD
201701307166	17	11	15	15	Wed	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701342511	17	12	19	14	Tue	2	1	0	Turning	Clear	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	C-Injury
201601071418	16	03	24	09	Thu	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Right	Intersection	Passenger	South	Slow/Stop - Left Turn	PD
201601042981	16	02	12	12	Fri	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	Northwest	Turning Left	Intersection	SUV	South	Straight Ahead	C-Injury
201601072730	16	03	27	14	Sun	2	0	0	Turning	Cloudy/Overcast	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Turning Left		Passenger	North	Straight Ahead	PD
201601059976	16	03	08	15	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	SUV	South	Straight Ahead	PD
201601087862	16	04	16	15	Sat	3	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601095753	16	04	26	13	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201601095994	16	04	23	11	Sat	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	C-Injury
201601114036	16	05	15	14	Sun	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601124002	16	05	26	11	Thu	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	Intersection	Passenger	Northwest	Turning Left	PD
201601136577	16	06	16	22	Thu	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	ctor With Semi-Tra	West	Turning Right	Off Pavement - Right				PD
201601237748	16	10	10	16	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201601241426	16	10	12	10	Wed	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	South	Straight Ahead	PD
201501108517	15	06	04	16	Thu	2	0	0	Sideswipe Opposite Direction	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	North	Backing	Other	Passenger	South	Backing	PD
201501085315	15	04	15	12	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Marion	Other/Unknown	SUV	West	Turning Right	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201501067405	15	04	03	11	Fri	2	0	0	Angle	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Passenger	West	Straight Ahead	PD
201501119811	15	06	19	18	Fri	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	South	Turning Left	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201501145818	15	07	23	11	Thu	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	A-Injury
201501172083	15	09	02	15	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	Southeast	Turning Left	Intersection	Pickup	North	Straight Ahead	PD
201501181931	15	09	10	19	Thu	2	1	0	Rear End	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	C-Injury
201501143705	15	07	24	15	Fri	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501205564	15	10	02	07	Fri	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	West	Straight Ahead	Intersection	Pickup	South	Straight Ahead	PD
201501233656	15	10	28	09	Wed	2	1	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	Southeast	Turning Left	Intersection	Passenger	North	Straight Ahead	C-Injury
201501295574	15	12	28	18	Mon	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201501276691	15	12	10	18	Thu	2	1	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Turning Left	Intersection	SUV	West	Straight Ahead	B-Injury
201501300172	15	02	13	18	Fri	2	0	0	Parked Motor Vehicle	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Pickup	Northwest	Turning Right	Other	Pickup	East	Parked	PD
201501210708	15	10	07	13	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Southeast	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501288540	15	12	23	17	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501317774	15	03	14	14	Sat	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	North	Turning Left		Pickup	South	Straight Ahead	C-Injury
201501407439	15	02	25	12	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201501100748	15	05	22	10	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201400163669	14	03	20	08	Thu	2	0	0	Turning	Clear	Daylight	Dry	Worn Surface	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Right	On Pavement (Roadway)	SUV	West	Straight Ahead	PD
201400140644	14	03	10	13	Mon	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	C-Injury
201400130676	14	03	02	14	Sun	2	0	0	Rear End	Snow	Daylight	Snow or Slush	No Defects	Traffic Signal	Marion	Other/Unknown	Unknown	West	Straight Ahead	Intersection	Passenger	West	Slow/Stop In Traffic	PD
201400168088	14	03	22	05	Sat	2	1	0	Head On	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	Intersection	SUV	North	Straight Ahead	C-Injury
201400102489	14	02	07	15	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	On Pavement (Roadway)	SUV	South	Slow/Stop In Traffic	C-Injury
201400208993	14	08	09	12	Sat	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Pickup	Southeast	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201400248918	14	05	13	09	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Slow/Stop In Traffic	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	PD
201400249288	14	05	17	15	Sat	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Marion	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	PD
201400094468	14	02	01	18	Sat	2	0	0	Turning	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201400296553	14	09	08	16	Mon	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Southwest	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201400352854	14	07	10	14	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400373767	14	08	17	20	Sun	2	1	0	Angle	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	South	Straight Ahead	C-Injury
201400371253	14	08	12	09	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Southeast	Turning Left	Intersection	SUV	North	Straight Ahead	PD
201400374806	14	08	19	15	Tue	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	West	Straight Ahead	B-Injury
201400390732	14	09	11	11	Thu	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Turning Left	Intersection	Van/Mini-Van	North	Straight Ahead	C-Injury
201400390663	14	09	11	21	Thu	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	PD
201400429711	14	11	09	00	Sun	1	1	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Straight Ahead	Off Pavement - Right				C-Injury
201400439514	14	11	26	14	Wed	2	0	0	Turning	Snow	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Van/Mini-Van	South	Straight Ahead	PD
201400427894	14	11	03	16	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Unknown	West	Unknown	Intersection	Passenger	South	Straight Ahead	PD
201400448265	14	12	09	18	Tue	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301052321	13	01	19	21	Sat	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Slow/Stop - Left Turn	Other	Passenger	East	Straight Ahead	PD
201301053941	13	01	21	13	Mon	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201301145773	13	06	19	21	Wed	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				PD
201301046551	13	01	12	17	Sat	2	0	0	Turning	Rain	Darkness, Lighted Road	Wet	No Defects	Stop Sign/Flasher	Marion	Normal	SUV	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201301045753	13	01	11	14	Fri	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Van/Mini-Van	West	Other	Off Pavement - Right				A-Injury
201301229546	13	10	23	10	Wed	1	0	0	Fixed Object	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	ctor With Semi-Tra	North	Turning Right	Off Pavement - Right				PD
201301075136	13	05	28	12	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Slow/Stop In Traffic	On Pavement (Roadway)	Pickup	East	Unknown	PD
201301361607	13	10	14	21	Mon	2	3	0	Turning	Clear	Darkness	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Turning Left	C-Injury
201301361145	13	10	13	15	Sun	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	South	Straight Ahead	Intersection	Passenger	West	Slow/Stop - Left Turn	PD
201301357589	13	10	01	18	Tue	2	1	0	Angle	Clear	Dusk	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	Northwest	Slow/Stop - Load/Unload	On Pavement (Roadway)	SUV	South	Straight Ahead	B-Injury
201301353209	13	10	04	15	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301408165	13	12	04	11	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Turning Left	Intersection	Van/Mini-Van	South	Straight Ahead	PD
201301415199	13	12	11	20	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	SUV	East	Slow/Stop In Traffic	Intersection	SUV	East	Slow/Stop In Traffic	PD

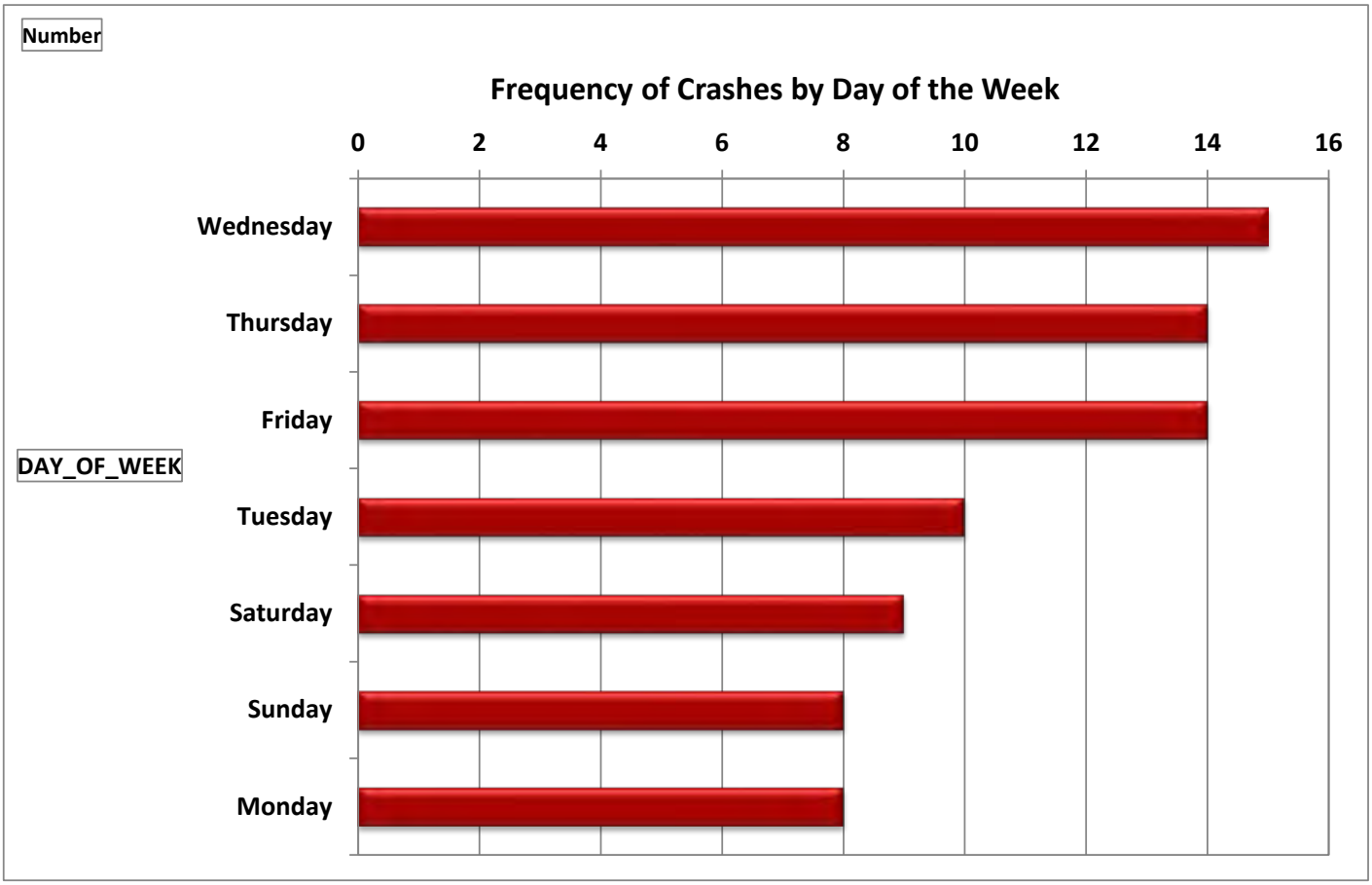
Intersection 01





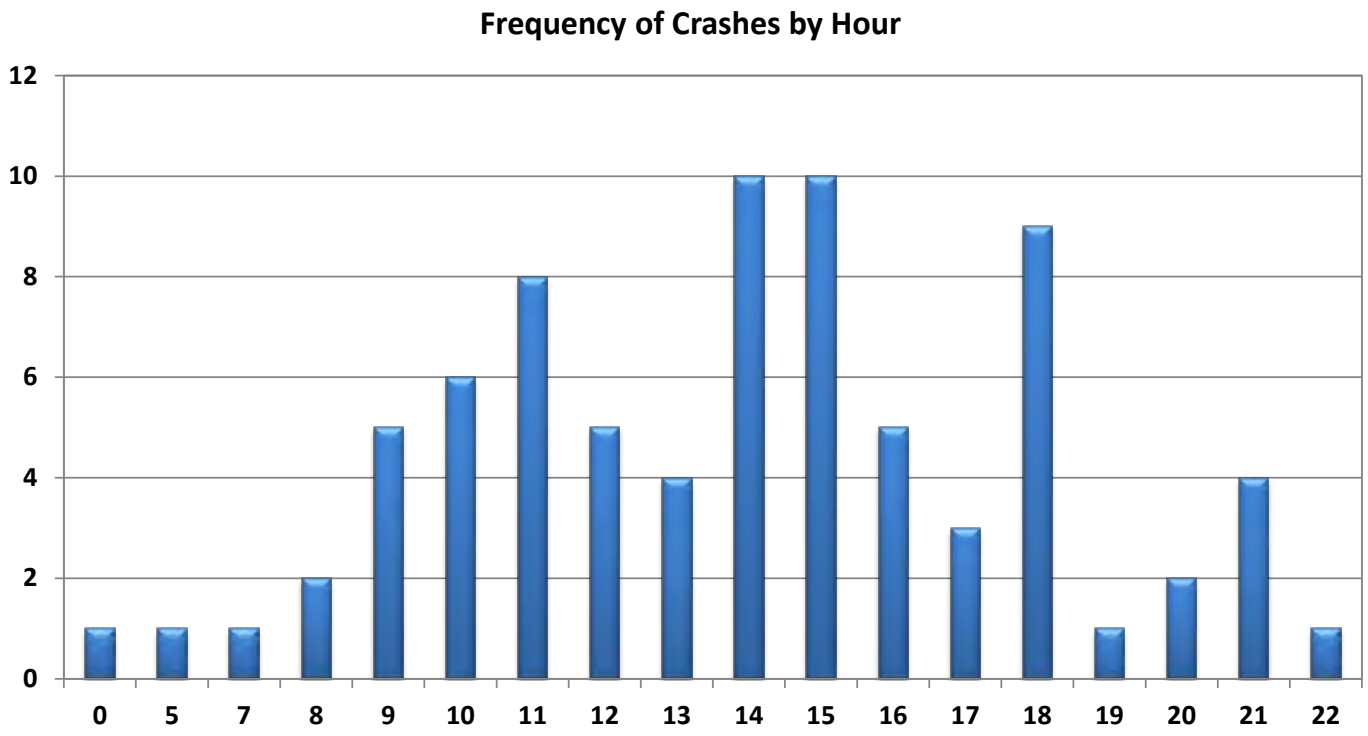
Intersection 01



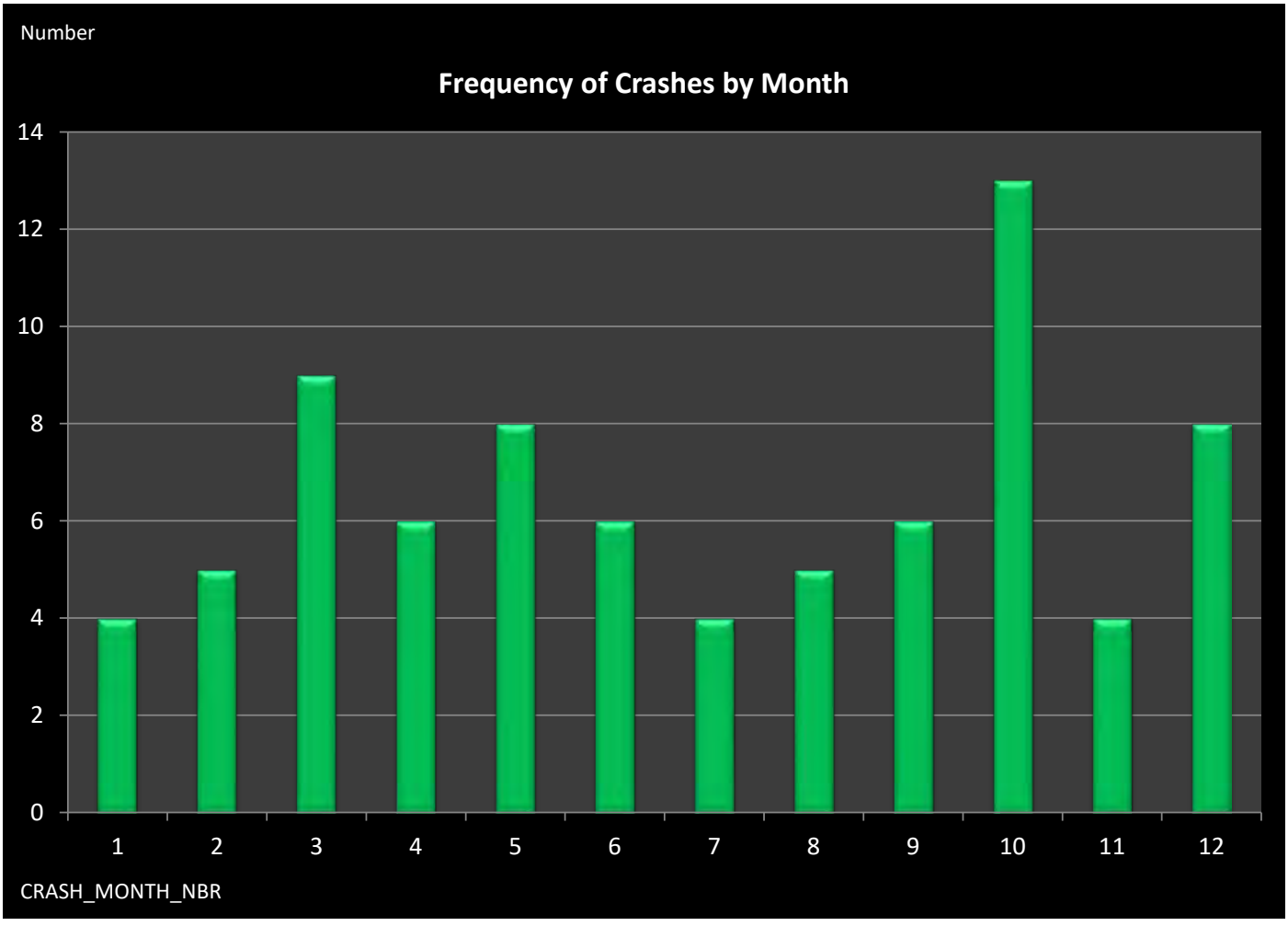


Intersection 01

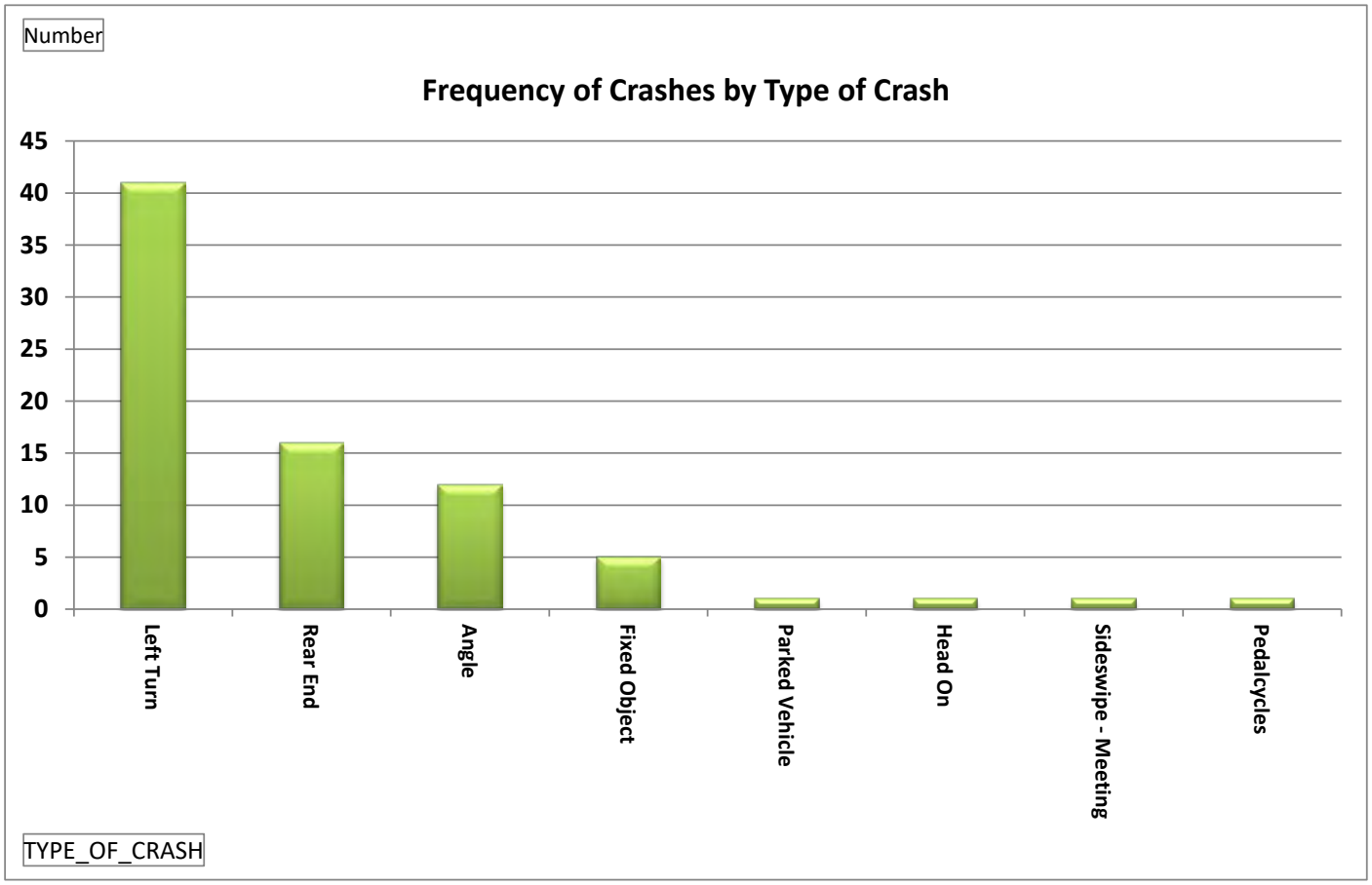
[redacted]

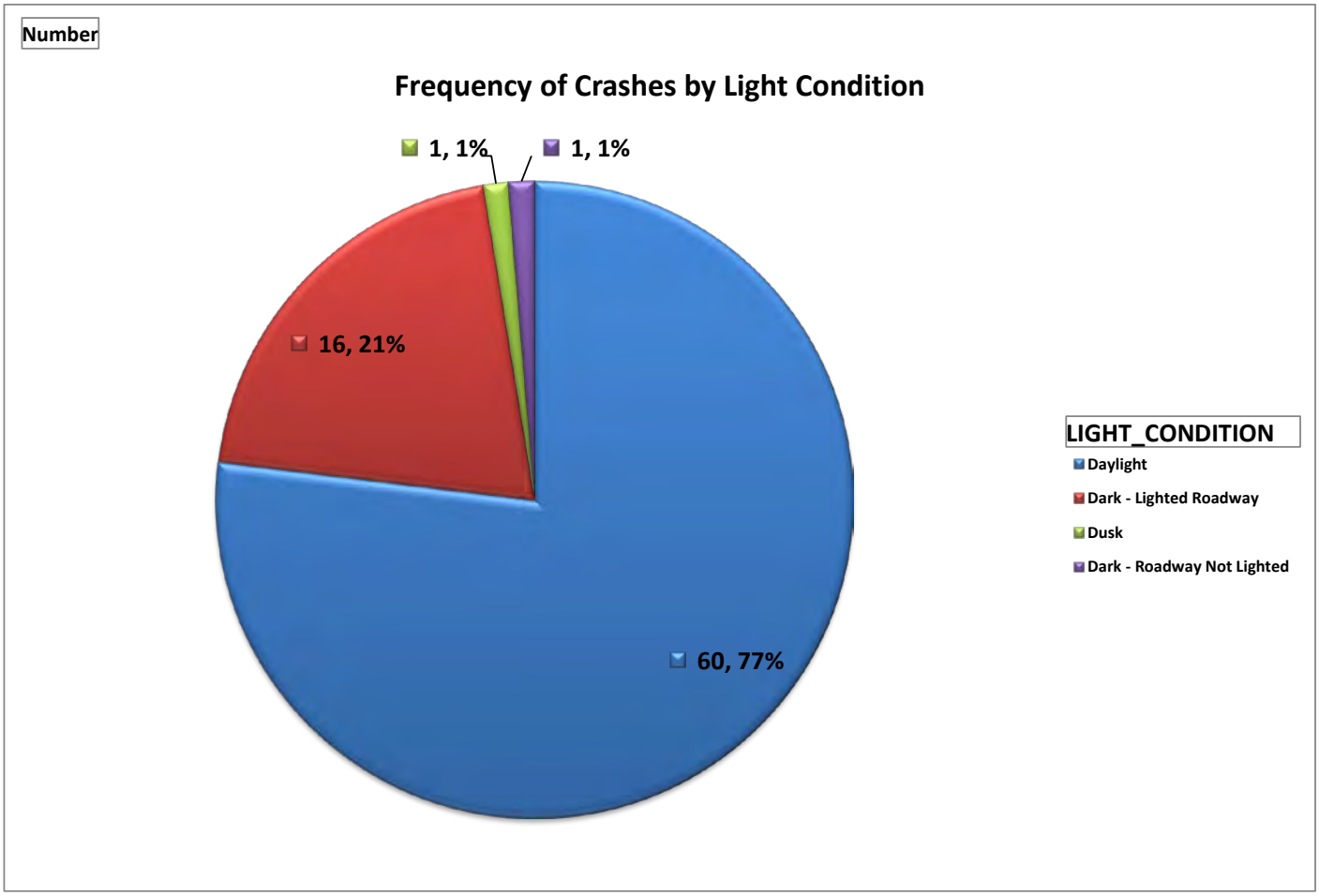


[redacted]

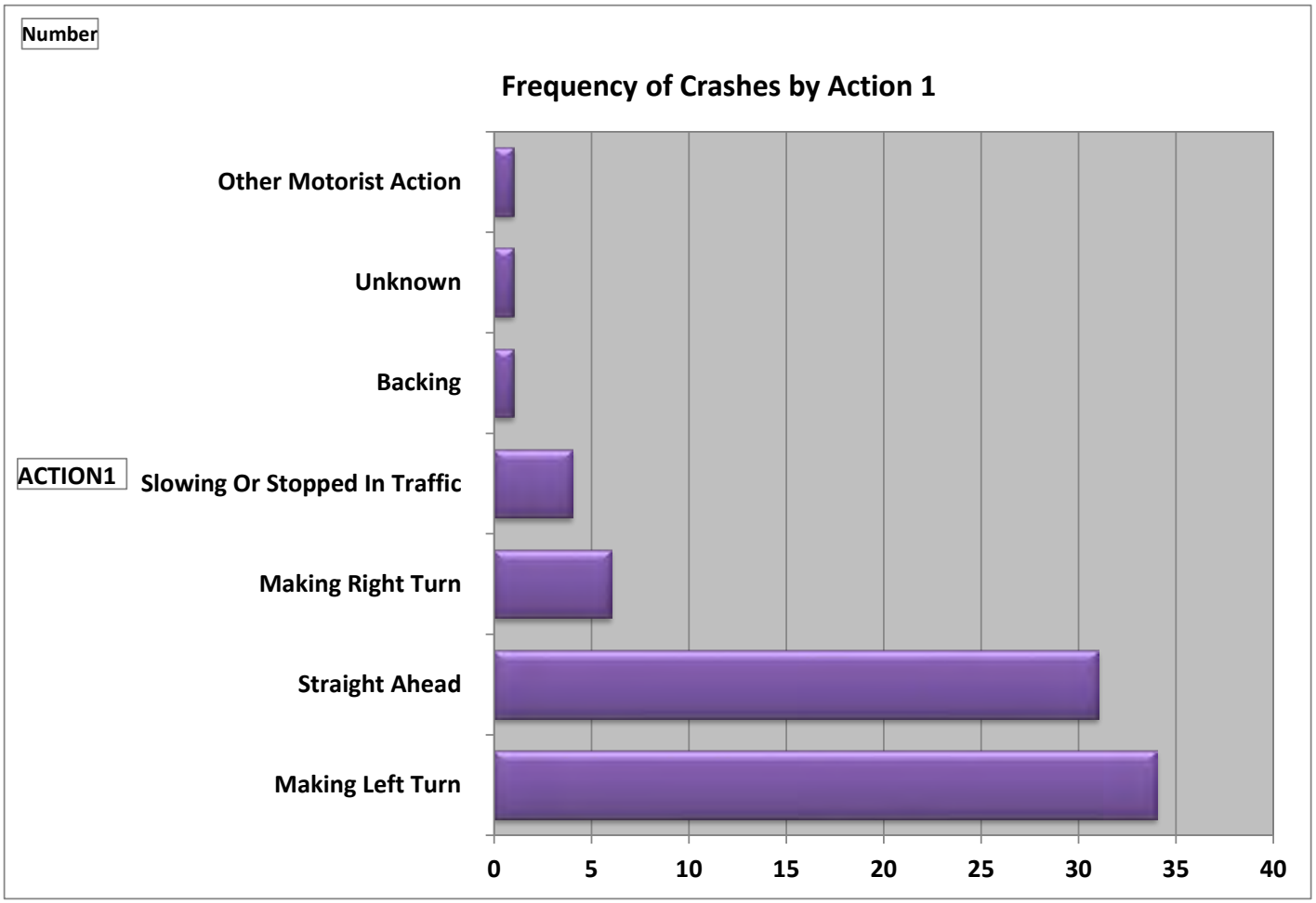


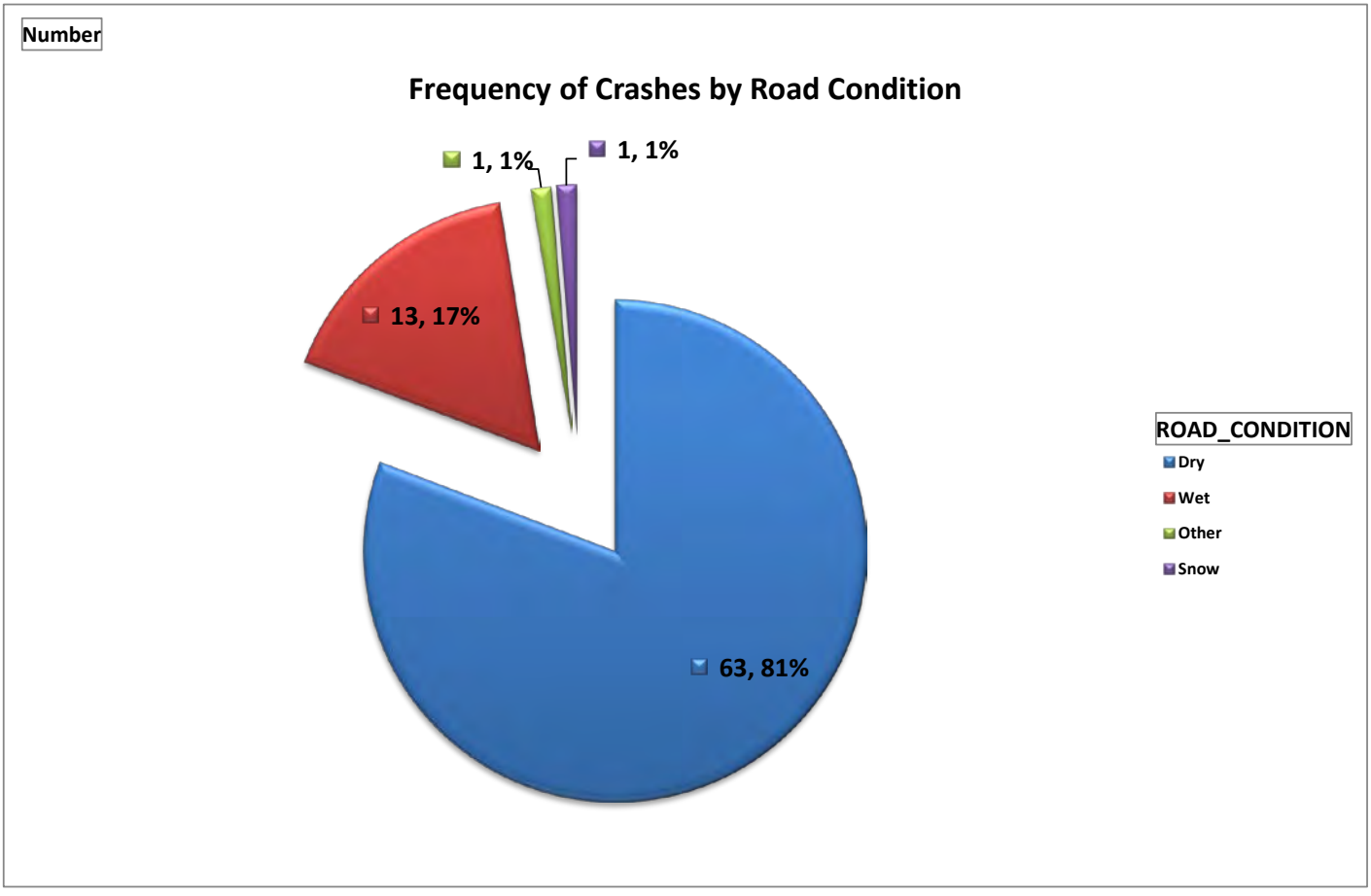
Intersection 01



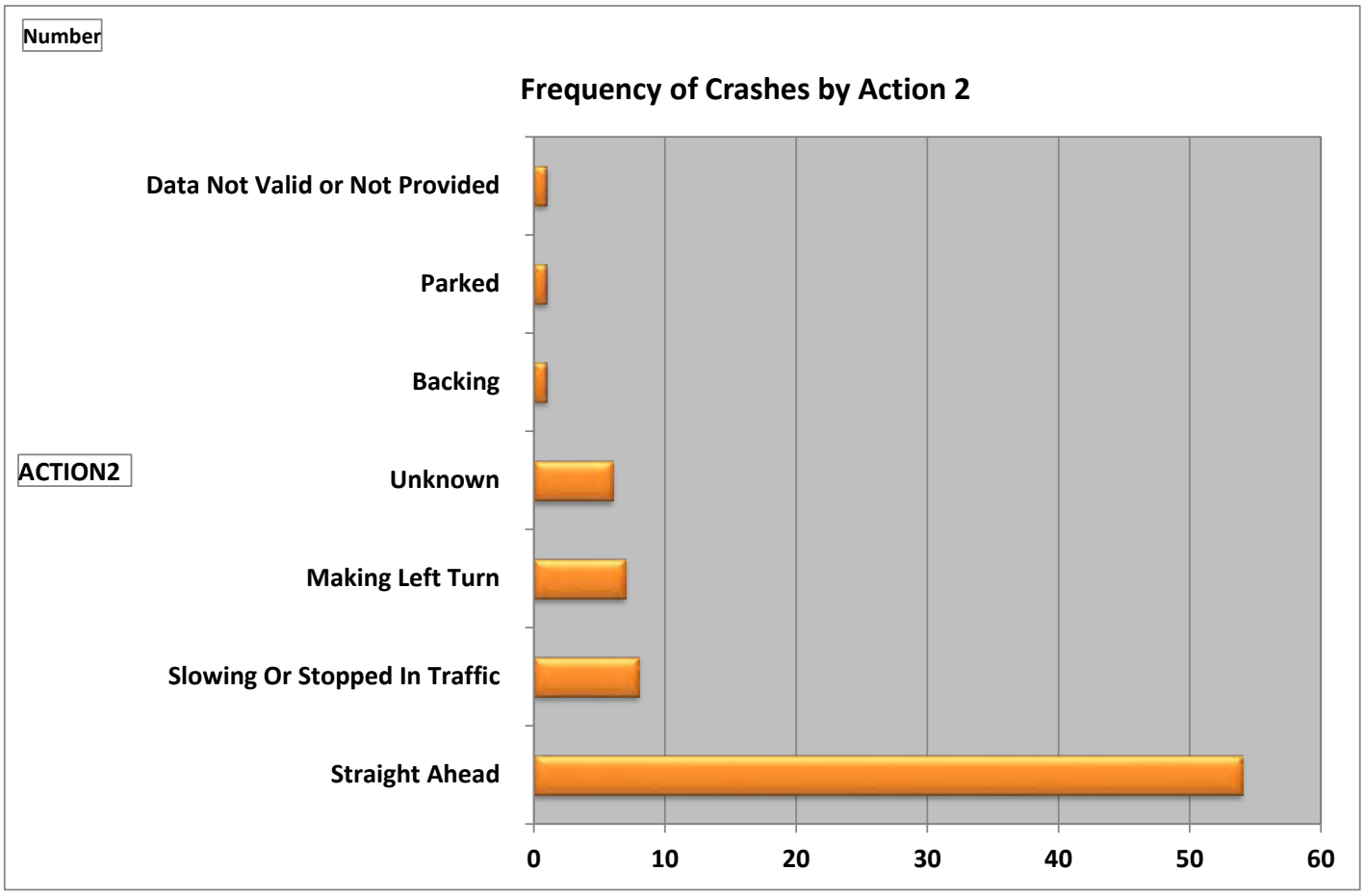


Intersection 01





Intersection 01



SIMPO Safety Study

APPENDIX A2: E. PLEASANT HILL ROAD AND GIANT CITY ROAD

CMT

E. Pleasant Hill Road and Giant City Road Intersection

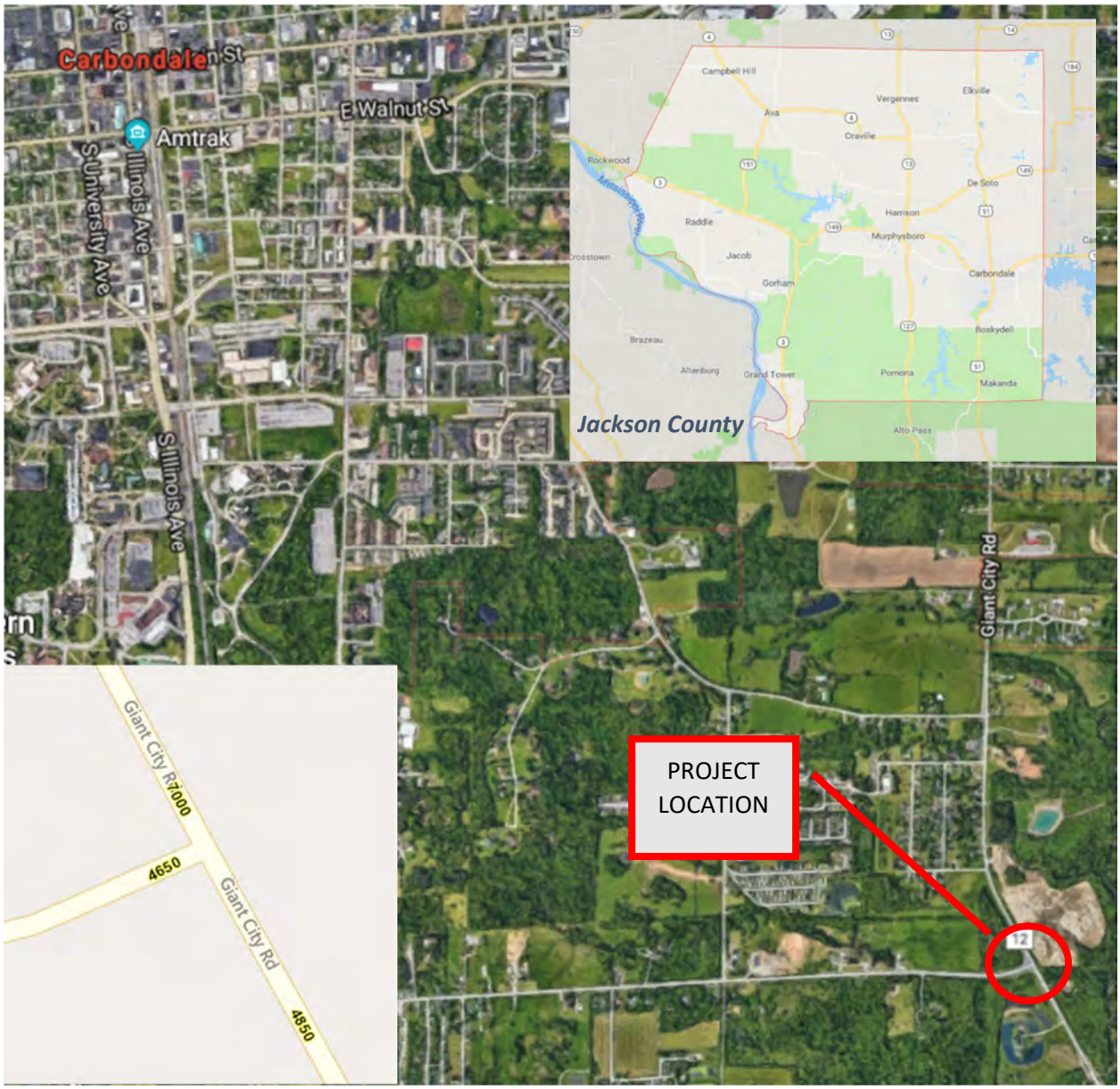
Intersection Priority #2

June 2019

INTRODUCTION

The E. Pleasant Hill Road and Giant City Road intersection, located within Jackson County, was identified as the 2nd ranked intersection within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The 3-leg intersection is currently unsignalized.

LOCATION MAP



EXISTING CONDITIONS

The subject intersection is a 3-leg intersection that is unsignalized. The adjacent land use is comprised of vacant or wooded property. The E. Pleasant Hill Road and Giant City Road intersection forms the southeast corner of a roadway network that serves Carbondale. **Figure 1** is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

The eastbound approach of E. Pleasant Hill Road is stop controlled. The eastbound approach has an exclusive left turn lane and an exclusive right turn movement. The posted speed limit on E. Pleasant Hill Road is 30 miles per hour. The existing conditions on the eastbound approach are summarized below:

- The stop line for the left turn lane is set back 10 feet from the edge of pavement of southbound Giant City Road. The effective turning radius of northbound left turning vehicles is 24 feet.
- The stop line for the right turn lane is located such that the intersection angle of 60 degrees exceeds the maximum allowable angle of 30 degrees for existing intersections (Section 36-1.05a). Motorists are required to turn their heads greater than 90 degrees to see southbound traffic. The vehicle shown turning right in **Photo 1** is not perpendicular to the lane markings to improve intersection sight distance angles.

- Left turning vehicles restrict the sight distance of right turning vehicles on the same approach as shown in **Photo 1**.
- A Stop Ahead sign is located 500 feet in advance of the intersection.

PHOTO 1: EB PLEASANT HILL ROAD LOOKING NORTH

The southbound approach of Giant City Road has the right of way. The southbound approach has an exclusive right turn lane and an exclusive through movement. The posted speed limit on Giant City Road is 50 miles per hour. The existing conditions on the southbound approach are summarized below:

- The exclusive right turn lane is 450 feet long including the taper.
- The right turn yields to northbound left turning vehicles. The location of the yield line is 50 feet from the intersection, effectively creating a second intersection. **Photo 2** shows the southbound right turning vehicle yielding to westbound traffic.
- The yield line for the right turn lane is located such that the intersection angle of 60 degrees exceeds the maximum allowable angle of 30 degrees for existing intersections (Section 36-1.05a). Motorists are required to turn their heads greater than 90 degrees to see westbound traffic. The vehicle shown in **Photo 2** is not perpendicular to the lane markings to improve intersection sight distance angles.

PHOTO 2: SB RIGHT TURN ON GIANT CITY ROAD LOOKING NW

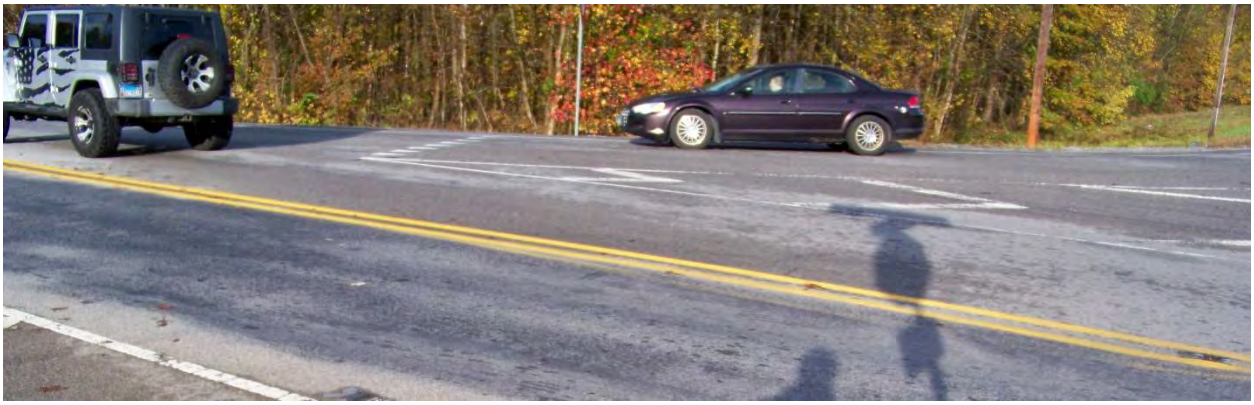


Photo 3 is a perspective of the southbound right turn lane looking in the southwest direction.

PHOTO 3: SB RIGHT TURN LANE ON GIANT CITY ROAD LOOKING SW

The northbound approach of Giant City Road is uncontrolled. The northbound approach has an exclusive left turn lane and an exclusive through movement. The posted speed limit on Giant City Road is 50 miles per hour. The existing conditions on the eastbound approach are summarized below:

- The exclusive left turn lane is 285 feet long including the taper.
- The left turn yields to southbound through turning vehicles. The left turn movement regularly crosses over the painted median to reduce conflicts with eastbound left turning vehicles.

PHOTO 4: NB LEFT TURN MOVEMENT

SAFETY ANALYSIS

A total of 27 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**. The crash frequency is distributed evenly across all study years with the exception of 2016.

The frequency of crashes by type on **Figure 3** shows a majority of crashes (70% or 19 crashes) are left turning crashes. The addition of angle crashes results in 20 crashes (or 74 percent) of types typically considered to be correctable.

Figure 3 shows the distribution of crashes within the study area by severity. The fatal and injury crashes at the subject intersection represent 30 percent of the total crashes. **The injury crashes include 3 Type A crashes and 3 Type B crashes.** No fatalities occurred at the intersection within the time frame of the study.

Figure 4 shows the severity of crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. The highest left turn crashes were coded on the northbound approach. The northwest bound left turn crashes and eastbound left turn crashes are combined to equal 19 left turning crashes.

Other turning crashes have occurred at the intersection. For example, right turning crashes on the eastbound approach are a crash type that could be mitigated depending upon the countermeasure. One of the two right turn crashes occurred on the eastbound approach.

FIGURE 2: FREQUENCY OF CRASHES BY YEAR

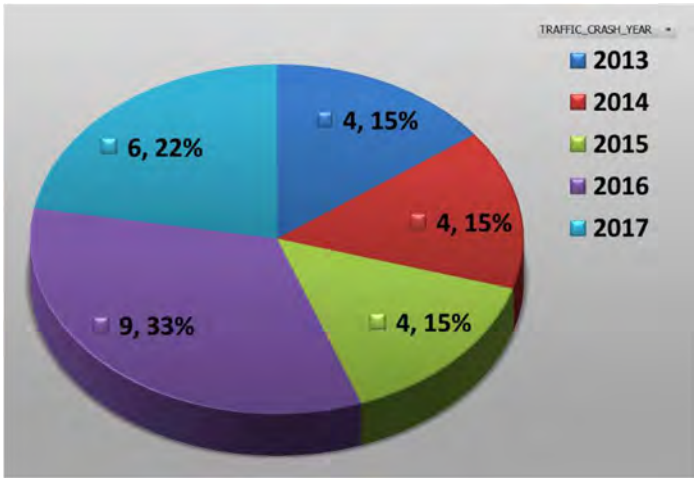


FIGURE 3: FREQUENCY OF CRASHES BY TYPE

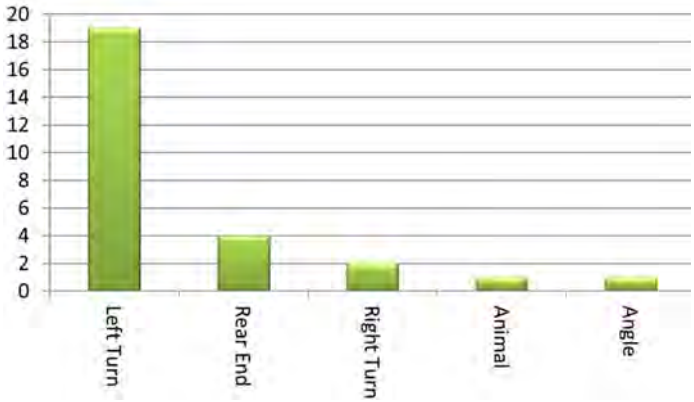


FIGURE 3: FREQUENCY OF CRASHES BY SEVERITY

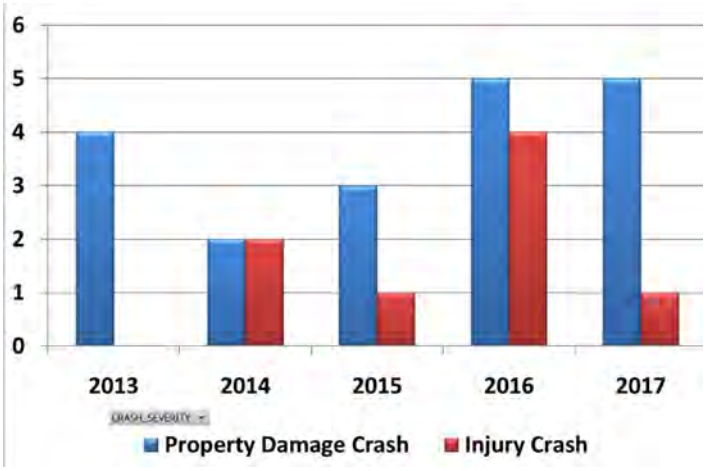
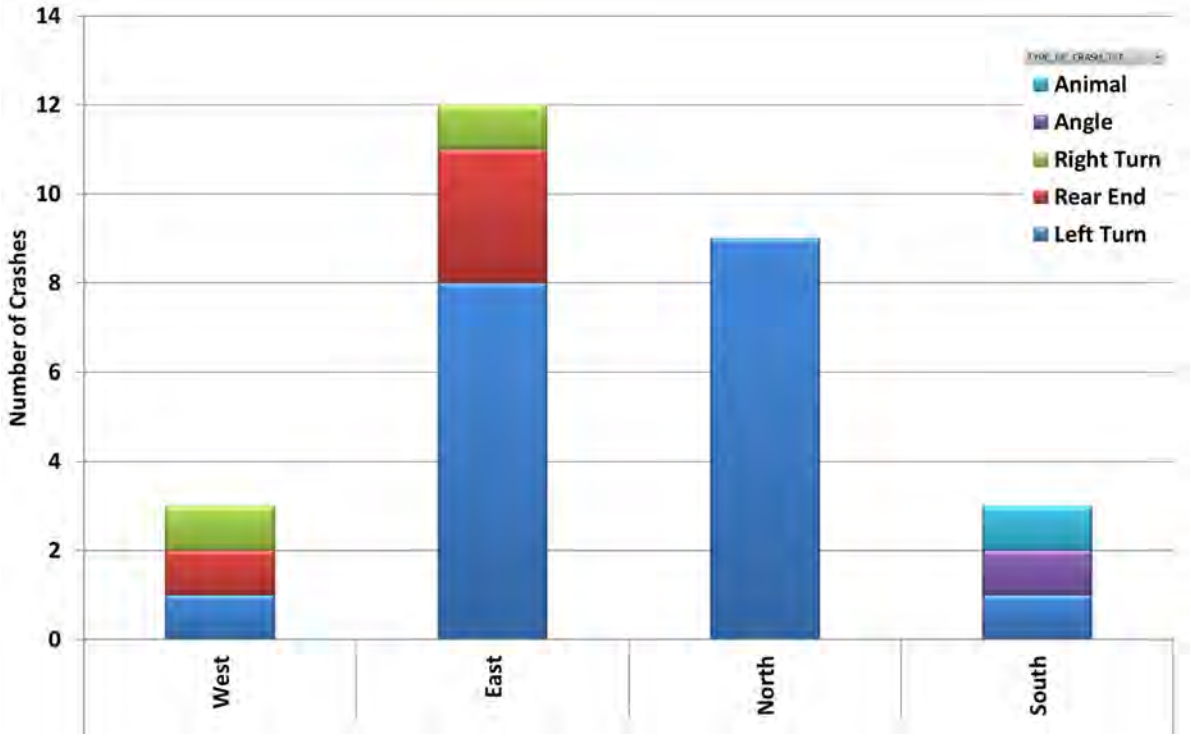
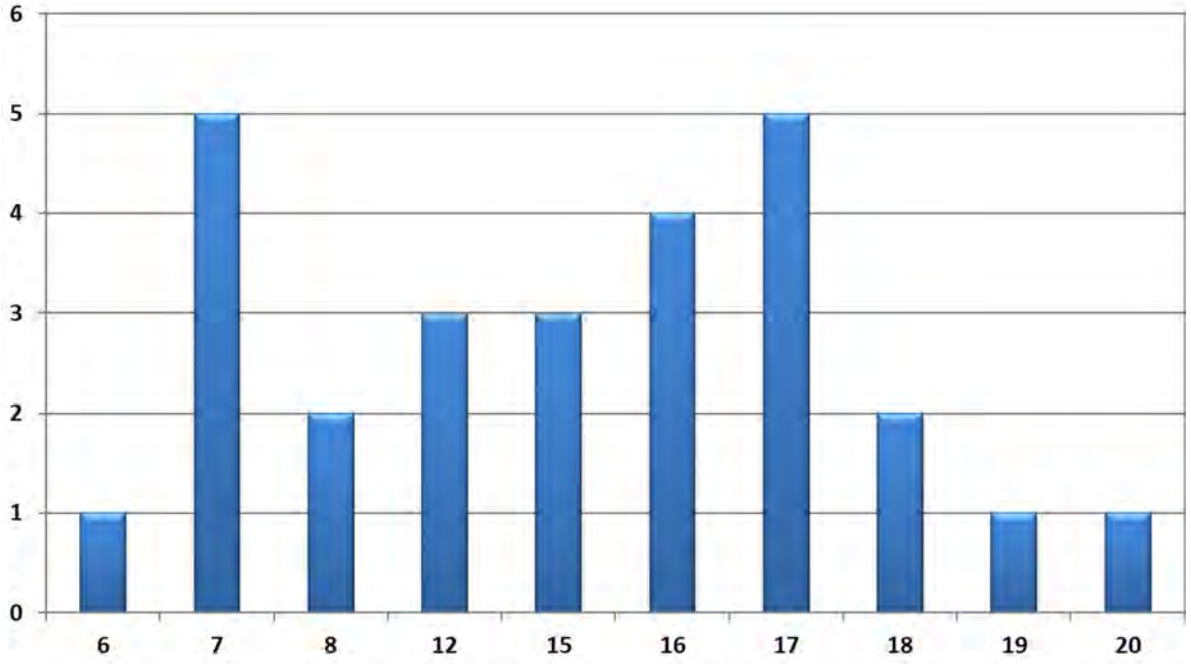


FIGURE 4: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The crashes' frequency by time of day suggests that congestion is a contributing factor to the safety performance of the study area. **Figure 5** shows the distribution by time of day. The highest frequencies of crashes occur in the AM and PM peak time frames.

FIGURE 5: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

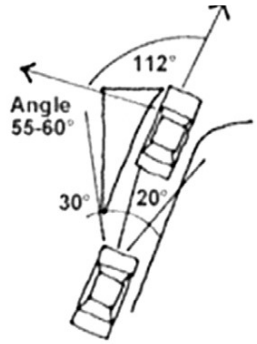
Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – LEFT TURN CRASHES

The crash type having the greatest frequency (19 crashes or 70 percent) was attributed to the northbound and eastbound left turn movements (**Figure 4**). Warrant 7, the Crash Experience warrant, requires five or more reported crashes of types susceptible to correction by a traffic signal within a 12-month period. The 22 left turn and angle crashes are below the 5 per year threshold if the total number of crashes are averaged over 5 years.

However, the crash frequency (**Figure 2**) by year shows the total number of crashes in 2016 (9) and 2017 (6) exceed the minimum threshold of 5 per year. The number of correctible crashes (angle or left turn crashes) for 2016 and 2017 are equal to 7 and 5 crashes, respectively. **Installation of a traffic signal is proposed based on the Crash Experience warrant as minimum criteria.** Other countermeasures to mitigate crashes as part of a short-term countermeasure include the following:

FIGURE 6: RT ANGLE



- The signal installation should provide for a protected/permissive left turn phase on the NB direction. Add eastbound right turn overlap phase.
- Setback the stop line on the eastbound left turn 20 feet to improve the turning radius of northbound left turning vehicles.
- Add channelized islands in the SW quadrant. The raised island design is to reduce the intersection angle of the right turn movement (**Figure 6**) for permissive right turn movements and to provide adequate stop line to signal head distances on the southbound approach.
- Eliminate signs that direct the SB right turn movement to yield to NB left turning traffic.

MEDIUM TERM COUNTERMEASURE – MITIGATE LT CRASHES

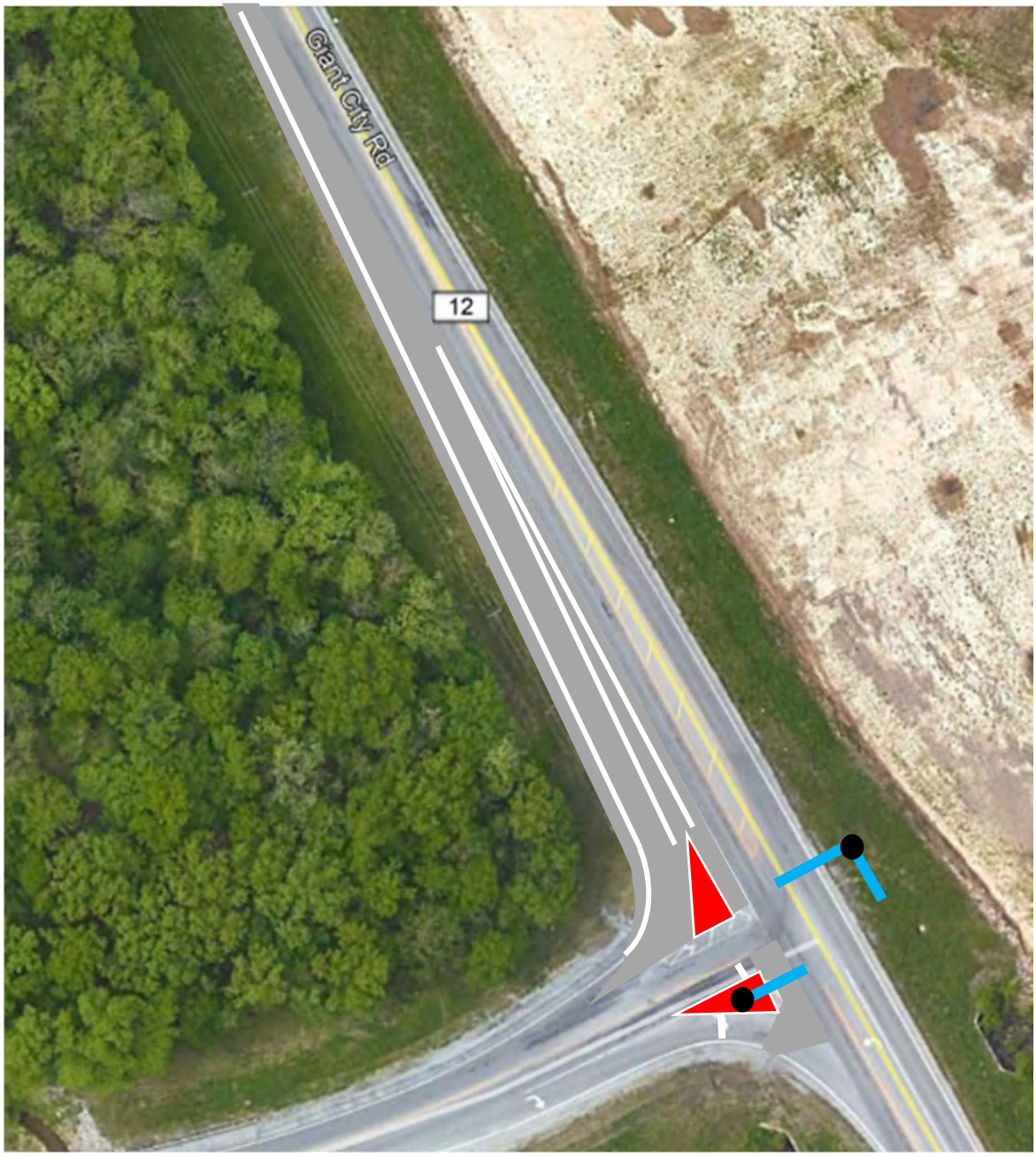
Countermeasures to mitigate the left turn crash pattern in lieu of a traffic signal installation include the following:

- Construct an offset right turn on the southbound approach. The right turn lane should be offset to provide intersection sight distance for eastbound left turning vehicles from the E. Pleasant Hill Road approach – occlusion of southbound through vehicles by large trucks in the right turn lane should be avoided.

- Setback the EB right turn lane stop line 20 feet behind the eastbound left turn lane. The purpose is to avoid right turning vehicles from blocking the intersection sight distance angles of left turning vehicles. The setback stop line also improves the intersection angle for right turning movements.
- Add channelized islands in the NW quadrant. The raised island design is to reduce the intersection angle of the right turn movement (**Figure 6**).

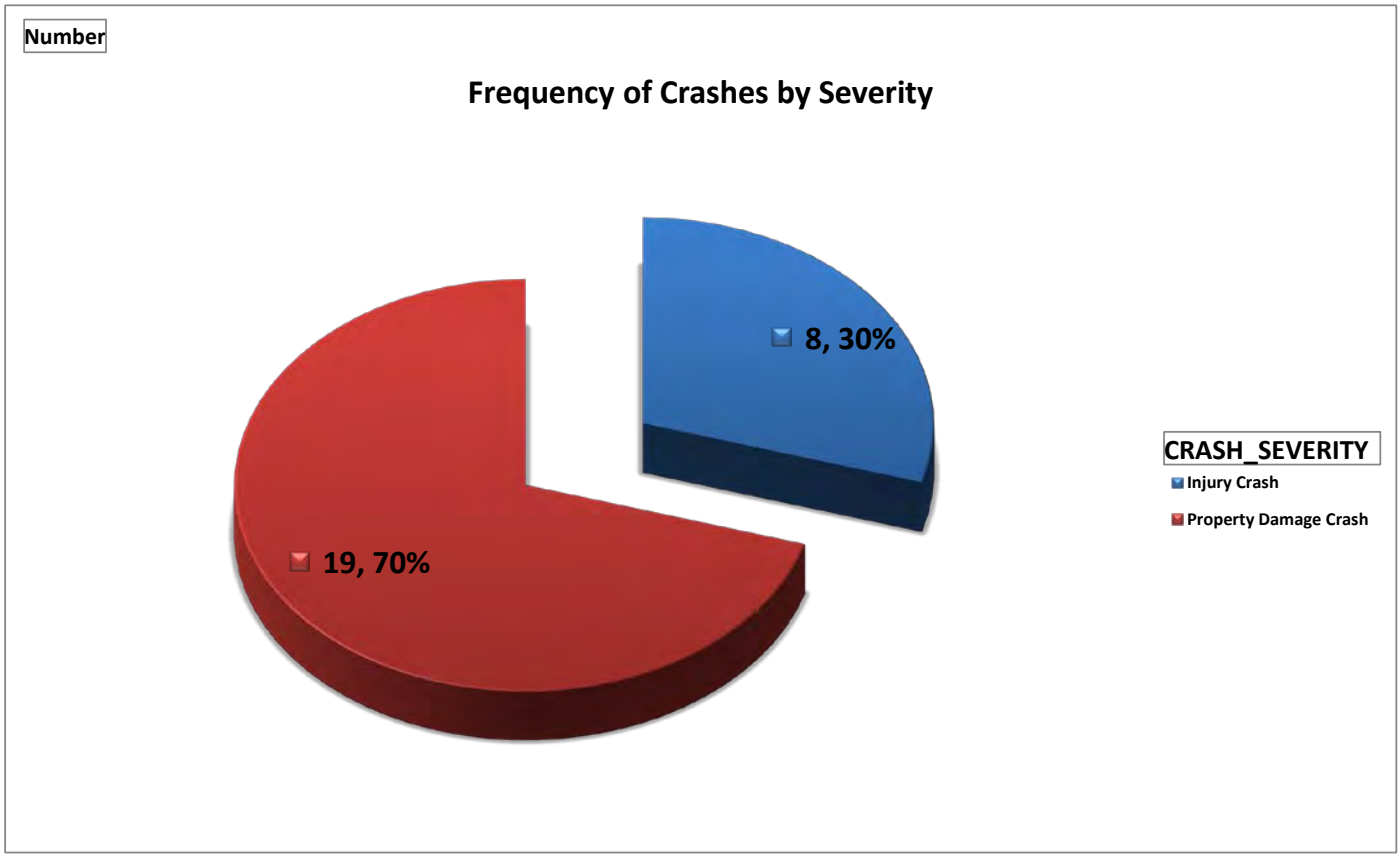
See **Figure 7** for a schematic plan of the proposed geometric improvements.

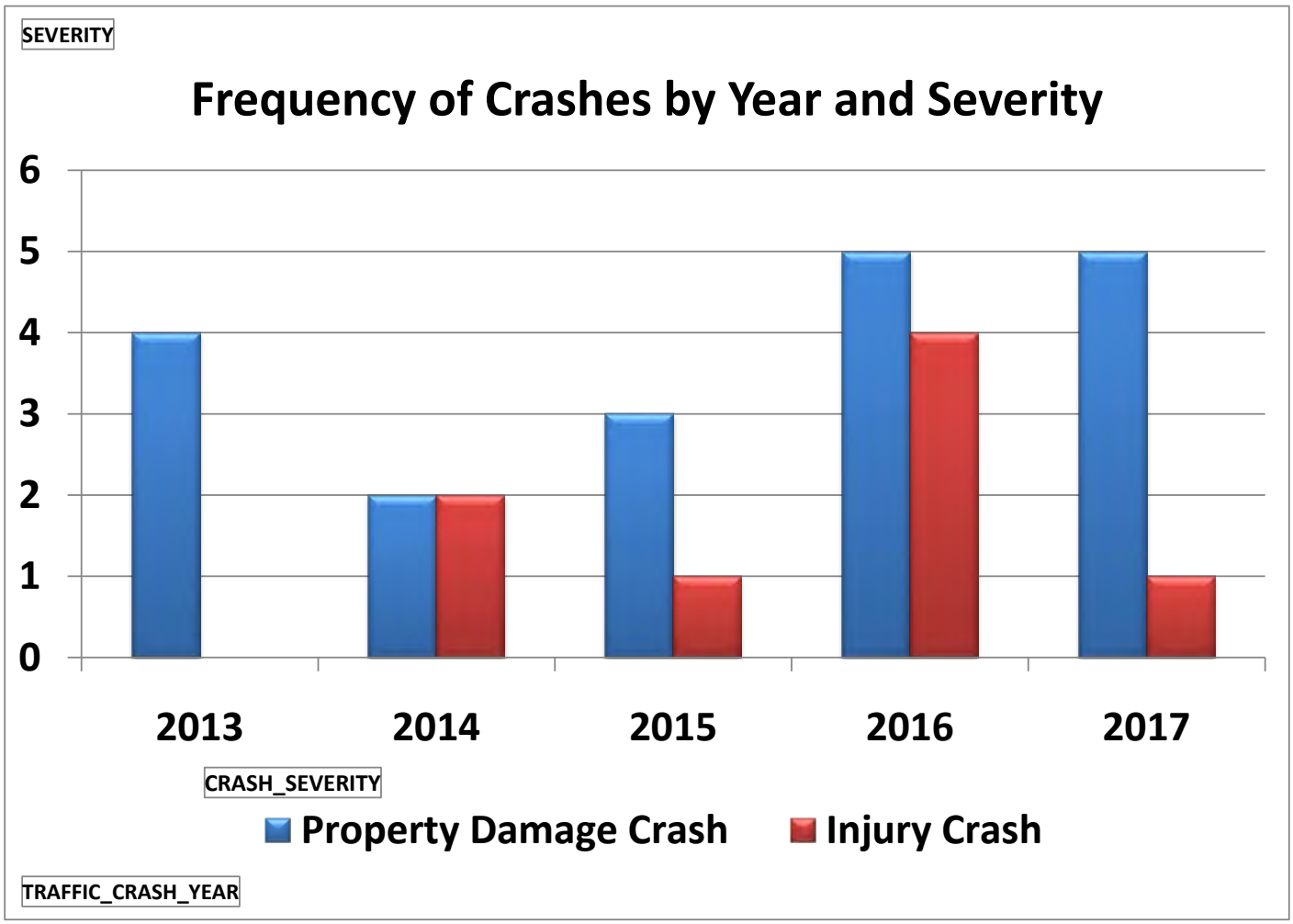
FIGURE 7: GEOMETRIC COUNTERMEASURES



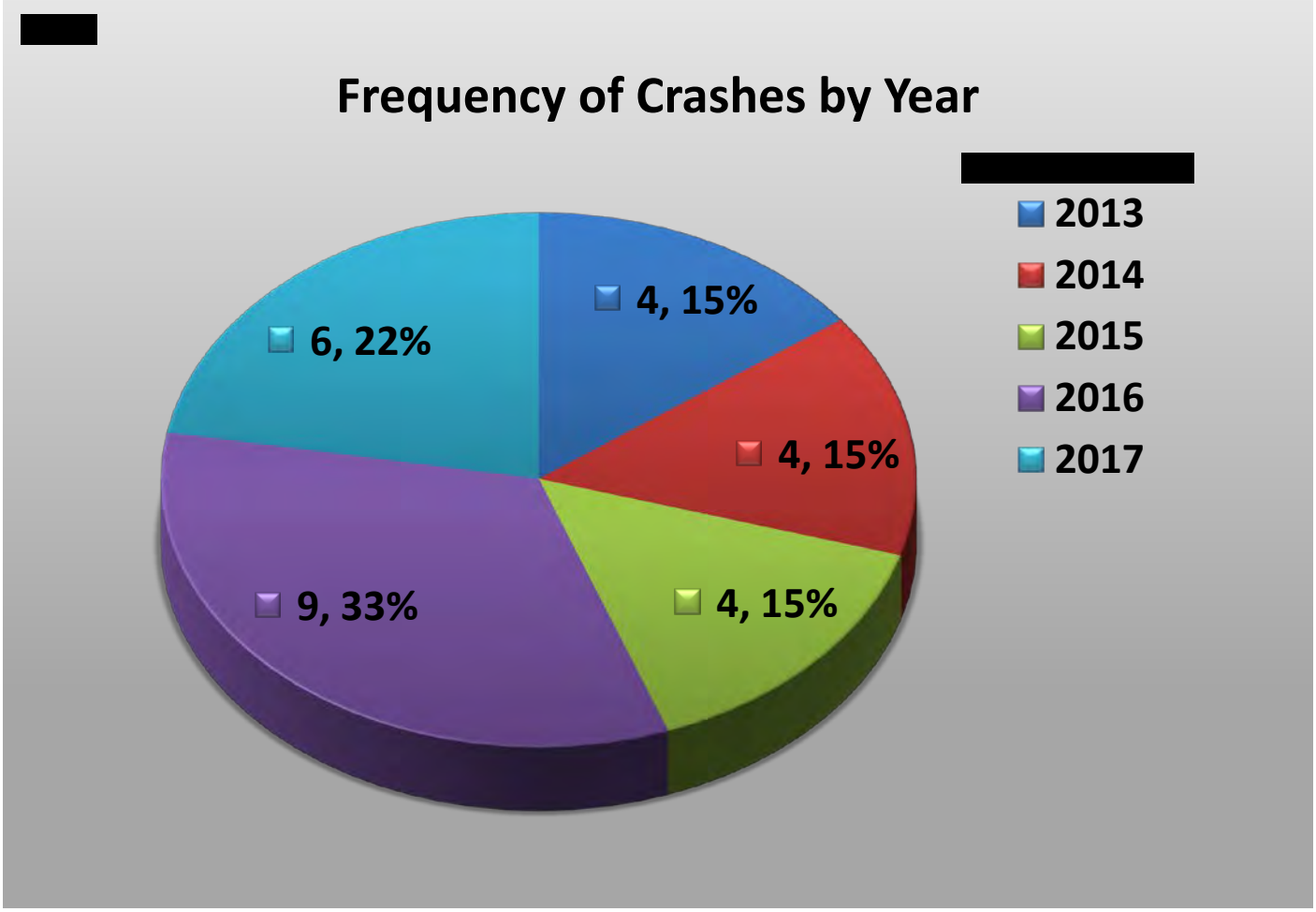
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_SPECL	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701018571	17	01	06	16	Fri	2	0	0	Rear End	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Slow/Stop - Right Turn	Intersection	Passenger	East	Slow/Stop - Right Turn	PD
201701080344	17	04	04	17	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201701137620	17	05	25	16	Thu	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201701173236	17	07	11	12	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Unincorporated	Normal	Pickup	Personal	East	Turning Left	On Pavement (Roadway)	SUV	South	Straight Ahead	PD
201701181084	17	07	19	08	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Unincorporated	Normal	SUV	Personal	West	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701338554	17	12	14	12	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	Intersection	Passenger	South	Avoiding Vehicle/Objects	PD
201601046961	16	02	12	07	Fri	2	0	0	Angle	Clear	Daylight	Snow or Slush	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	South	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Slow/Stop - Left Turn	PD
201601030758	16	01	28	18	Thu	3	3	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	A-Injury
201601107770	16	05	10	07	Tue	2	1	0	Turning	Rain	Daylight	Wet	No Defects	No Controls	Unincorporated	Normal	SUV	Personal	North	Turning Left	Intersection	Truck Single Unit	South	Straight Ahead	A-Injury
201601077823	16	04	02	08	Sat	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Avoiding Vehicle/Objects	PD
201601188196	16	08	13	12	Sat	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Unincorporated	Normal	SUV	Personal	East	Turning Right	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201601202191	16	08	30	17	Tue	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Turning Left	Intersection	SUV	South	Straight Ahead	A-Injury
201601263040	16	11	05	06	Sat	1	0	0	Animal	Clear		Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Van/Mini-Van	Personal	South	Straight Ahead	On Pavement (Roadway)				PD
201601297591	16	12	02	15	Fri	3	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201601271536	16	11	02	07	Wed	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501204480	15	10	02	07	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	SUV	Personal	West	Slow/Stop - Right Turn	Intersection	Pickup	West	Slow/Stop - Right Turn	PD
201501282943	15	04	09	07	Thu	3	2	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501240742	15	03	10	18	Tue	2	0	0	Turning	Clear	Darkness	Dry		Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	South	Turning Right	On Pavement (Roadway)	SUV	East	Slow/Stop - Left Turn	PD
201501270813	15	12	04	19	Fri	2	0	0	Turning	Clear	Darkness	Dry	No Defects	No Controls	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Pickup	South	Straight Ahead	PD
201400076355	14	01	15	20	Wed	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Pickup	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400107915	14	02	11	17	Tue	2	0	0	Turning	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	SUV	Personal	East	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400092452	14	01	30	15	Thu	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	North	Straight Ahead	C-Injury
201400413690	14	10	26	15	Sun	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	North	Turning Left	C-Injury
201301218985	13	05	23	16	Thu	2	0	0	Rear End	Clear	Daylight	Dry	Debris On Roadway	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Slow/Stop - Right Turn	On Pavement (Roadway)	Passenger	East	Slow/Stop - Right Turn	PD
201301301198	13	08	13	16	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301348108	13	10	01	17	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	SUV	Personal	West	Turning Right	Intersection	SUV	West	Turning Right	PD
201301417145	13	12	13	17	Fri	2	0	0	Rear End	Sleet/Hail	Darkness	Snow or Slush	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Other	On Pavement (Roadway)	Passenger	East	Slow/Stop - Right Turn	PD

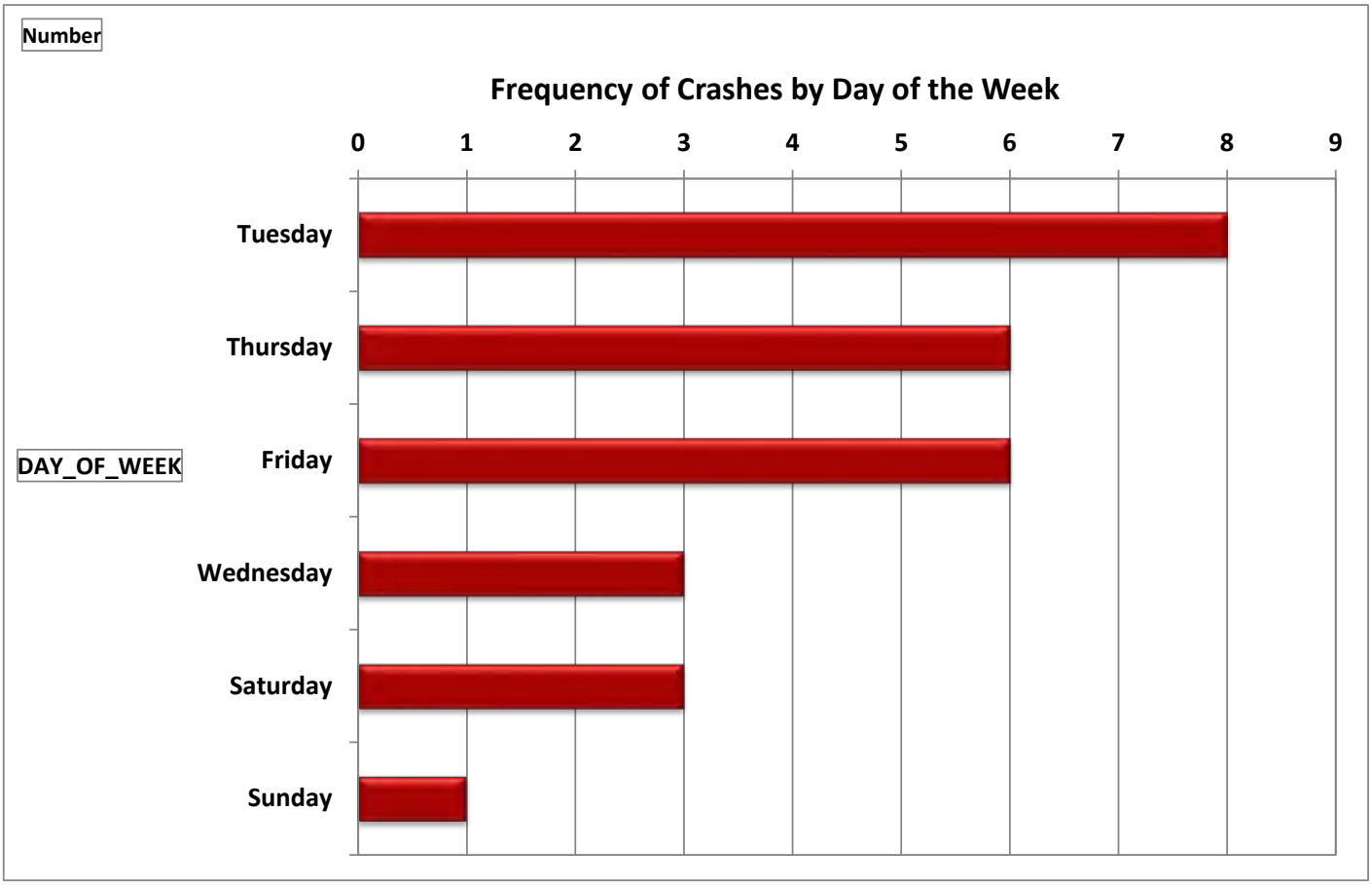
Intersection 02





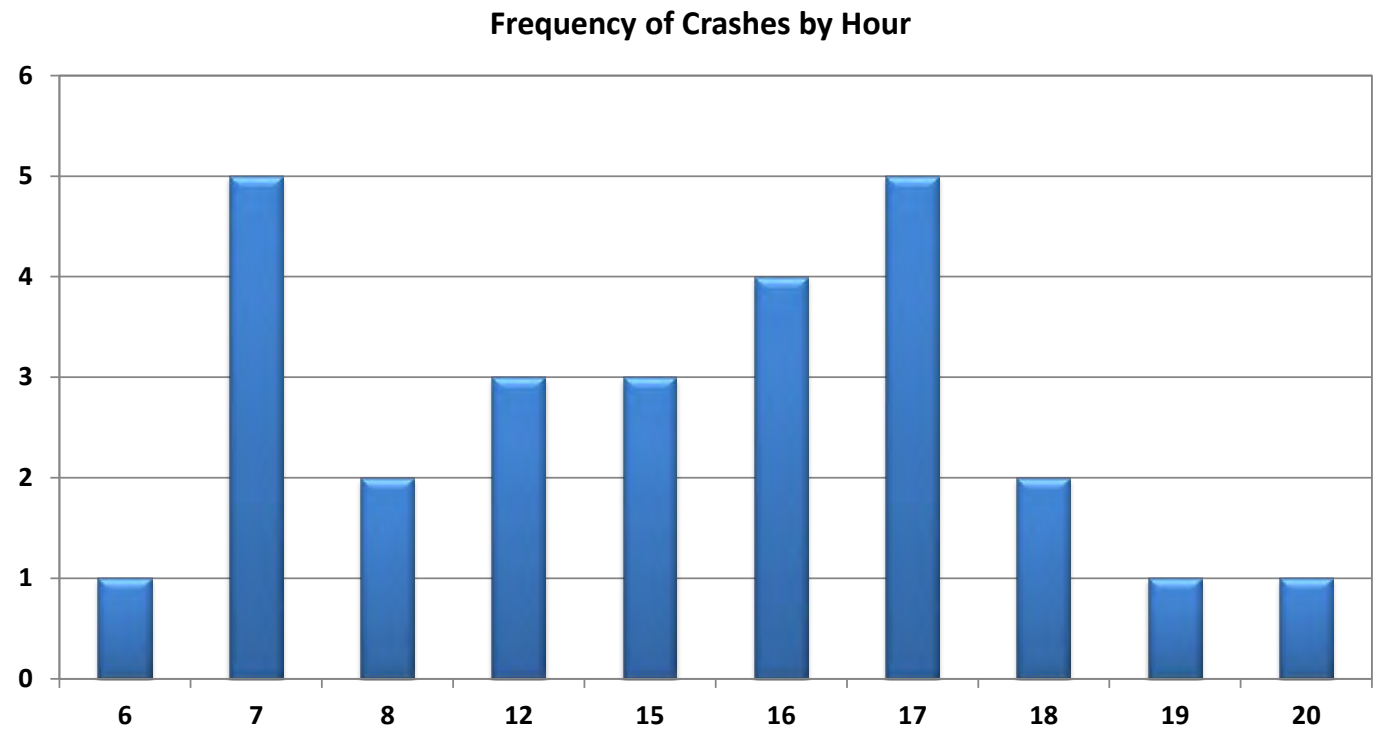
Intersection 02



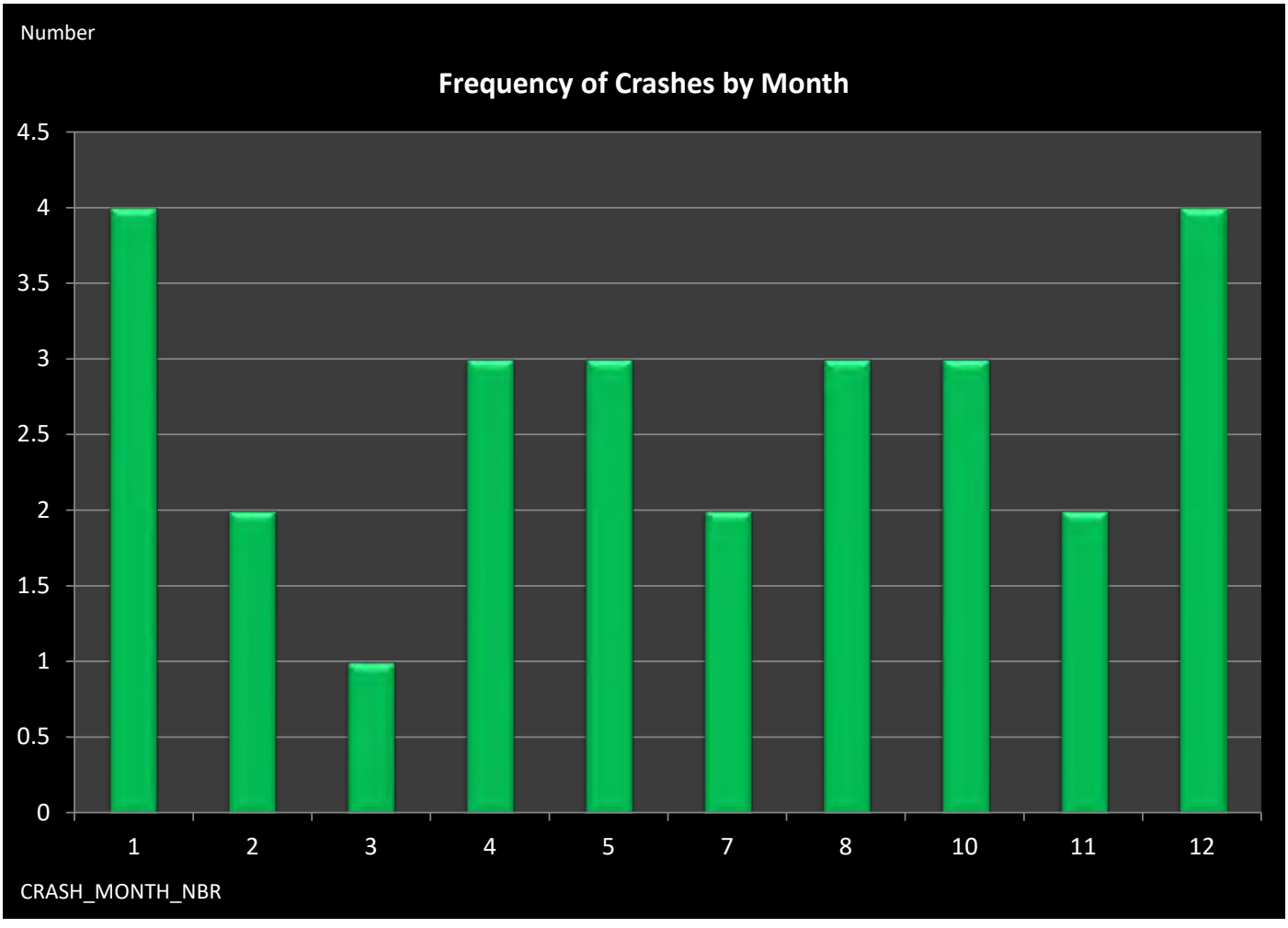


Intersection 02

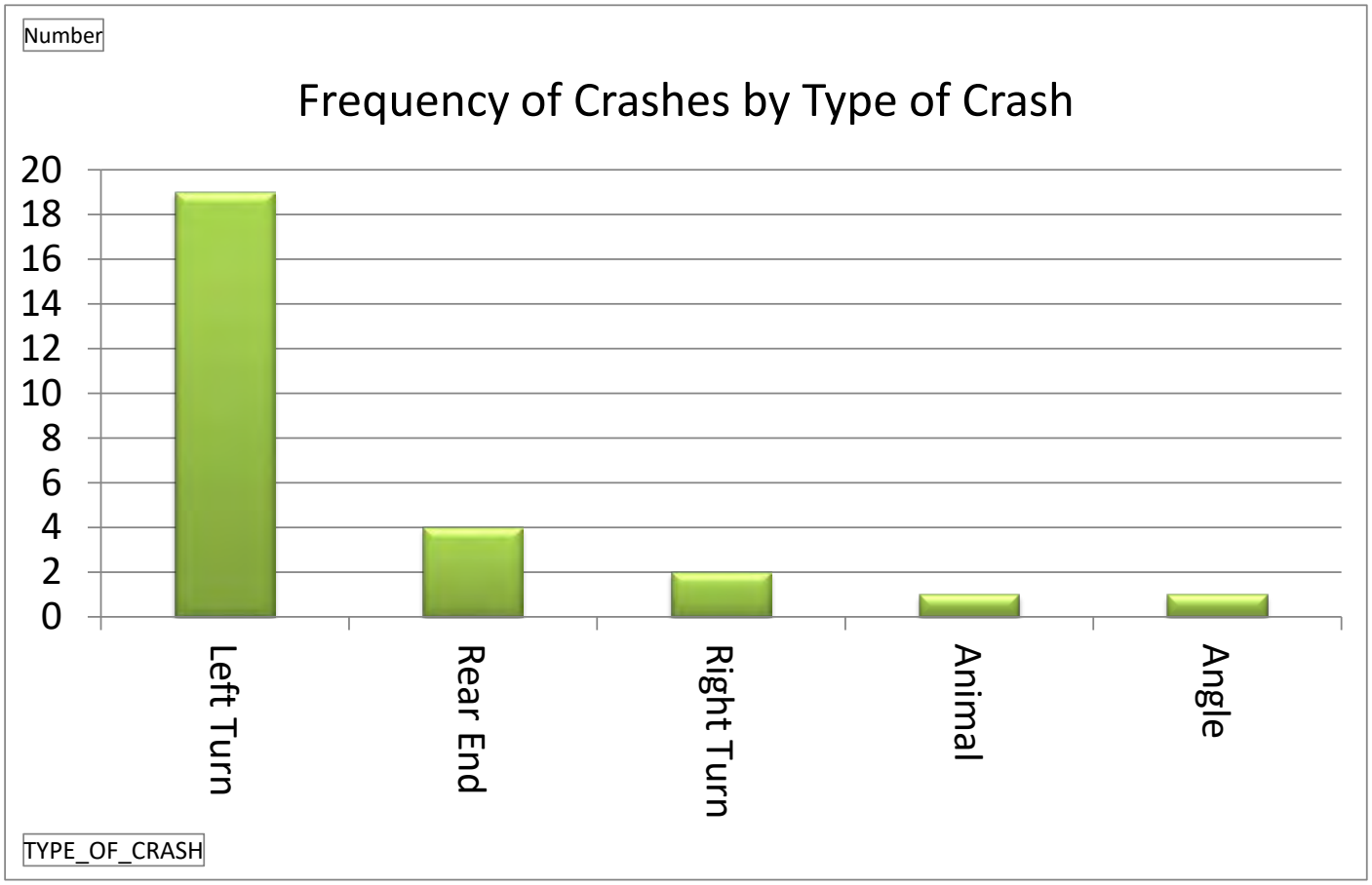
[redacted]

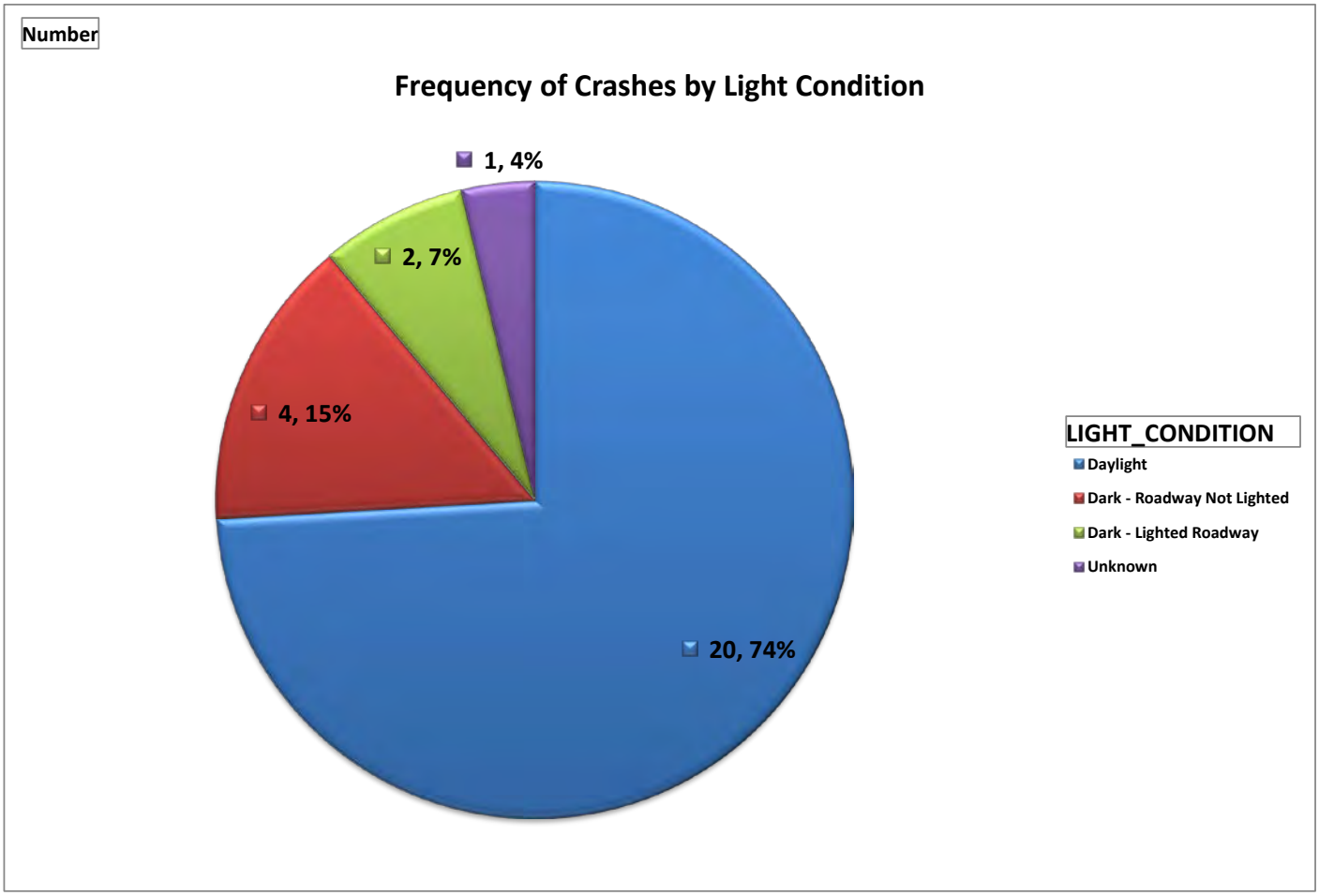


[redacted]

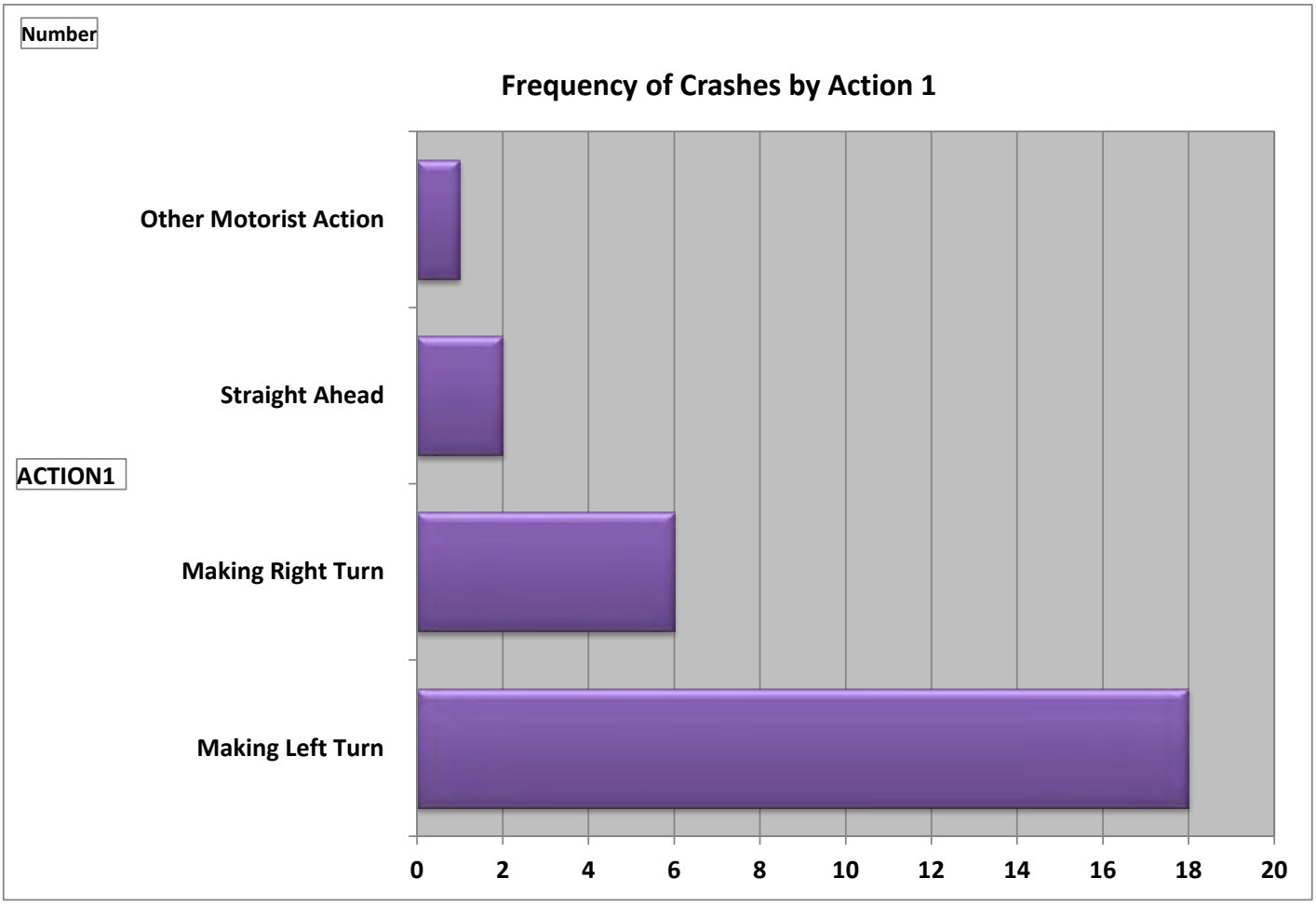


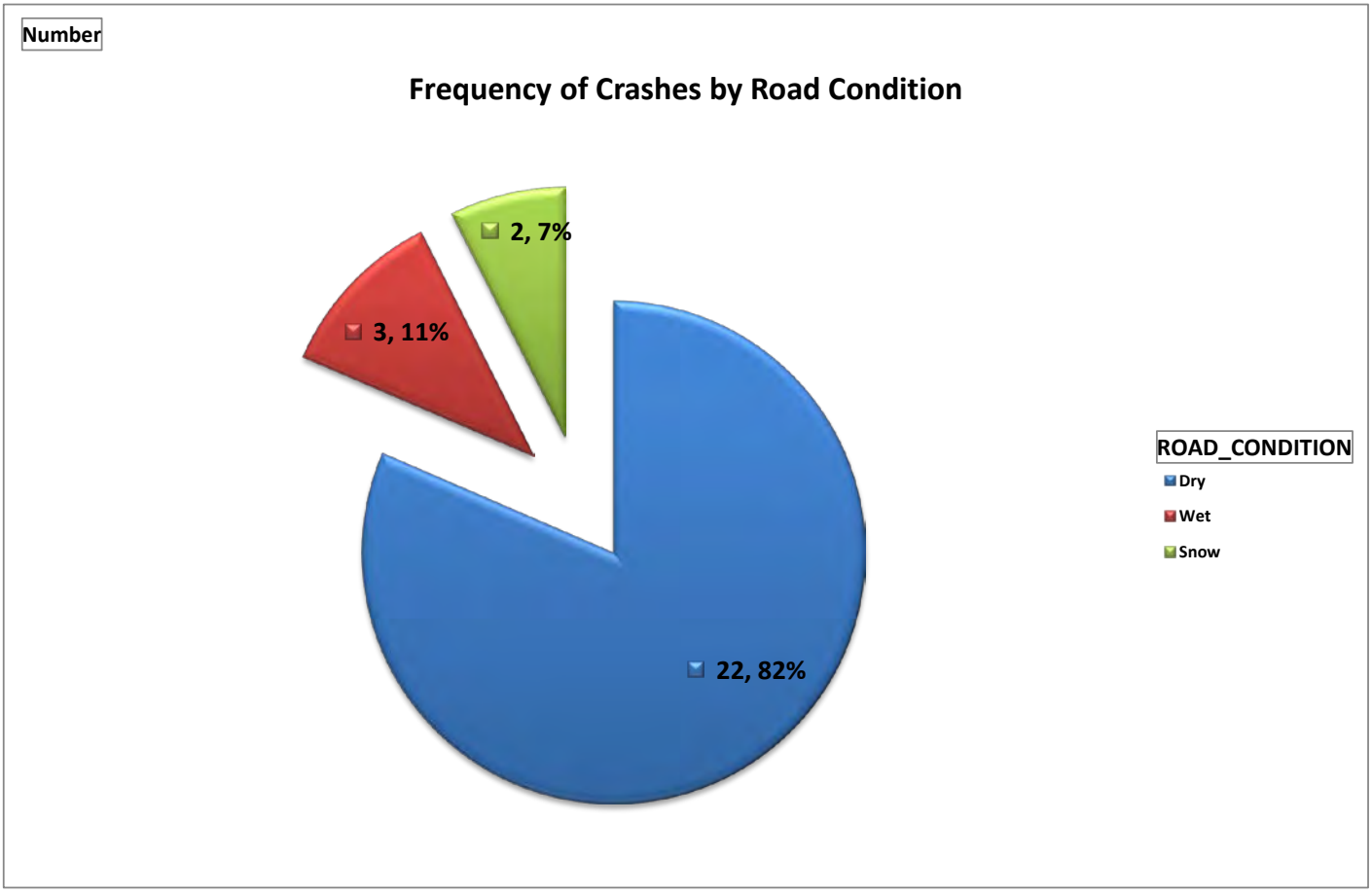
Intersection 02



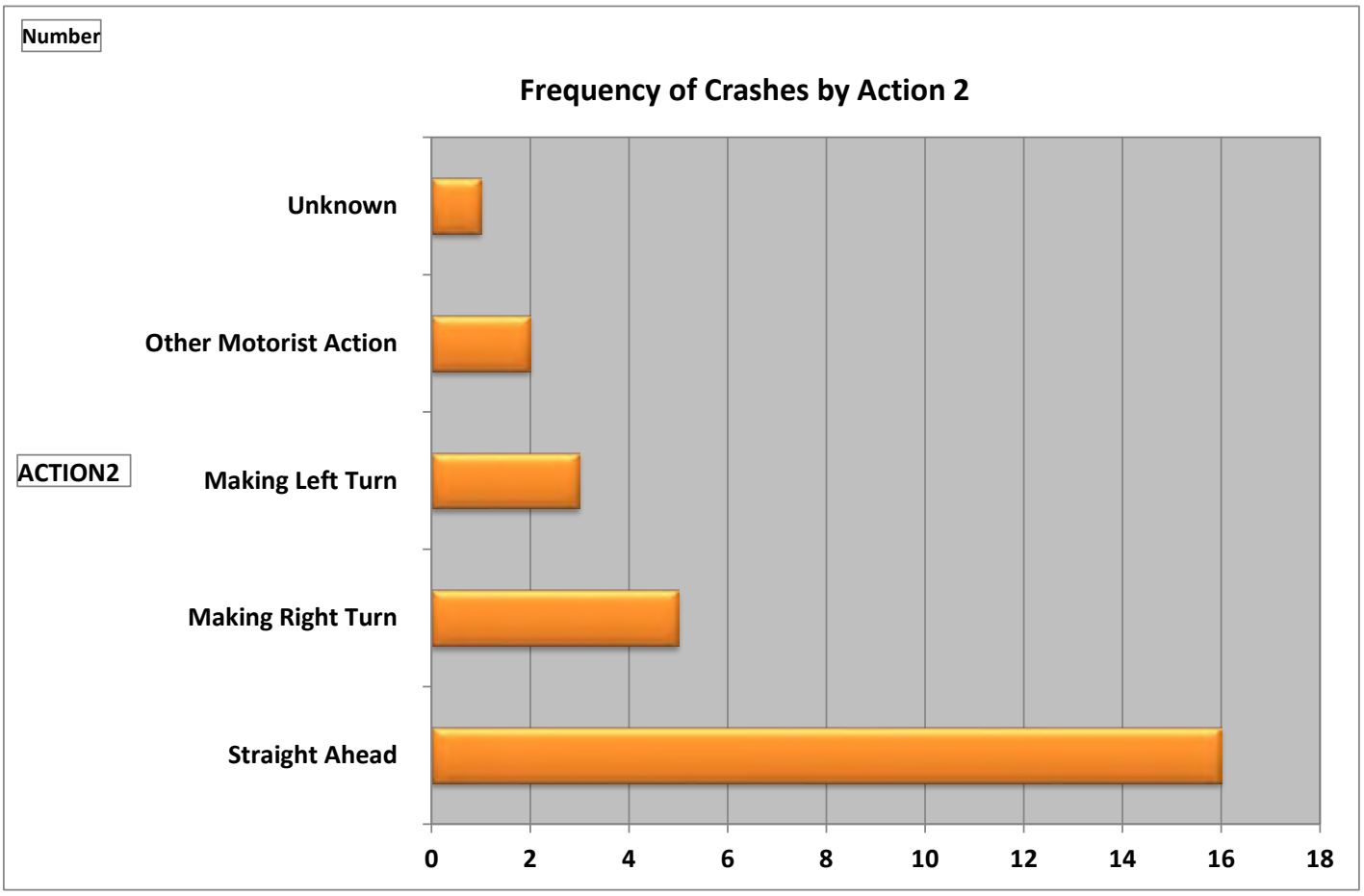


Intersection 02



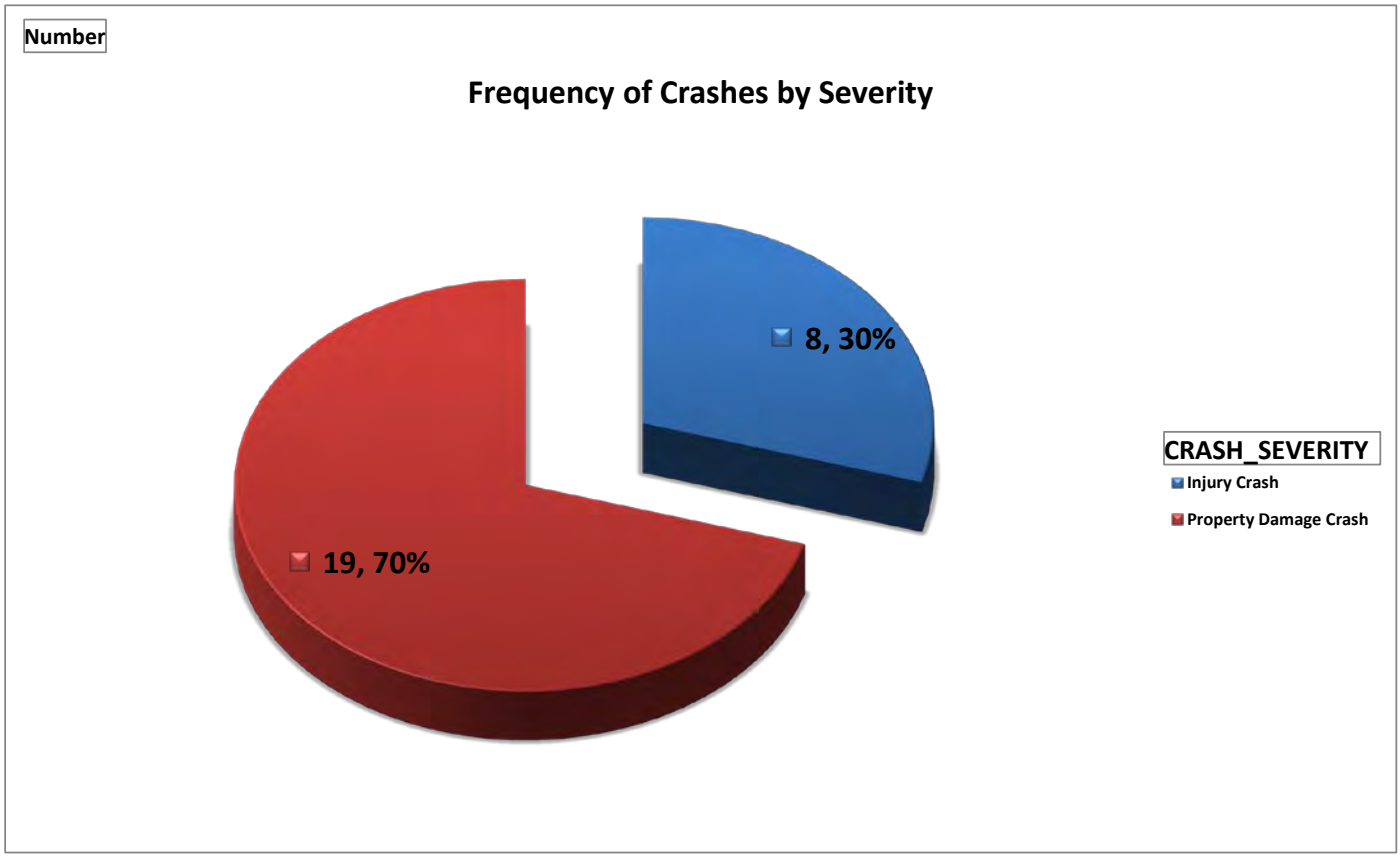


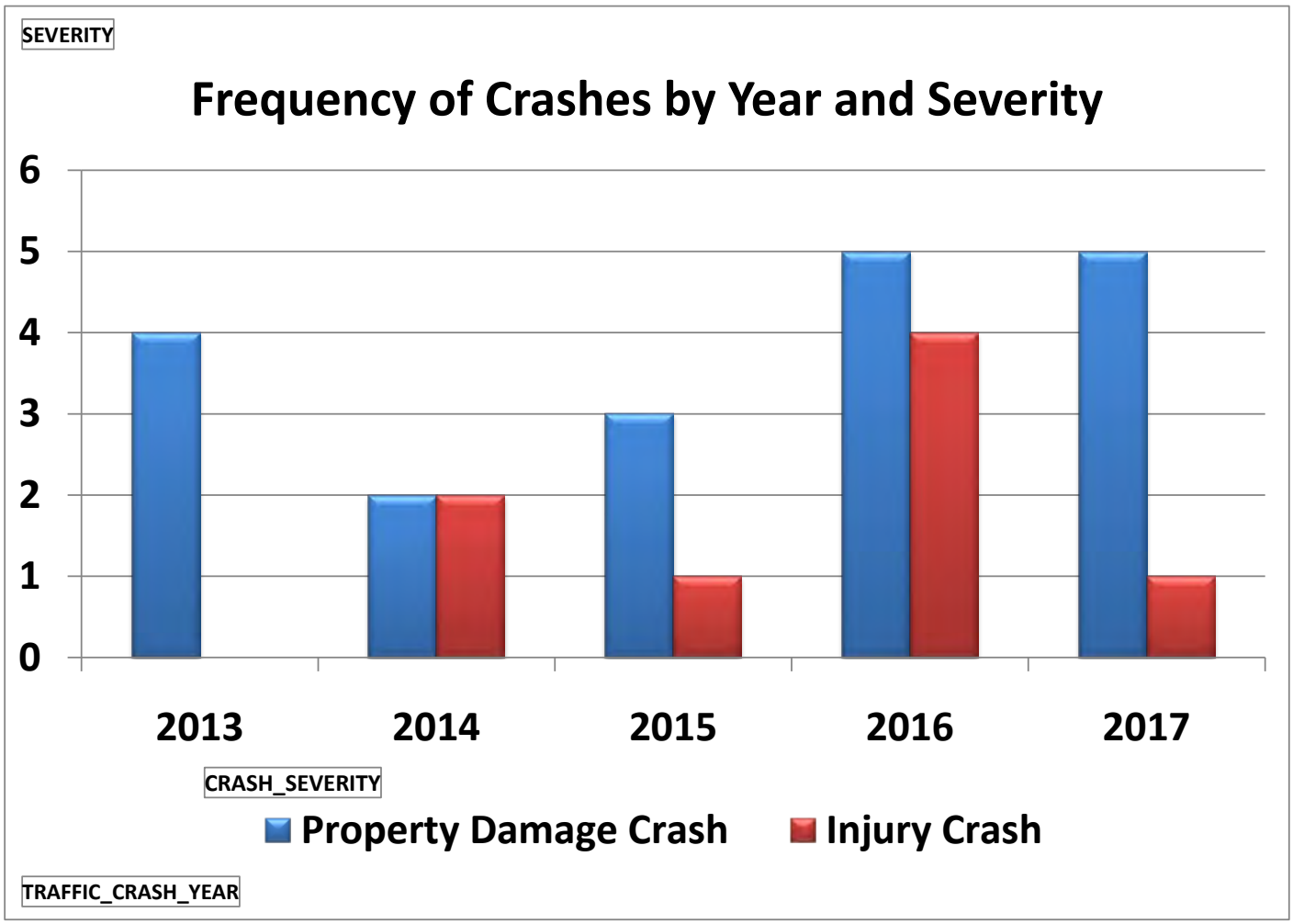
Intersection 02



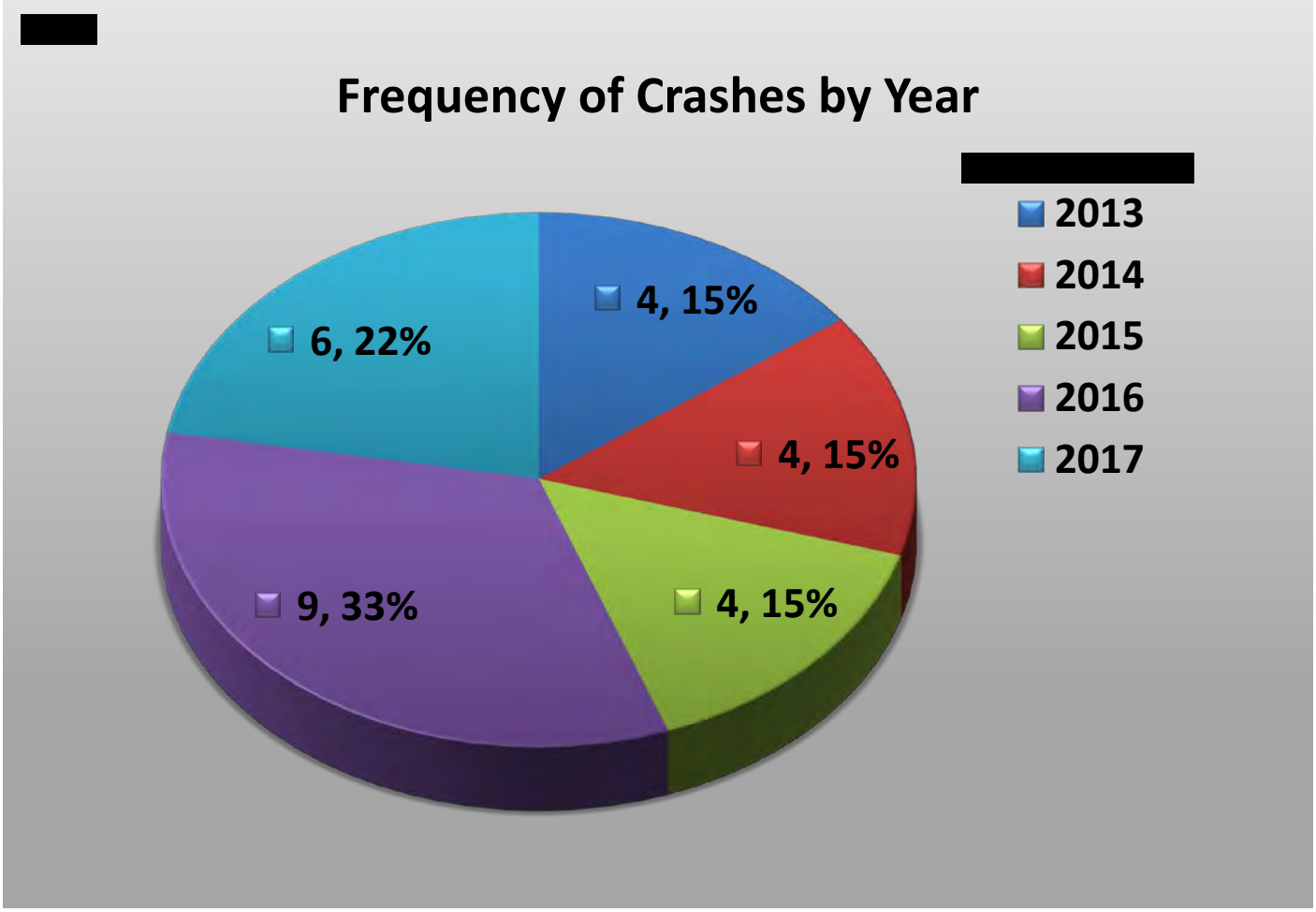
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_SPECL	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701018571	17	01	06	16	Fri	2	0	0	Rear End	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Slow/Stop - Right Turn	Intersection	Passenger	East	Slow/Stop - Right Turn	PD
201701080344	17	04	04	17	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201701137620	17	05	25	16	Thu	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201701173236	17	07	11	12	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Unincorporated	Normal	Pickup	Personal	East	Turning Left	On Pavement (Roadway)	SUV	South	Straight Ahead	PD
201701181084	17	07	19	08	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Unincorporated	Normal	SUV	Personal	West	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201701338554	17	12	14	12	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	Intersection	Passenger	South	Avoiding Vehicle/Objects	PD
201601046961	16	02	12	07	Fri	2	0	0	Angle	Clear	Daylight	Snow or Slush	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	South	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Slow/Stop - Left Turn	PD
201601030758	16	01	28	18	Thu	3	3	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Pickup	South	Straight Ahead	A-Injury
201601107770	16	05	10	07	Tue	2	1	0	Turning	Rain	Daylight	Wet	No Defects	No Controls	Unincorporated	Normal	SUV	Personal	North	Turning Left	Intersection	Truck Single Unit	South	Straight Ahead	A-Injury
201601077823	16	04	02	08	Sat	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Avoiding Vehicle/Objects	PD
201601188196	16	08	13	12	Sat	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Unincorporated	Normal	SUV	Personal	East	Turning Right	On Pavement (Roadway)	Pickup	South	Straight Ahead	PD
201601202191	16	08	30	17	Tue	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Turning Left	Intersection	SUV	South	Straight Ahead	A-Injury
201601263040	16	11	05	06	Sat	1	0	0	Animal	Clear		Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Van/Mini-Van	Personal	South	Straight Ahead	On Pavement (Roadway)				PD
201601297591	16	12	02	15	Fri	3	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201601271536	16	11	02	07	Wed	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501204480	15	10	02	07	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	SUV	Personal	West	Slow/Stop - Right Turn	Intersection	Pickup	West	Slow/Stop - Right Turn	PD
201501282943	15	04	09	07	Thu	3	2	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	North	Turning Left	On Pavement (Roadway)	Passenger	South	Straight Ahead	B-Injury
201501240742	15	03	10	18	Tue	2	0	0	Turning	Clear	Darkness	Dry		Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	South	Turning Right	On Pavement (Roadway)	SUV	East	Slow/Stop - Left Turn	PD
201501270813	15	12	04	19	Fri	2	0	0	Turning	Clear	Darkness	Dry	No Defects	No Controls	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Pickup	South	Straight Ahead	PD
201400076355	14	01	15	20	Wed	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Lane Use Marking	Unincorporated	Normal	Pickup	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400107915	14	02	11	17	Tue	2	0	0	Turning	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	SUV	Personal	East	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201400092452	14	01	30	15	Thu	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	North	Straight Ahead	C-Injury
201400413690	14	10	26	15	Sun	2	1	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Turning Left	On Pavement (Roadway)	Pickup	North	Turning Left	C-Injury
201301218985	13	05	23	16	Thu	2	0	0	Rear End	Clear	Daylight	Dry	Debris On Roadway	Stop Sign/Flasher	Unincorporated	Normal	Passenger	Personal	East	Slow/Stop - Right Turn	On Pavement (Roadway)	Passenger	East	Slow/Stop - Right Turn	PD
201301301198	13	08	13	16	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	Passenger	Personal	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301348108	13	10	01	17	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Yield	Unincorporated	Normal	SUV	Personal	West	Turning Right	Intersection	SUV	West	Turning Right	PD
201301417145	13	12	13	17	Fri	2	0	0	Rear End	Sleet/Hail	Darkness	Snow or Slush	No Defects	Stop Sign/Flasher	Unincorporated	Normal	Pickup	Personal	East	Other	On Pavement (Roadway)	Passenger	East	Slow/Stop - Right Turn	PD

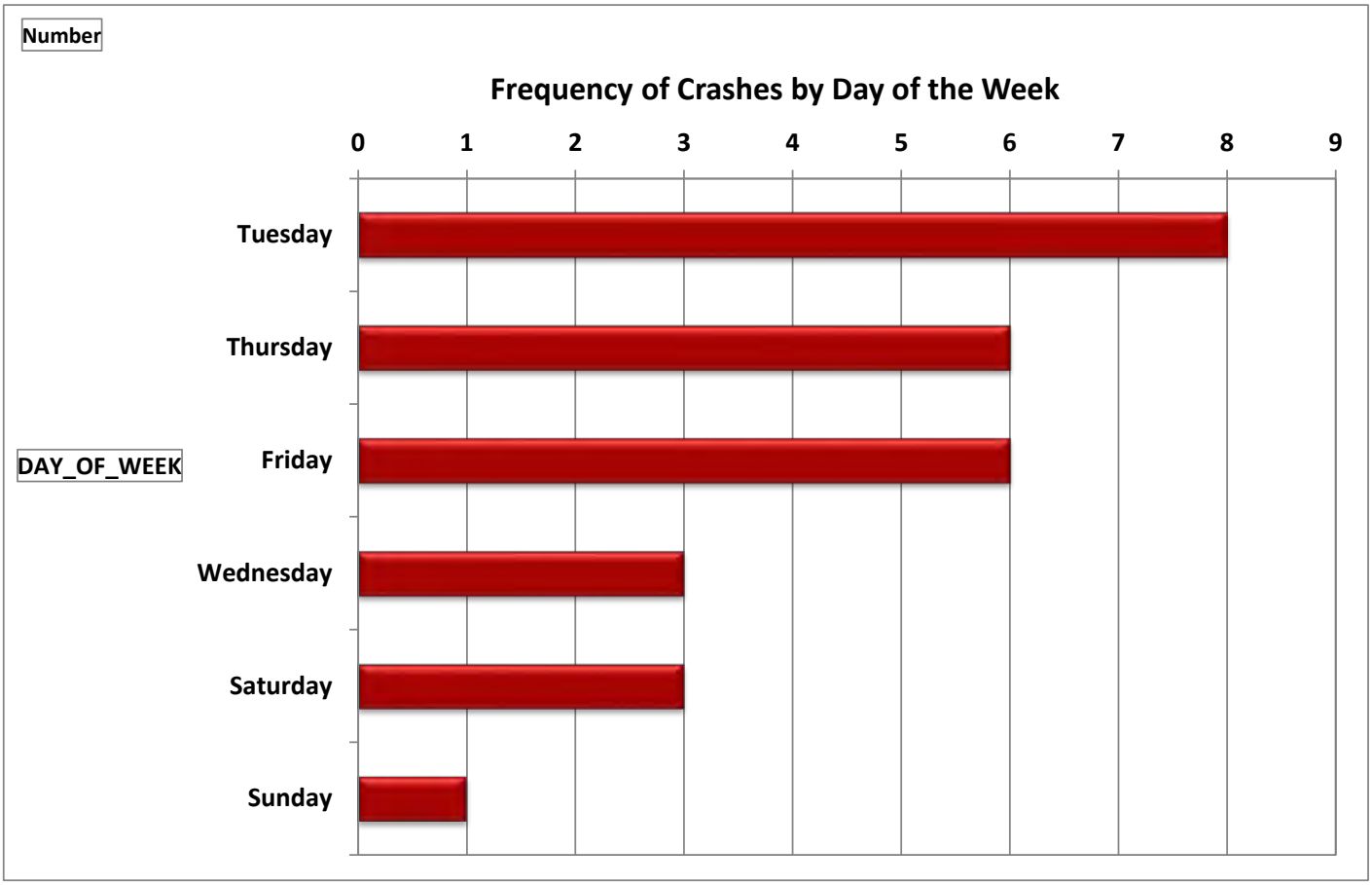
Intersection 02





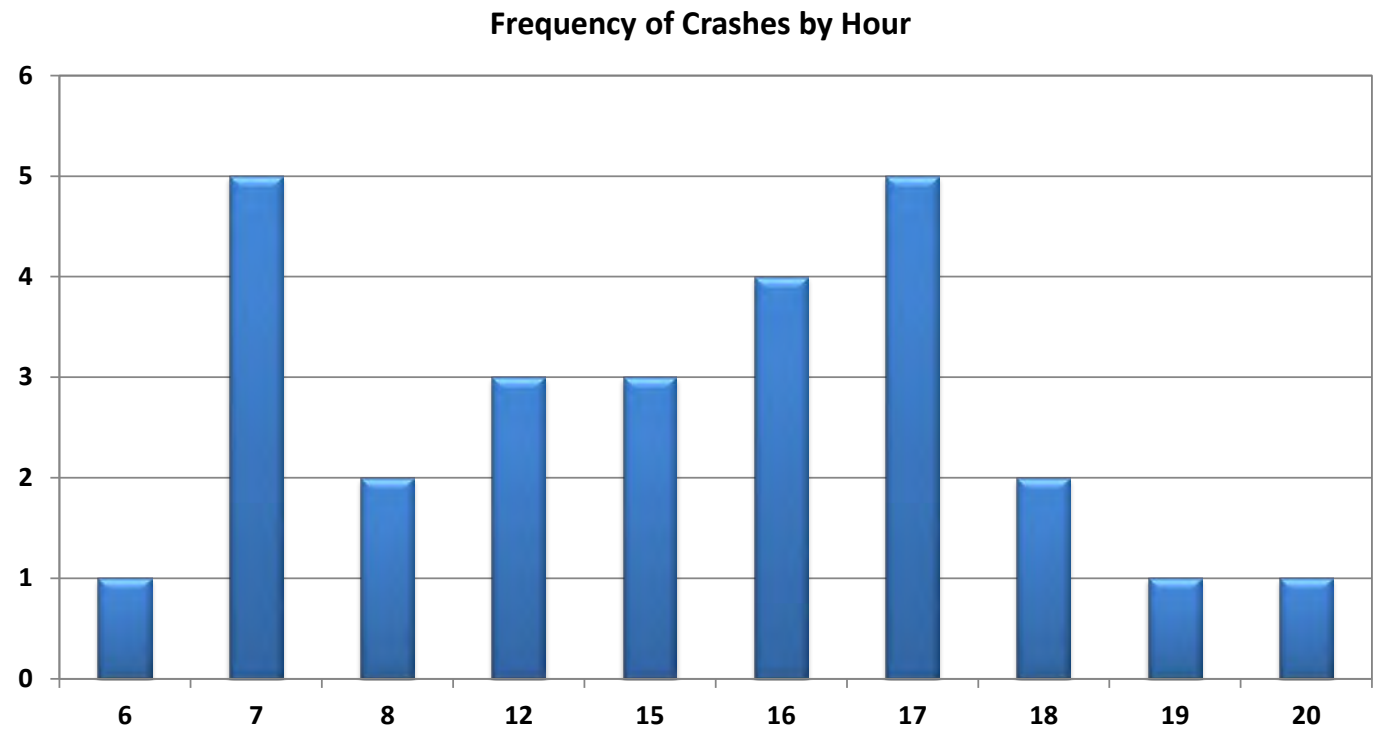
Intersection 02



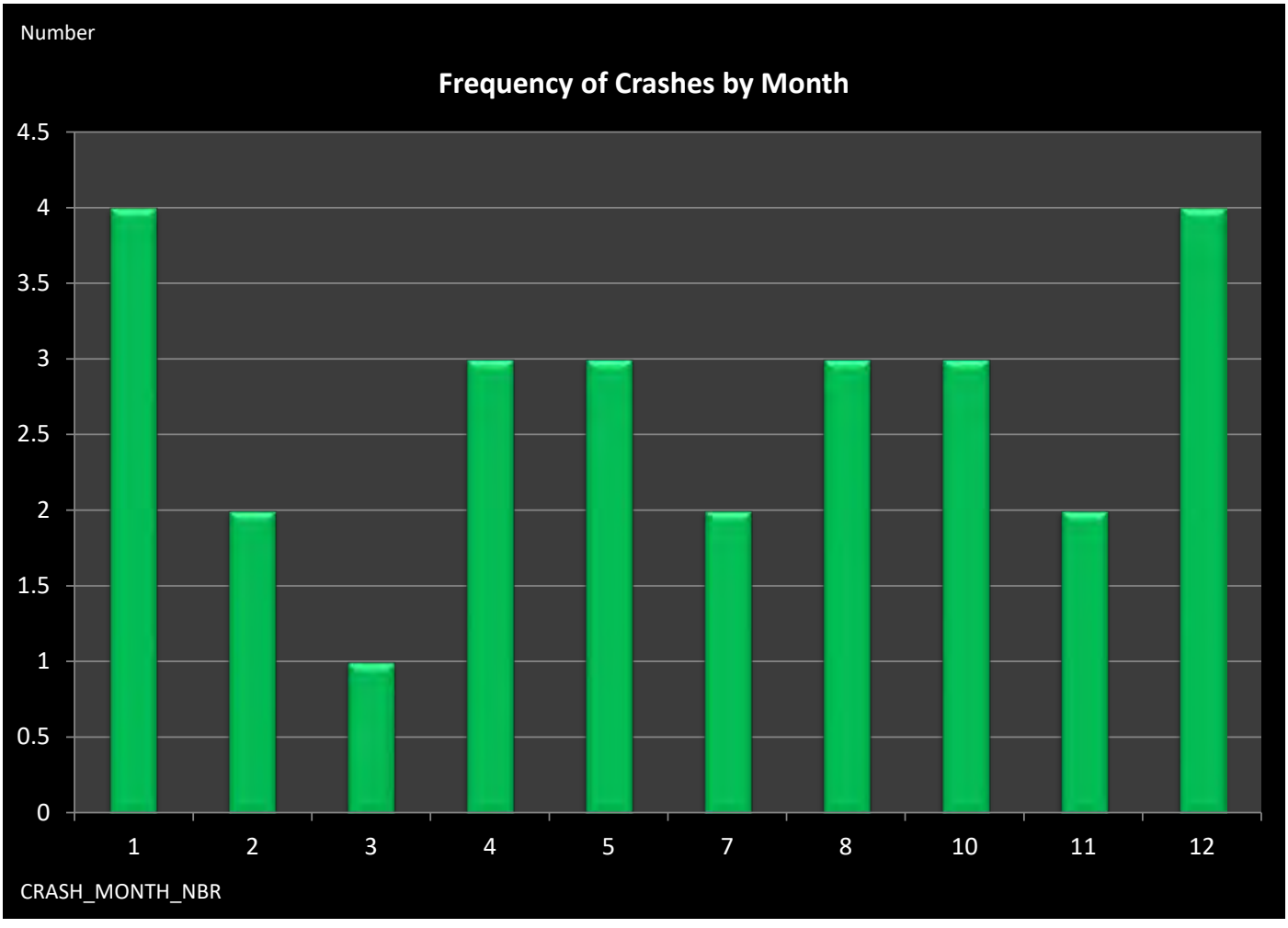


Intersection 02

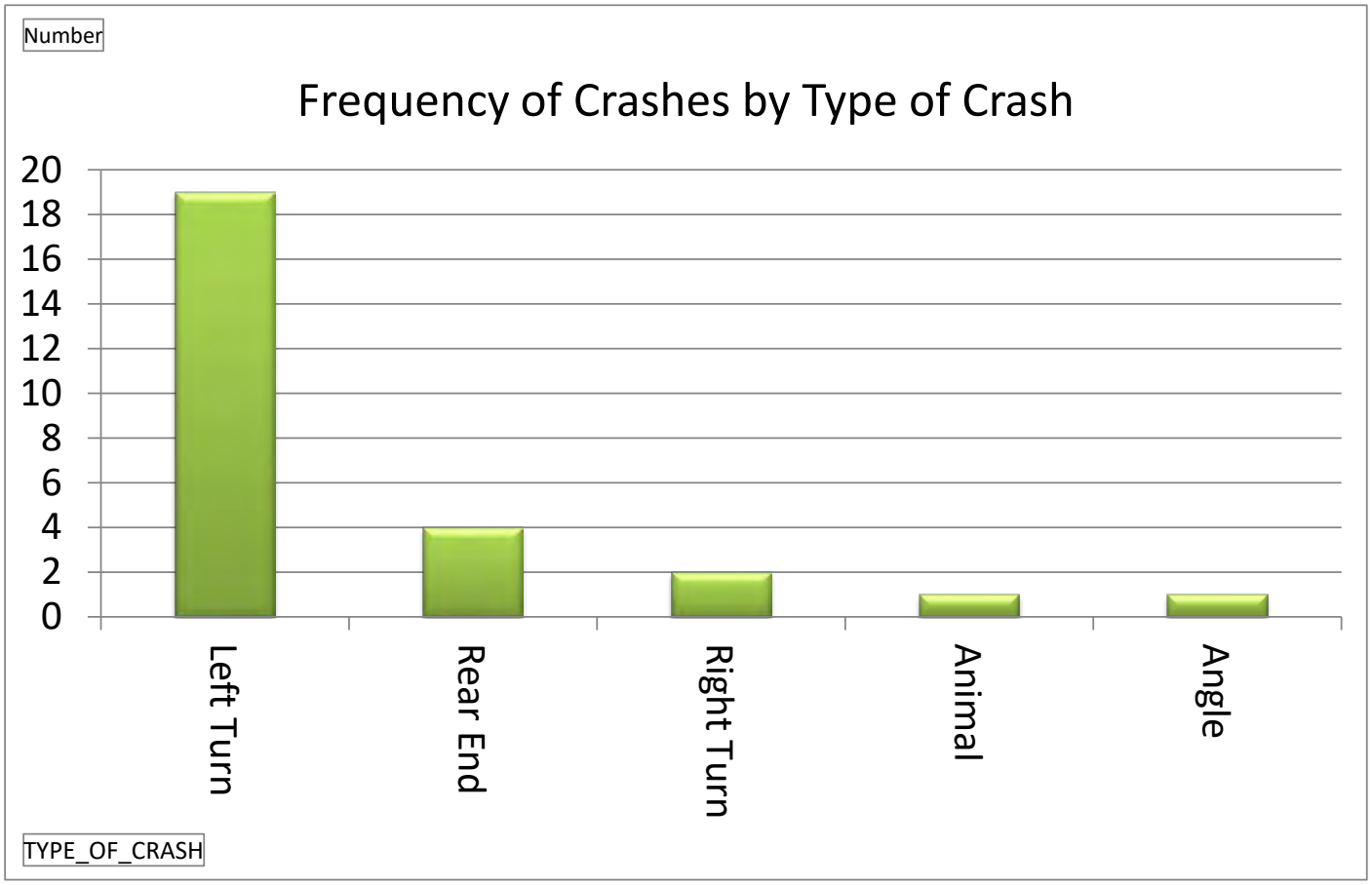
[redacted]

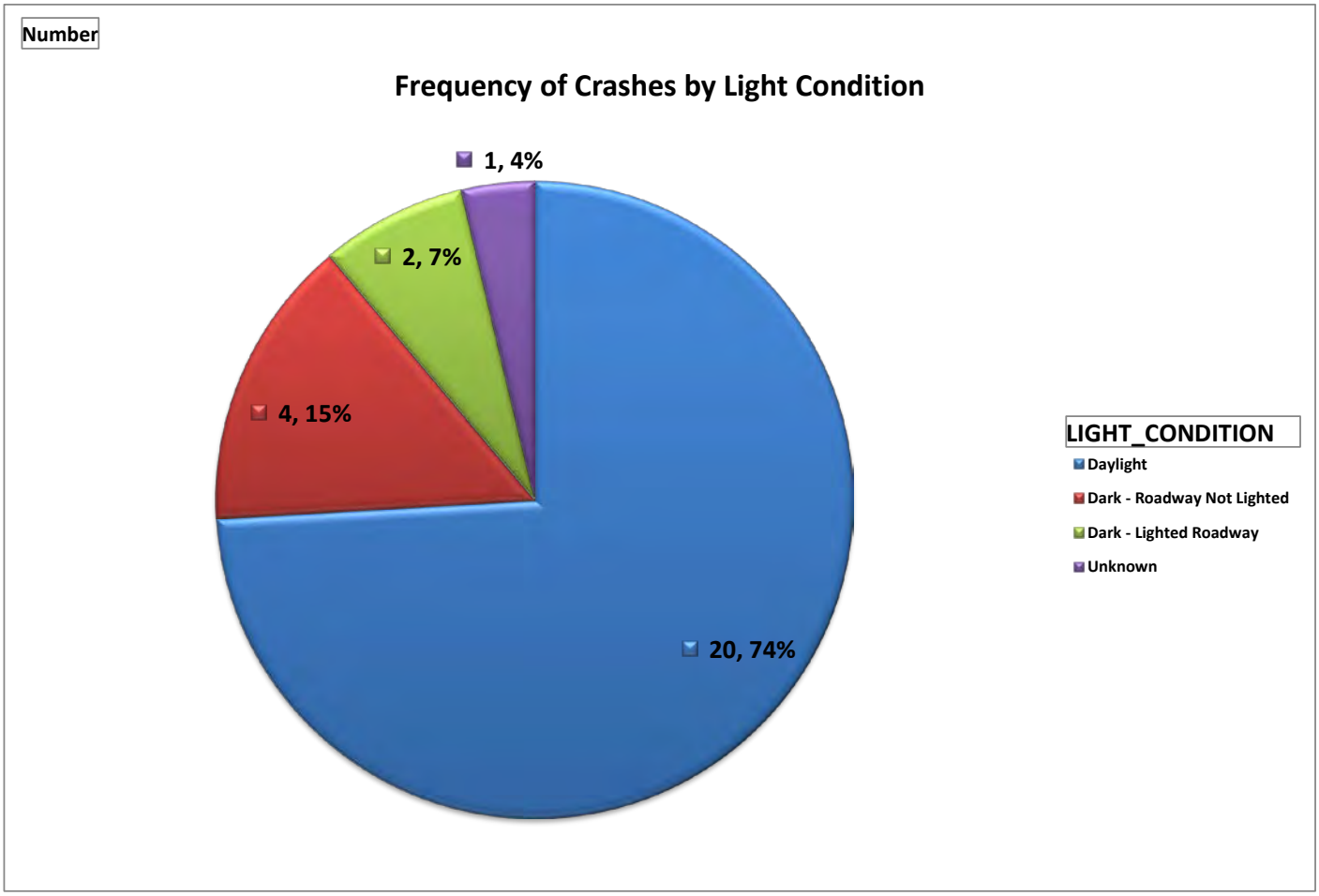


[redacted]

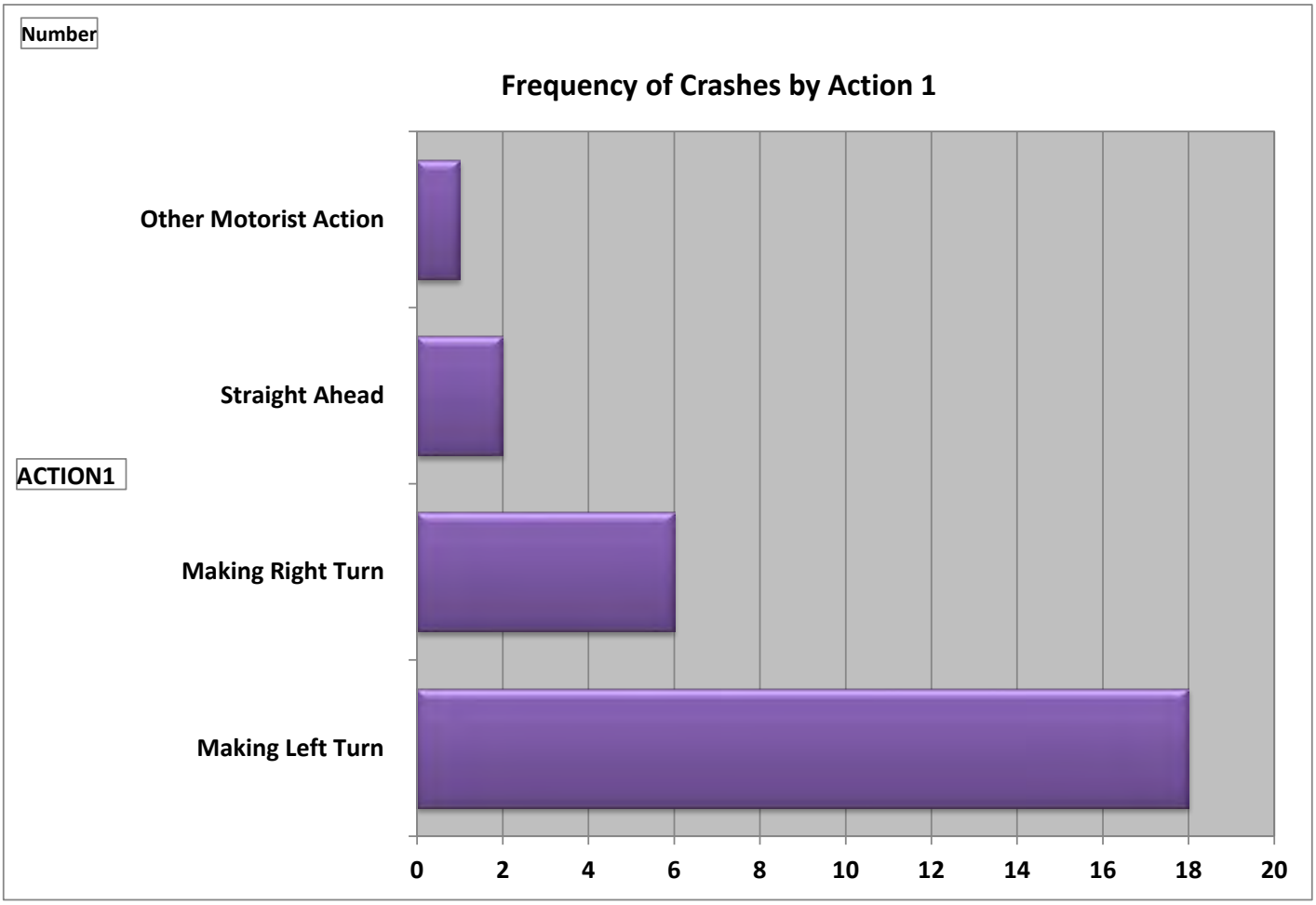


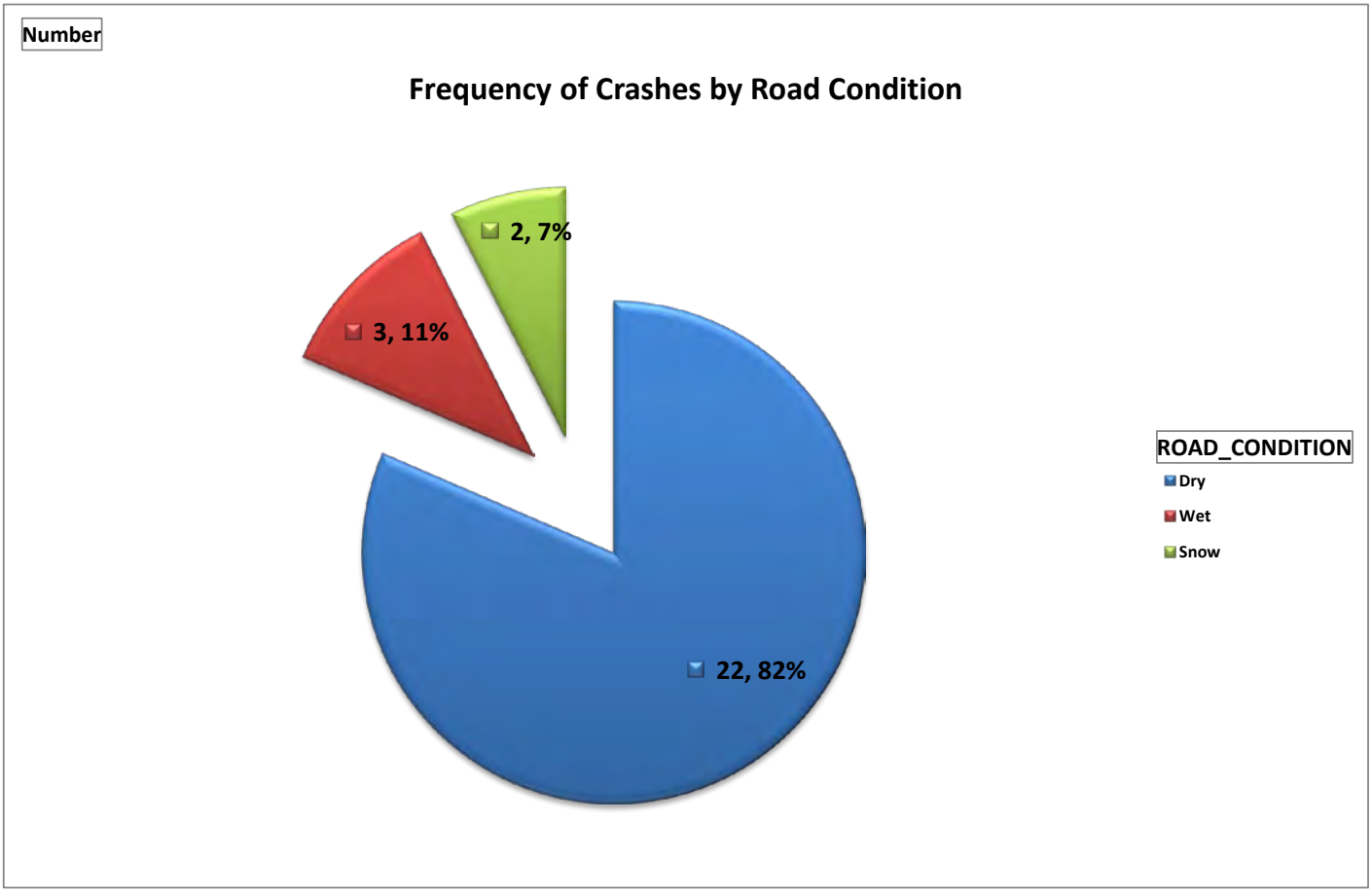
Intersection 02



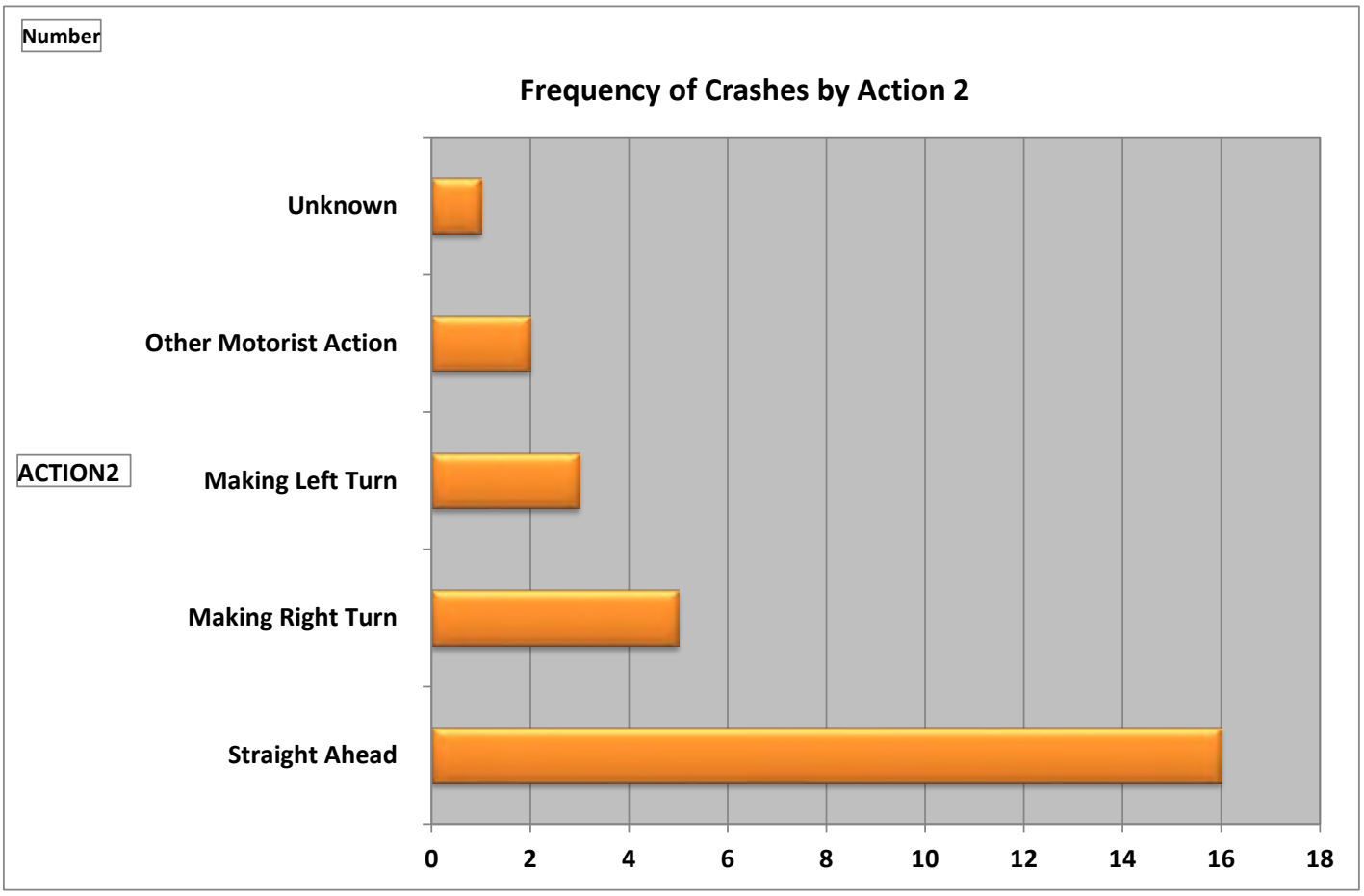


Intersection 02





Intersection 02



SIMPO Safety Study

APPENDIX A3: CARBON STREET AND W. MAIN ST

CMT

Carbon Street and Main Street Intersection

Intersection Priority #3

June 2019

INTRODUCTION

The Carbon Street and Main Street intersection located within the City of Marion was identified as the 3rd ranked intersection within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The 4-leg intersection is signalized with signal supports.

EXISTING CONDITIONS

Carbon Street is a 2-lane roadway oriented in the north-south direction and is parallel to the I-57 corridor (3,600 feet west). The adjacent land use is comprised of commercial and residential property. Left turn lanes (200 feet) exist on Carbon Street at the Main Street intersection. An at-grade railroad crossing is located 1,000 feet north of the subject intersection.

Main Street is a 3-lane roadway oriented in the east-west direction and is parallel to IL Route 13 (3,600 feet north). The adjacent land uses include commercial, residential and institutional. The Marion Junior High School campus is located 400 feet east of the subject intersection.

Figure 1 is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

Curb ramps were reconstructed on the NE and SE quadrants of the intersection in 2016. Main Street and the south leg of Carbon Street were resurfaced in 2018.

The traffic signal installation consists of overhead mounted signal heads on signal supports. Protected permissive left turn phases exist on all approaches with supplemental Left Turn Yield on Green signs. The northbound and eastbound left turn phases are recalled which adds delay to off-peak periods.

No pedestrian pushbuttons are present. All approaches are recalled except for the southbound through movement.

Photos 1 through 4 show a street view of each approach. All signal heads mounted overhead have backplates (without reflective edges).

PHOTO 1: NB CARBON STREET APPROACH

PHOTO 2: SB CARBON STREET APPRAOCH

PHOTO 3: EB MAIN STREET APPROACH

PHOTO 4: WB MAIN STREET

The supplemental sign indicating that the Left Turn Must Yield on Green is missing on the signal support on the westbound Main Street approach.

SAFETY ANALYSIS

A total of 52 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**. The crash frequency is distributed across all study years with the exception of 2015. No factors were identified that contribute to the crash frequency.

The frequency of crashes by type on **Figure 3** shows a majority of crashes (56% or 29 crashes) are rear end crashes which is typically the predominant crash type for a signalized intersection.

Three crashes involving bicycles occurred within the study timeframe. All resulted in injuries (1 Type A, 2 Type B). Two are not considered to be school related since they occurred when school was not open (June and July). The direction of the cyclist is not known – all vehicles were northbound or southbound on Carbon Street.

Figure 4 shows the distribution of crashes within the study area by severity and by year. The fatal and injury crashes at the subject intersection represent 25 percent of the total crashes. **The injury crashes include 2 Type A crashes and 6 Type B crashes.** No fatalities occurred at the intersection within the time frame of the study.

Figure 5 shows the severity of crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. The highest frequency of left turn crashes was coded on the northbound approach. The northwest bound left turn crashes and northbound left turn crashes are combined to equal 5 left turning crashes.

The majority of rear end crashes occurred on the eastbound and westbound approaches (22 crashes).

FIGURE 2: FREQUENCY OF CRASHES BY YEAR

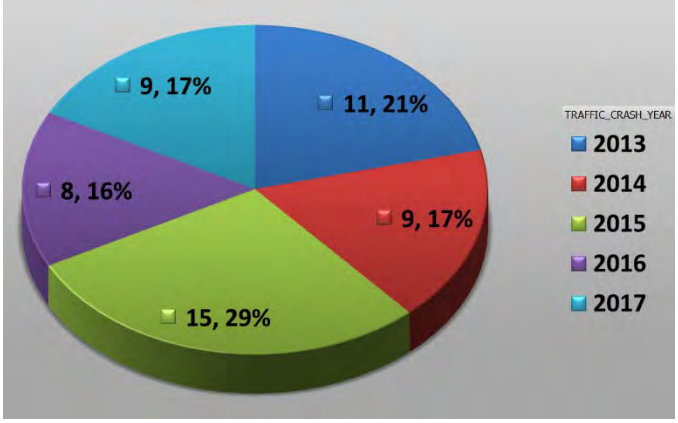


FIGURE 3: FREQUENCY OF CRASHES BY TYPE

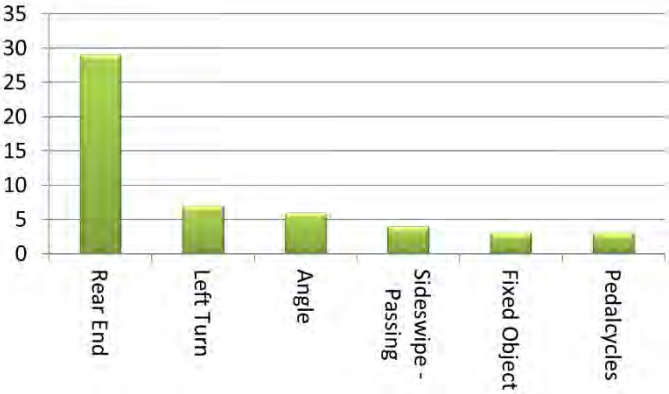


FIGURE 4: FREQUENCY OF CRASHES BY SEVERITY

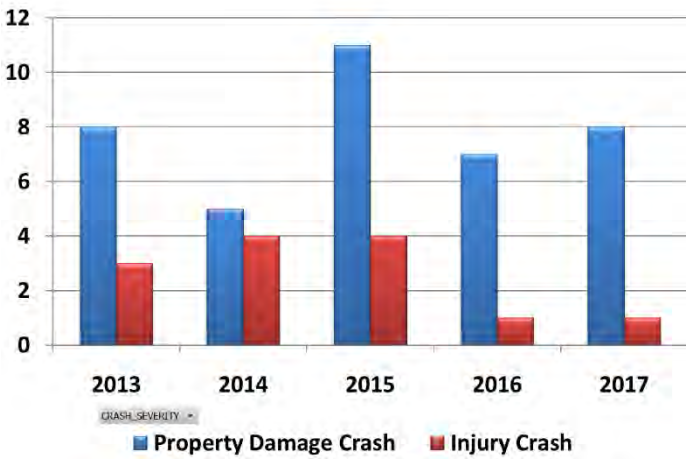
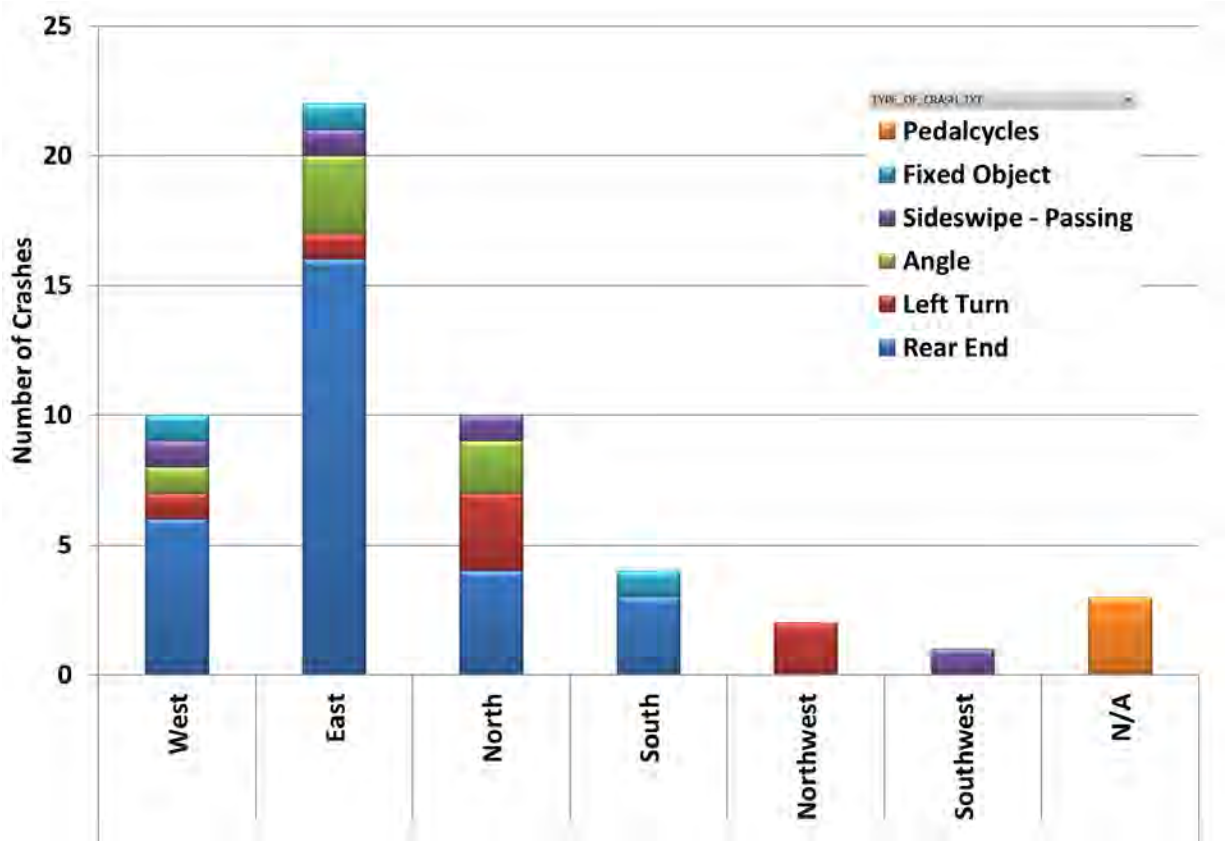
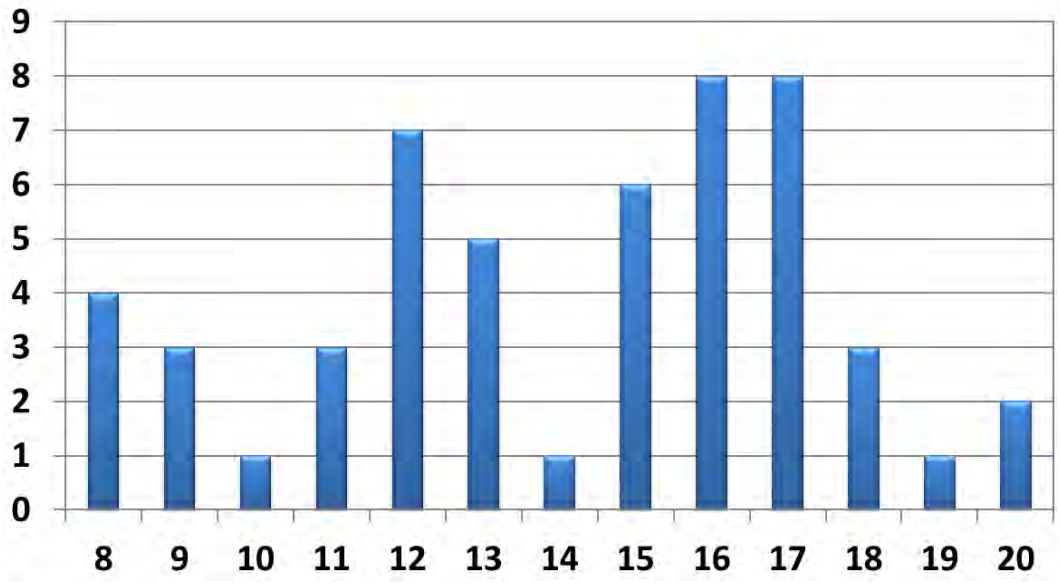


FIGURE 5: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The crashes' frequency by time of day suggests that congestion is a contributing factor to the safety performance of the study area. **Figure 6** shows the distribution by time of day. The highest frequency of crashes occurs in the afternoon and PM peak time frames. A noon peak is also evident.

FIGURE 6: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improving safety performance.

SHORT TERM COUNTERMEASURE – MAIN STREET REAR END CRASHES

The crash type having the greatest frequency (22 crashes or 42 percent) was attributed to the rear end crashes on Main Street. Main Street has a posted speed limit of 30 miles per hour. A 20 MPH school zone exists 400 feet east of the signalized intersection. Clearance intervals (yellow and all-red) have been calculated for 30 MPH approach speeds. The National Cooperative Highway Research Program (NCHRP) Report 831 for Signal Timing Manual (Second Edition) was released January 2018.

Signal timing to balance delays may also be desirable to mitigate the crashes on Main Street. **Photo 5** shows a Google street view of queues formed on westbound Main Street. **Photo 6** shows the longest queue that formed on Carbon Street during field observations. No vehicles were on the southbound Carbon Street approach. Additional green time may be desirable to reduce queue lengths which may be a factor for rear end crashes. To reduce queues, vehicle detection is recommended for all left-turn phases (and removal of the recalls) and the northbound approach to the intersection (at a minimum). Appropriate vehicle detection is also shown to reduce rear end crashes caused by prematurely ending a green phase.

PHOTO 5: WB MAIN STREET QUEUE

PHOTO 6: NB CARBON STREET QUEUE

Updated clearance intervals may also address the 4 angle crashes on the east and westbound approaches.

Using established guidelines to calculate the duration of yellow change and red clearance intervals has been shown to reduce total crashes between 8 and 14 percent while reducing injury crashes by approximately 12 percent.

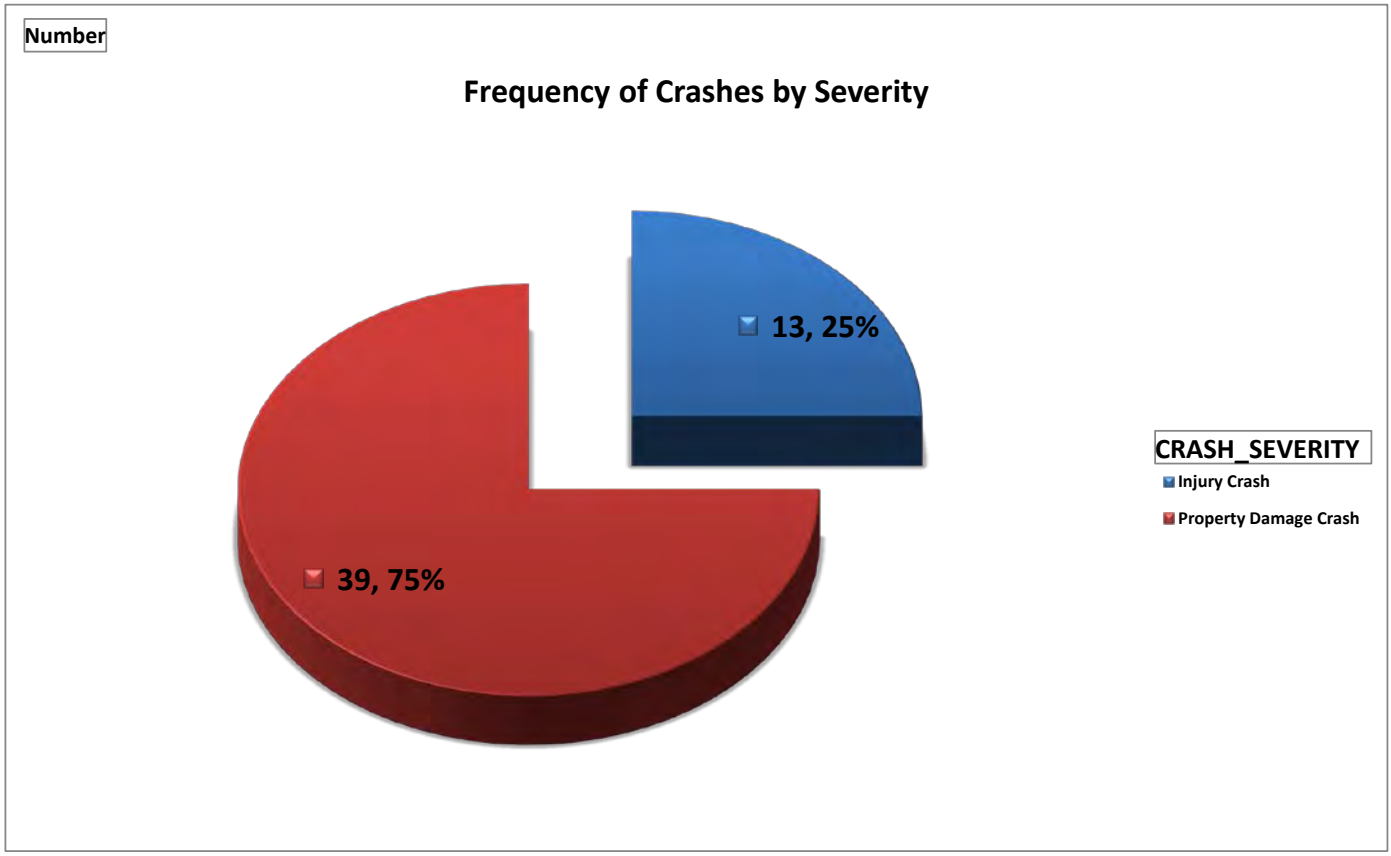
SHORT TERM COUNTERMEASURE – PEDESTRIAN SIGNALS

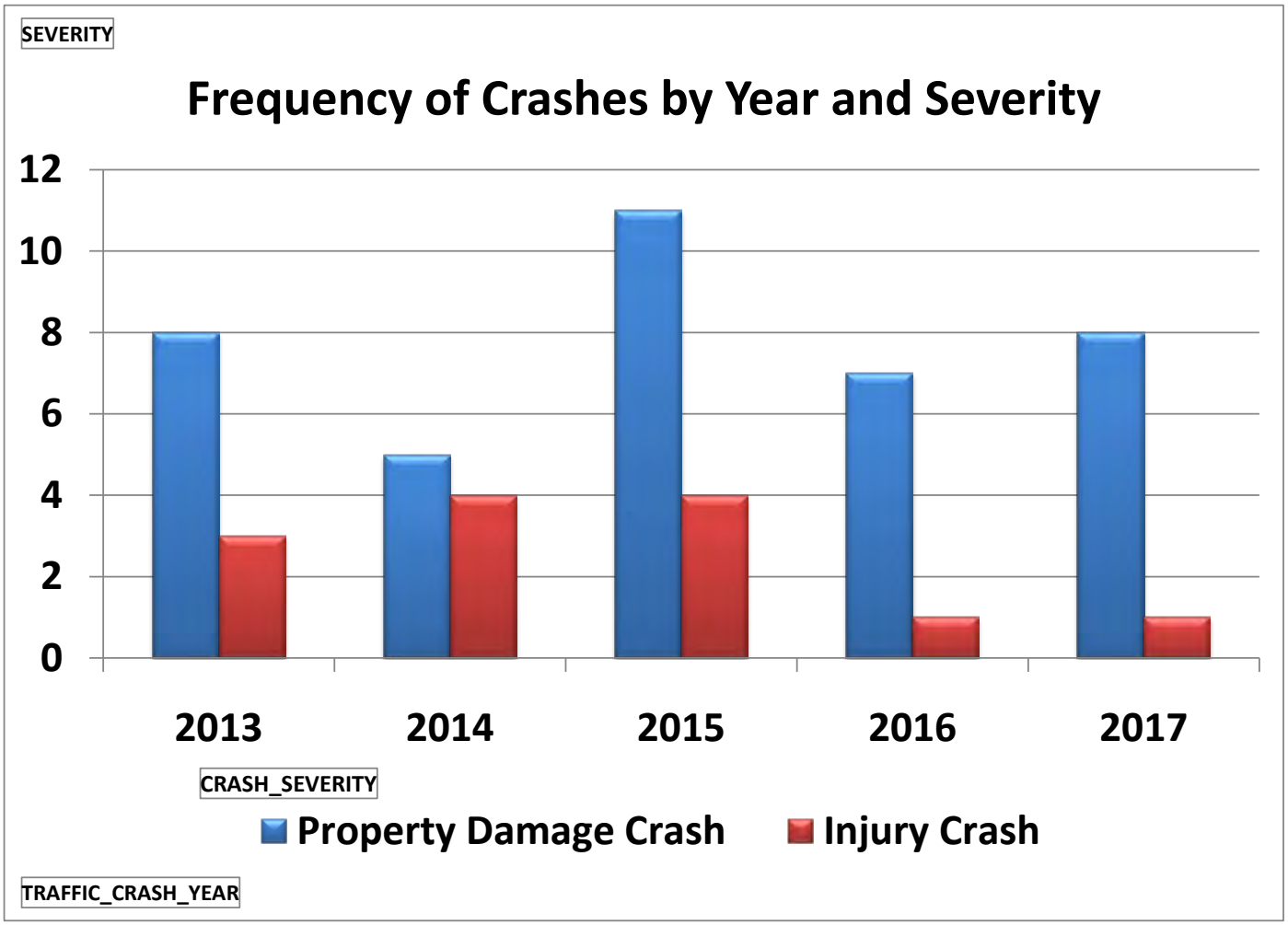
Despite no crashes involving pedestrian were documented, two countermeasures may be considered to enhance pedestrian accommodations:

- The southbound approach is not recalled and no pedestrian pushbuttons exist on the signal supports. Therefore, a pedestrian does not have the ability to place a call into the controller if wanting to cross Main Street during low volume periods. Install pedestrian pushbuttons or recall the Carbon Street approaches.
- Add pedestrian signals with countdown features. The protected/permissive left turn phases may create confusion for pedestrians. Pedestrian signals may be helpful considering the potential for young pedestrians due to the proximity of the middle school.

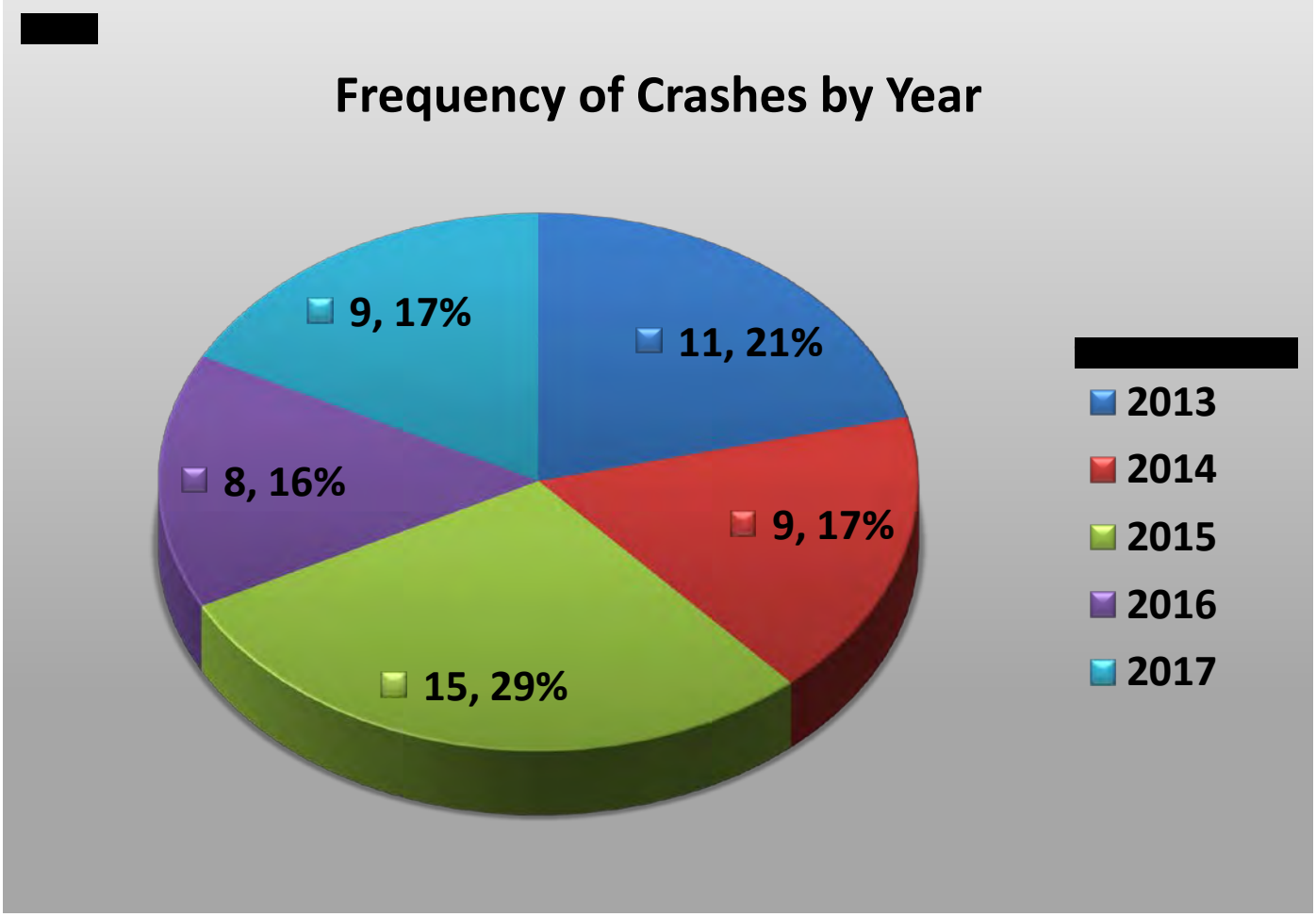
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701168470	17	07	06	13	Thu	2	0	0	Rear End	Cloudy/Overcast	Daylight	Wet	No Defects	No Controls	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201701208198	17	08	15	16	Tue	5	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Slow/Stop In Traffic	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201701166157	17	07	01	17	Sat	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	PD
201701283320	17	10	27	12	Fri	2	0	0	Rear End	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	North	Slow/Stop In Traffic	Intersection	Pickup	North	Slow/Stop In Traffic	PD
201701257018	17	10	01	11	Sun	1	0	0	Fixed Object	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	South	Straight Ahead	Intersection				PD
201701266982	17	10	12	19	Thu	2	0	0	Rear End	Clear	Dusk	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Straight Ahead	PD
201701272519	17	10	13	09	Fri	2	0	0	Angle	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Pickup	East	Straight Ahead	PD
201701356168	17	12	30	18	Sat	2	0	0	Rear End	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201701178438	17	07	17	13	Mon	1	1	0	Pedalcyclist	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	N/A	N/A	N/A	N/A	N/A	SUV	North	Straight Ahead	A-Injury
201601015149	16	01	11	15	Mon	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	SUV	East	Slow/Stop In Traffic	PD
201601016006	16	01	08	17	Fri	2	0	0	Turning	Clear	Dusk	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Passenger	East	Turning Left	On Pavement (Roadway)	Pickup	East	Turning Left	PD
201601072734	16	03	21	15	Mon	4	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201601125175	16	06	02	09	Thu	1	0	0	Fixed Object	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Marion	Normal	Other	East	Turning Right	Off Pavement - Right				PD
201601152331	16	07	05	15	Tue	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	Northeast	Turning Left	PD
201601303053	16	12	16	16	Fri	2	0	0	Sideswipe Same Direction	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Passenger	North	Changing Lanes	On Pavement (Roadway)	SUV	North	Straight Ahead	PD
201601235554	16	10	03	17	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Entering Traffic Lane Fr	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201601314725	16	12	21	17	Wed	2	1	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Tractor With Semi-Trailer	Northwest	Turning Left	Intersection	SUV	East	Slow/Stop - Left Turn	C-Injury
201501119814	15	06	19	12	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Slow/Stop In Traffic	On Pavement (Roadway)	Van/Mini-Van	West	Slow/Stop In Traffic	PD
201501124273	15	06	24	20	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Avoiding Vehicle/Objects	PD
201501124275	15	06	25	17	Thu	3	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	East	Slow/Stop In Traffic	On Pavement (Roadway)	SUV	East	Slow/Stop In Traffic	B-Injury
201501214182	15	10	13	18	Tue	2	0	0	Rear End	Clear	Dusk	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	SUV	West	Straight Ahead	PD
201501144959	15	07	22	16	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201501202626	15	01	21	16	Wed	2	0	0	Sideswipe Same Direction	Clear	Daylight	Dry	No Defects	Lane Use Marking	Marion	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201501243050	15	11	10	13	Tue	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	PD
201501222201	15	10	20	20	Tue	2	0	0	Rear End	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	East	Slow/Stop In Traffic	Intersection	Van/Mini-Van	East	Slow/Stop In Traffic	PD
201501203514	15	09	30	12	Wed	2	1	0	Angle	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	East	Backing	Other	Passenger	Northeast	Entering Traffic Lane Fr	C-Injury
201501237844	15	01	29	13	Thu	3	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201501269798	15	12	04	09	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201501412780	15	03	06	16	Fri	2	0	0	Rear End	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201501417720	15	03	17	17	Tue	3	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	PD
201501117705	15	06	12	16	Fri	1	1	0	Pedalcyclist	Clear	Daylight	Dry	No Defects	No Controls	Marion	N/A	N/A	N/A	N/A	N/A	Passenger	North	Straight Ahead	B-Injury
201501085906	15	04	13	08	Mon	1	1	0	Pedalcyclist	Clear	Daylight	Dry	No Defects	No Controls	Marion	N/A	N/A	N/A	N/A	N/A	Passenger	South	Straight Ahead	B-Injury
201400141118	14	03	10	11	Mon	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	Marion	Normal	SUV	North	Turning Left	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201400240270	14	05	27	08	Tue	3	2	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Passenger	South	Unknown	On Pavement (Roadway)	Van/Mini-Van	South	Slow/Stop In Traffic	B-Injury
201400248696	14	05	27	15	Tue	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Entering Traffic Lane Fr	On Pavement (Roadway)	Passenger	North	Turning Left	PD
201400060837	14	02	18	08	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Truck Single Unit	North	Backing	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201400210149	14	04	09	08	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	PD
201400374392	14	08	18	10	Mon	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	SUV	East	Slow/Stop In Traffic	C-Injury
201400353626	14	07	11	12	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Pickup	North	Straight Ahead	B-Injury
201400437402	14	11	23	17	Sun	1	0	0	Fixed Object	Rain	Darkness, Lighted Road	Wet	No Defects	No Controls	Marion	Normal	Passenger	West	Unknown	Off Pavement - Right				PD
201400432037	14	11	14	11	Fri	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Lane Use Marking	Marion	Normal	Passenger	North	Enter From Drive/Alley	On Pavement (Roadway)	Van/Mini-Van	East	Straight Ahead	B-Injury
201301055736	13	01	23	13	Wed	2	0	0	Sideswipe Same Direction	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Pickup	Southwest	Passing/Overtaking	Intersection	SUV	South	Straight Ahead	PD
201301042608	13	01	09	12	Wed	3	0	0	Rear End	Clear	Daylight	Wet	No Defects	No Controls	Marion	Normal	Passenger	South	Skidding/Control Loss	On Pavement (Roadway)	SUV	South	Slow/Stop In Traffic	PD
201301094889	13	02	27	17	Wed	2	0	0	Rear End	Rain	Daylight	Wet	No Defects	Lane Use Marking	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Straight Ahead	PD
201301097049	13	02	14	16	Thu	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Other/Unknown	Passenger	South	Straight Ahead	On Pavement (Roadway)	SUV	South	Slow/Stop In Traffic	PD
201301079336	13	02	01	15	Fri	2	0	0	Sideswipe Same Direction	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	West	Changing Lanes	Intersection	Van/Mini-Van	West	Straight Ahead	PD
201301157118	13	08	08	12	Thu	4	3	0	Rear End	Rain	Darkness	Wet	No Defects	Traffic Signal	Marion	Normal	Pickup	East	Slow/Stop In Traffic	Intersection	Van/Mini-Van	East	Slow/Stop In Traffic	A-Injury
201301350445	13	10	01	12	Tue	2	1	0	Rear End	Clear	Daylight	Dry		Traffic Signal	Marion	Other/Unknown	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	C-Injury
201301362849	13	10	15	15	Tue	2	0	0	Rear End	Rain	Daylight	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201301377339	13	10	31	18	Thu	2	1	0	Rear End	Rain	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Marion	Normal	Passenger	East	Skidding/Control Loss	Intersection	Passenger	East	Slow/Stop In Traffic	C-Injury
201301325317	13	09	11	16	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Van/Mini-Van	Northwest	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201301398952	13	11	22	14	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Marion	Normal	Passenger	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD

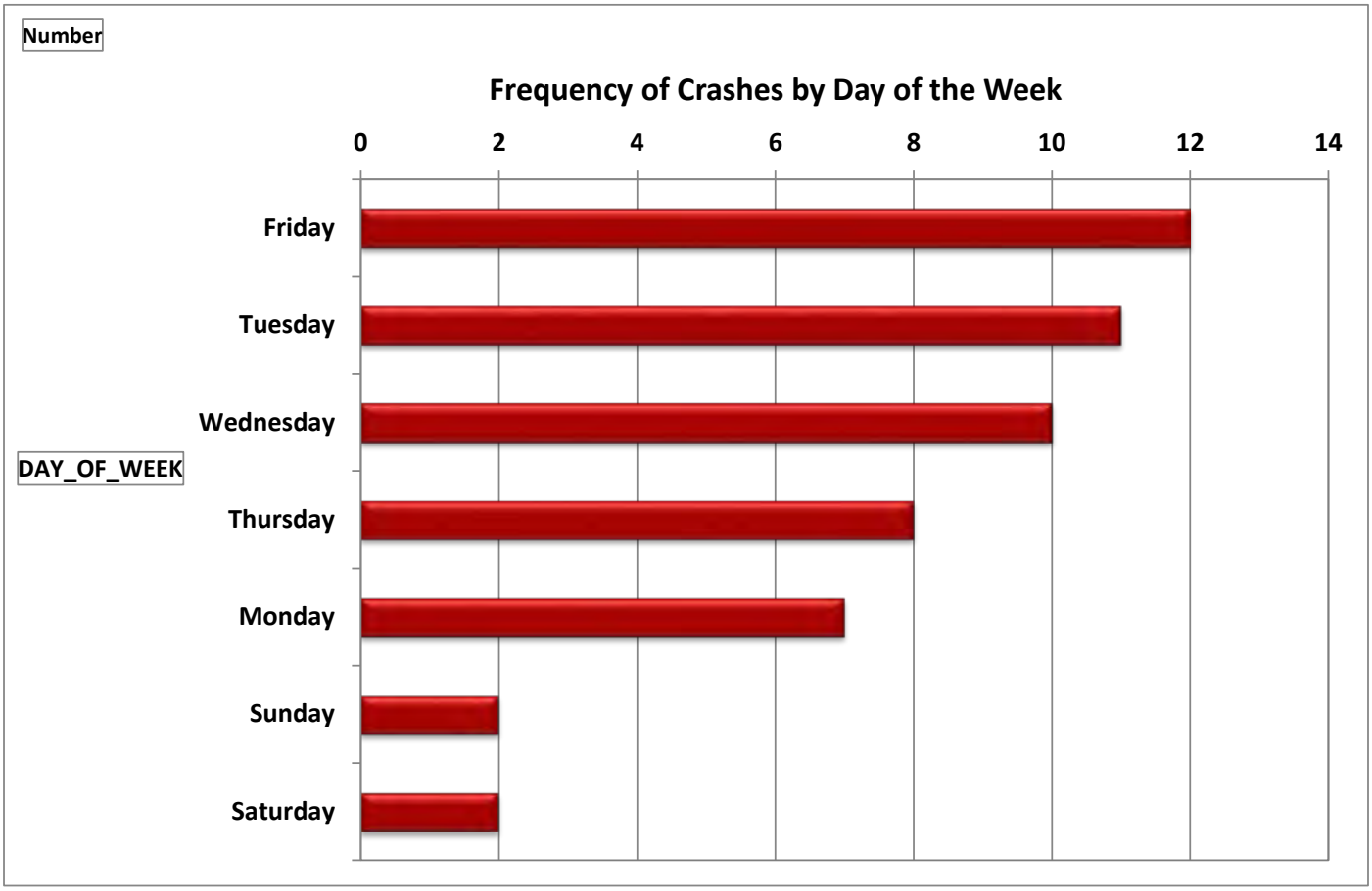
Type 'Heading' Here



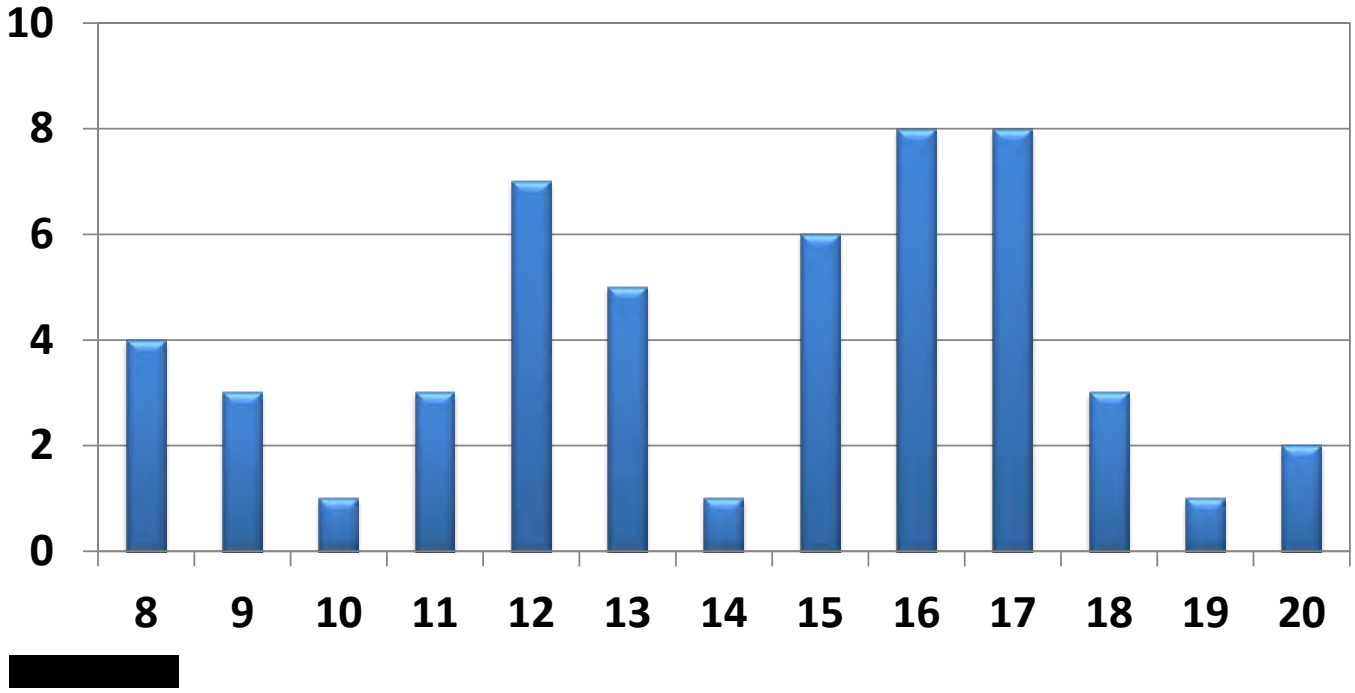


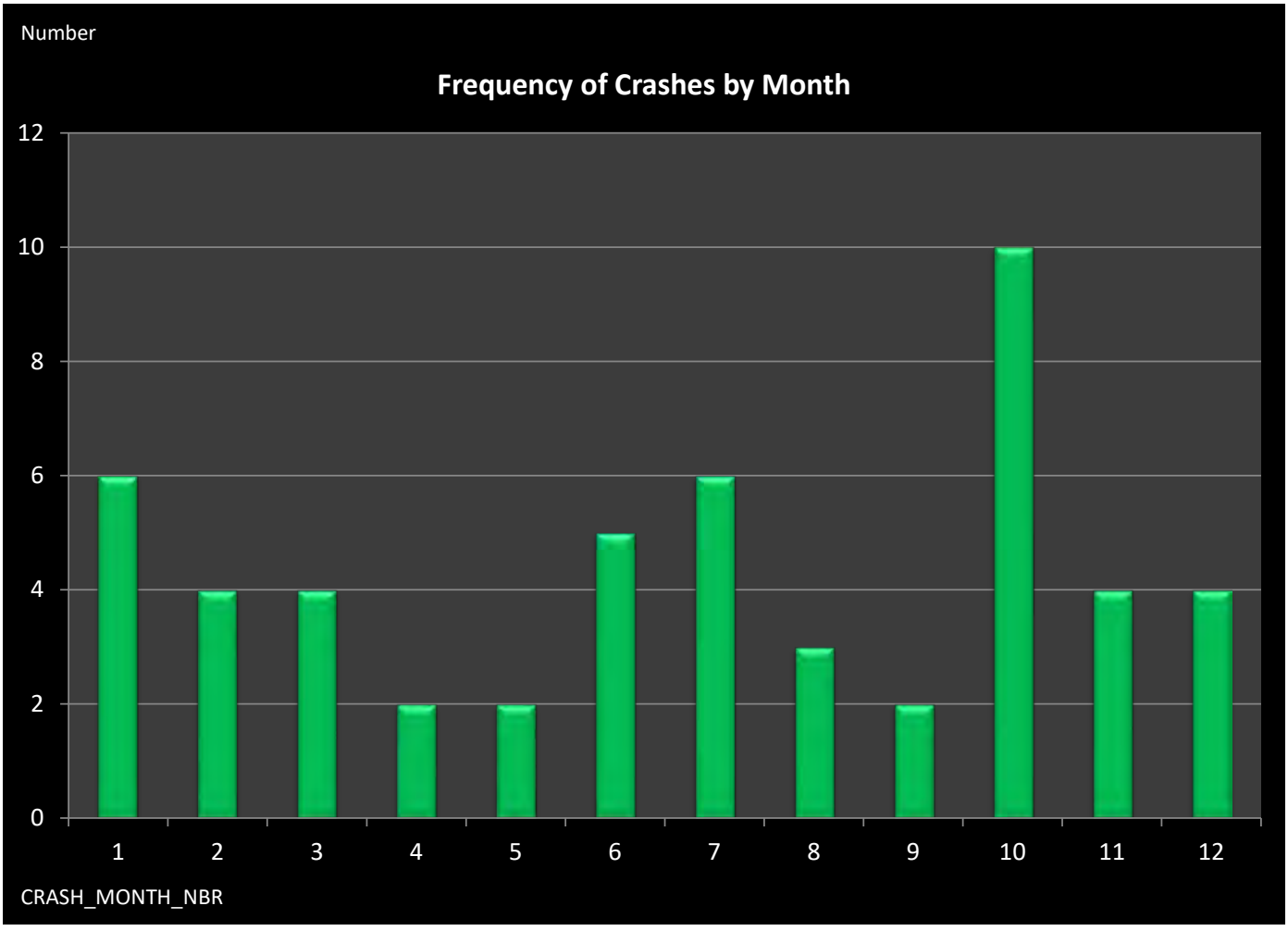
Type 'Heading' Here



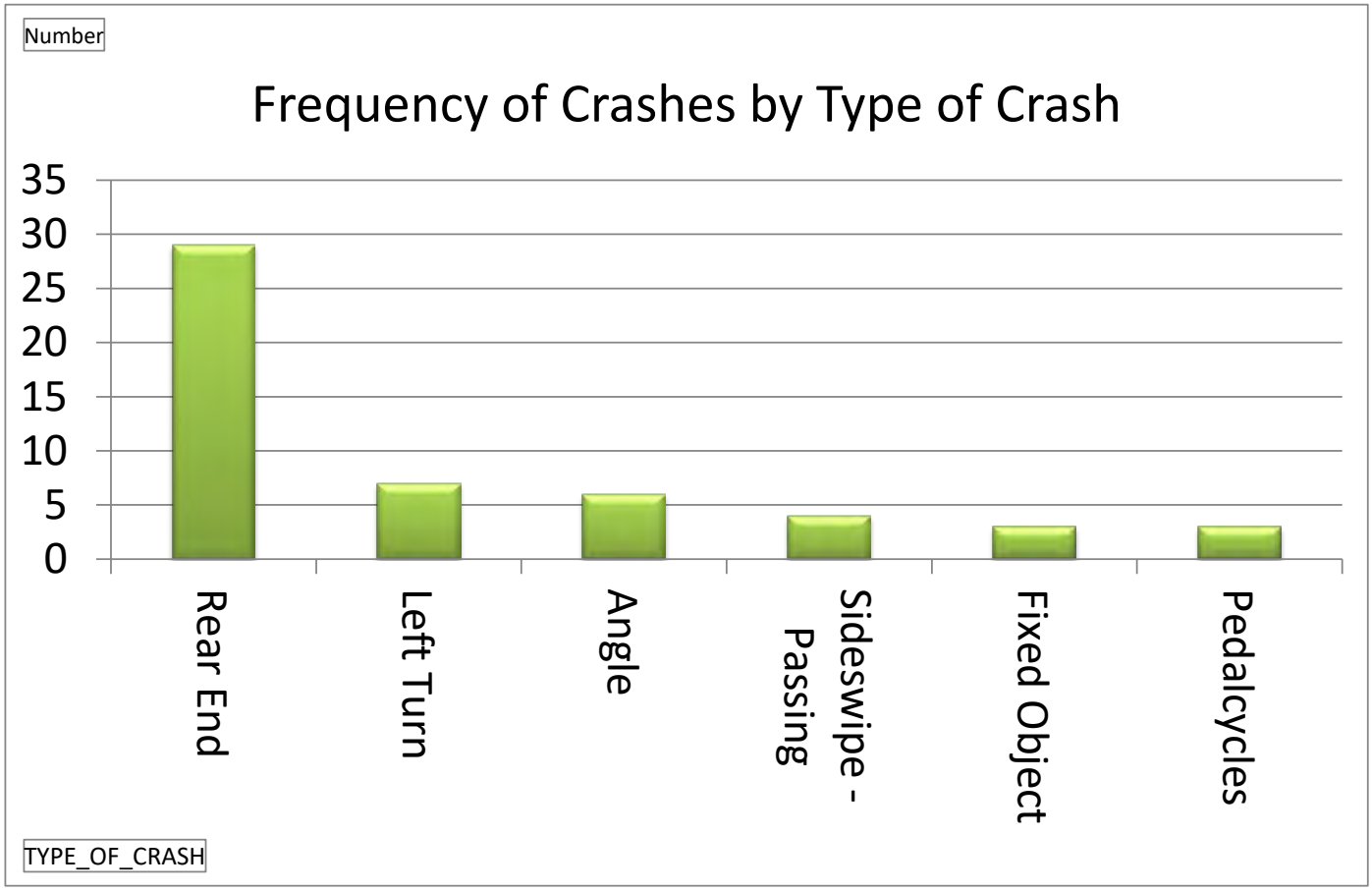


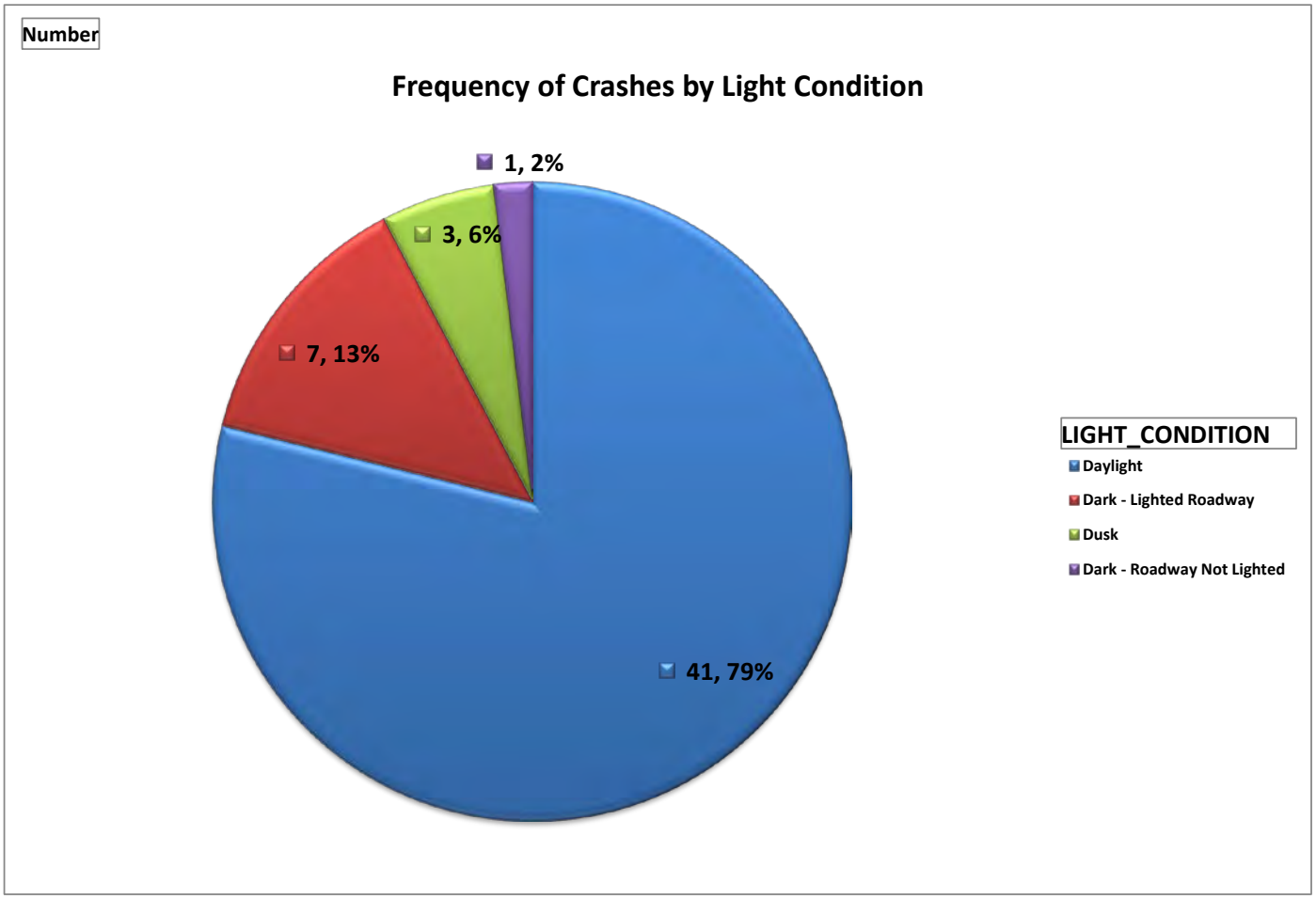
Type 'Heading' Here



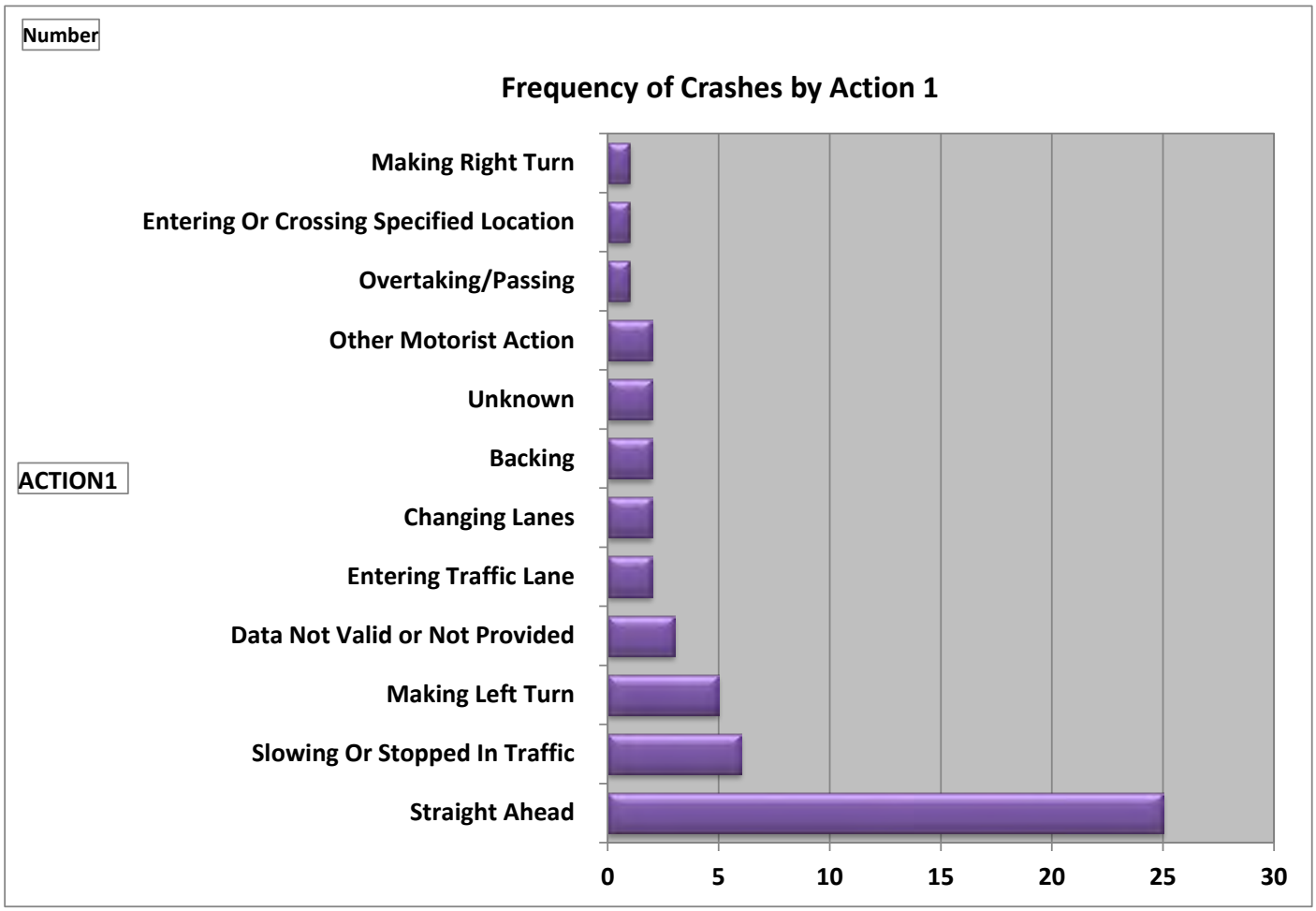


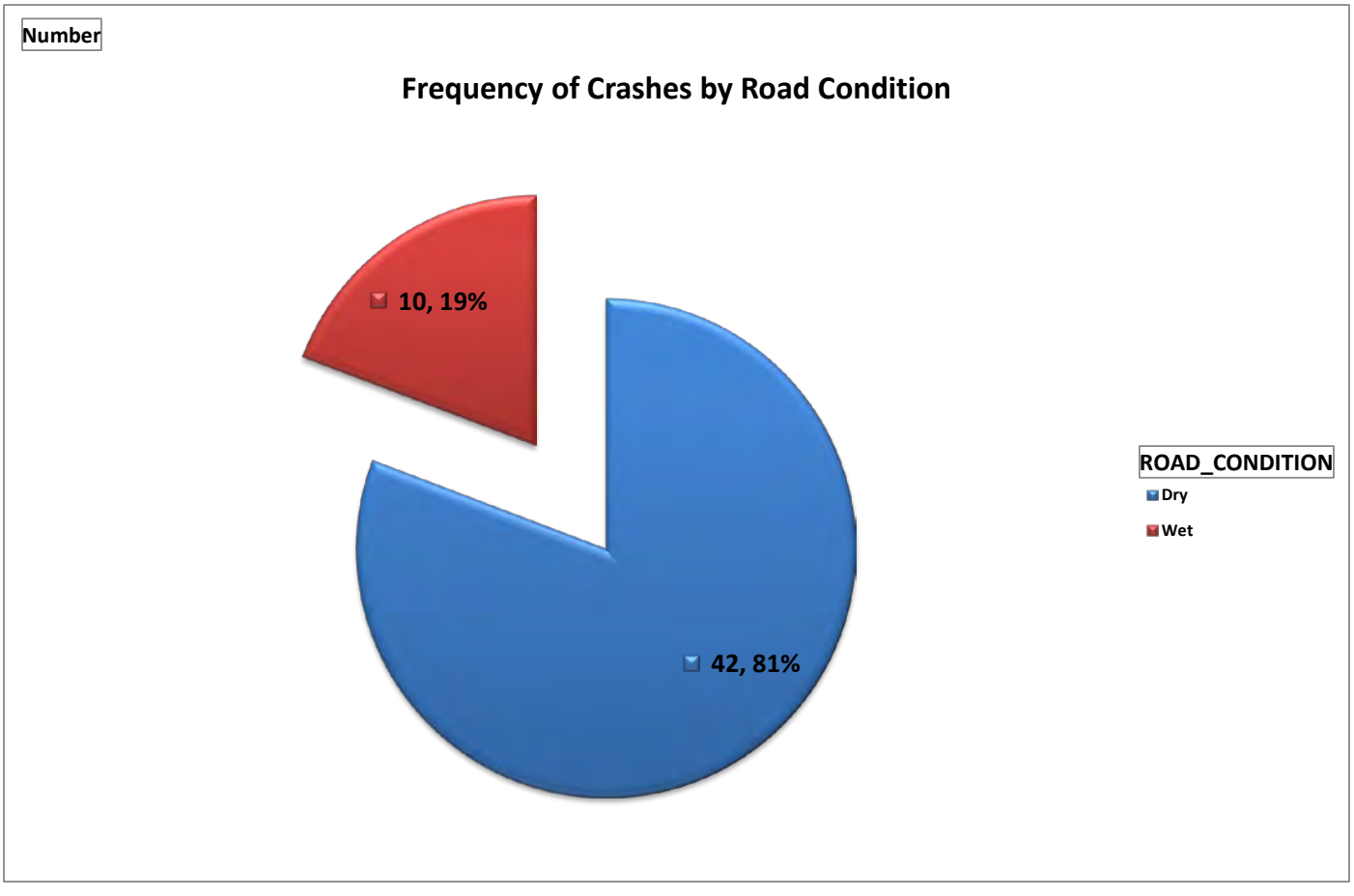
Type 'Heading' Here



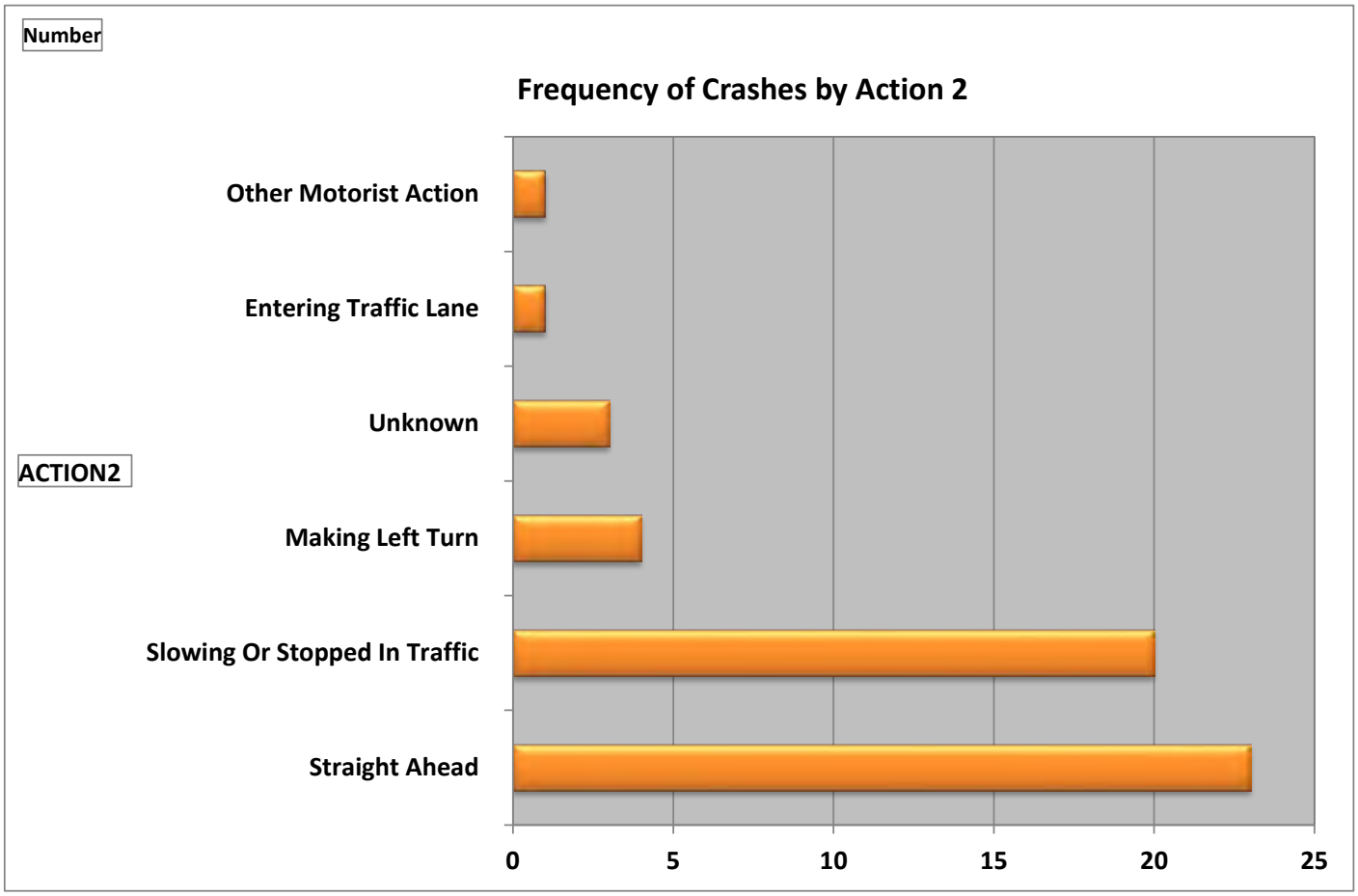


Type 'Heading' Here





Type 'Heading' Here



SIMPO Safety Study

APPENDIX A4: E. HERRIN ROAD AND 13TH STREET

E. Herrin Road and 13th Street Intersection

Intersection Priority #4

June 2019

INTRODUCTION

The E. Herrin Road and 13th Street intersection, located within the City of Herrin, was identified as the 4th ranked intersection within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The 4-leg intersection is currently unsignalized.

PROJECT LOCATION

EXISTING CONDITIONS

The subject intersection is a 4-leg intersection with E. Herrin Road an east/west route and 13th Street a north/south route. The adjacent land use is comprised of residential property. The Herrin Hospital is located 0.70 south of the intersection. The Herrin High School is located 700 feet east of the intersection. **Figure 1** is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

The existing conditions of the intersections are summarized below:

- E. Herrin Road is a 3-lane roadway having a center two way left turn lane (TWLTL). The posted speed on E. Herrin is 30 MPH. **Photo 1** shows the westbound approach of the stop-controlled intersection.
- 13th Street is a local residential street with a posted speed of 25 MPH. **Photo 2** shows the northbound approach of the stop-controlled intersection.
- The 4-way stop control is supplemented with a single lens beacon that flashes red.
- No stop lines exist on any approach. The use of stop lines is not required.
- The average daily traffic (AADT) is 7,300 vehicles per day on E. Herrin Road. The AADT on 13th Street is 2,050 vehicles per day.
- No Stop Ahead signs exist on any approach.

PHOTO 1: WB HERRIN ROAD

PHOTO 2: SB 13TH STREET APPROACH

PHOTO 3: EB HERRIN ROAD APPROACH

PHOTO 4: NB 13TH STREET APPROACH

SAFETY ANALYSIS

A total of 20 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**. The crash frequency is distributed evenly across all study years with the exception of 2015. No factors were identified that contributed to the crash frequency.

The frequency of crashes by type on **Figure 3** shows a majority of crashes (50% or 10 crashes) are angle crashes. The addition of the left turn crash results in 11 crashes (or 55 percent) of crash types typically considered to be correctable with stop control.

Figure 4 shows the distribution of crashes within the study area by severity. The fatal and injury crashes at the subject intersection represent 40 percent of the total crashes. **The injury crashes include 1 fatal and 3 Type B crashes.**

The fatal crash occurred on December 30, 2017 when an eastbound vehicle ran the stop sign and hit a northbound vehicle. The drivers in both vehicles were killed. Police observed the at-fault driver operating the vehicle at a high rate of speed on E. Herrin and running stop signs before the crash.

Figure 5 shows the severity of crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. All 4 approaches included at-fault drivers running the stop sign – the eastbound approach has the highest number of angle crashes (4).

All rear end crashes occur on E. Herrin Street approaches.

FIGURE 2: FREQUENCY OF CRASHES BY YEAR

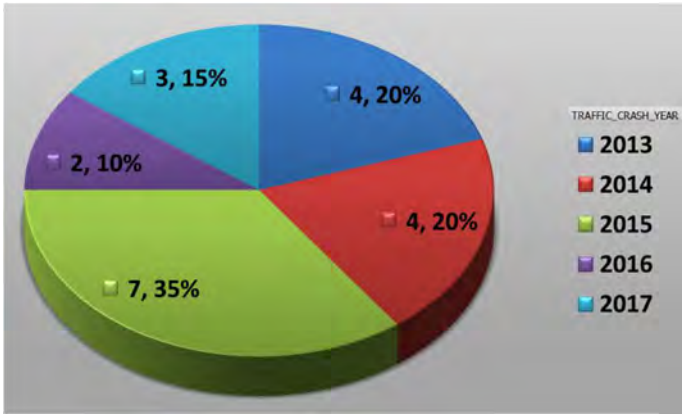


FIGURE 3: FREQUENCY OF CRASHES BY TYPE

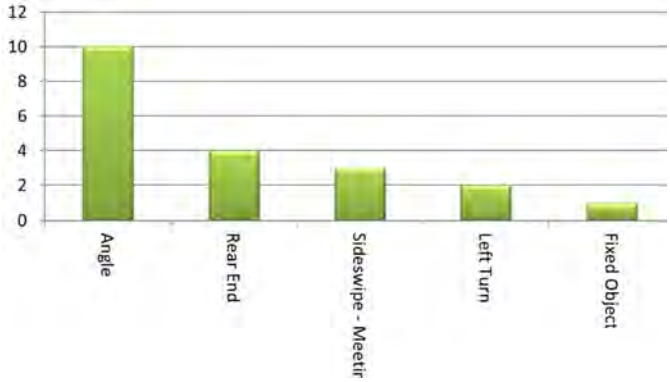


FIGURE 4: FREQUENCY OF CRASHES BY SEVERITY

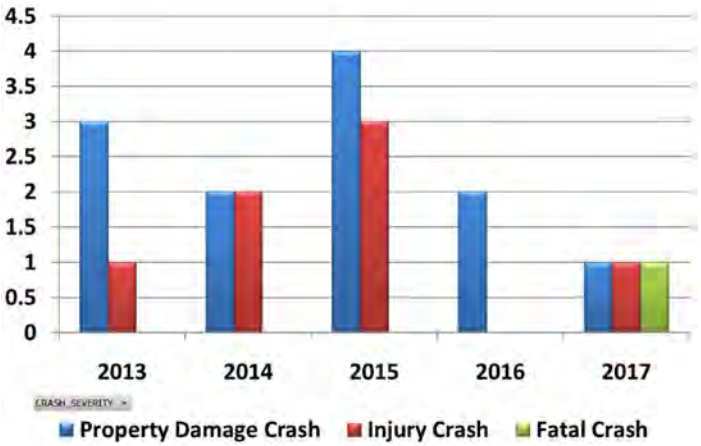
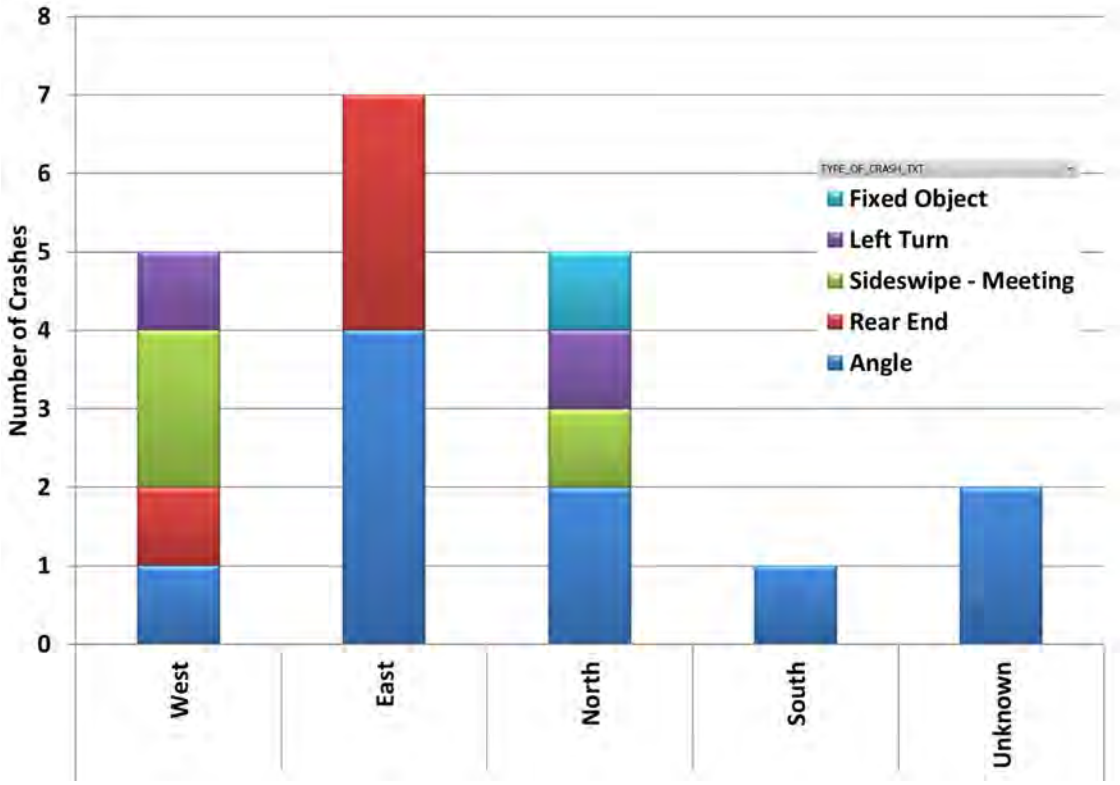
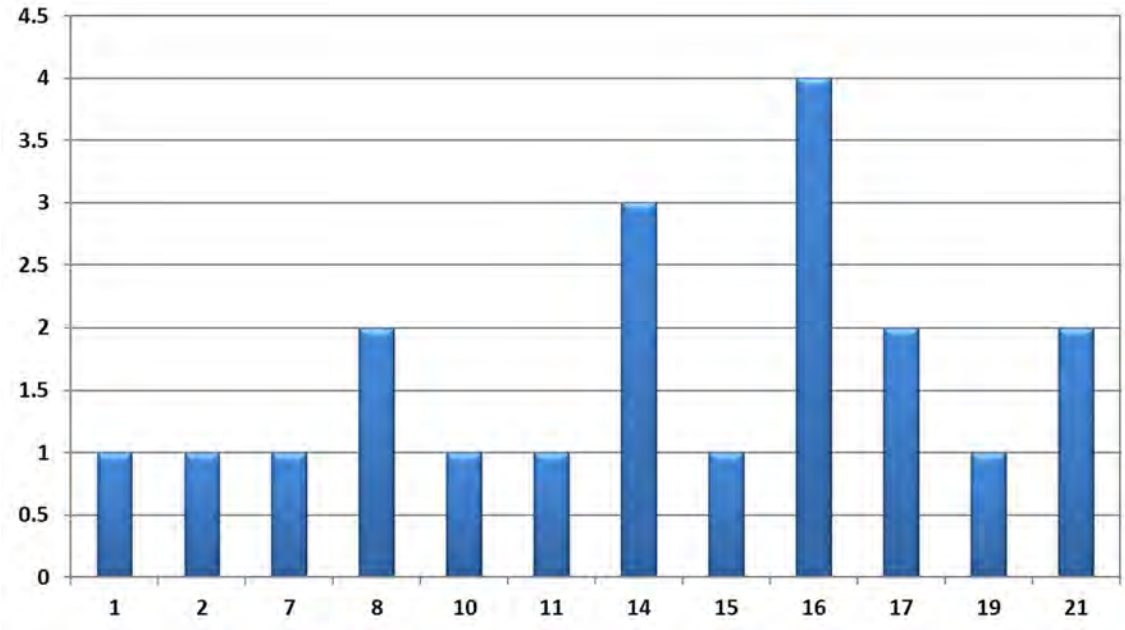


FIGURE 5: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The crashes' frequency by time of day suggests that congestion is a contributing factor to the safety performance of the study area. **Figure 6** shows the distribution by time of day. The 2:00 PM timeframe is consistent with the dismissal of the high school.

FIGURE 6: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – TRAFFIC CONTROL UPGRADES

Countermeasures to reinforce the E. Herrin Road and 13th Street intersection are proposed to improve the safety performance of a 4-way stop-controlled intersection.

1. Install stop lines and high visibility crosswalks using the continental style of markings. The visibility of the crosswalk is intended to emphasize the stop condition especially on the E. Herrin Road approaches.
2. Add dual stop signs on all approaches to the intersection. Vehicles in the center lane may not have visibility of a single stop sign on the right side of the roadway. Stop signs on 13th Street are to increase emphasis of the stop condition. Nearly half of the at-fault drivers were on the 13th Street approaches as shown in **Figure 5**.
3. Section 2A.16 of the MUTCD states that stop signs should be mounted on individual posts. The Hospital sign should be removed from the Stop Sign to emphasize the regulatory message.
4. Paint center lane as an auxiliary left turn lane (50 ft length) to emphasize to the driver that they are entering an intersection.
5. Upgrade overhead flashing beacon to an LED module to increase visibility

MEDIUM TERM COUNTERMEASURE – MINI-ROUNDABOUT

The E. Herrin Road and 13th Street intersection could be converted to a mini-roundabout design. A mini-roundabout is a smaller footprint of a typical roundabout that permits the mounting of the central island and minimizes/avoids property impacts. The characteristics that are suitable for a mini-roundabout:

- 2-lane/3-lane minor arterial roads and high-volume collector roads
- Speed limit: 35 MPH or less. E. Herrin Road's posted speed is 30 MPH.
- Traffic volume: 15,000 ADT or less. AADT of E. Herrin Road is 7,300 vehicles per day.
- Truck percent: 3% or less.

The mini-roundabout is proposed to mitigate the two Type B crashes as well as being a deterrent for the fatal crash that occurred in 2017. Driving through the subject intersection at or above posted speeds would not be feasible without losing control of the vehicle.

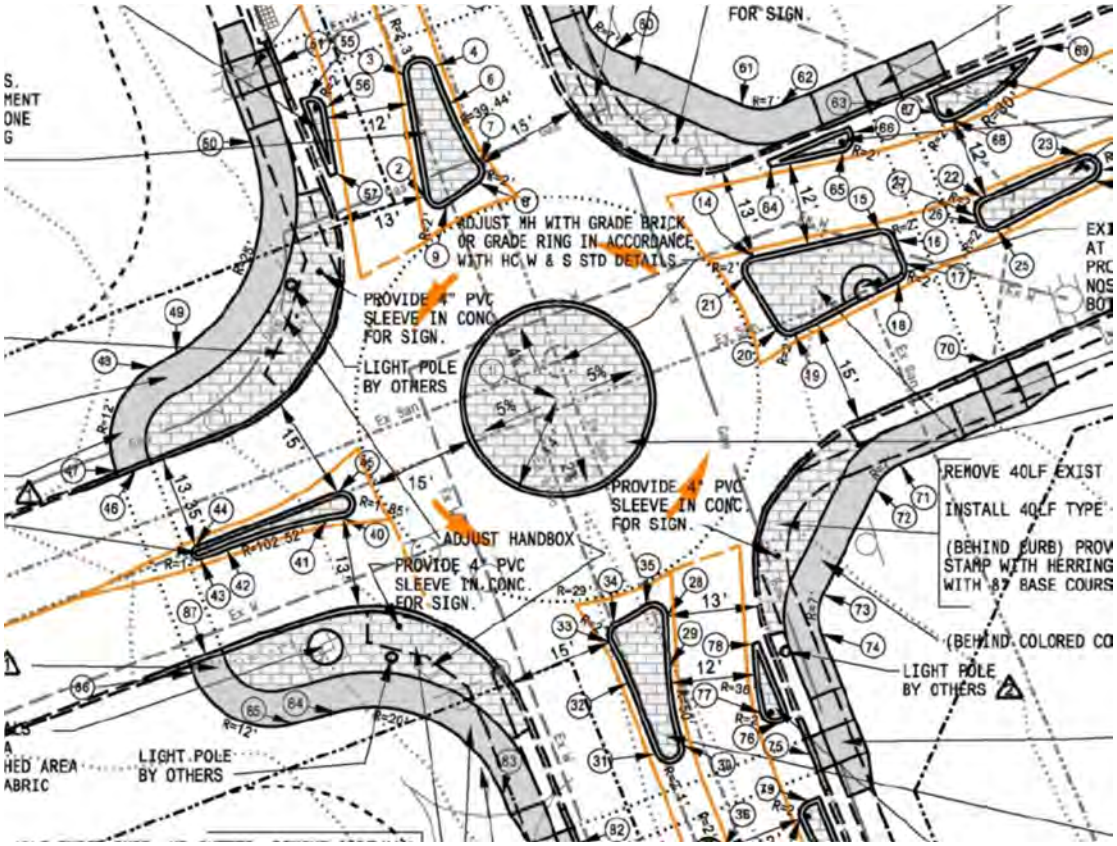
Figure 7 shows a circle with a 30 ft radius at the E. Herrin Road and 13th Street intersection that is representative of the size of a mini-roundabout. An FHWA study of mini-roundabouts was concluded in 2016. One of the study locations was Tollgate Road and MacPhail Road in Bel Air, Maryland. A plan of the Maryland design is shown in **Figure 8**. The inscribed radius shown on the plan is 30 feet.

A YouTube video was created for the Maryland site to show how the finished design works for different vehicle types. Additional information can be provided if interested in learning more about this alternative intersection design.

FIGURE 7: HERRIN/ 13TH STREET FOOTPRINT

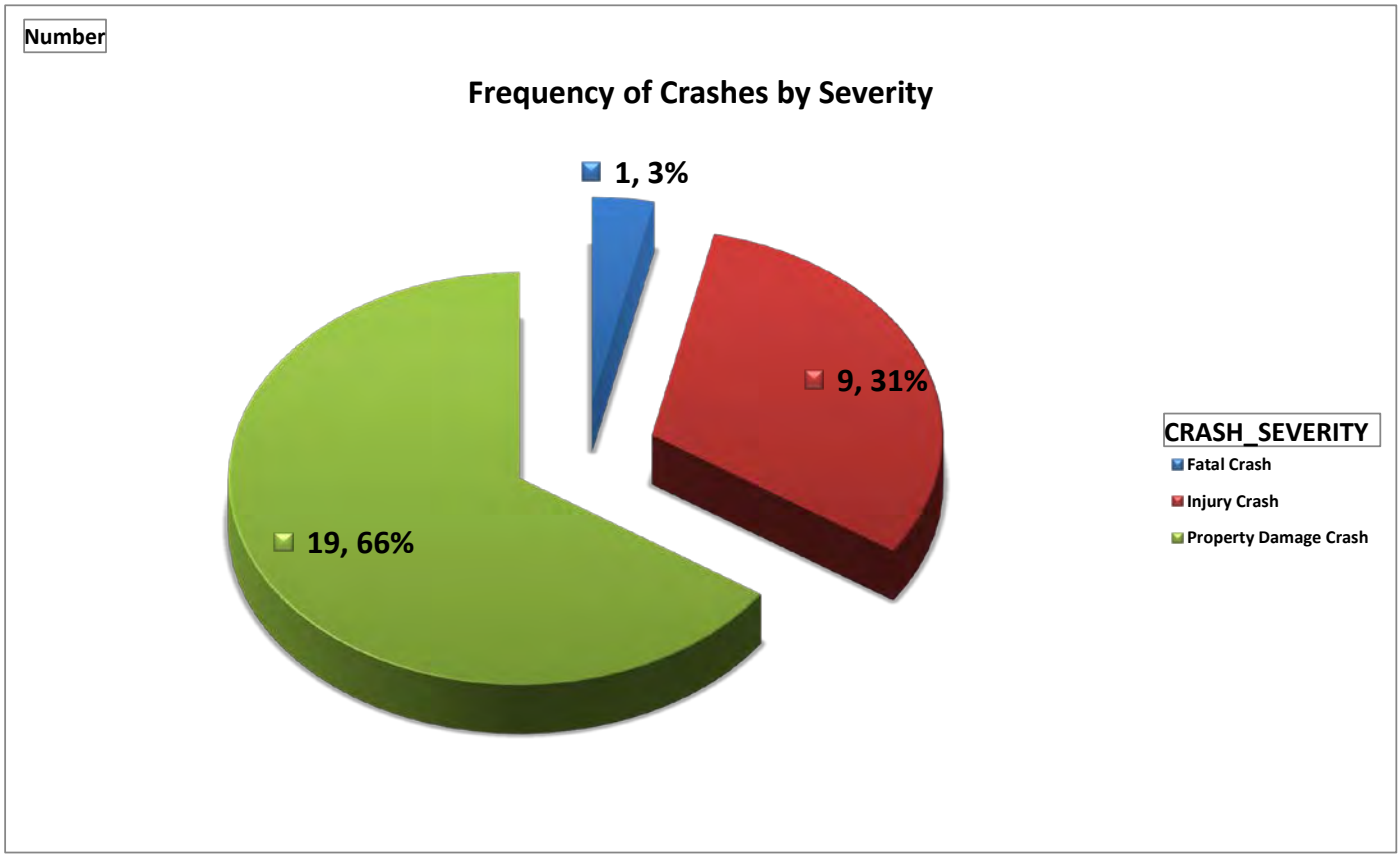
https://www.youtube.com/watch?v=3KLbr1awEbk&feature=youtube_gdata_player

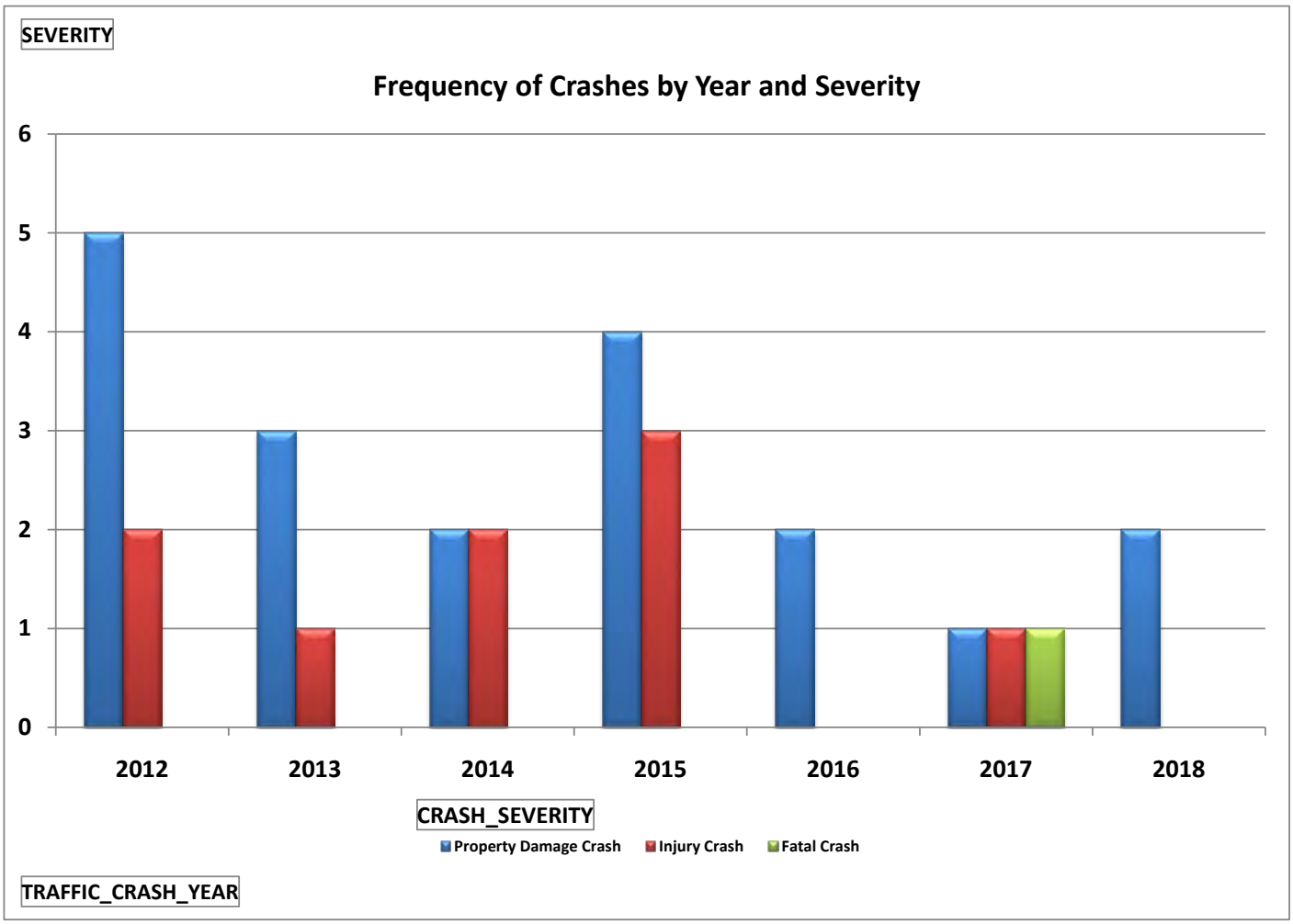
FIGURE 8: TOLLGATE/MACPHAIL ROAD DESIGN (29 FT RADIUS)



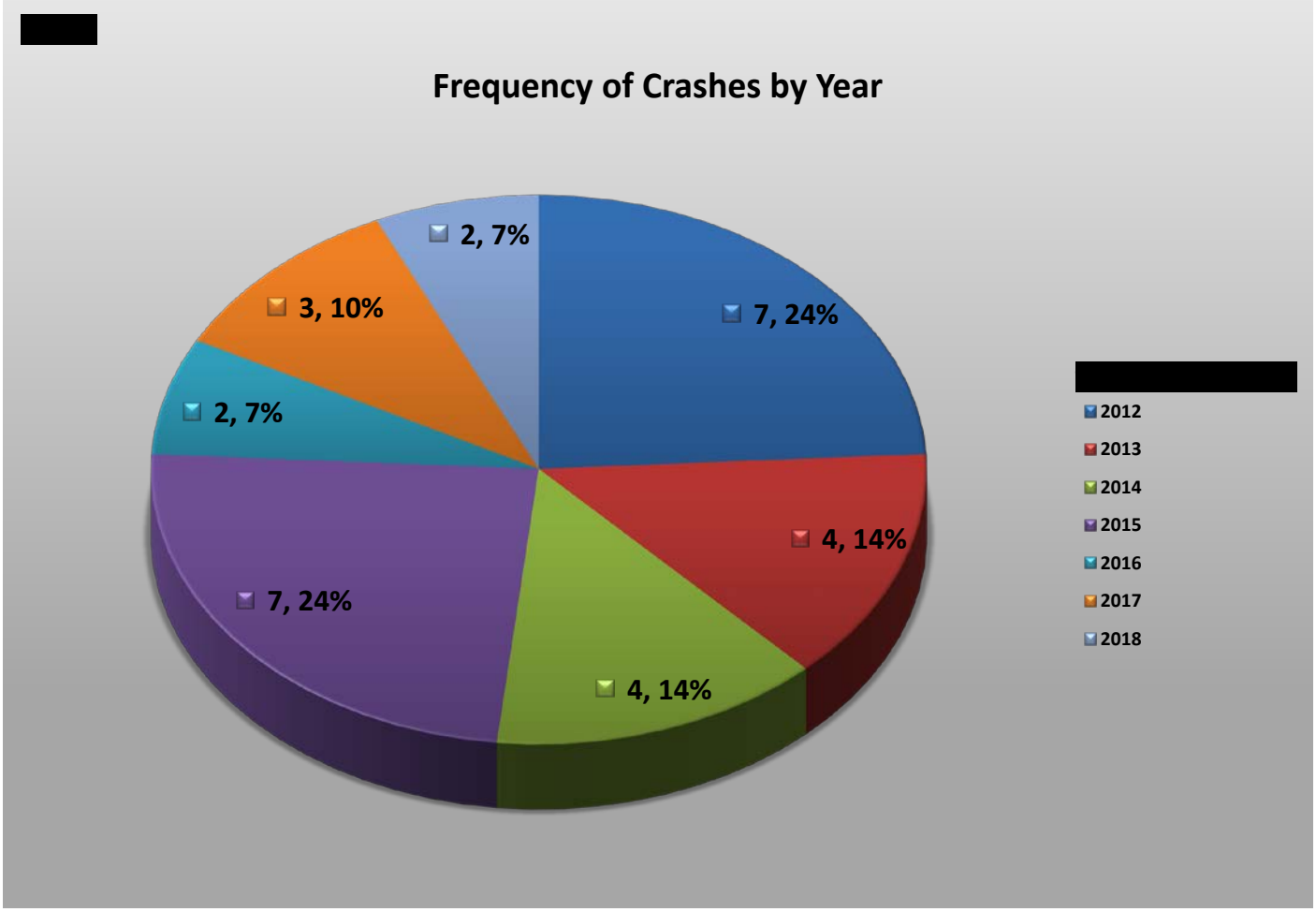
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701328883	17	12	02	02	Sat	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.42000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD
201601010901	16	01	02	20	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.17000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				PD
201601052765	16	02	26	17	Fri	2	2	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	B-Injury
201601052742	16	02	26	23	Fri	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	Off Pavement - Right				PD
201601043801	16	02	14	16	Sun	1	0	0	Fixed Object	Clear	Daylight	Snow or Slush		No Controls	1.65000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				PD
201601105592	16	05	06	12	Fri	1	1	0	Fixed Object	Clear	Daylight	Dry	Worn Surface	No Controls	0.93000000000	Normal	Motorcycle (Over 150cc)	Northwest	Skidding/Control Loss	Off Pavement - Right				B-Injury
201601139230	16	06	20	09	Mon	1	0	0	Fixed Object				No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Motor Driven Cycle	South	Unknown	Off Pavement - Right				PD
201601140580	16	06	21	15	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Slow/Stop In Traffic	On Pavement (Roadway)	Passenger	Northeast	Slow/Stop - Right Turn	PD
201601177807	16	08	03	20	Wed	1	1	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.50000000000	Normal	Motorcycle (Over 150cc)	East	Skidding/Control Loss	Off Pavement - Left				A-Injury
201601169108	16	07	22	16	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Slow/Stop In Traffic	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201601243529	16	10	12	23	Wed	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Passenger	North	Straight Ahead	Off Pavement - Right				PD
201601211488	16	09	09	12	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	B-Injury
201601282695	16	11	23	08	Wed	1	0	0	Animal	Rain	Daylight	Wet	No Defects	No Controls	0.47000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)				PD
201601245693	16	10	19	06	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Other	0.00000000000	Normal	Van/Mini-Van	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	PD
201501022190	15	01	20	01	Tue	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Alcohol Impaired	Passenger	North	Straight Ahead	Other				PD
201501022180	15	01	25	07	Sun	1	0	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	0.25000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Left				PD
201501058333	15	03	18	20	Wed	1	1	0	Overturned	Rain	Darkness	Wet	No Defects	No Controls	1.45000000000	Normal	Passenger	West	Skidding/Control Loss	Off Pavement - Right				B-Injury
201501073186	15	04	15	17	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Straight Ahead	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201501134506	15	07	12	04	Sun	1	1	0	Fixed Object	Clear	Darkness	Dry	Worn Surface	No Controls	1.89000000000	Fatigued	Passenger	East	Skidding/Control Loss	Off Pavement - Left				A-Injury
201501215510	15	10	14	09	Wed	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	1.45000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				A-Injury
201501264619	15	11	30	16	Mon	2	0	0	Turning	Rain	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	Southeast	Turning Right	On Pavement (Roadway)	Pickup	North	Slow/Stop - Left Turn	PD
201501225902	15	10	23	22	Fri	1	1	0	Overturned	Clear	Darkness	Dry	No Defects	No Controls	0.05000000000	Alcohol Impaired	Passenger	East	Skidding/Control Loss	Off Pavement - Right				B-Injury
201400007289	14	01	07	13	Tue	2	0	0	Rear End	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Tractor With Semi-Trailer	North	Starting In Traffic	On Pavement (Roadway)	Passenger	North	Starting In Traffic	PD
201400223131	14	04	19	19	Sat	2	2	0	Turning	Clear	Dusk	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	Northwest	Turning Left	On Pavement (Roadway)	Passenger	East	Straight Ahead	B-Injury
201400247364	14	05	21	13	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects		0.42000000000	Normal	Passenger	East	Passing/Overtaking	On Pavement (Roadway)	Passenger	North	Turning Left	PD
201400307161	14	06	10	17	Tue	3	0	0	Rear End	Clear	Dusk	Dry	No Defects	No Controls	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201400211245	14	04	10	02	Thu	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.74000000000	Normal	Passenger	East	Turning Left	Other				PD
201400362174	14	07	25	19	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Turning Left	PD
201400287001	14	08	21	16	Thu	1	1	0	Fixed Object	Clear	Daylight	Other	No Defects	No Controls	1.43000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				B-Injury
201400362647	14	12	24	18	Wed	2	0	0	Rear End	Clear	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201400395850	14	09	20	16	Sat	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	1.94000000000	Normal	Passenger	East	Turning Right	On Pavement (Roadway)	Pickup	West	Straight Ahead	PD
201301145660	13	06	29	22	Sat	1	2	0	Fixed Object	Rain	Darkness	Wet	No Defects	No Controls	0.76000000000	Normal	Passenger	West	Skidding/Control Loss	Off Pavement - Right				A-Injury
201301119183	13	04	17	15	Wed	4	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.00000000000	Normal	Pickup	West	Straight Ahead	Other	Passenger	West	Straight Ahead	A-Injury
201301049812	13	01	14	16	Mon	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	1.43000000000	Normal	SUV	East	Avoiding Vehicle/Objects	Off Pavement - Left				B-Injury
201301161955	13	07	30	21	Tue	1	0	0	Fixed Object	Rain	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Pickup	East	Avoiding Vehicle/Objects	Off Pavement - Right				PD
201301149870	13	07	26	19	Fri	1	1	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	0.42000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				C-Injury
201301081639	13	04	18	15	Thu	1	0	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	1.42000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Left				PD
201301268751	13	07	13	05	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	Other				PD
201301251095	13	06	26	15	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Starting In Traffic	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201301380360	13	11	03	00	Sun	1	1	0	Other Non-Collision	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Pickup	North	Straight Ahead	Other				B-Injury

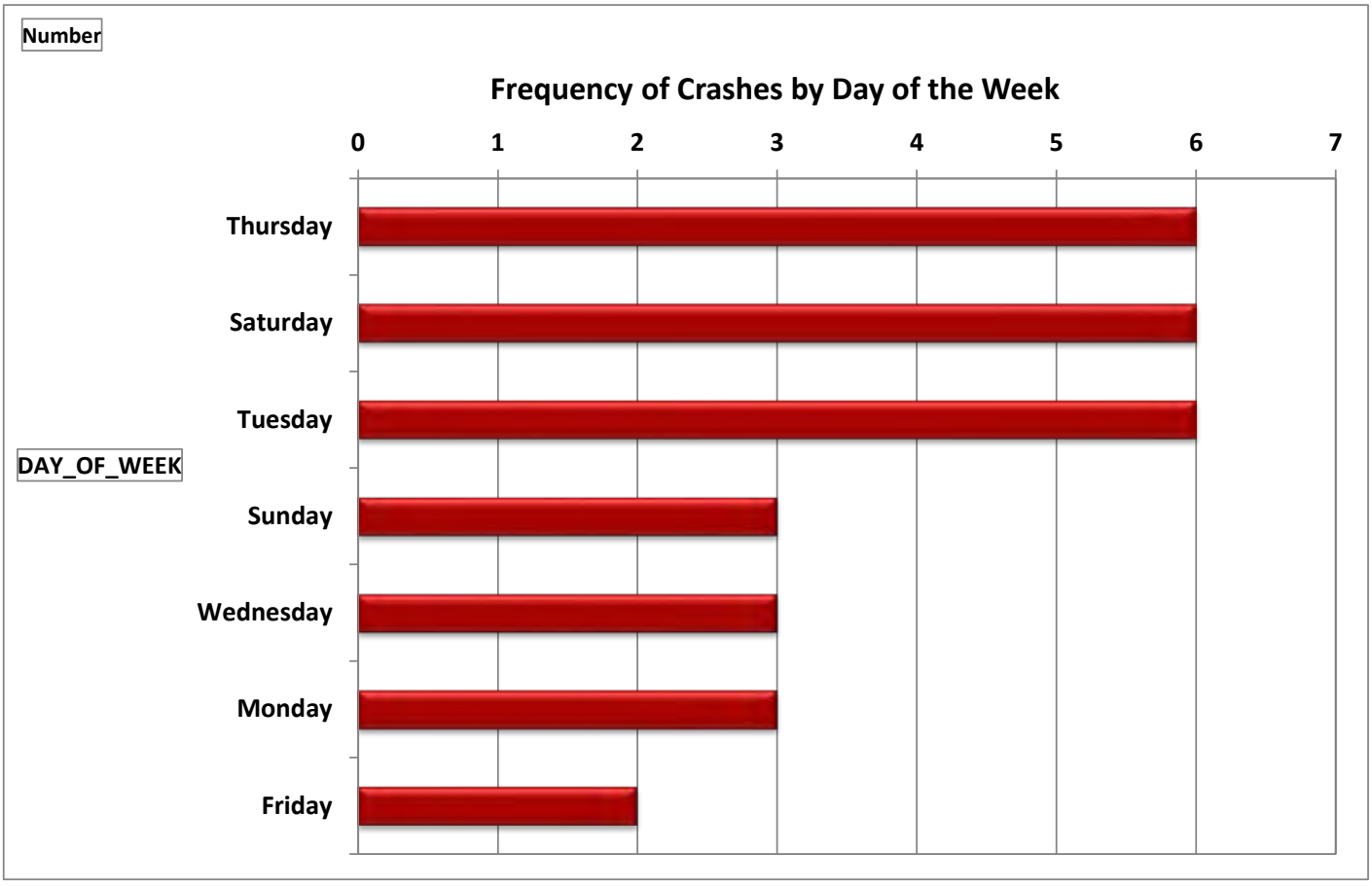
Intersection 04





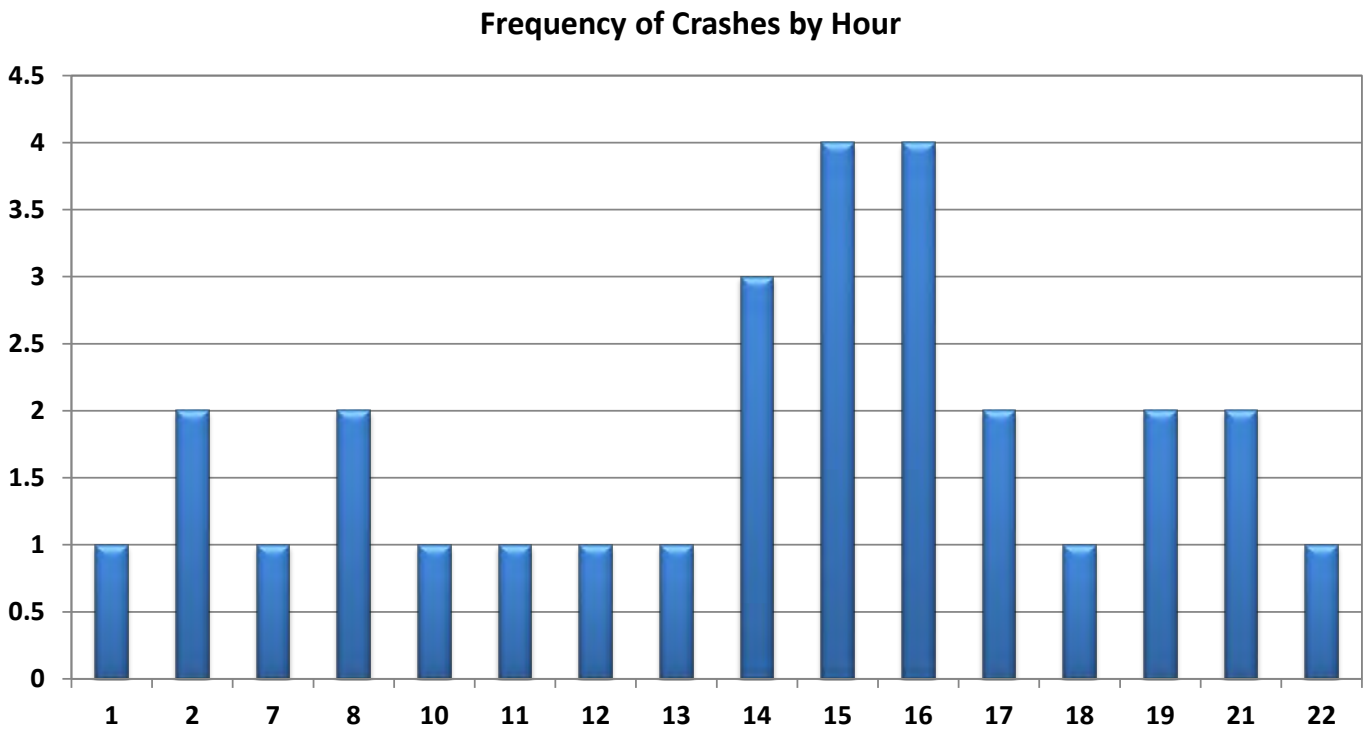
Intersection 04



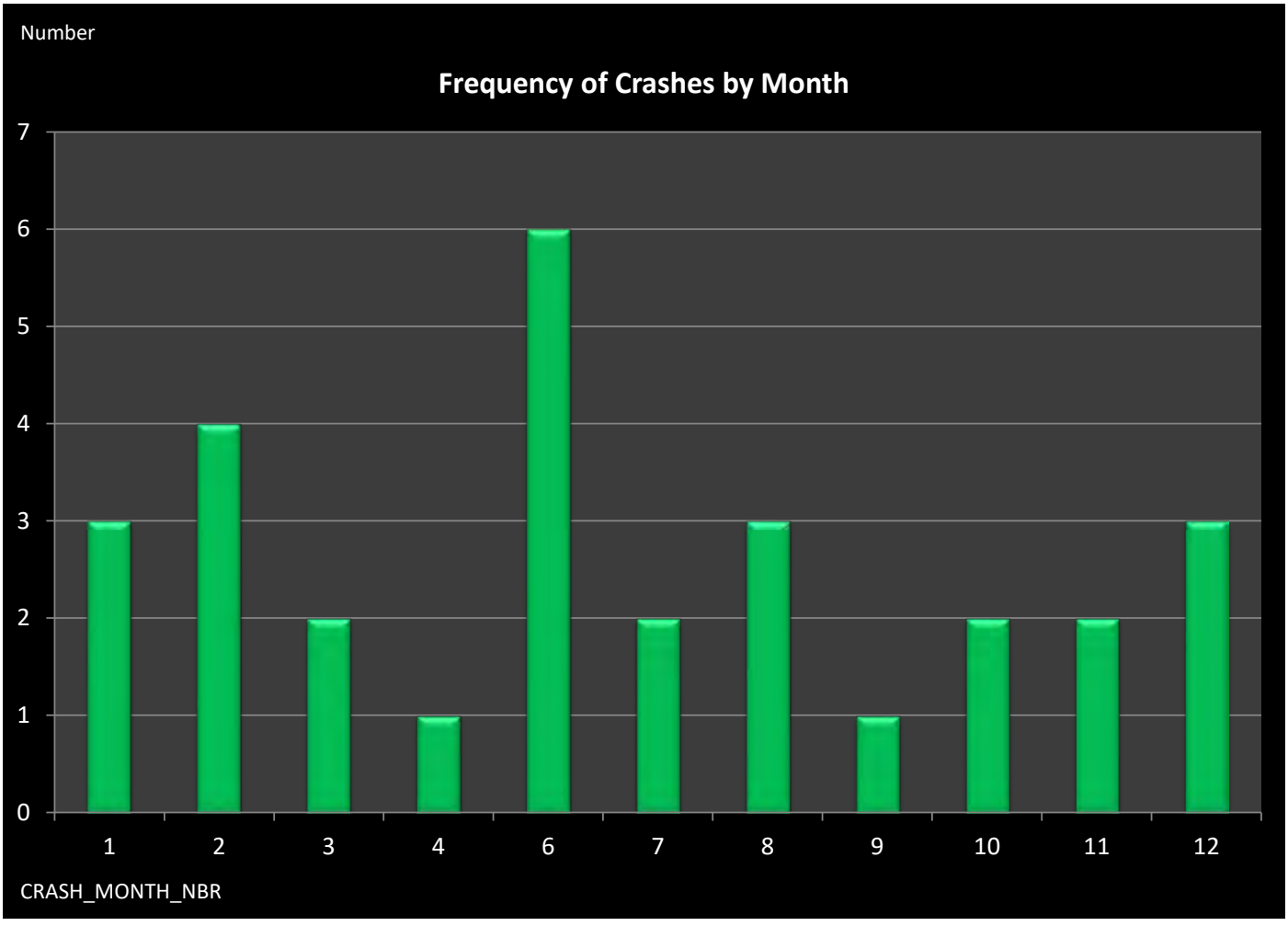


Intersection 04

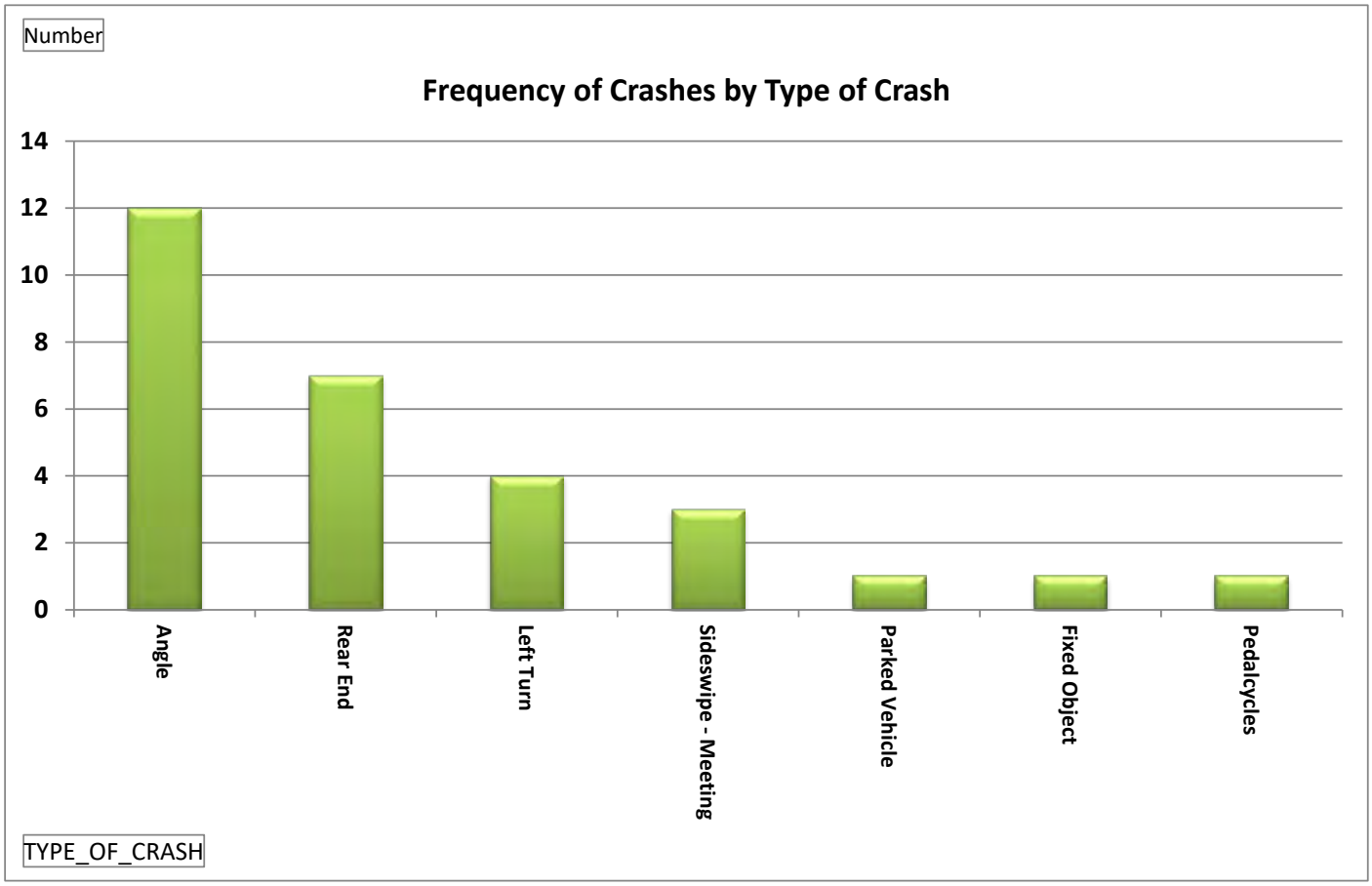
[redacted]

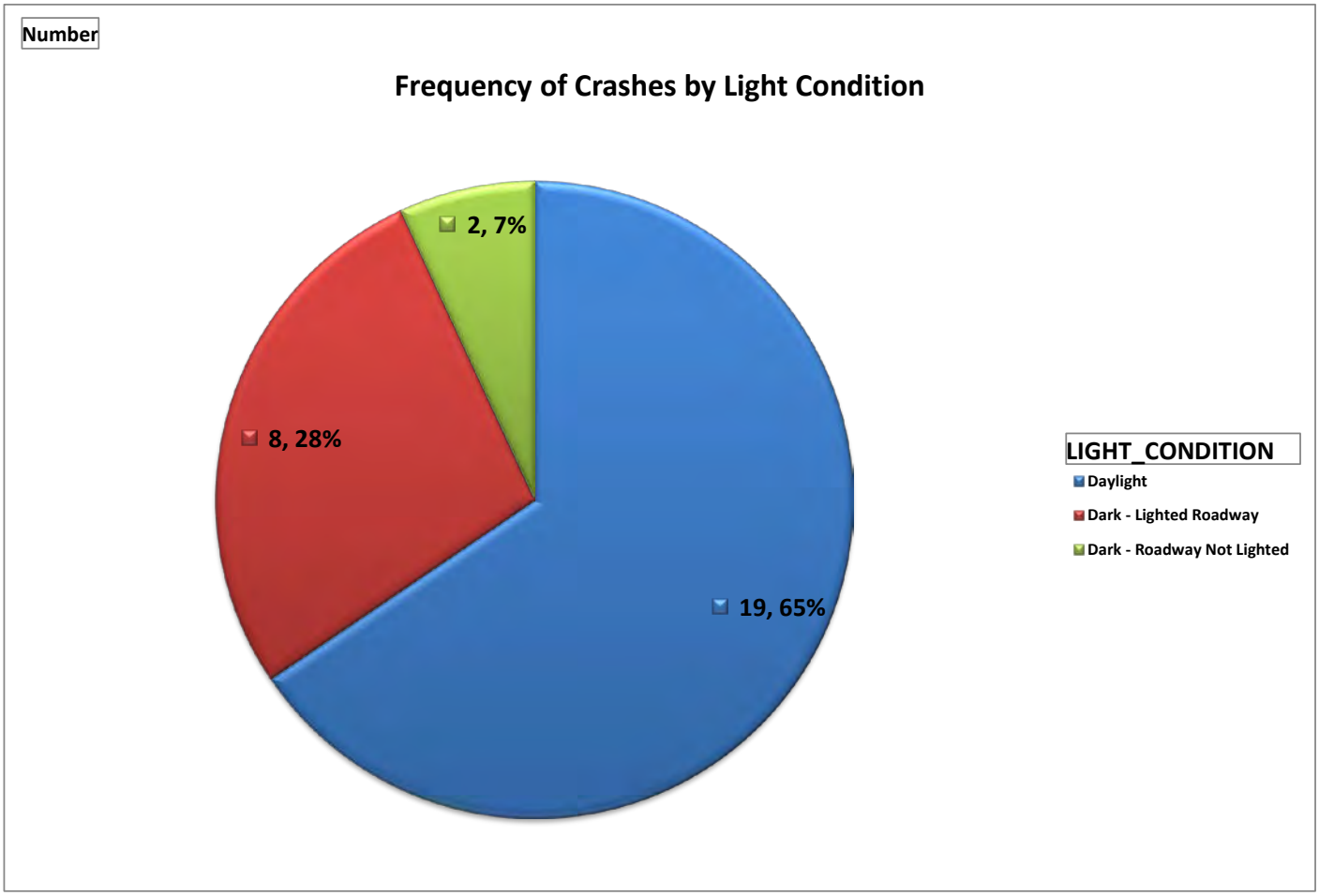


[redacted]

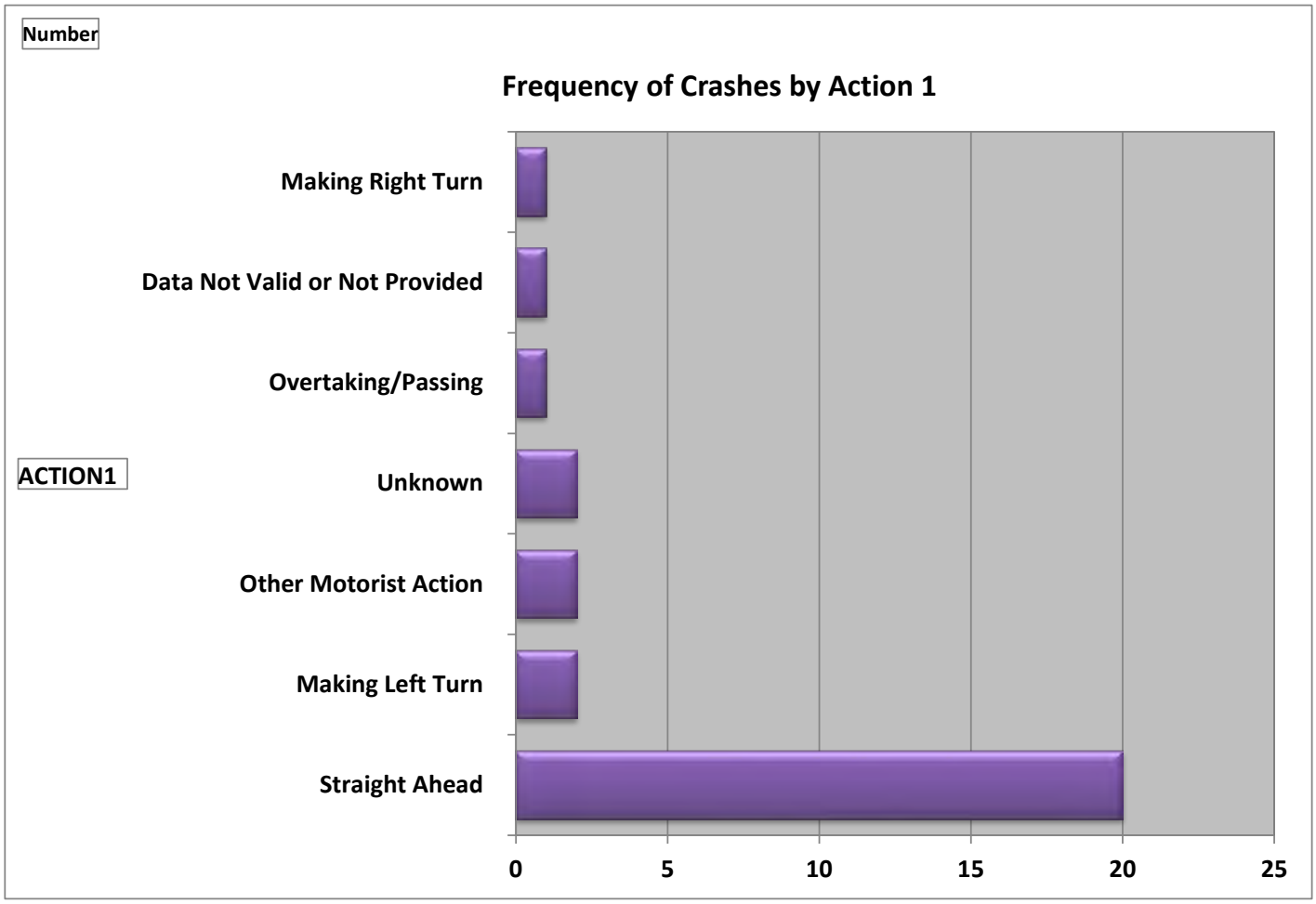


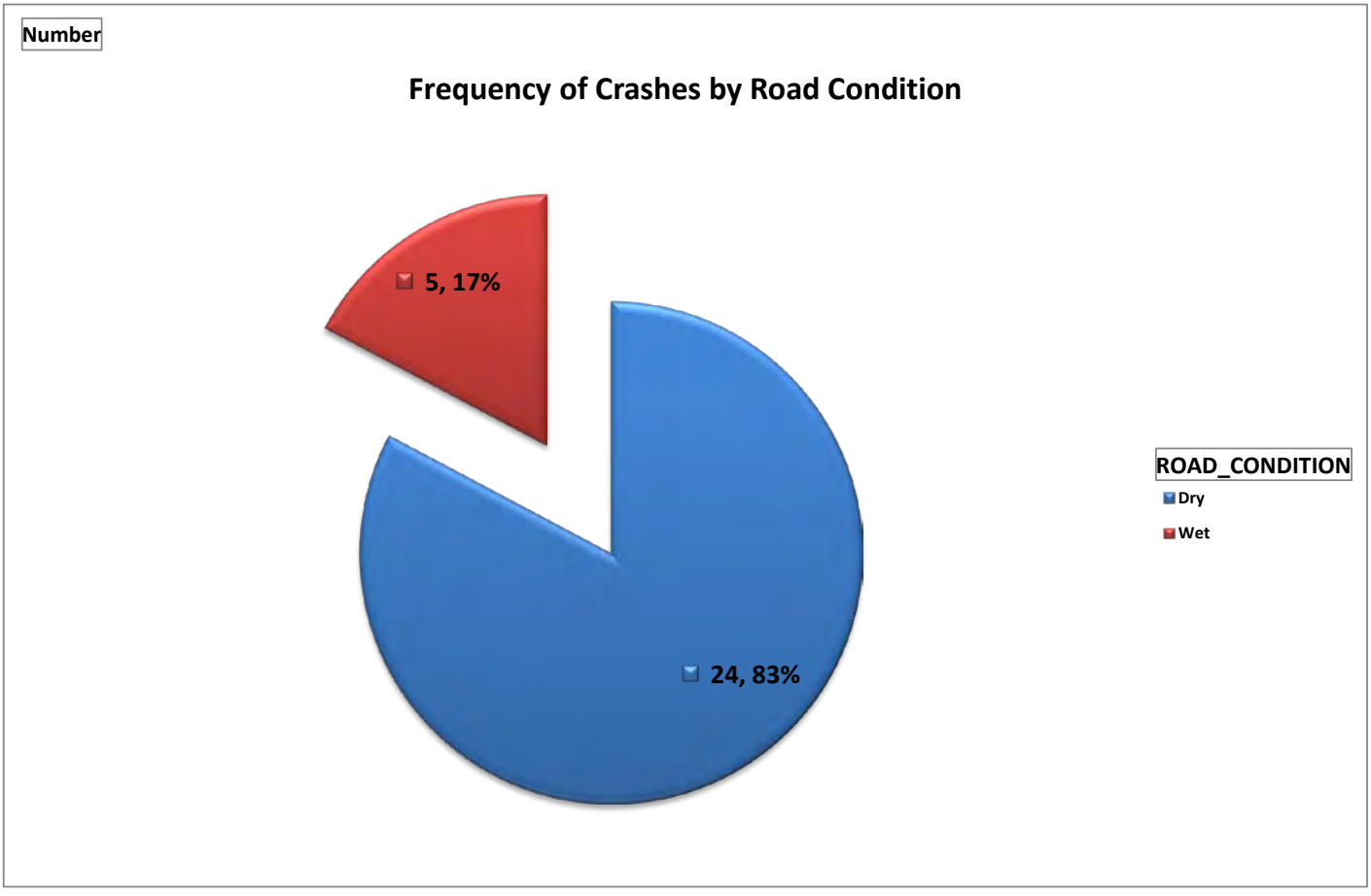
Intersection 04



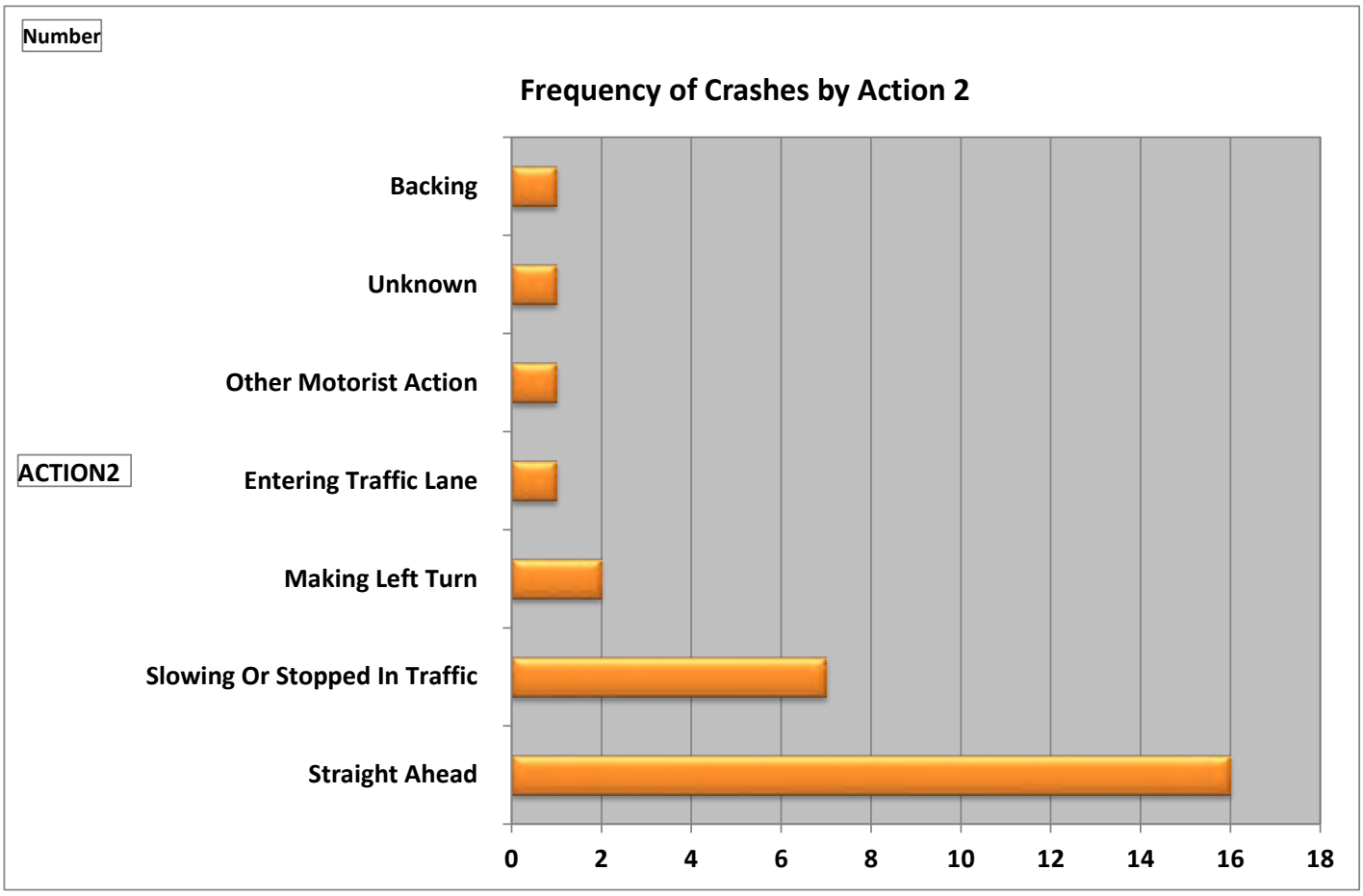


Intersection 04



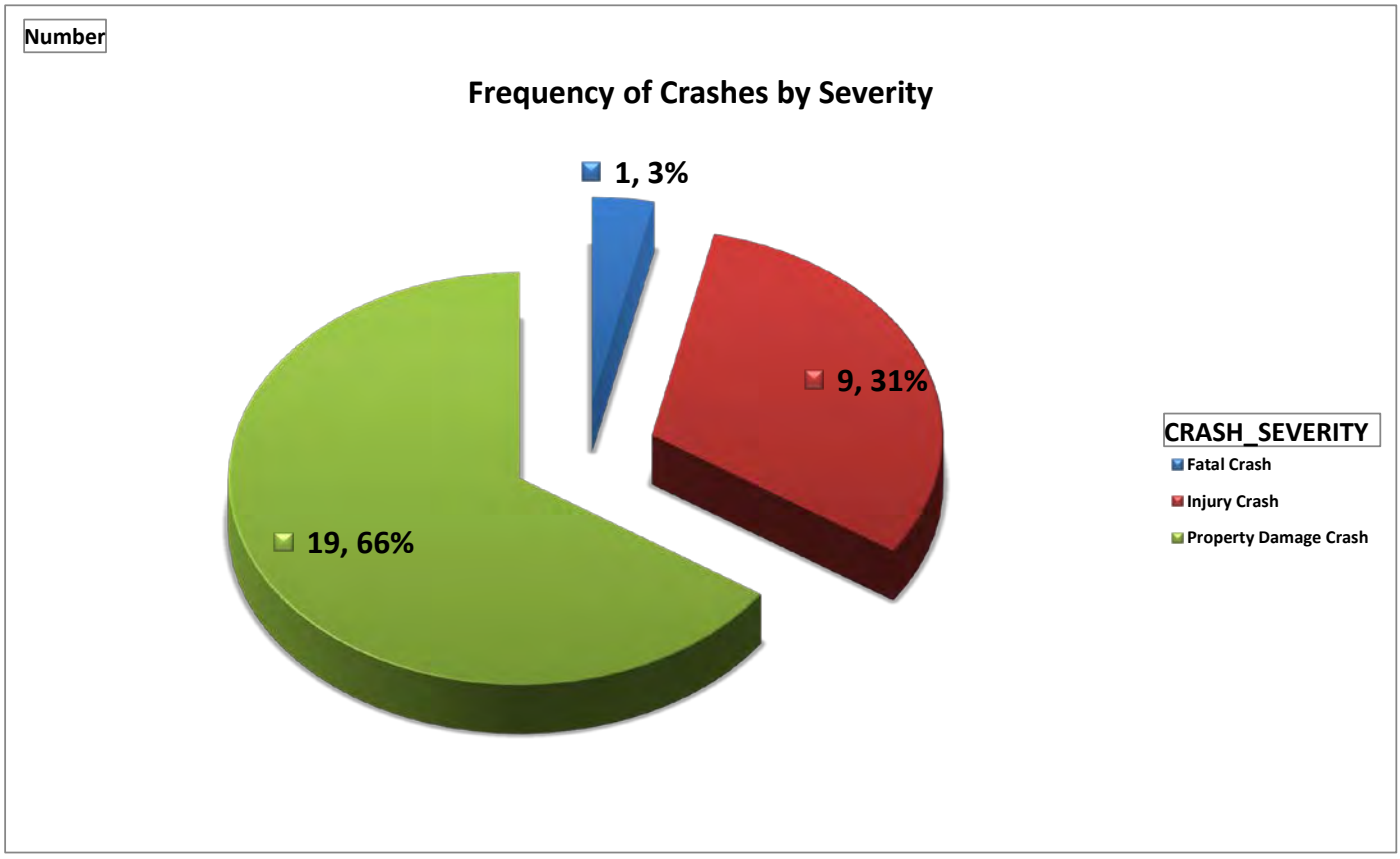


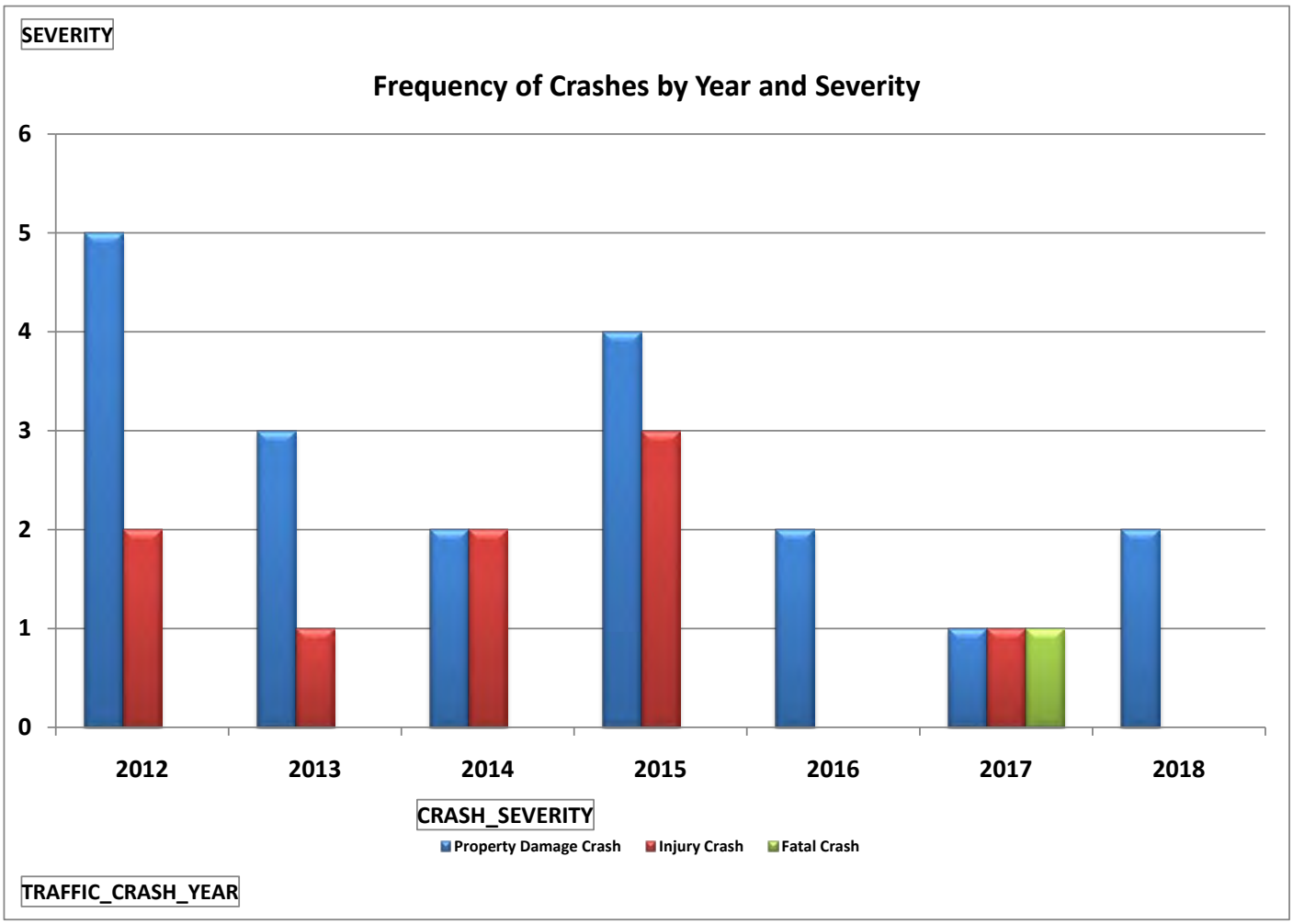
Intersection 04



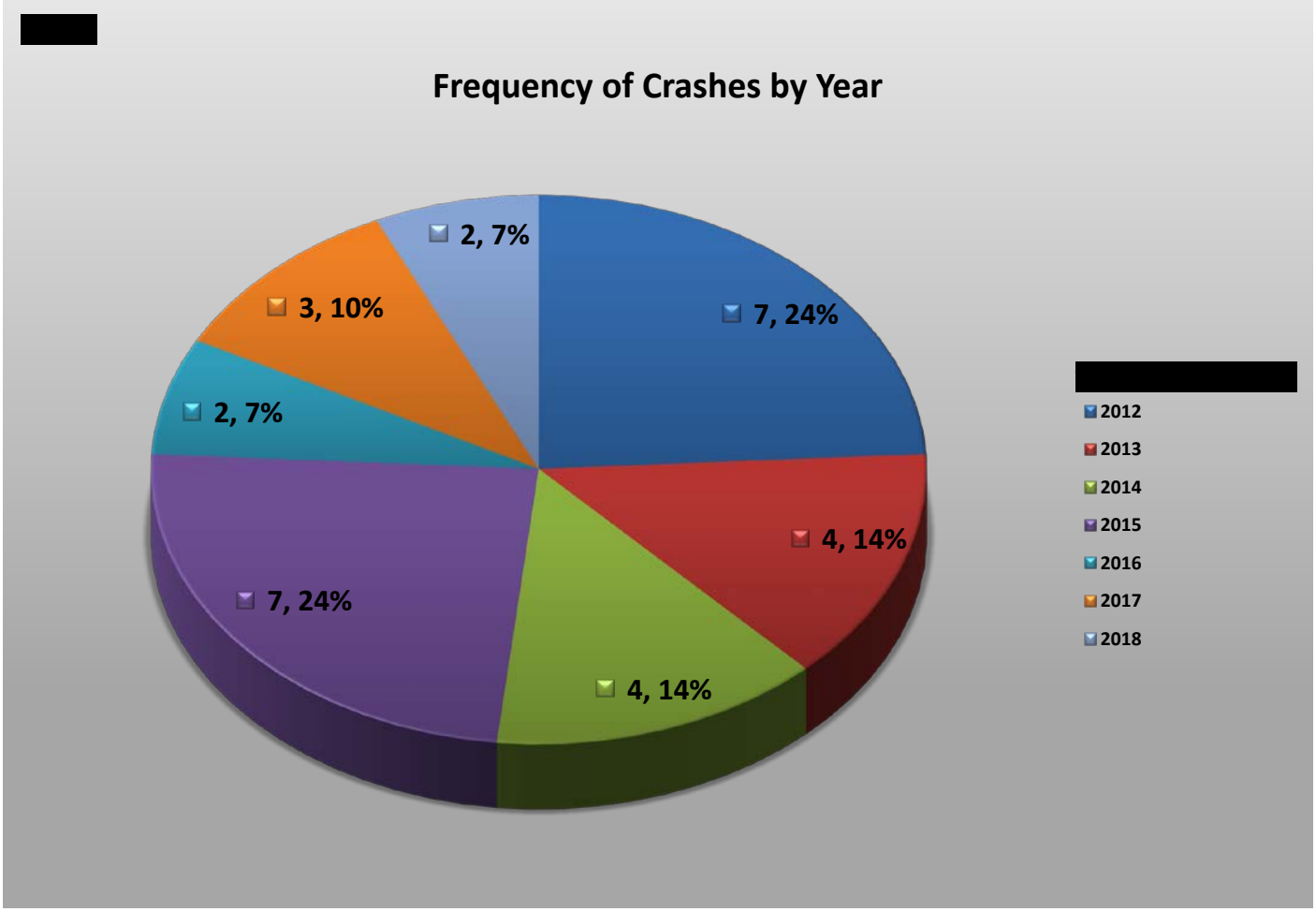
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701019789	17	01	16	16	Mon	2	2	0	Sideswipe Opposite Direction	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Herrin	Illness	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	B-Injury
201701357176	17	12	30	01	Sat	2	1	2	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Herrin	Drug Impaired	SUV	North	Straight Ahead	Intersection	SUV	West	Straight Ahead	Fatal
201701383261	17	02	28	08	Tue	3	0	0	Angle	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Herrin	Normal	SUV	East	Straight Ahead	Intersection	Passenger	South	Straight Ahead	PD
201601315338	16	01	28	07	Thu	2	0	0	Rear End	Fog/Smoke/Haze	Daylight	Dry	No Defects	No Passing	Herrin	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	PD
201601364223	16	03	28	11	Mon	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Unknown	Unknown	Unknown	Intersection	SUV	East	Straight Ahead	PD
201501188397	15	01	16	14	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	SUV	West	Turning Left	On Pavement (Roadway)	SUV	West	Turning Left	PD
201501264939	15	02	03	19	Tue	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Herrin	Other/Unknown	Unknown	Unknown	Unknown	Other	SUV	East	Straight Ahead	PD
201501300231	15	02	14	21	Sat	2	1	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	North	Straight Ahead	C-Injury
201501327102	15	06	22	16	Mon	3	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Herrin	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	C-Injury
201501390553	15	12	19	17	Sat	2	1	0	Turning	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Pickup	North	Turning Right	On Pavement (Roadway)	Passenger	East	Straight Ahead	B-Injury
201501473334	15	10	04	02	Sun	2	0	0	Sideswipe Opposite Direction	Fog/Smoke/Haze	Darkness, Lighted Road	Dry	No Defects	No Passing	Herrin	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Straight Ahead	PD
201501460598	15	08	15	14	Sat	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201400267294	14	06	20	16	Fri	3	1	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Pickup	South	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	C-Injury
201400368016	14	08	07	08	Thu	2	0	0	Sideswipe Opposite Direction	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Pickup	West	Straight Ahead	Intersection	Pickup	East	Backing	PD
201400368096	14	08	07	15	Thu	1	0	0	Fixed Object	Clear	Daylight	Wet	Other	No Controls	Herrin	Other/Unknown	Pickup	North	Skidding/Control Loss	Off Pavement - Right				PD
201400384627	14	09	02	14	Tue	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	Passenger	East	Straight Ahead	Intersection	Motorcycle (Over 150cc)	South	Straight Ahead	B-Injury
201301114071	13	04	03	16	Wed	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Herrin	Normal	SUV	East	Straight Ahead	Other	Passenger	South	Straight Ahead	PD
201301235447	13	06	13	17	Thu	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Herrin	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	PD
201301144931	13	07	02	10	Tue	2	1	0	Rear End	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Herrin	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	SUV	West	Slow/Stop In Traffic	C-Injury
201301144920	13	06	20	21	Thu	2	0	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Herrin	Alcohol Impaired	Passenger	North	Straight Ahead	Intersection	SUV	East	Straight Ahead	PD

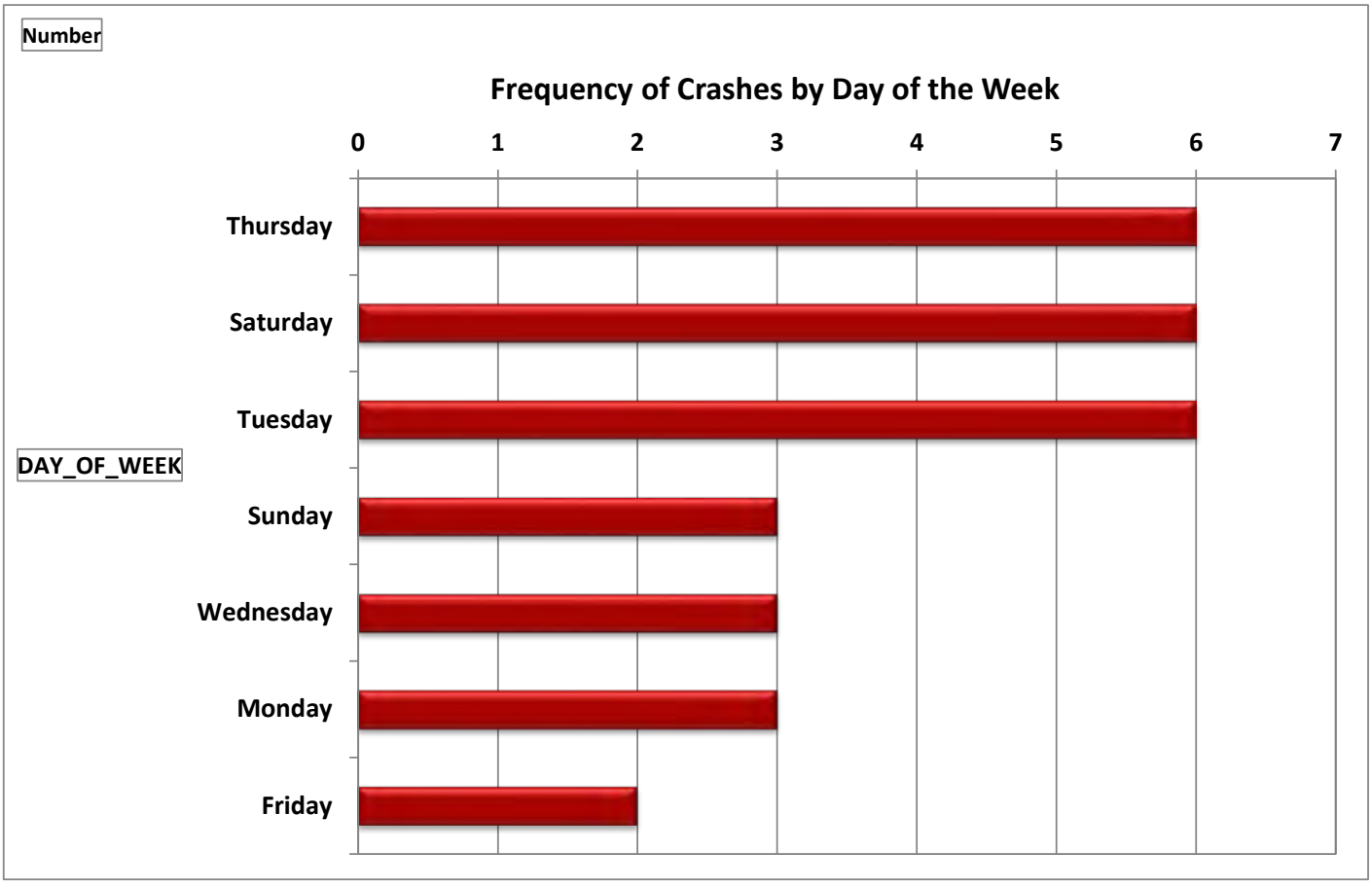
Intersection 04





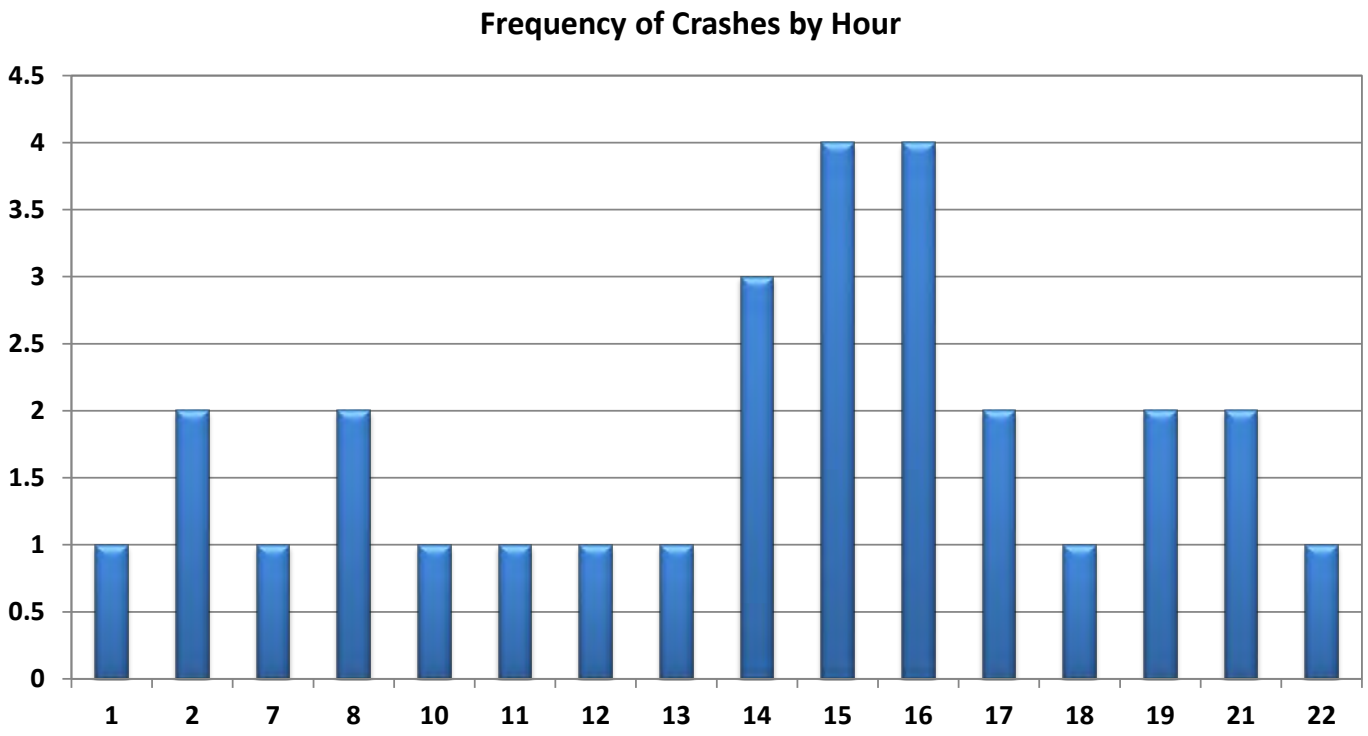
Intersection 04



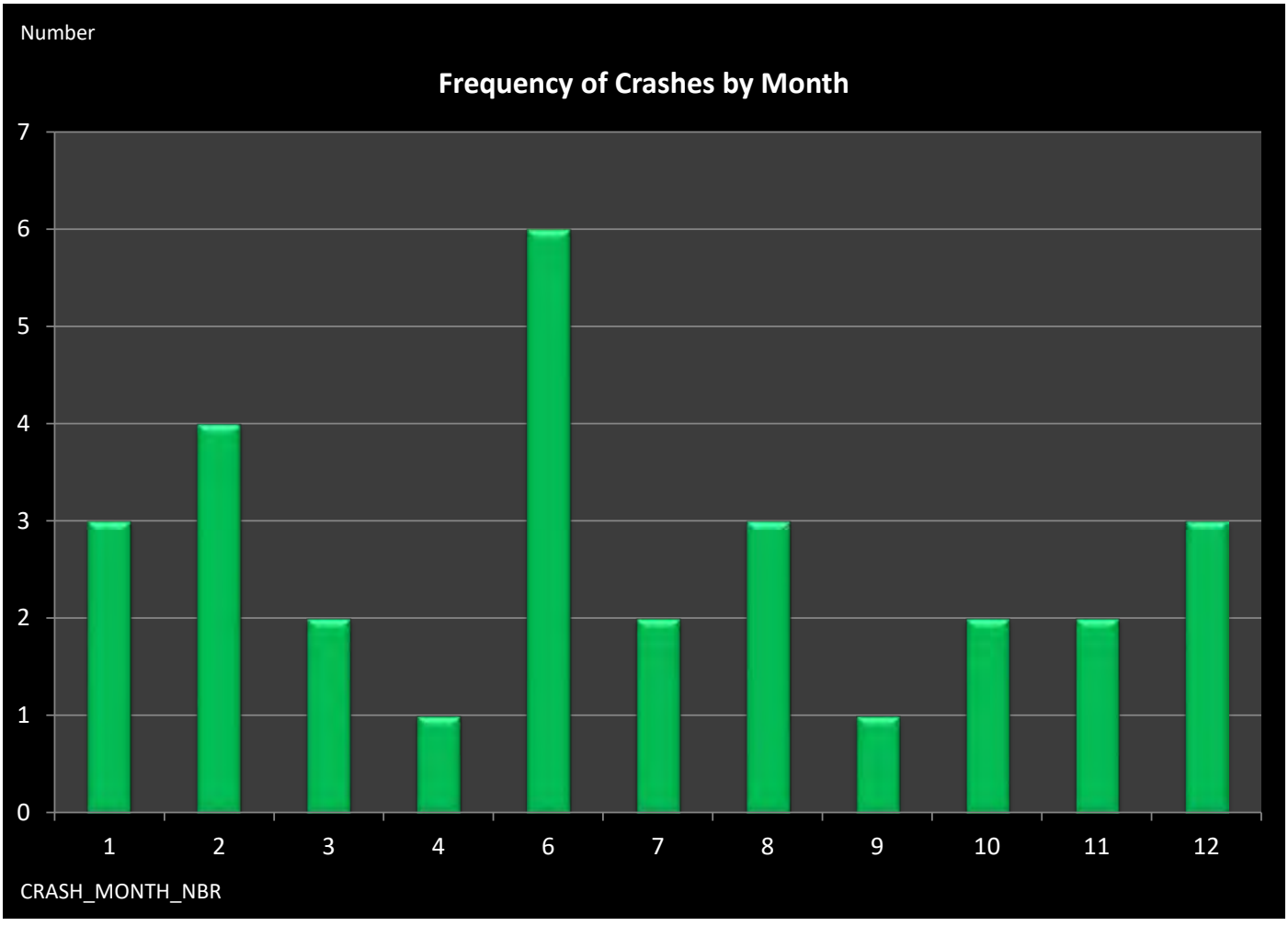


Intersection 04

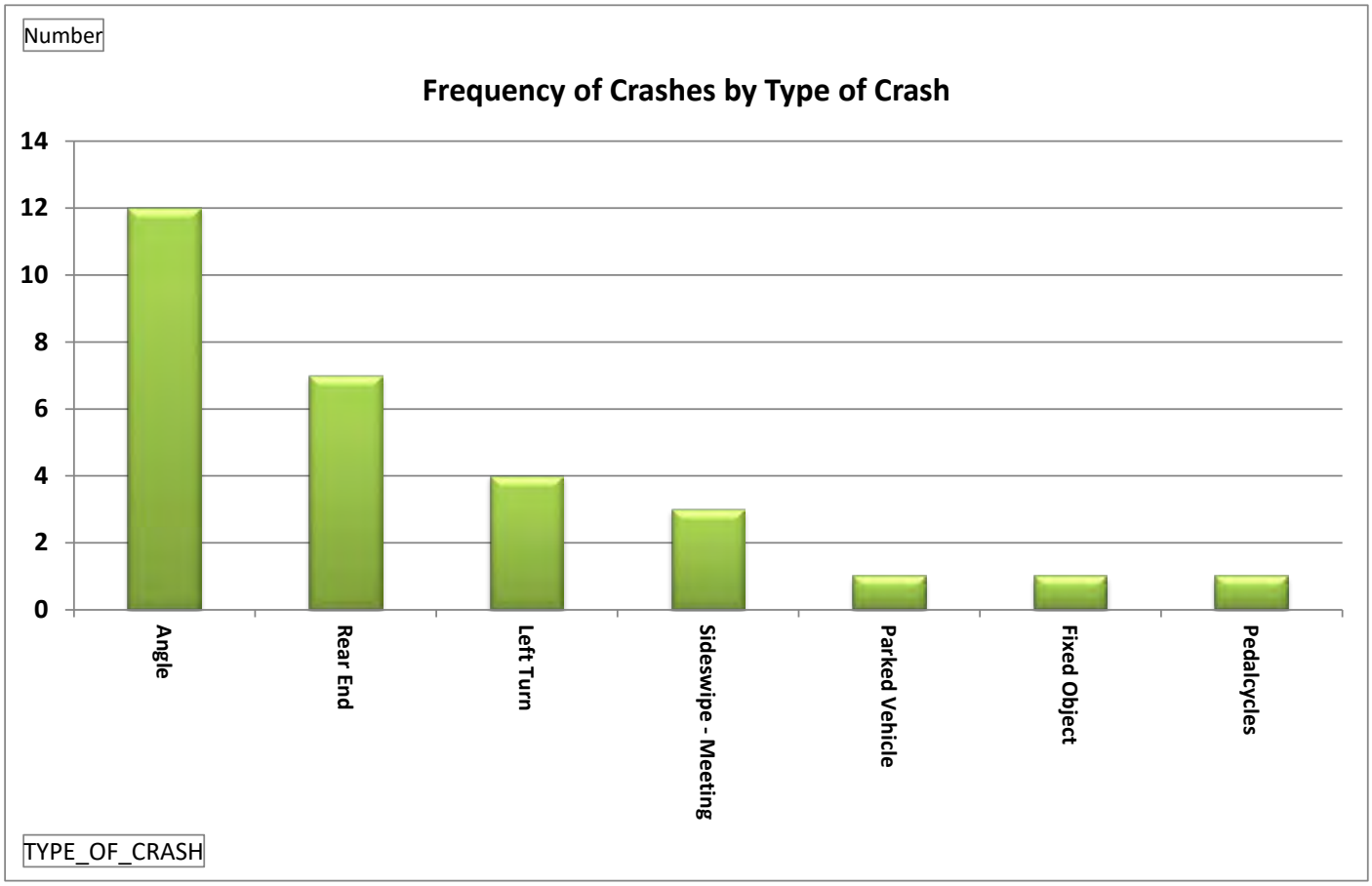
[redacted]

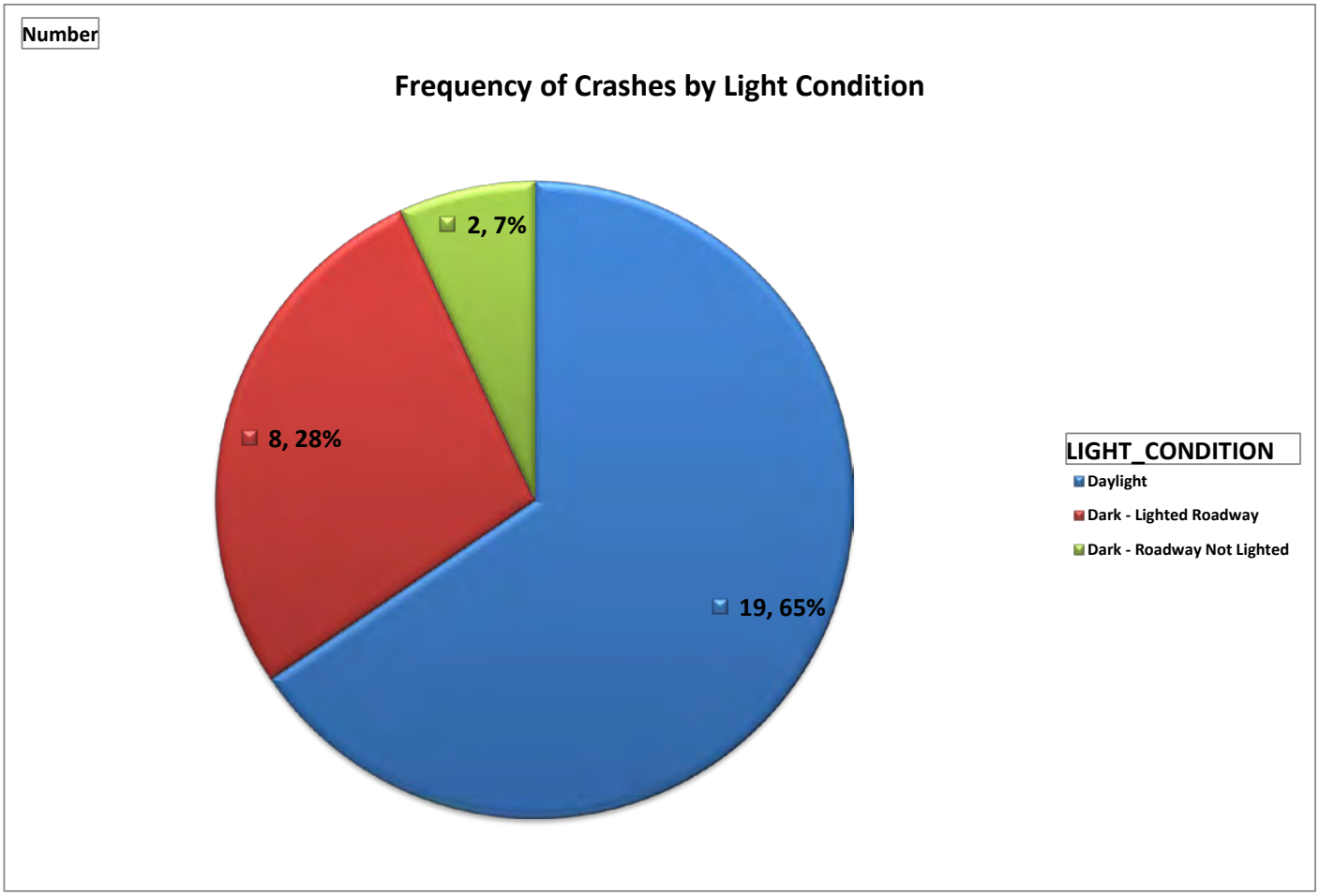


[redacted]

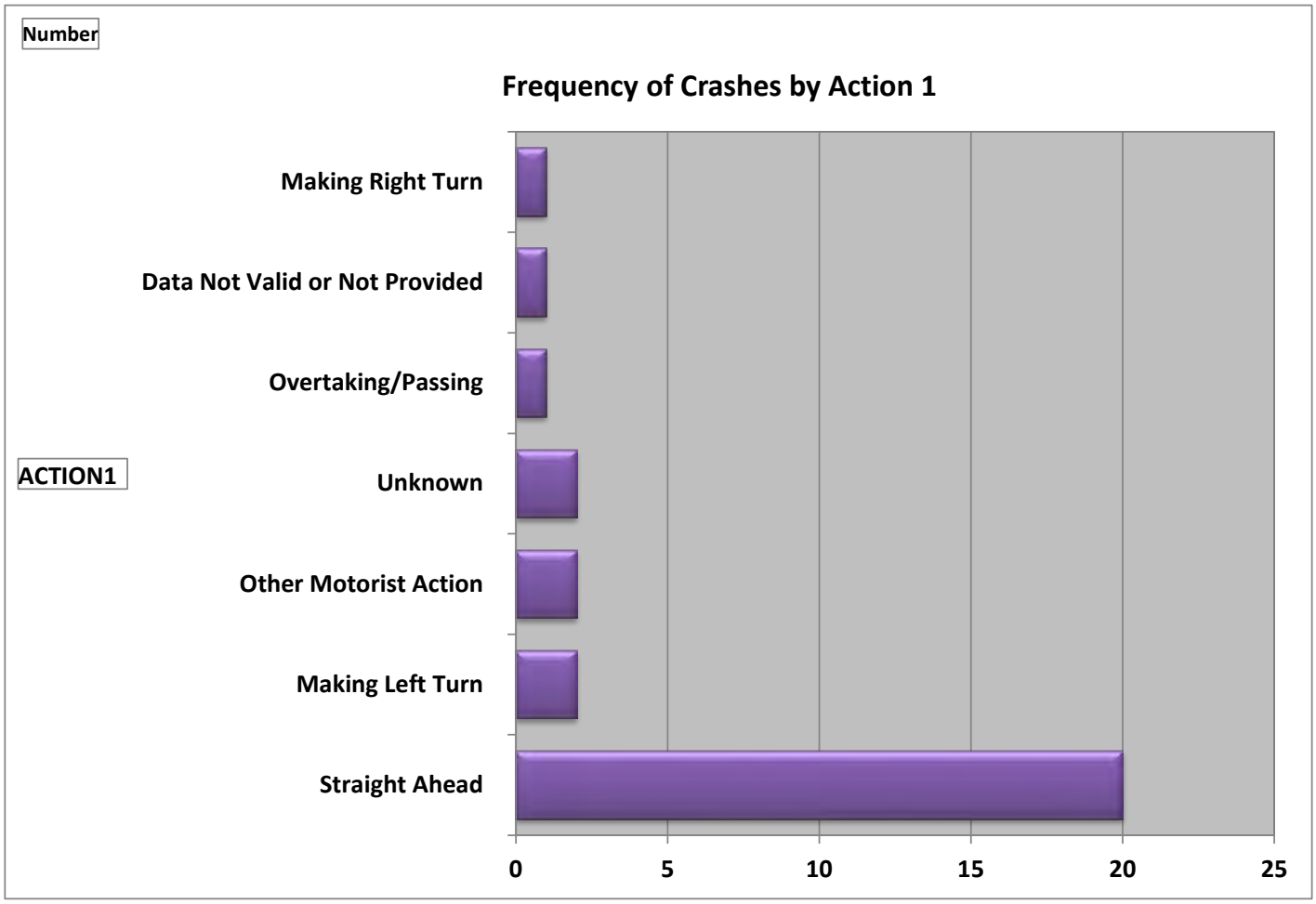


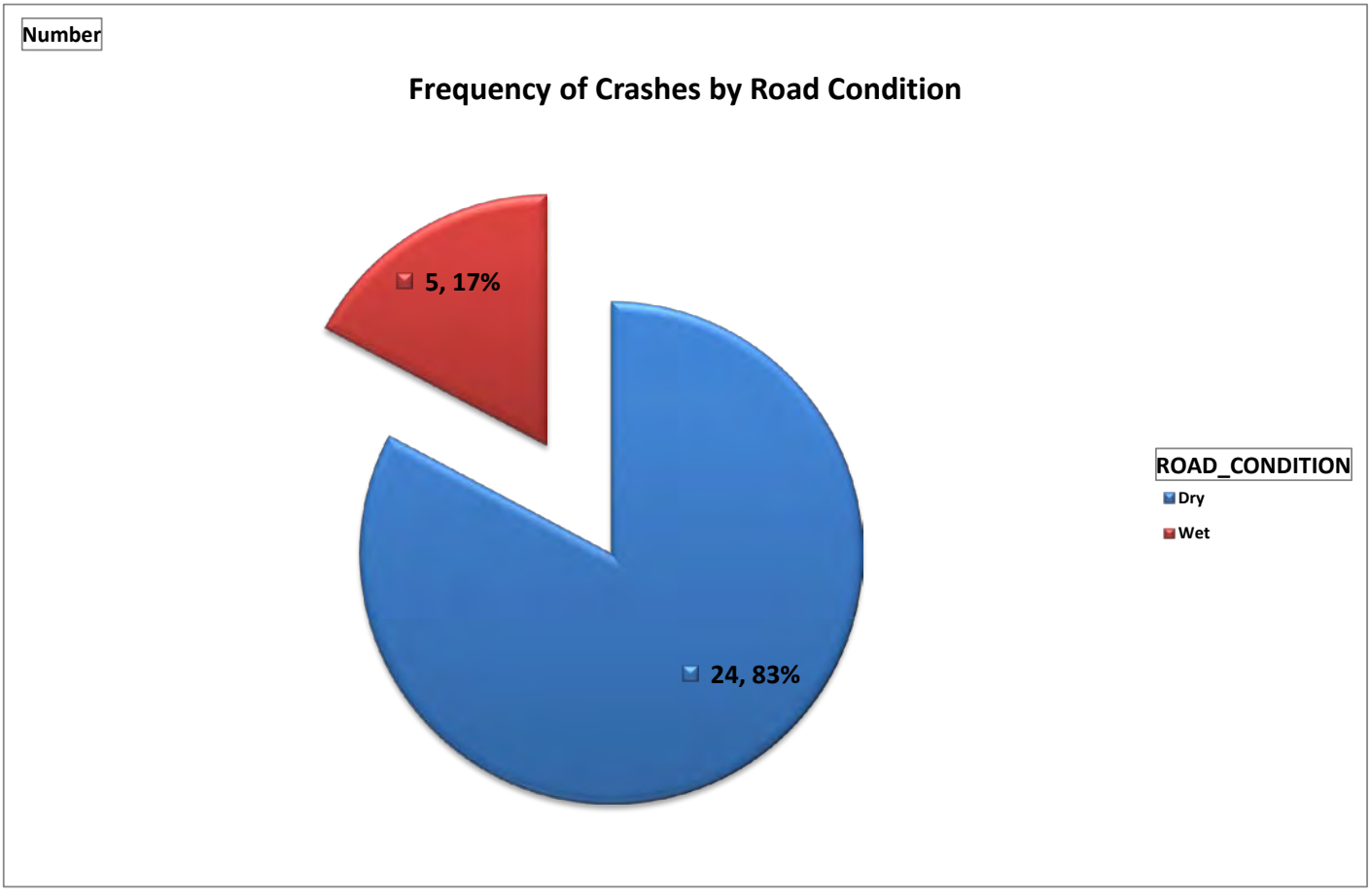
Intersection 04



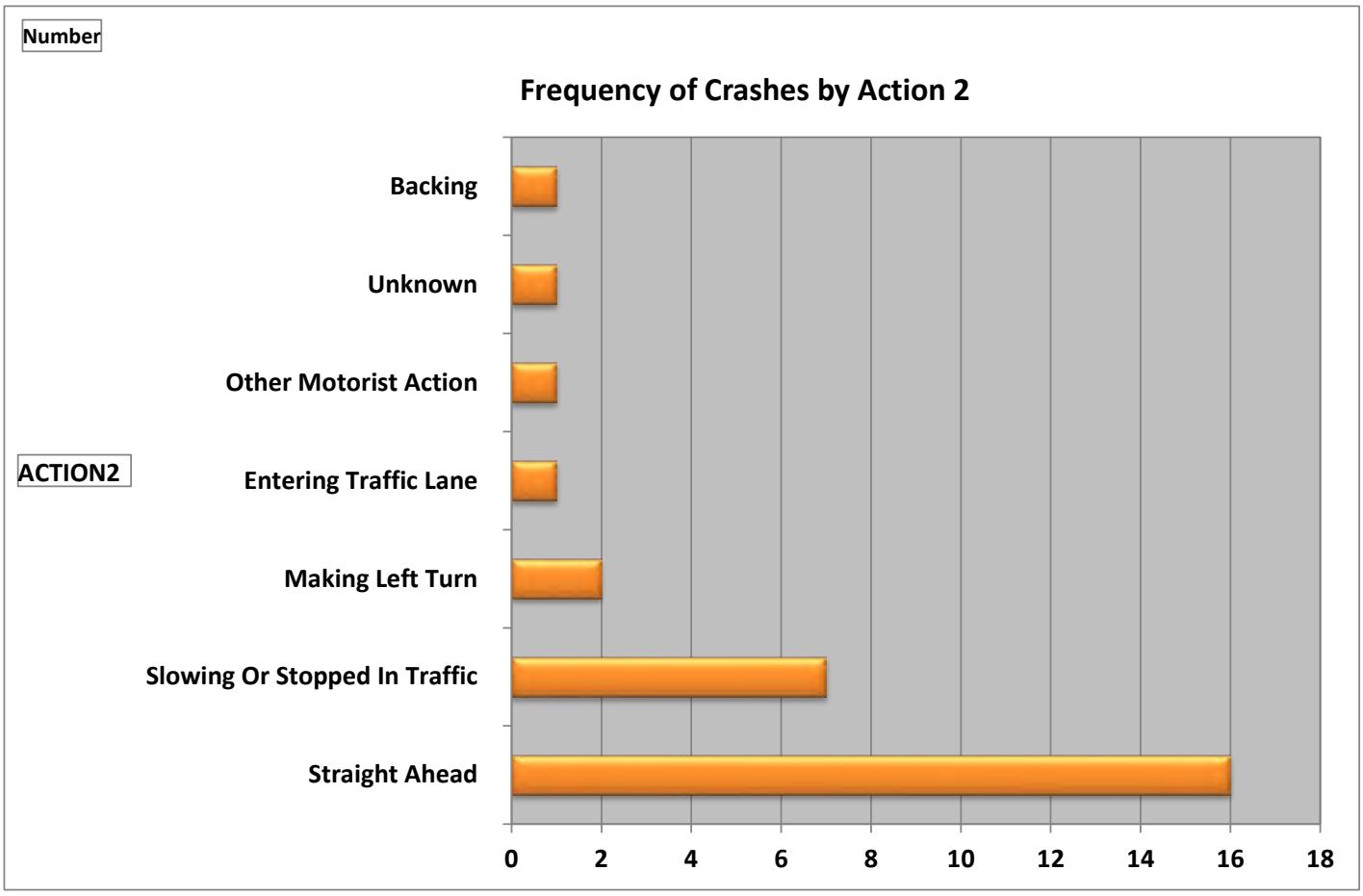


Intersection 04





Intersection 04



SIMPO Safety Study

APPENDIX A5: N. GIANT CITY ROAD AND MAIN FRONTAGE ROAD

Frontage Road and Giant City Road Intersection

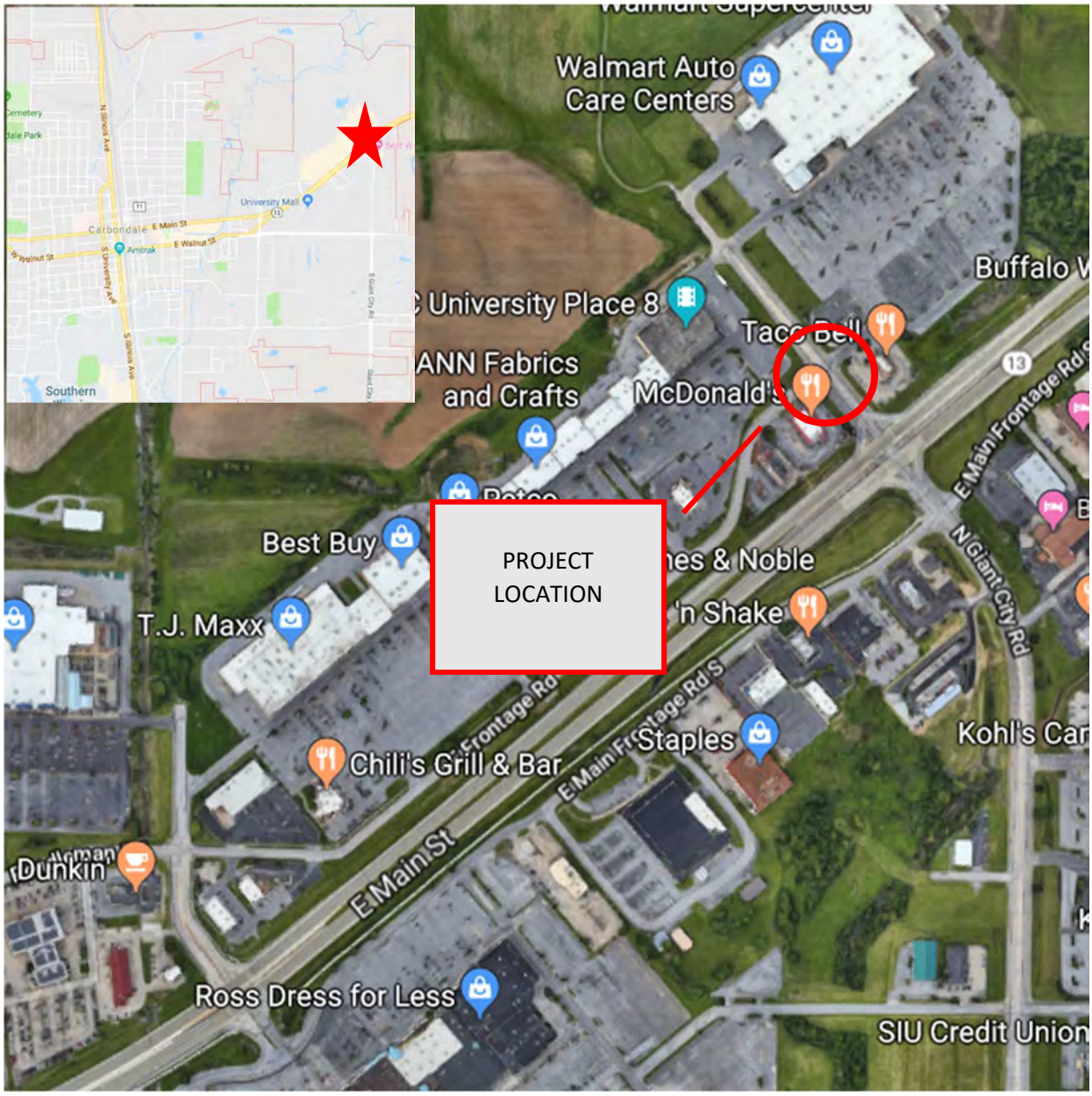
Intersection Priority #5

June 2019

INTRODUCTION

The Frontage Road and Giant City Road intersection located within the City of Carbondale was identified as the 5th ranked intersection within the Southern Illinois Planning Organization (SIMPO) jurisdiction. The 4-leg intersection is 3-way stop control (TWSC) – the northbound approach of Giant City Road has right-of-way.

INTRODUCTION



EXISTING CONDITIONS

The unsignalized 4-leg intersection is located 250 feet from the signalized intersection of Giant City Road and IL Route 13. The adjacent land use is comprised only of commercial property. The Frontage Road corridor serves as a parallel route to IL Route 13. **Figure 1** is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

A 2015 corridor study was completed on Giant City Road that extended about 0.5 miles south of IL Route 13. The Frontage Road and Giant City Road intersection was identified as a focus area of the study due to a high level of frustration shared by the public.

Existing traffic volumes (2015) at the subject intersection were collected for the PM peak (4:30-5:30 PM) during a weekday and a mid-day peak (1:30 – 2:30 PM) during a weekend (Saturday). These volumes were forecasted to a 2040 design year. **Figures 2 and 3** show the existing and future volumes at the Frontage Road and Giant City Road intersection. The volumes in parenthesis represent the weekend volumes.

The existing levels of service (LOS) as an unsignalized intersection were equal to LOS E for the westbound approach (highest delay) whereas the other approaches were LOS B for the weekday PM peak. All stop-controlled approaches were equal to LOS F for the weekend midday peak.

FIGURE 2: EXISTING VOLUMES (2015)

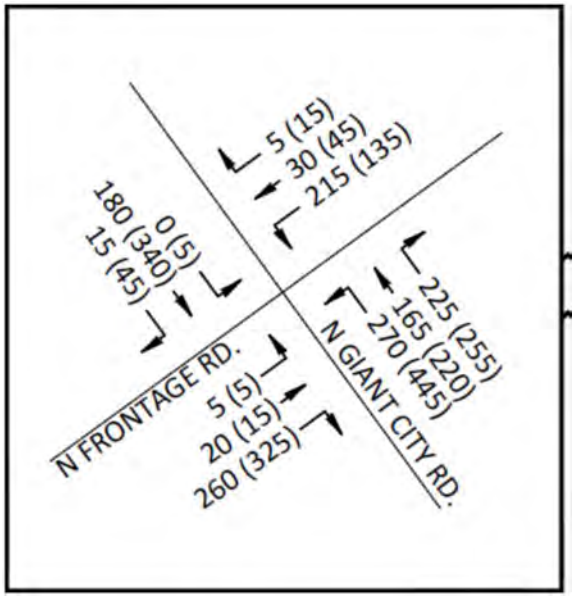
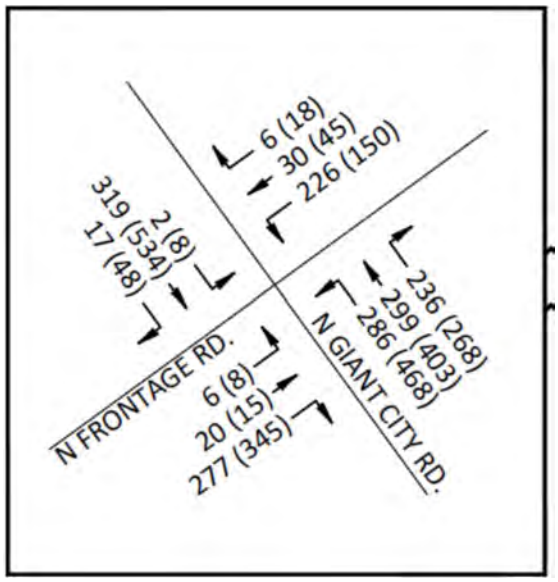


FIGURE 3: FUTURE VOLUMES (2040)

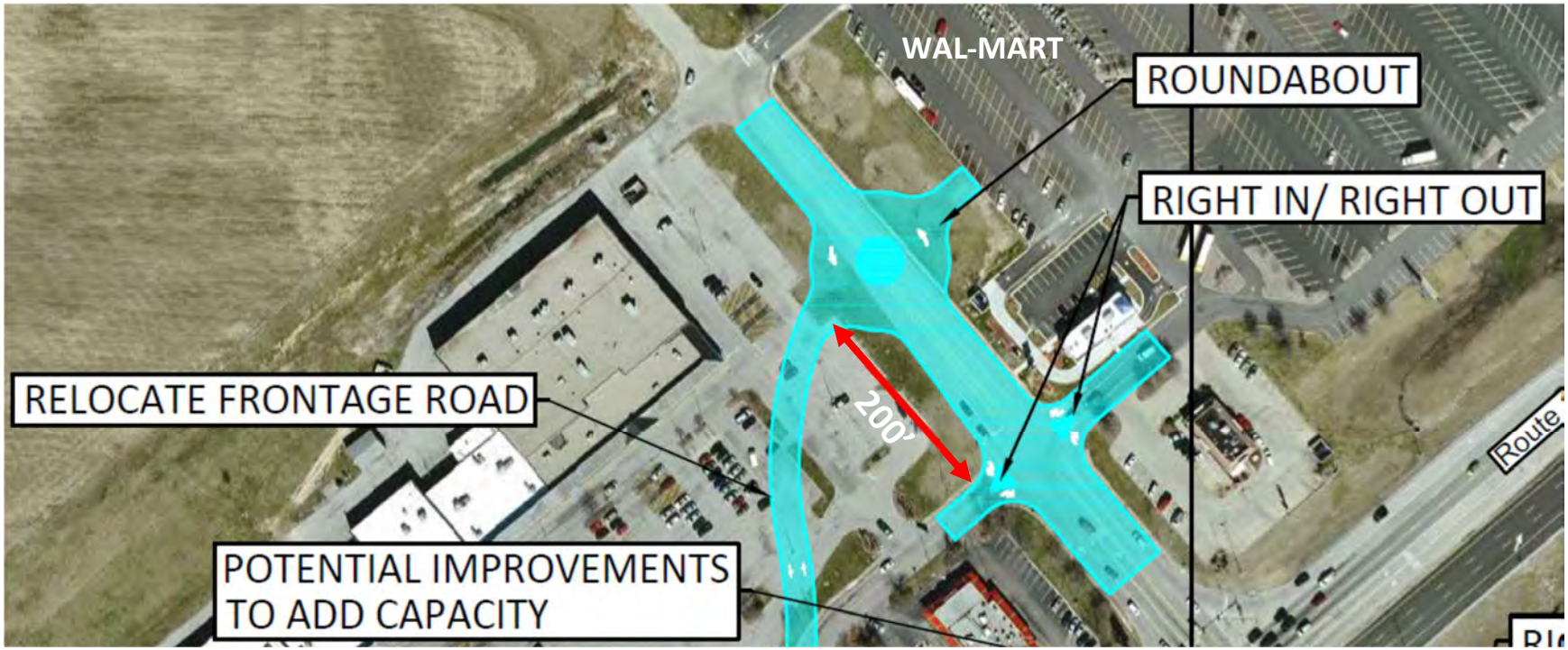


The future levels of service (LOS) as an unsignalized intersection were equal to LOS F for all approaches and for all peak periods. The 2015 study noted that **the frontage road intersections would be effectively gridlocked during peak periods without improvements.** Improvements proposed at the Frontage Road and Giant City Road intersection include the following:

- Relocate the North Frontage Road approximately 300 feet further to the north
- Install a roundabout at the new intersection with Giant City Road. The roundabout could also serve Wal-Mart directly provided parking lot modifications are made. The roundabout would need two circulating lanes on the east side (to accommodate two northbound through lanes) but only one lane on the west side.
- Retain the existing frontage road but restrict it to right-in/right-out (RIRO) movements only.

Figure 4 shows a conceptual plan of the proposed improvements on Giant City Road north of IL Route 13.

FIGURE 4: CONCEPTUAL IMPROVEMENTS (2015 STUDY)



Other improvements were proposed at the IL Route 13 intersection:

- Add a separate southbound right-turn lane
- Add a second northbound left-turn lane
- Modify signal phasing, sequencing and timing

All approaches are stop controlled except for northbound Giant City Road resulting in 3-way stop-controlled intersection having 4 legs. The lane configuration on all approaches to the intersection are summarized below:

- **Eastbound Frontage Road**. Single lane approach that is stop controlled. Note through movement offset by 6 feet across intersection. A supplemental warning sign exists under the Stop Sign which reads "Traffic From Right Does Not Stop." See **Photo 1.**

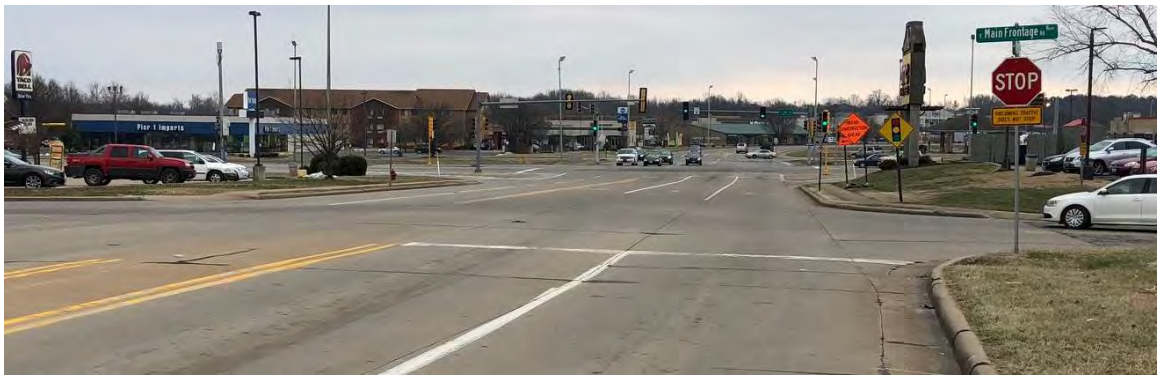
PHOTO 1: EB FRONTAGE ROAD

- **Westbound Frontage Road**. Two lane approach with an auxiliary left turn lane. The approach is stop-controller. Note stop sign condition on **Photo 2**. A supplemental warning sign exists under the Stop Sign which reads "Traffic From Left Does Not Stop." Pavement markings were recently upgraded. Single line centerline exists on the westbound approach. The aerial view of **Figure 1** shows the centerline pavement markings were worn/not existent.

PHOTO 2: WB FRONTAGE ROAD

- **Southbound Giant City Road**. The two-lane approach has a shared through-right lane and a shared through-left lane. The shared through left turn lane is offset from the opposing through movement by 9 feet – the width of the painted median. The approach is stop controlled. Note the proximity of the signalized intersection at IL Route 13. See **Photo 3**.

PHOTO 3: SB GIANT CITY ROAD



- **Northbound Giant City Road**. The two-lane approach has a shared through-right lane and a shared through-left lane. The approach has right of way (no stop control). See **Photo 4**.

PHOTO 4: NB GIANT CITY ROAD

The traffic volumes for a weekend are slightly higher on a weekend than on a weekday at the subject intersection as shown in Figures 2 and 3. The exception is the westbound left turn movement which is higher during the weekday (215 vehicles) than on a weekend (135 vehicles).

SAFETY ANALYSIS

A total of 21 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 5**. The crash frequency varied by year: 0 in 2017 and 8 in 2013/ 2016. No factors were identified to explain the variations in crash frequency.

The frequency of crashes by type on **Figure 6** shows a majority of crashes (67% or 14 crashes) are left turn and angle crashes. This crash type is correctable with traditional countermeasures such as a traffic signal.

Figure 7 shows the distribution of crashes within the study area by severity. The fatal and injury crashes at the subject intersection represent 33 percent of the total crashes. **The injury crashes include 2 Type A crashes and 1 Type B crash – all were angle crashes involving eastbound through vehicles colliding with northbound vehicles.** No fatalities occurred at the intersection within the time frame of the study.

Figure 8 shows the severity of crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. The highest crash type were angle crashes (33% or 7 crashes) involving eastbound and northbound vehicles.

An additional 4 crashes involved northbound vehicles:

- Two NB left turn crashes involving southbound through vehicles (at fault)
- One SB left turn crash (at fault) involving northbound through vehicle
- One WB left turn crash (at fault) involving a northbound through vehicle

FIGURE 5: FREQUENCY OF CRASHES BY YEAR

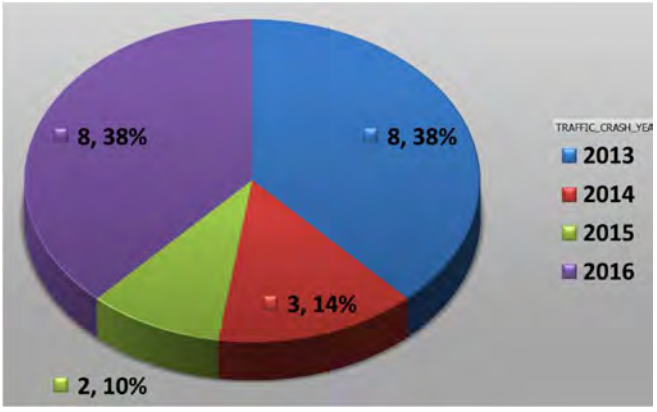


FIGURE 6: FREQUENCY OF CRASHES BY TYPE

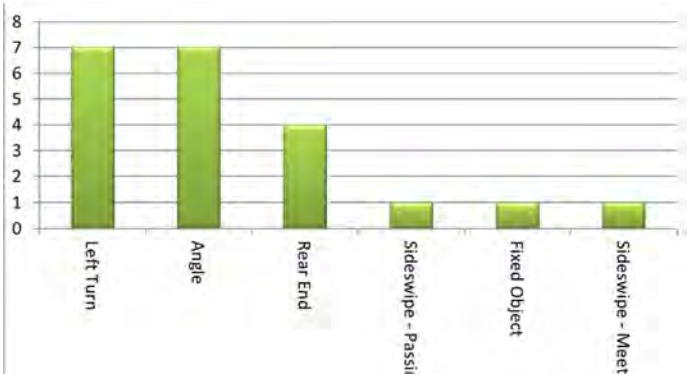


FIGURE 7: FREQUENCY OF CRASHES BY SEVERITY

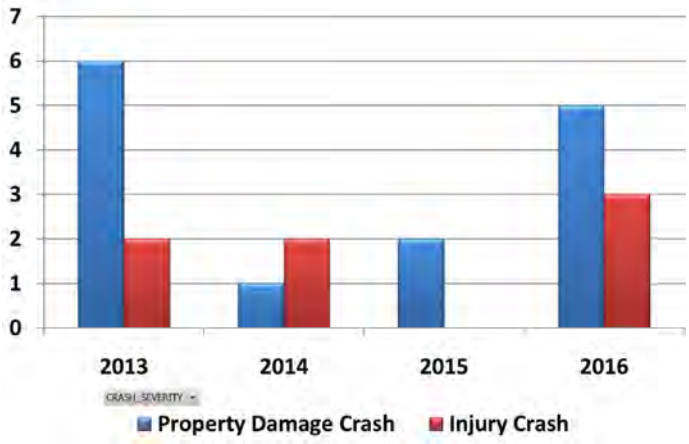
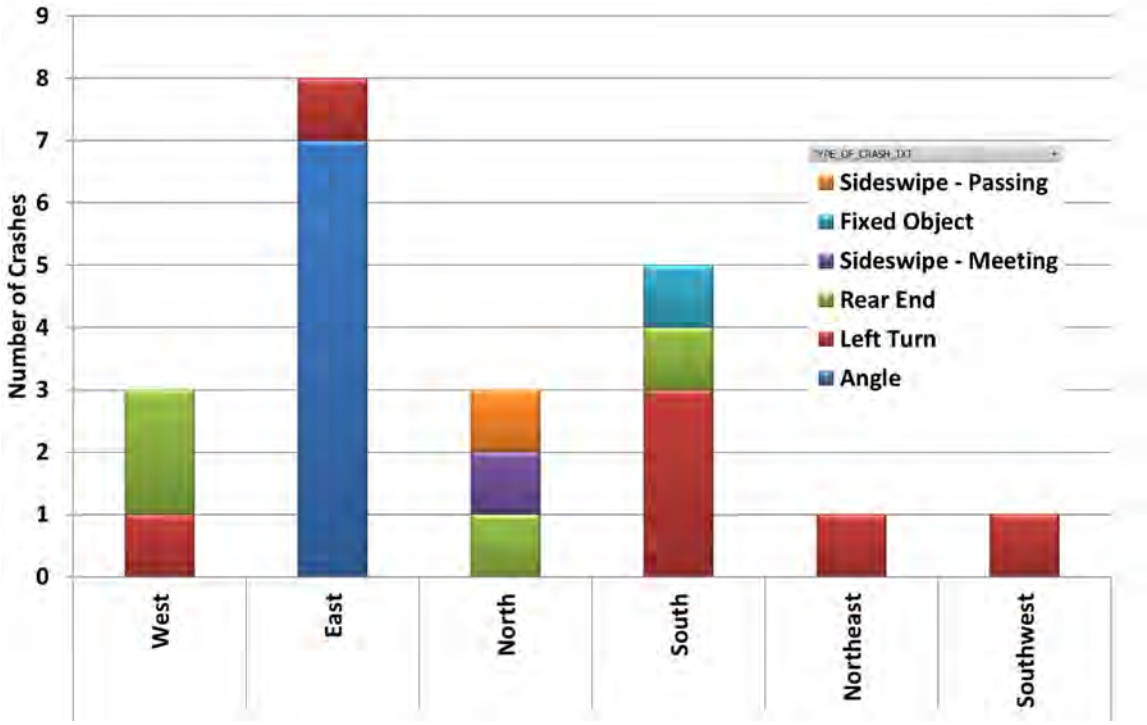
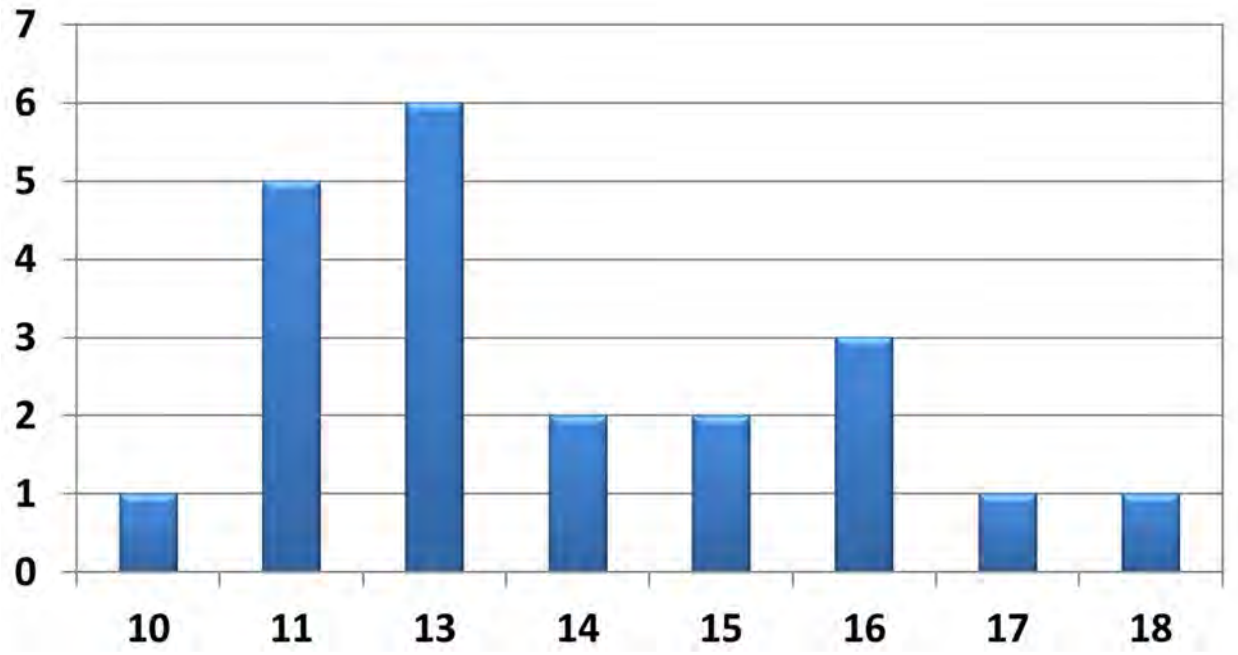


FIGURE 8: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The frequency by time of day suggests that congestion and speed are contributing factors to the safety performance of the study area. **Figure 9** shows the distribution by time of day. The highest frequency of crashes occurs in the afternoon and PM peak time frames. The highest crash frequency also occurs on a Sunday (6 crashes) and a Thursday (6 crashes)

FIGURE 9: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improving safety performance.

SHORT TERM COUNTERMEASURE – MITIGATE ANGLE CRASHES

Two crash types comprised the majority of the crashes and contributed to the severity of crashes:

- Angle crashes involving eastbound and northbound through vehicles. A total of 7 crashes which included 4 injury crashes (2 Type A crashes, 1 Type B crash).
- Angle or left turn crashes involving northbound vehicles with vehicles on various approaches: 2 southbound through, one southbound left, and one westbound left.

The following countermeasures are proposed to improve the safety performance of the Frontage Road intersection:

1. **Channelize northbound left turn movement**. Channelizing the northbound left turn movement is proposed to effectively restrict the eastbound approach to right turns only. The southbound left turn movement is restricted with the channelized NB left turn movement. Less than 10 vehicles are impacted during the 2040 design hour.

   Converting the northbound left turn movement to stop control may be considered to reduce confusion caused by the northbound direction having right of way. Levels of service C or better are expected on all approaches to the intersection. The 90th percentile queue for the northbound left is 8 vehicles (160-200 feet). Total distance to the IL Route 13 intersection is 250 feet.

   The 2015 study proposed relocating the northbound left turn movement to a roundabout north of the Frontage Road. Restricting the northbound left turn movement is considered to be a long-term countermeasure that is desirable if southbound queues extending from the IL Route 13 intersection contribute to the safety performance of the Frontage Road intersection.

2. **Restrict eastbound approach to RIRO/ Left In**. Eastbound traffic wanting to continue straight across Giant City Road or to turn left on NB Giant City Road comprise 1% of the total entering volumes (weekend, 2015). The same movements comprise 33% of all crashes (100% of Type A and B crashes).

   An alternate route for diverted traffic includes the drive aisle of the parking lot north of the Frontage Road (see **Figure 1**). No alignment changes are proposed to the Frontage Road. A total of 23 vehicles would be diverted through the parking lot by restricting eastbound left and through traffic at the Frontage Road intersection (weekend, 2040 volumes). Alternate routes are likely being used by other motorists due to the difficulty in completing the movements safely for the existing condition.

Permitting the NB left turn movement is in addition to the short-term countermeasure proposed in the 2015 study -- RIRO operation of the eastbound approach.

3. **Restrict westbound approach to RIRO**. Restricting the westbound approach to right in, right out (RIRO) operation is required by channelizing the northbound left turn lane. Two angle crashes are mitigated by converting the westbound approach to RIRO operation. This short-term countermeasure is consistent with the 2015 study.

4. **Add SB right turn at the IL Route 13**. This countermeasure was identified as part of the 2015 study. The additional right turn lane reduces queue lengths on the southbound approach to the IL Route 13 signalized intersection. Reducing the frequency of queues from extending into the Frontage Road intersection is desirable to reduce driver workload.

LONG TERM COUNTERMEASURE – MITIGATE ANGLE CRASHES

A countermeasure is proposed in addition to improvements at the Frontage Road intersection.

5. **Construct roundabout at the Wal-Mart driveway (north end).** This countermeasure is proposed to mitigate downstream impacts caused by converting the westbound Frontage Road approach to RIRO operation. The roundabout enables diverted traffic to perform a U-turn at the roundabout and proceed back to the IL Route 13 intersection. A total of 256 vehicles (left, through vehicles) are diverted to be right turn movements on the westbound approach.

   Locating the roundabout at the existing Wal-Mart driveway results in an intersection spacing of 425 feet when measured from the Frontage Road. Minimum intersection spacing of local streets typically is not less than 500 to 600 feet. A roundabout at the northern driveway of Wal-Mart on Giant City road is considered to the minimum intersection spacing considering the potential development that could occur north of the Wal-Mart site.

   Two SB lanes on Giant City Road on the approach to the Frontage Road reduces risk of queue spillback into the roundabout.

The roundabout could be constructed as part of a future phase. The westbound approach of the Frontage Road intersection would be most impacted. Wayfinding signs could be added on westbound Frontage Road to direct traffic destine to IL Route 13 to turn north along a drive aisle on the Wal-Mart property to minimize the need for a roundabout for U-turn movements. See **Figure 10**.

A conceptual plan of the proposed improvements is shown on **Figure 11**.

FIGURE 10: ON-SITE WAYFINDING

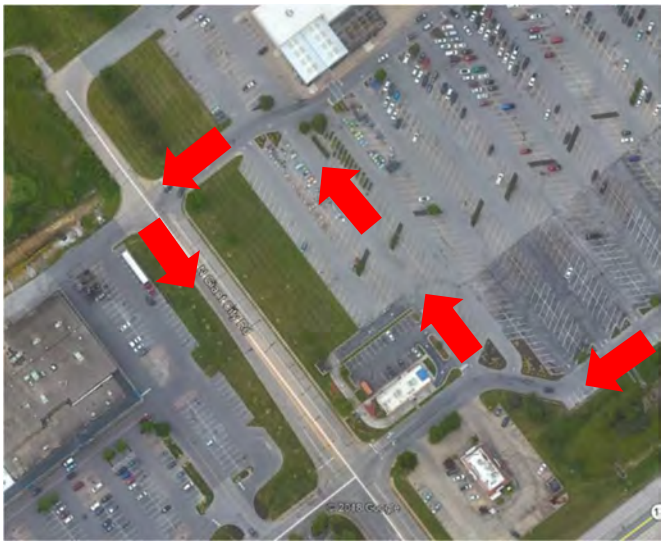
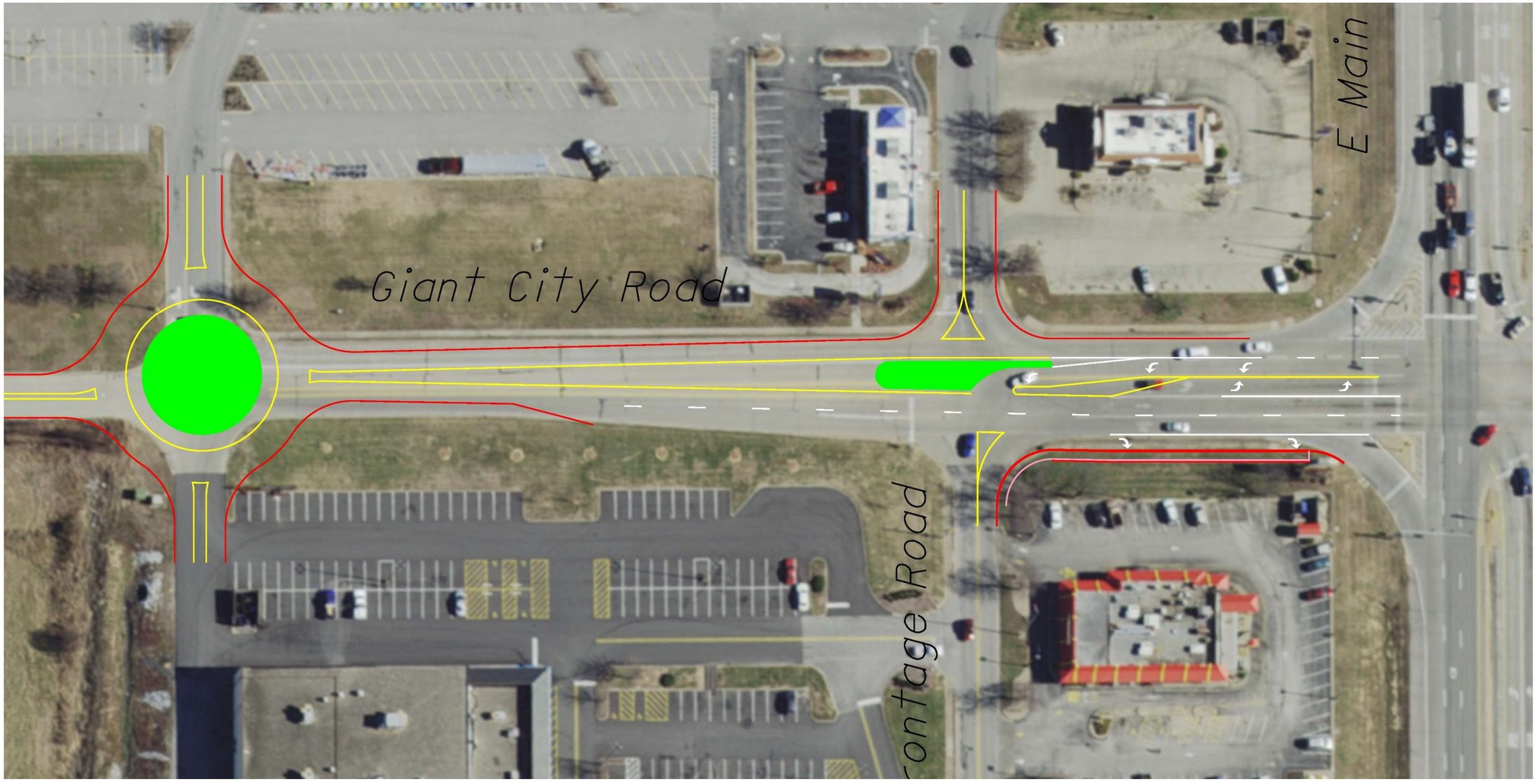
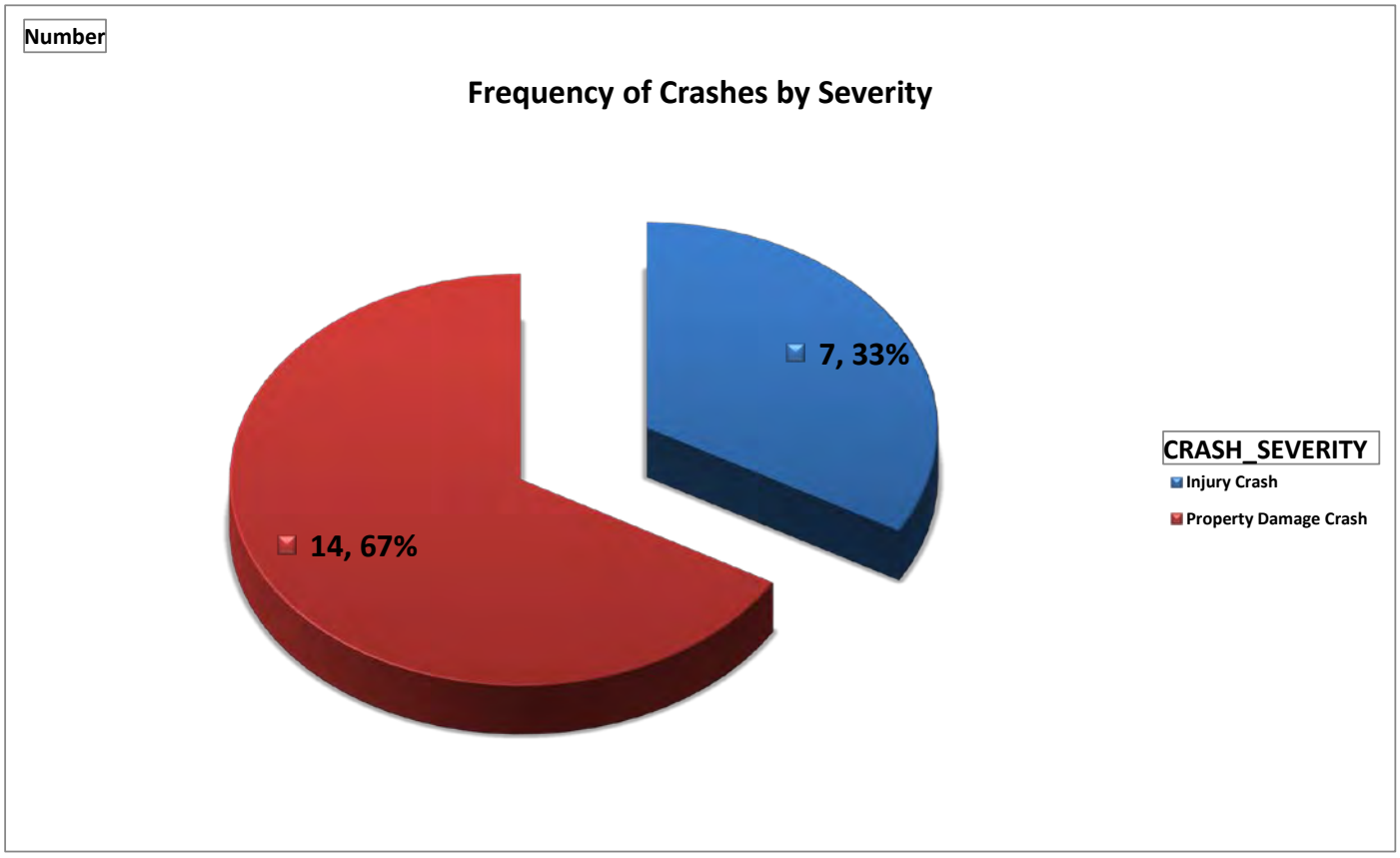


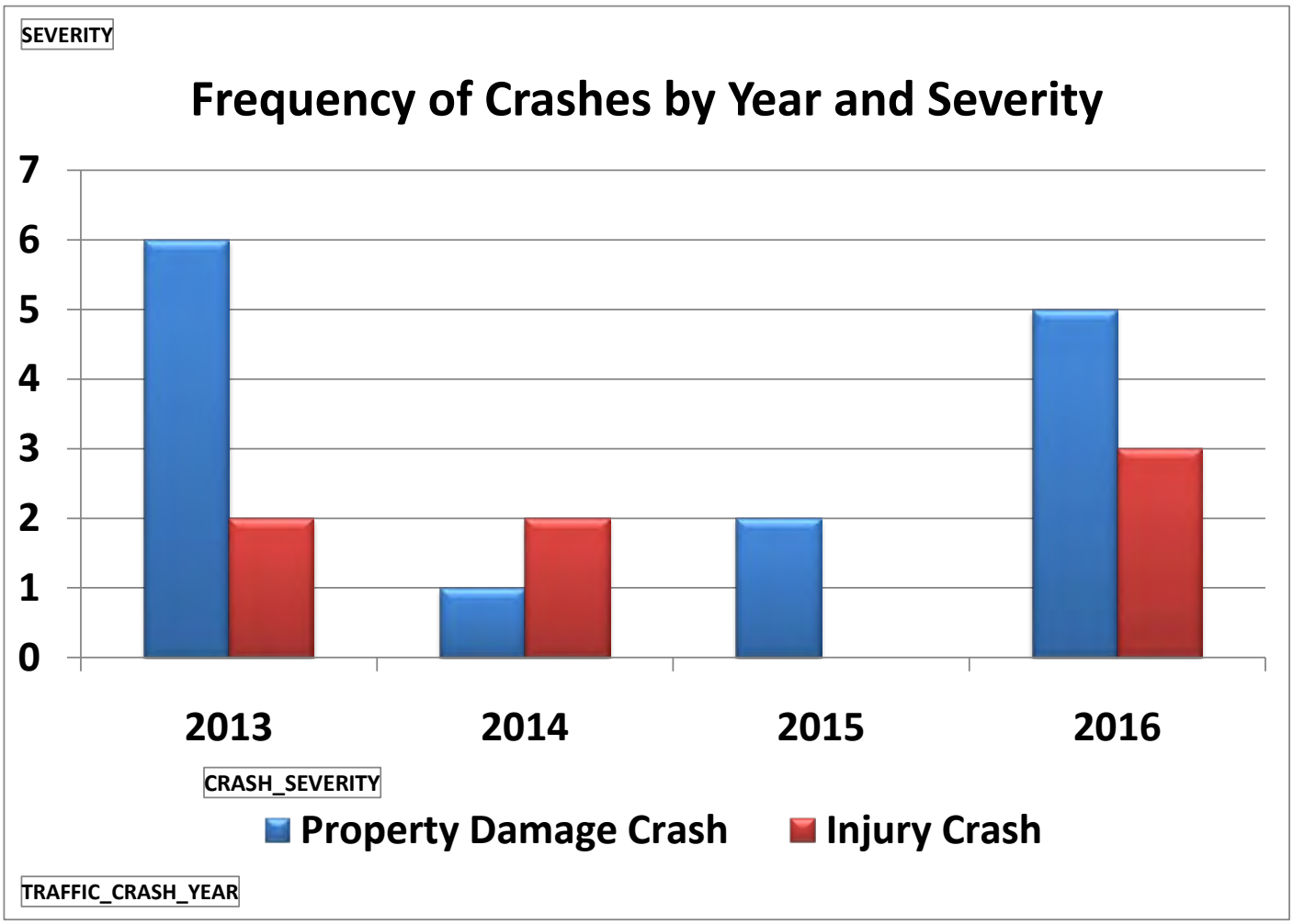
FIGURE 11: CONCEPTUAL PLAN OF COUNTERMEASURES



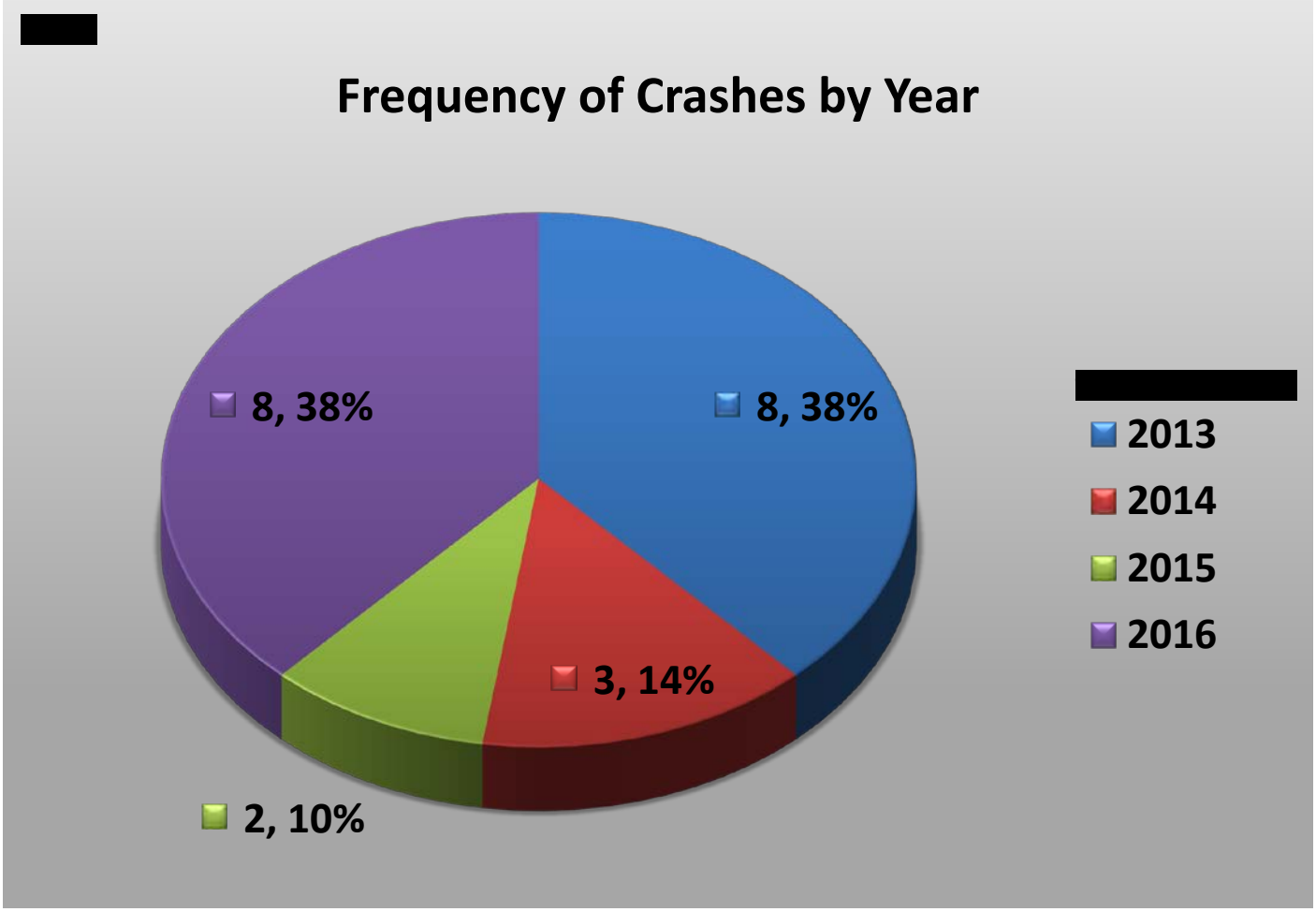
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201601348664	16	02	07	11	Sun	2	0	0	Sideswipe Opposite Direction	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	North	Merging	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601358233	16	03	25	14	Fri	2	0	0	Turning	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	Southwest	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201601407685	16	06	15	11	Wed	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Carbondale	Normal	SUV	Northeast	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201601422849	16	07	03	13	Sun	4	1	0	Angle	Cloudy/Overcast	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Alcohol Impaired	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	C-Injury
201601422442	16	07	07	14	Thu	2	1	0	Angle	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Unknown	North	Straight Ahead	B-Injury
201601473482	16	10	06	16	Thu	2	0	0	Sideswipe Same Direction	Clear	Daylight	Dry		Lane Use Marking	Carbondale	Other/Unknown	Passenger	North	Merging	On Pavement (Roadway)	SUV	North	Straight Ahead	PD
201601456445	16	09	04	15	Sun	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	West	Turning Left	Intersection	Pickup	North	Straight Ahead	PD
201601502752	16	12	01	16	Thu	2	1	0	Turning	Clear	Dusk	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	East	Turning Right	Intersection	SUV	East	Slow/Stop - Right Turn	C-Injury
201501428689	15	11	06	11	Fri	2	0	0	Angle	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	SUV	North	Straight Ahead	PD
201501495718	15	12	26	13	Sat	3	0	0	Rear End	Rain	Daylight	Wet	No Defects	No Controls	Carbondale	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201400098737	14	04	21	13	Mon	3	2	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	A-Injury
201400388265	14	09	14	13	Sun	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	PD
201400422479	14	11	23	10	Sun	1	1	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	Carbondale	Other	Passenger	South	Other	Other				B-Injury
201301038393	13	01	04	18	Fri	2	0	0	Turning	Fog/Smoke/Haze	Darkness, Lighted Road	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Turning Left	PD
201301038394	13	01	04	17	Fri	2	1	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	A-Injury
201301148443	13	07	12	13	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Carbondale	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop - Left Turn	C-Injury
201301124661	13	05	02	11	Thu	3	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	SUV	East	Straight Ahead	Intersection	Pickup	North	Straight Ahead	PD
201301197866	13	04	25	13	Thu	2	0	0	Rear End	Clear	Daylight	Dry		No Controls	Carbondale	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop - Left Turn	PD
201301319556	13	09	05	11	Thu	2	0	0	Angle	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Van/Mini-Van	East	Slow/Stop In Traffic	Intersection	Passenger	North	Straight Ahead	PD
201301311460	13	08	26	16	Mon	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201301294015	13	08	11	15	Sun	2	0	0	Turning	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	Northwest	Turning Left	PD

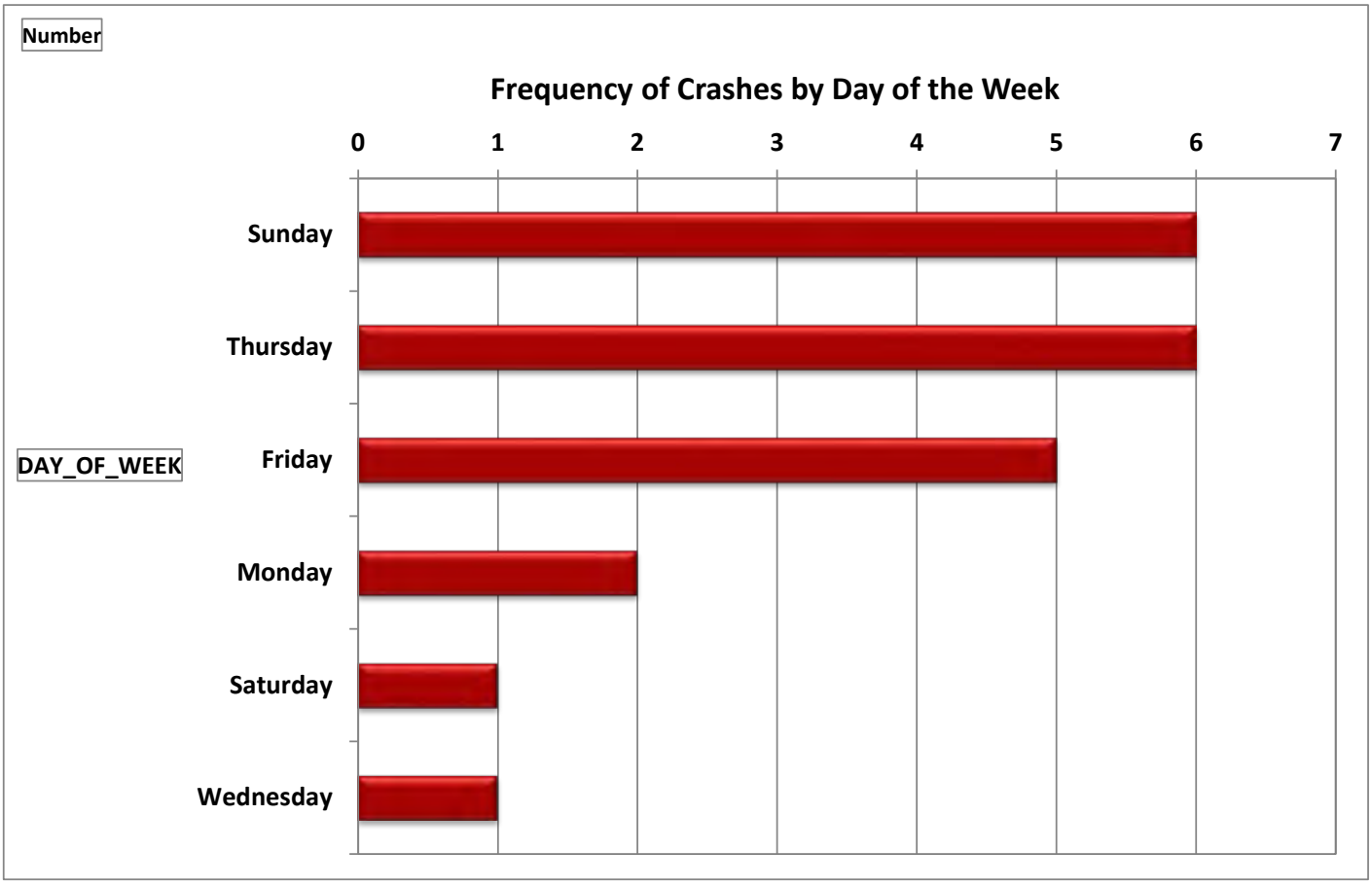
Type 'Heading' Here



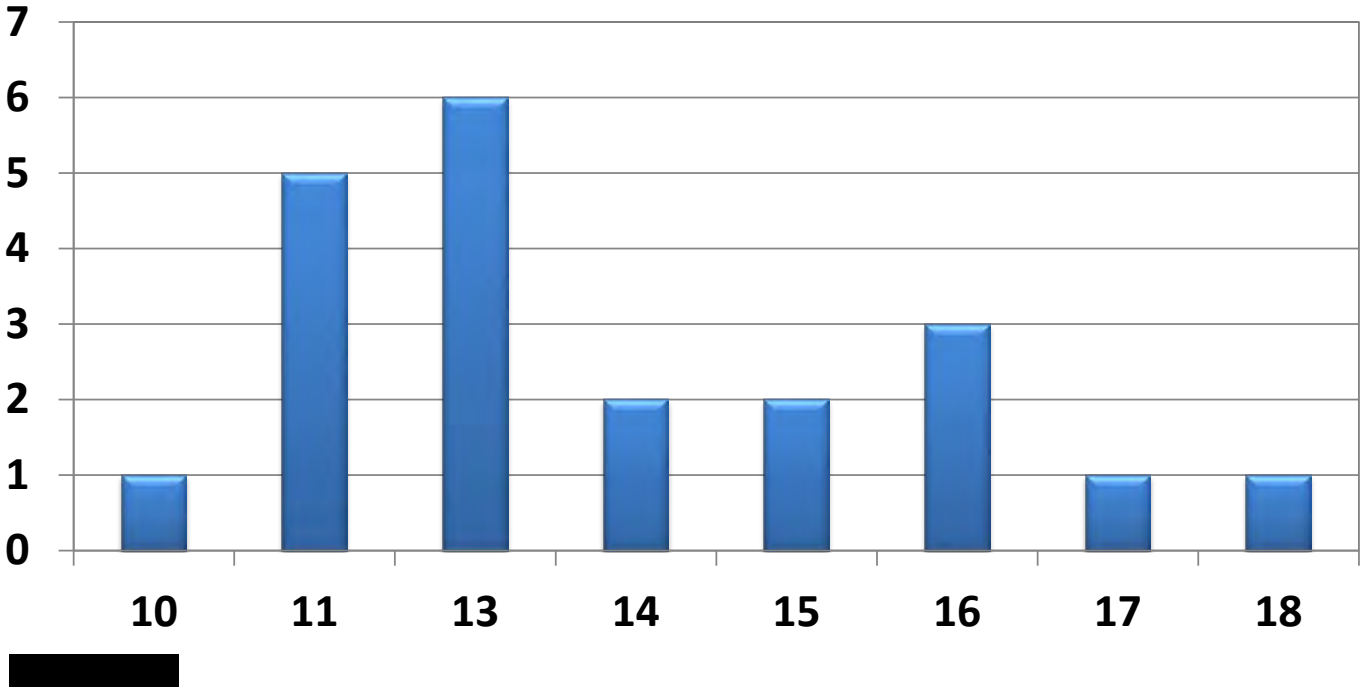


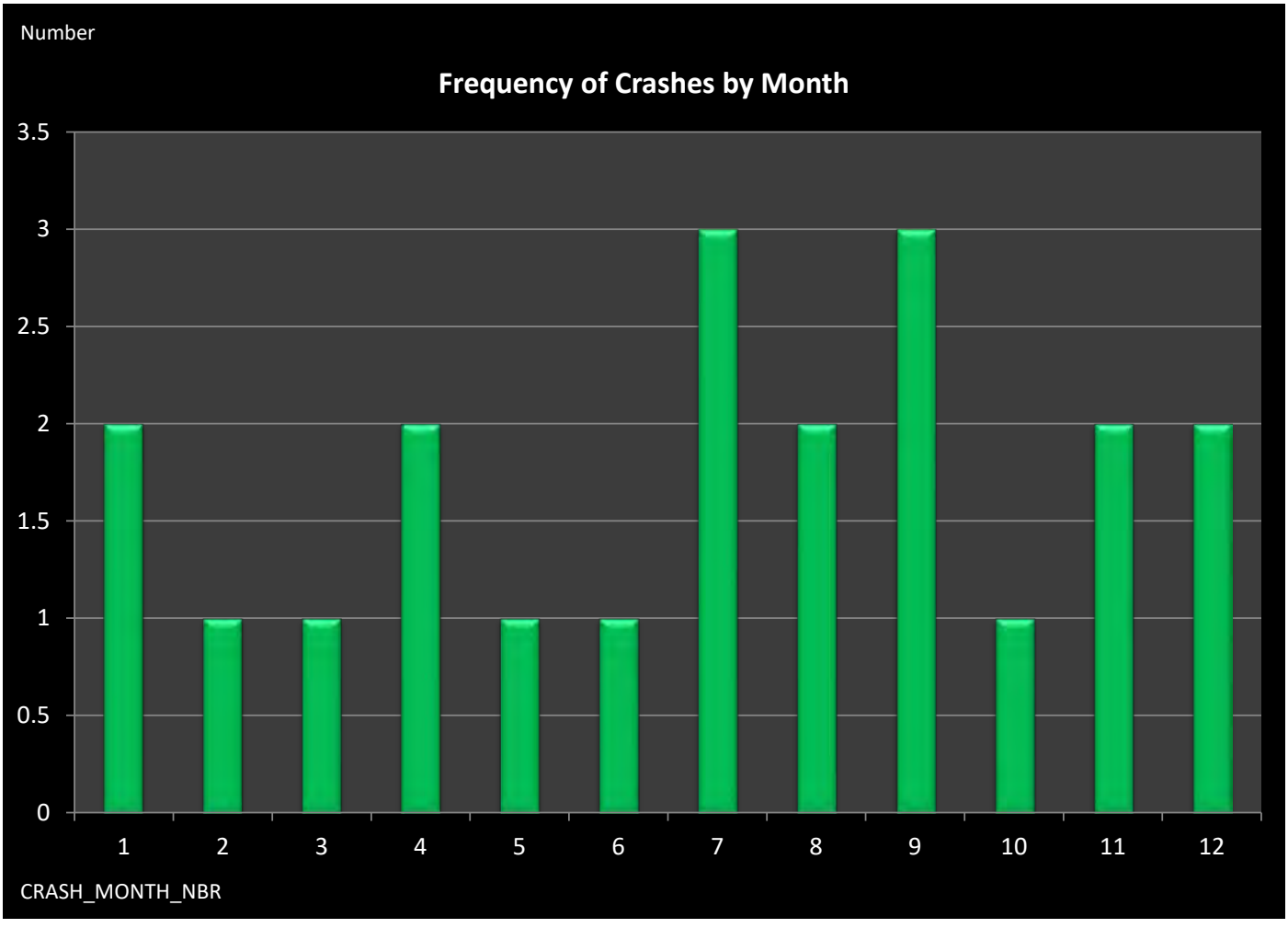
Type 'Heading' Here



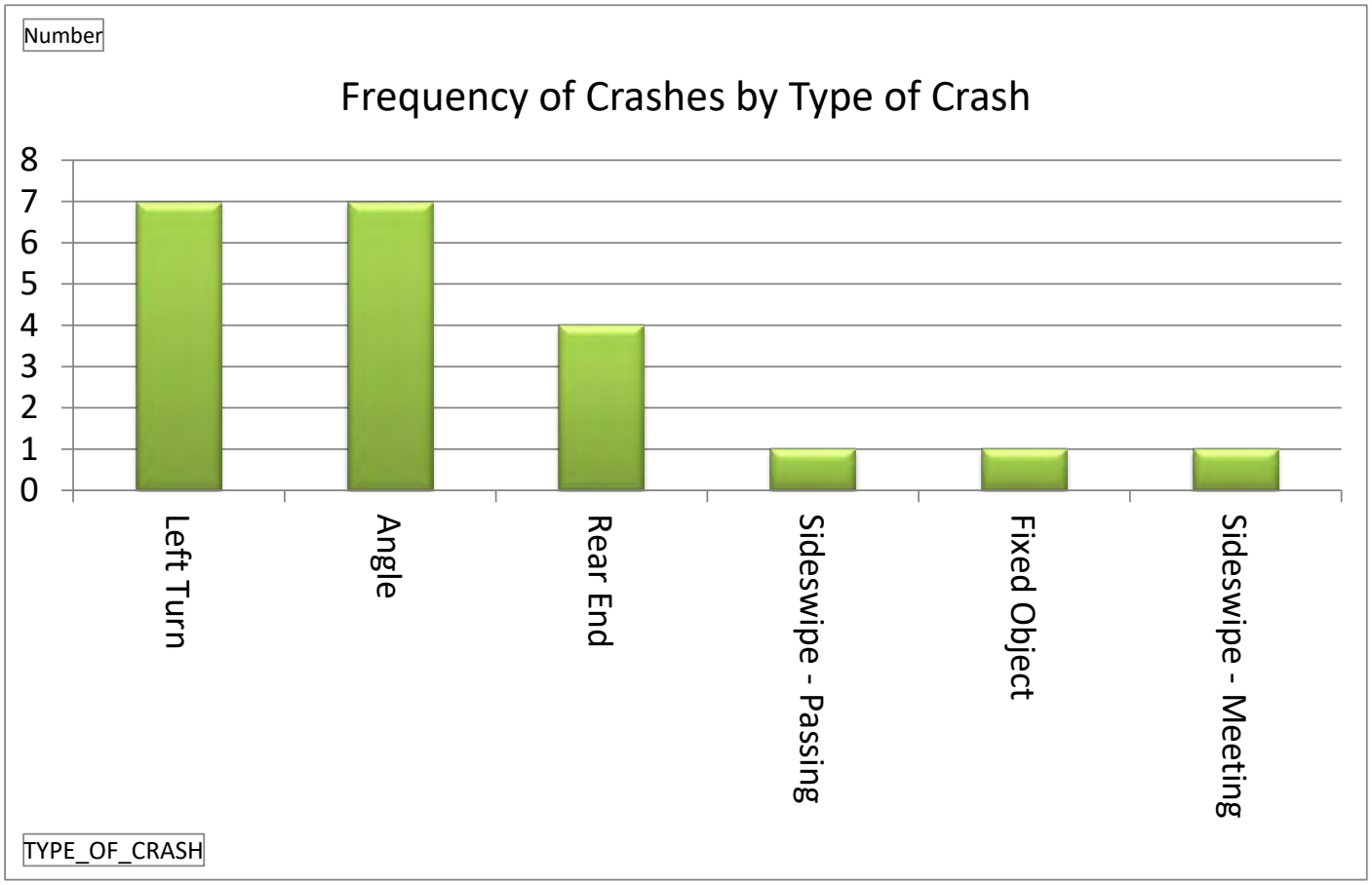


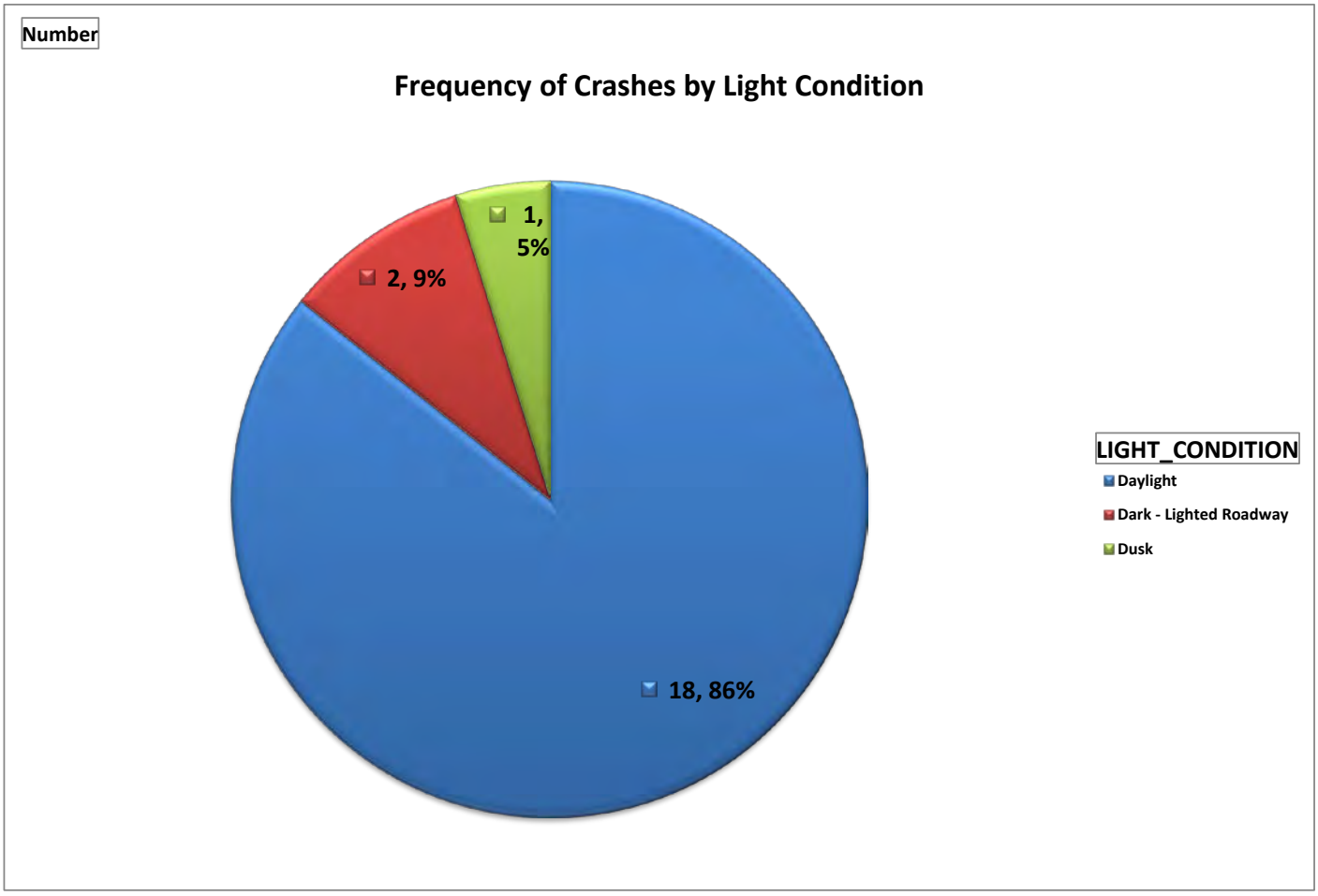
Type 'Heading' Here



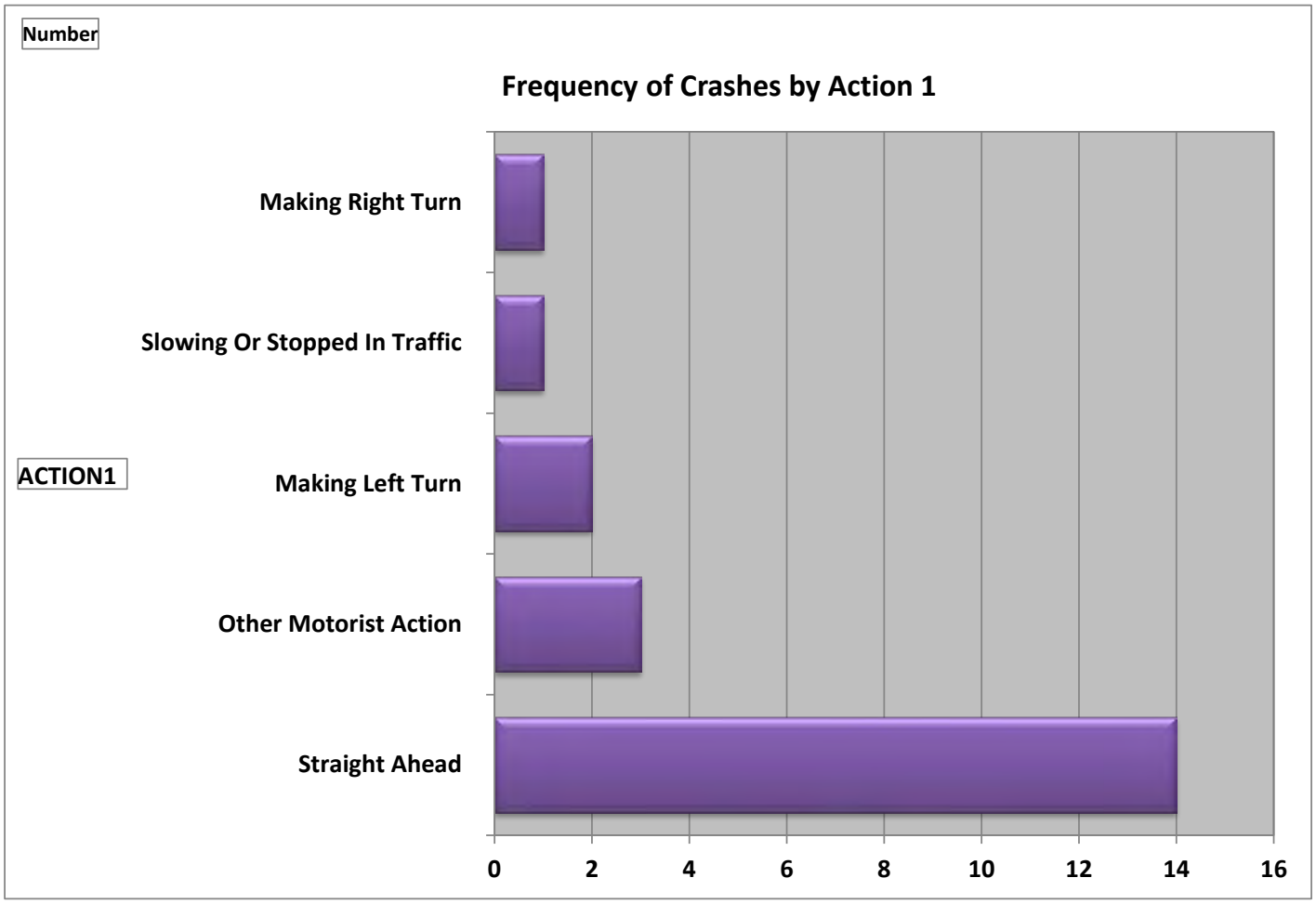


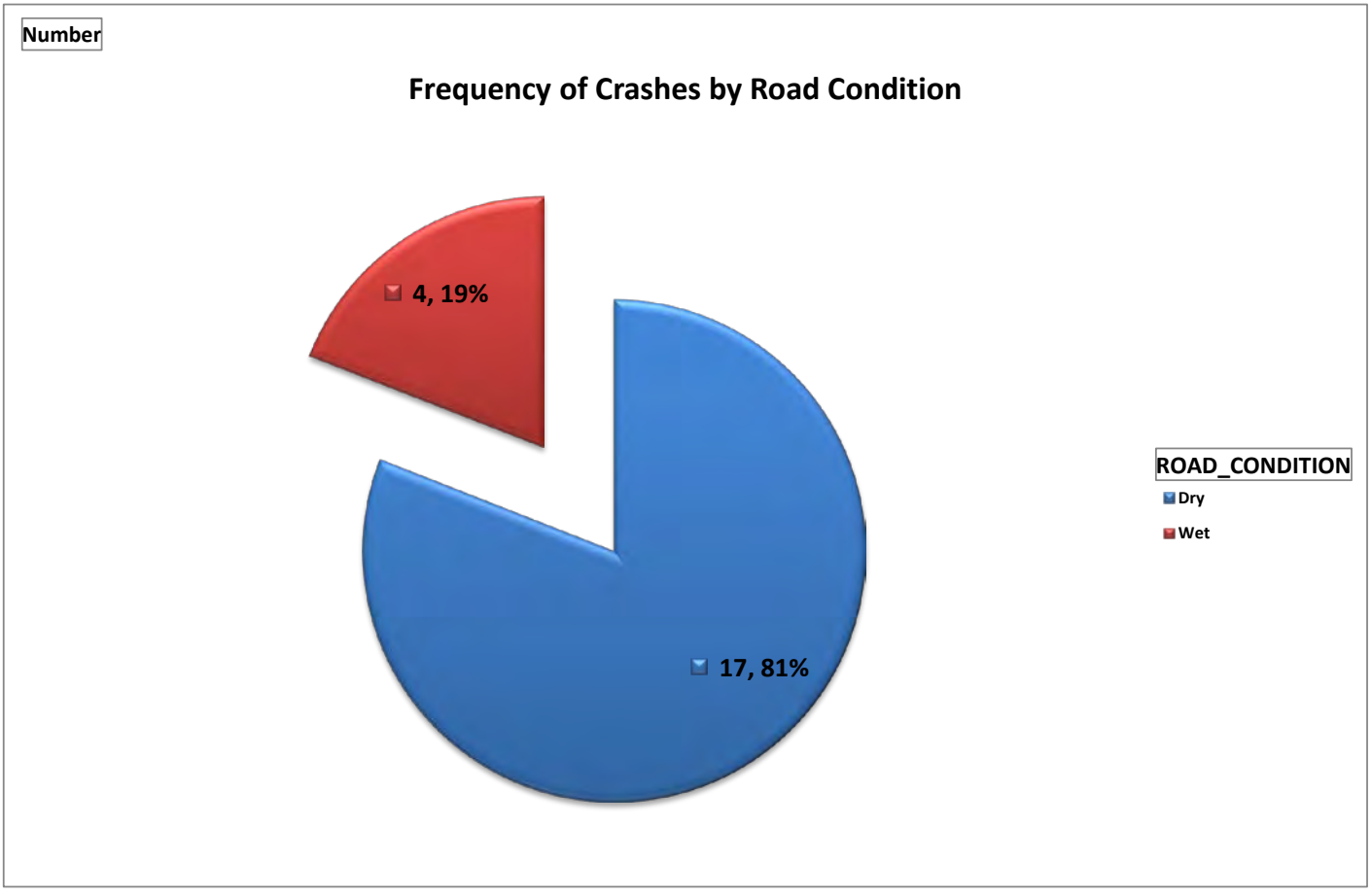
Type 'Heading' Here



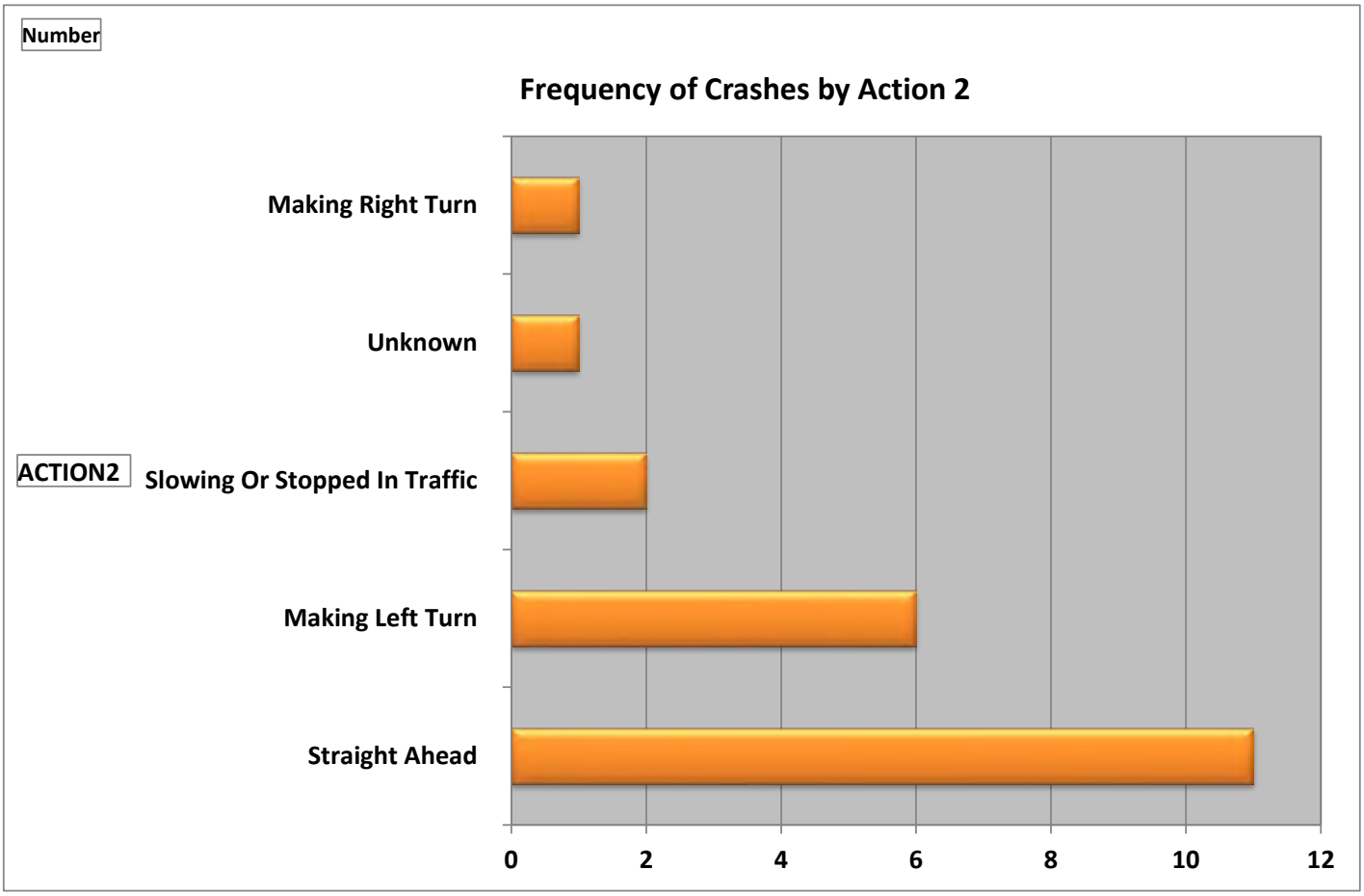


Type 'Heading' Here



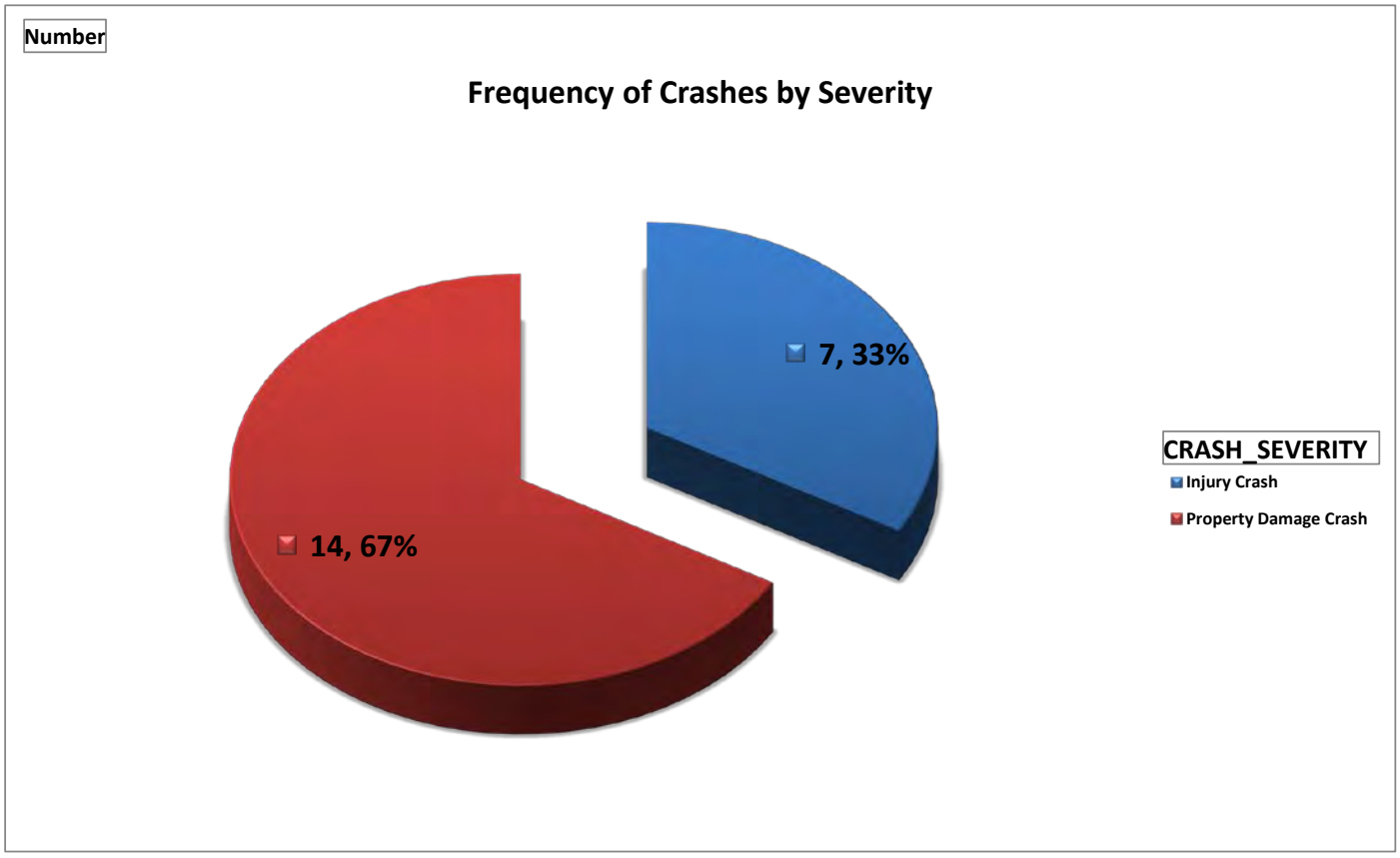


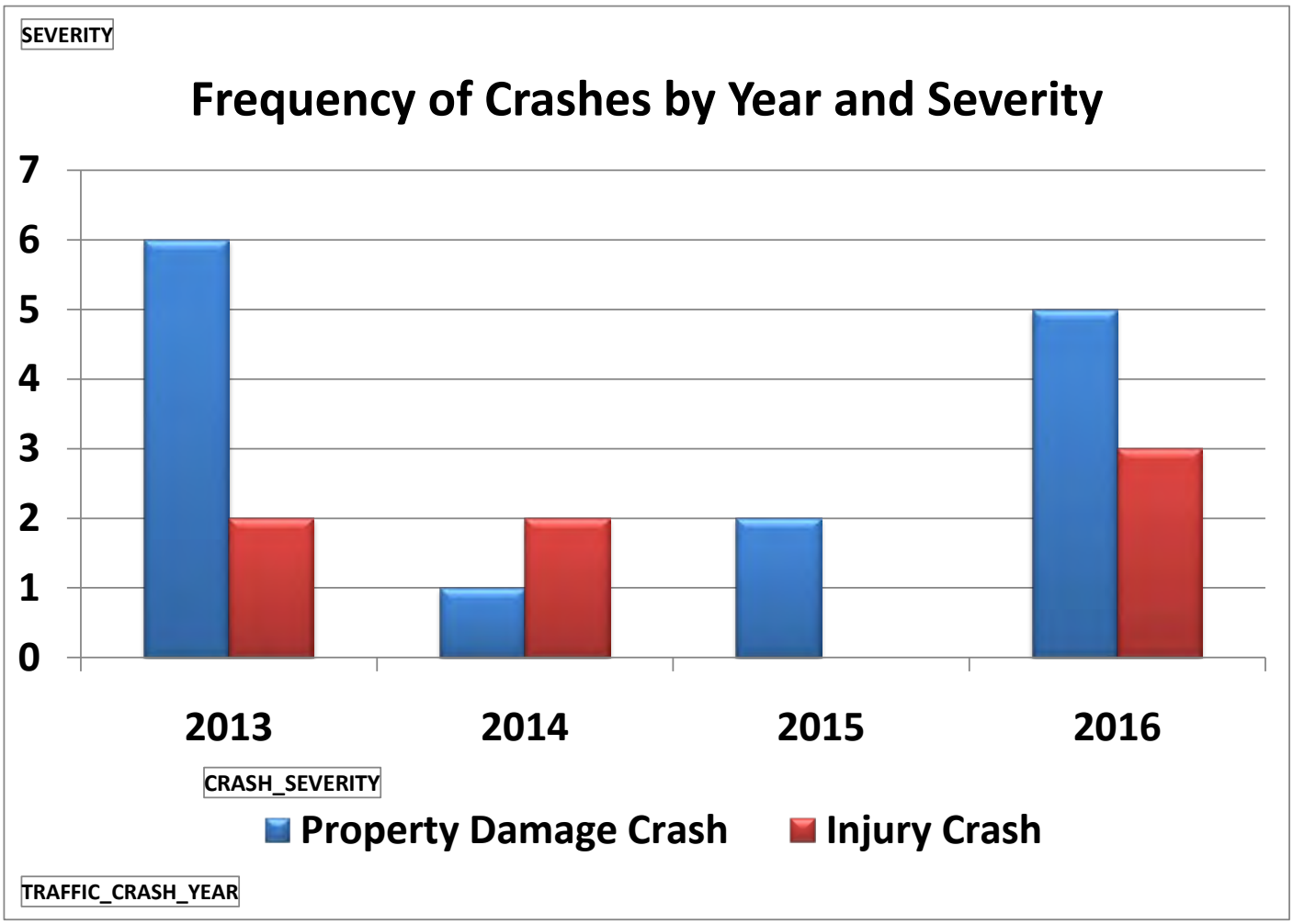
Type 'Heading' Here



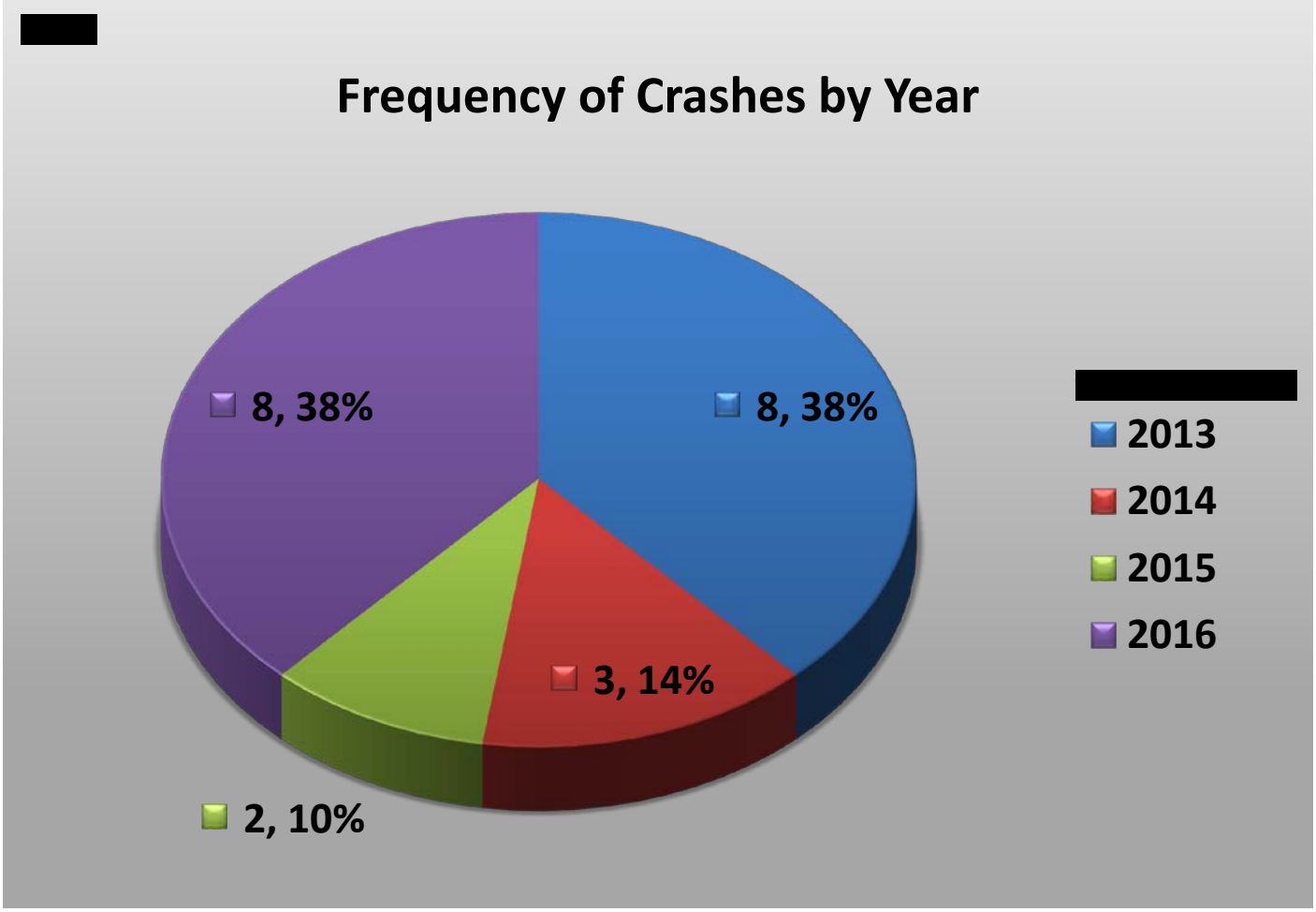
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201601348664	16	02	07	11	Sun	2	0	0	Sideswipe Opposite Direction	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	North	Merging	On Pavement (Roadway)	Passenger	South	Straight Ahead	PD
201601358233	16	03	25	14	Fri	2	0	0	Turning	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	Southwest	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201601407685	16	06	15	11	Wed	2	0	0	Turning	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	Carbondale	Normal	SUV	Northeast	Turning Left	Intersection	SUV	South	Straight Ahead	PD
201601422849	16	07	03	13	Sun	4	1	0	Angle	Cloudy/Overcast	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Alcohol Impaired	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	C-Injury
201601422442	16	07	07	14	Thu	2	1	0	Angle	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Unknown	North	Straight Ahead	B-Injury
201601473482	16	10	06	16	Thu	2	0	0	Sideswipe Same Direction	Clear	Daylight	Dry		Lane Use Marking	Carbondale	Other/Unknown	Passenger	North	Merging	On Pavement (Roadway)	SUV	North	Straight Ahead	PD
201601456445	16	09	04	15	Sun	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Pickup	West	Turning Left	Intersection	Pickup	North	Straight Ahead	PD
201601502752	16	12	01	16	Thu	2	1	0	Turning	Clear	Dusk	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	East	Turning Right	Intersection	SUV	East	Slow/Stop - Right Turn	C-Injury
201501428689	15	11	06	11	Fri	2	0	0	Angle	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	SUV	North	Straight Ahead	PD
201501495718	15	12	26	13	Sat	3	0	0	Rear End	Rain	Daylight	Wet	No Defects	No Controls	Carbondale	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201400098737	14	04	21	13	Mon	3	2	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	A-Injury
201400388265	14	09	14	13	Sun	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	PD
201400422479	14	11	23	10	Sun	1	1	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	Carbondale	Other	Passenger	South	Other	Other				B-Injury
201301038393	13	01	04	18	Fri	2	0	0	Turning	Fog/Smoke/Haze	Darkness, Lighted Road	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	West	Turning Left	PD
201301038394	13	01	04	17	Fri	2	1	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	North	Straight Ahead	A-Injury
201301148443	13	07	12	13	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	Carbondale	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop - Left Turn	C-Injury
201301124661	13	05	02	11	Thu	3	0	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	SUV	East	Straight Ahead	Intersection	Pickup	North	Straight Ahead	PD
201301197866	13	04	25	13	Thu	2	0	0	Rear End	Clear	Daylight	Dry		No Controls	Carbondale	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop - Left Turn	PD
201301319556	13	09	05	11	Thu	2	0	0	Angle	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Van/Mini-Van	East	Slow/Stop In Traffic	Intersection	Passenger	North	Straight Ahead	PD
201301311460	13	08	26	16	Mon	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	Carbondale	Normal	Passenger	South	Straight Ahead	Intersection	Pickup	Northwest	Turning Left	PD
201301294015	13	08	11	15	Sun	2	0	0	Turning	Clear	Daylight	Dry		Stop Sign/Flasher	Carbondale	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	Northwest	Turning Left	PD

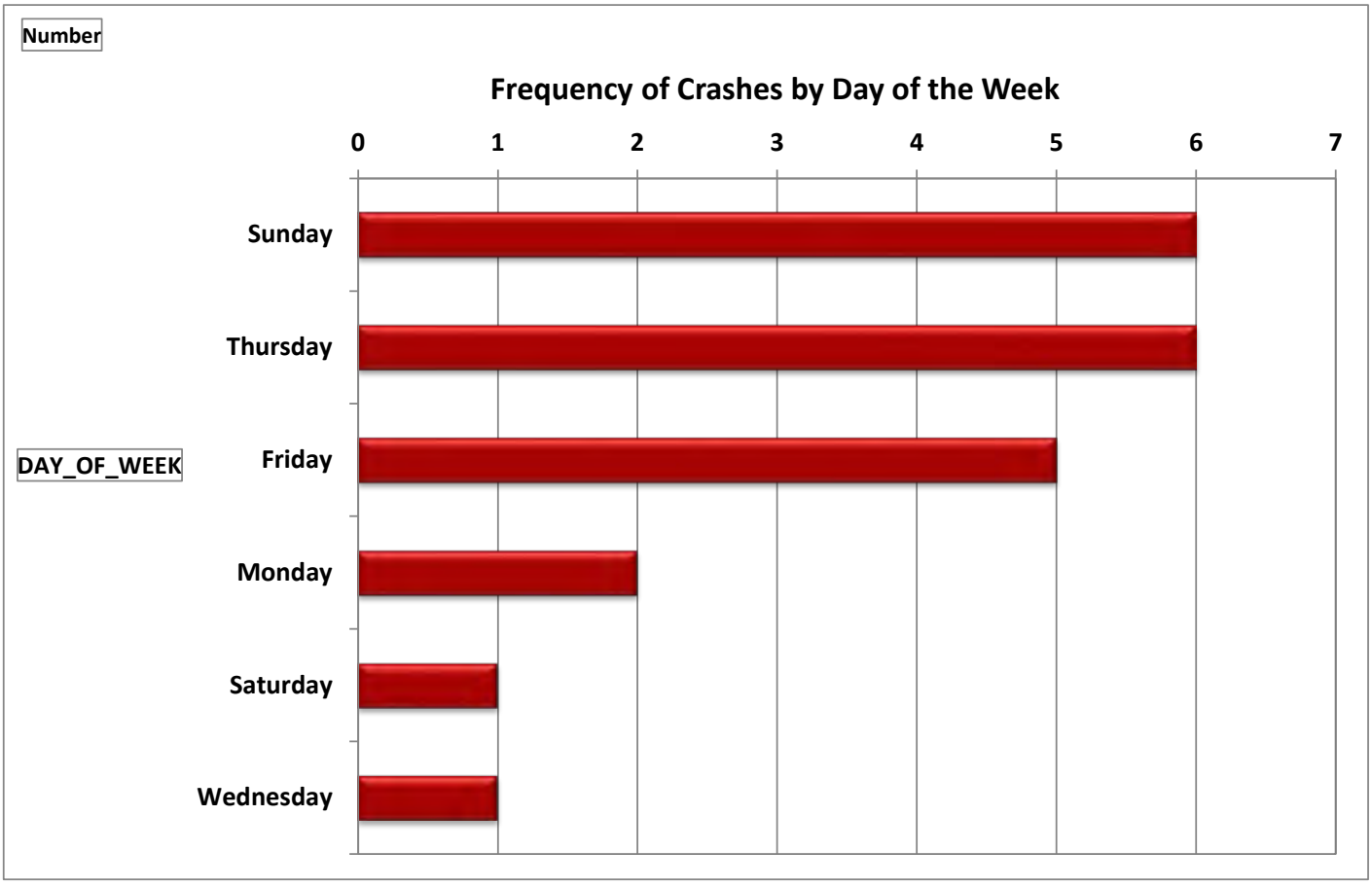
Type 'Heading' Here



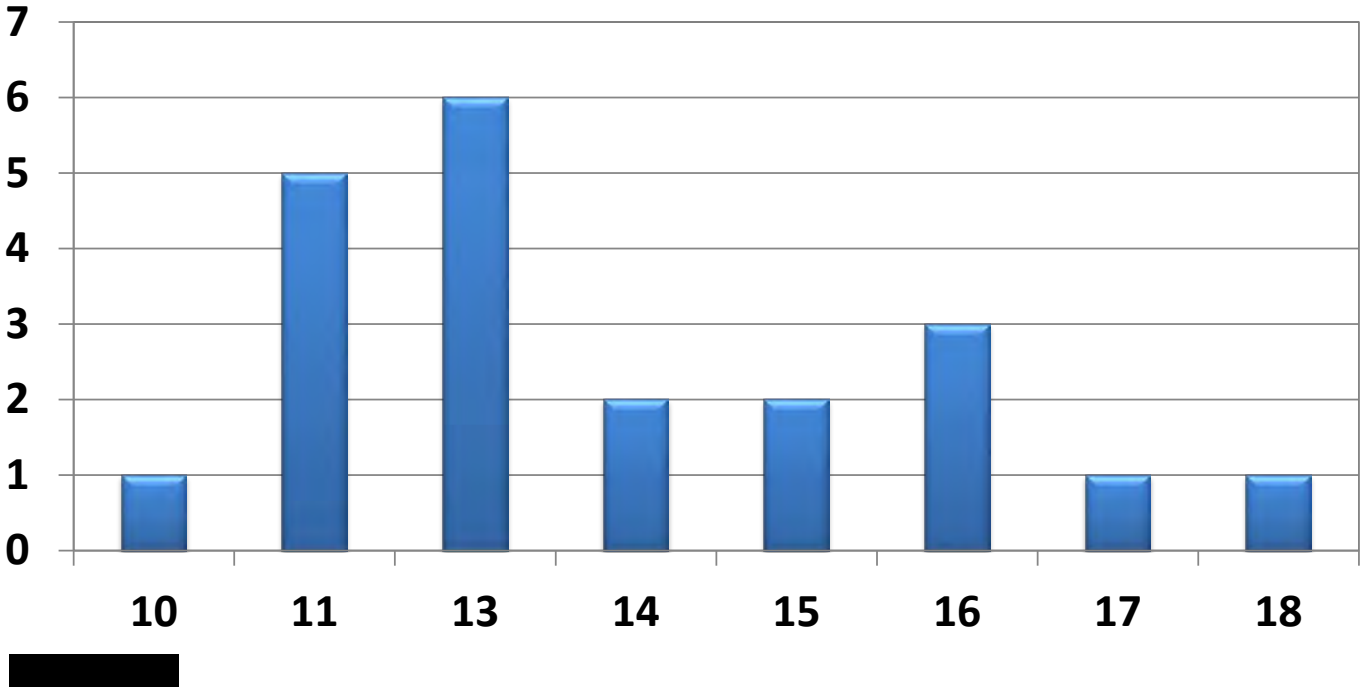


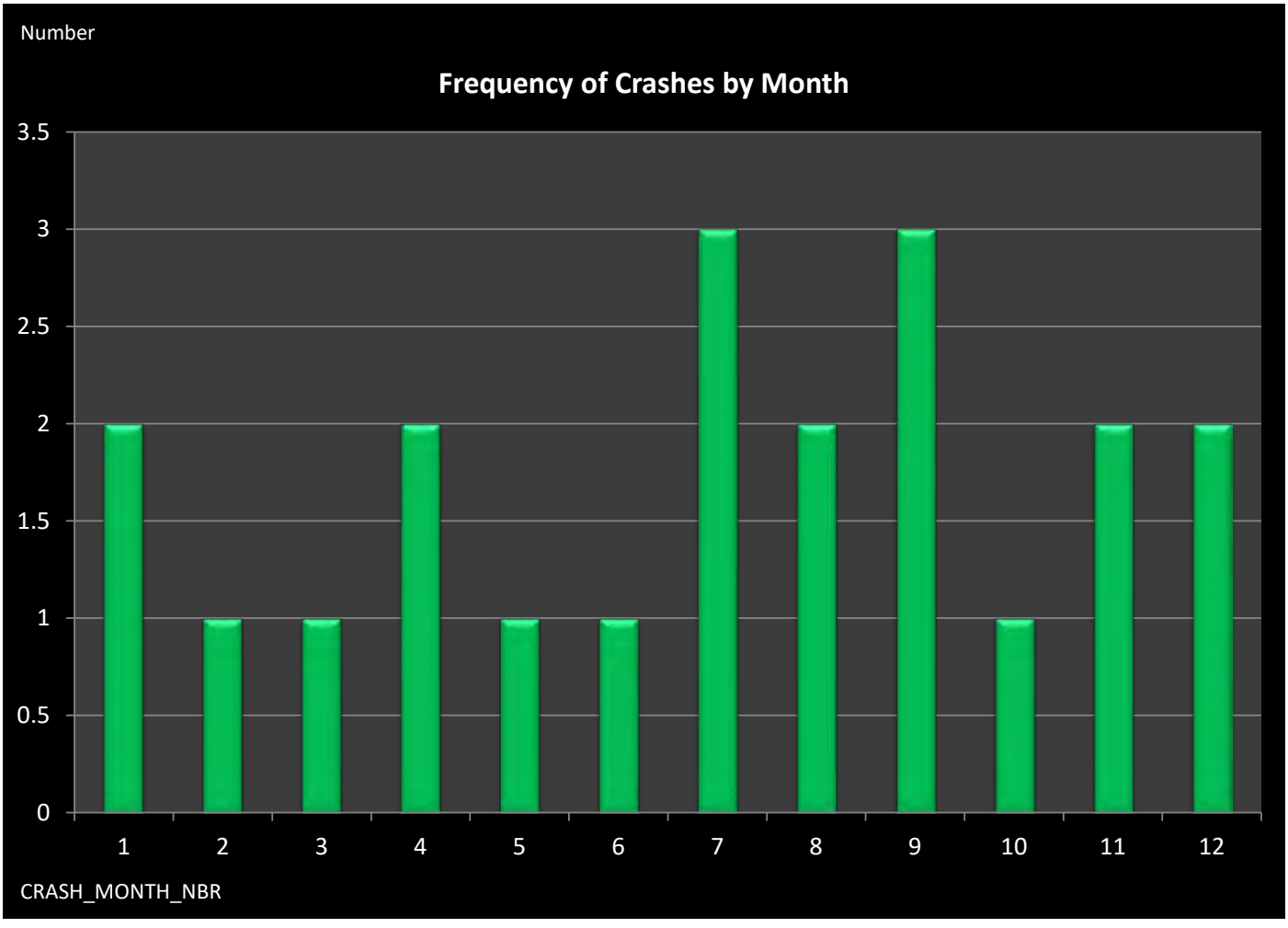
Type 'Heading' Here



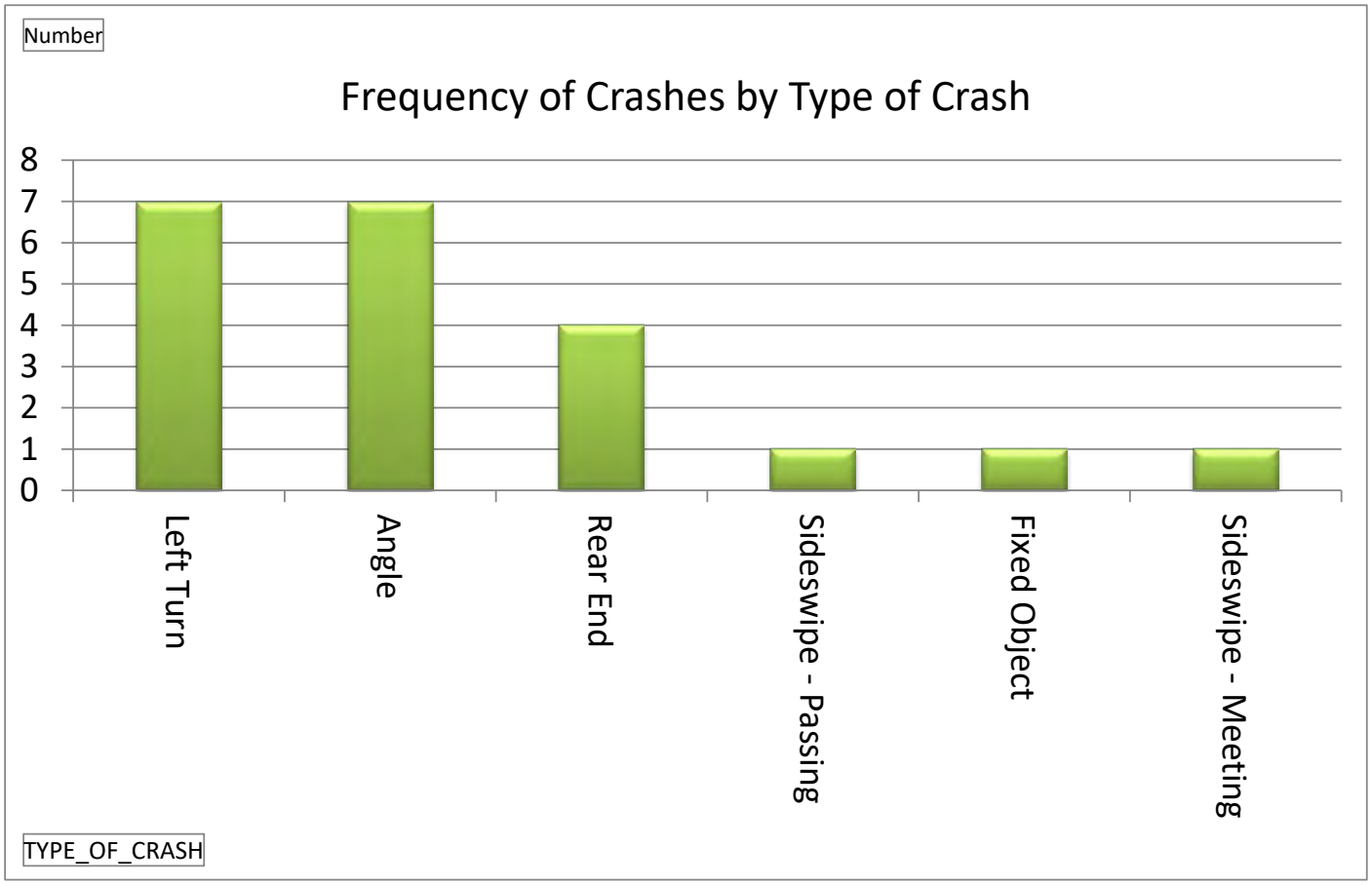


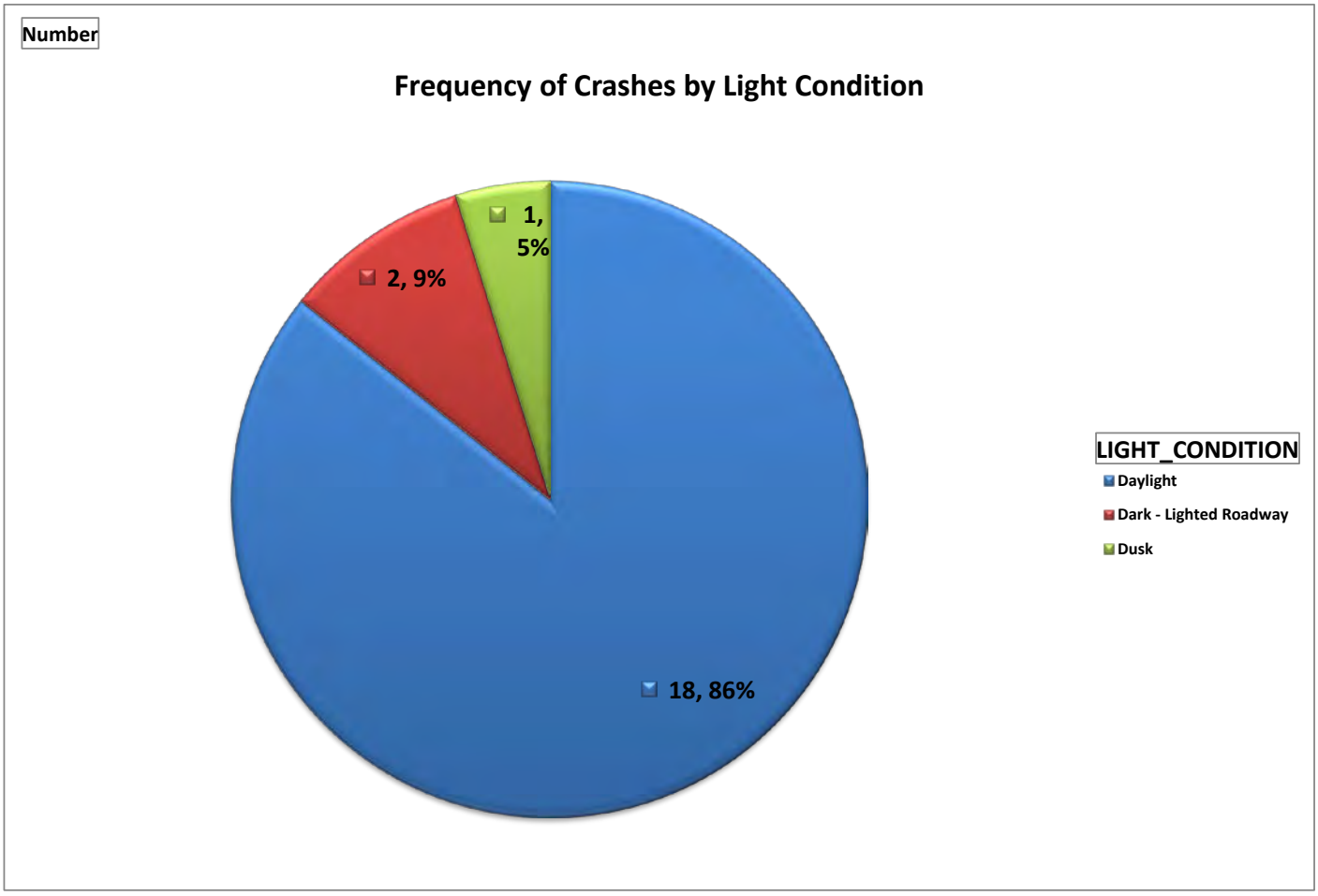
Type 'Heading' Here



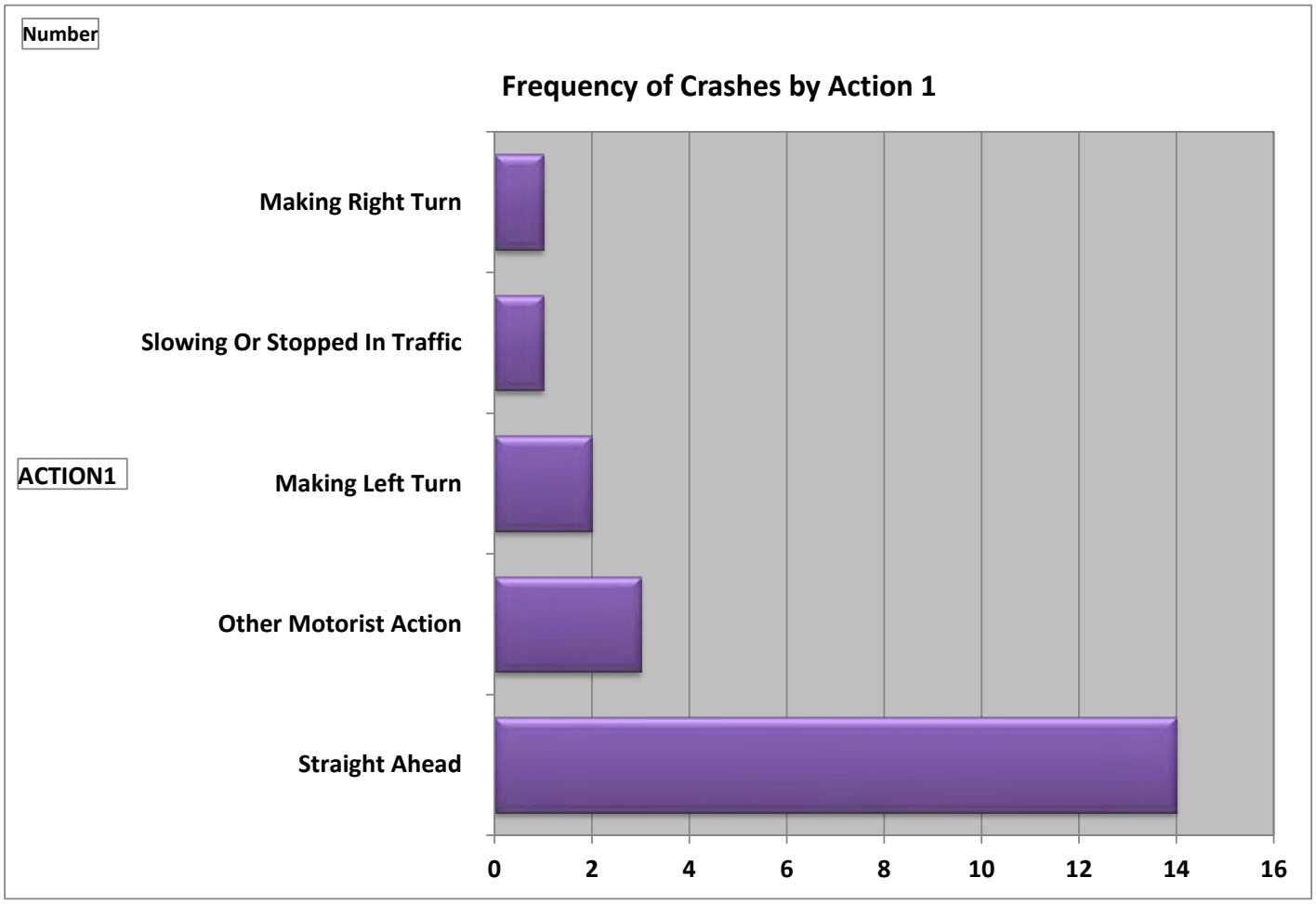


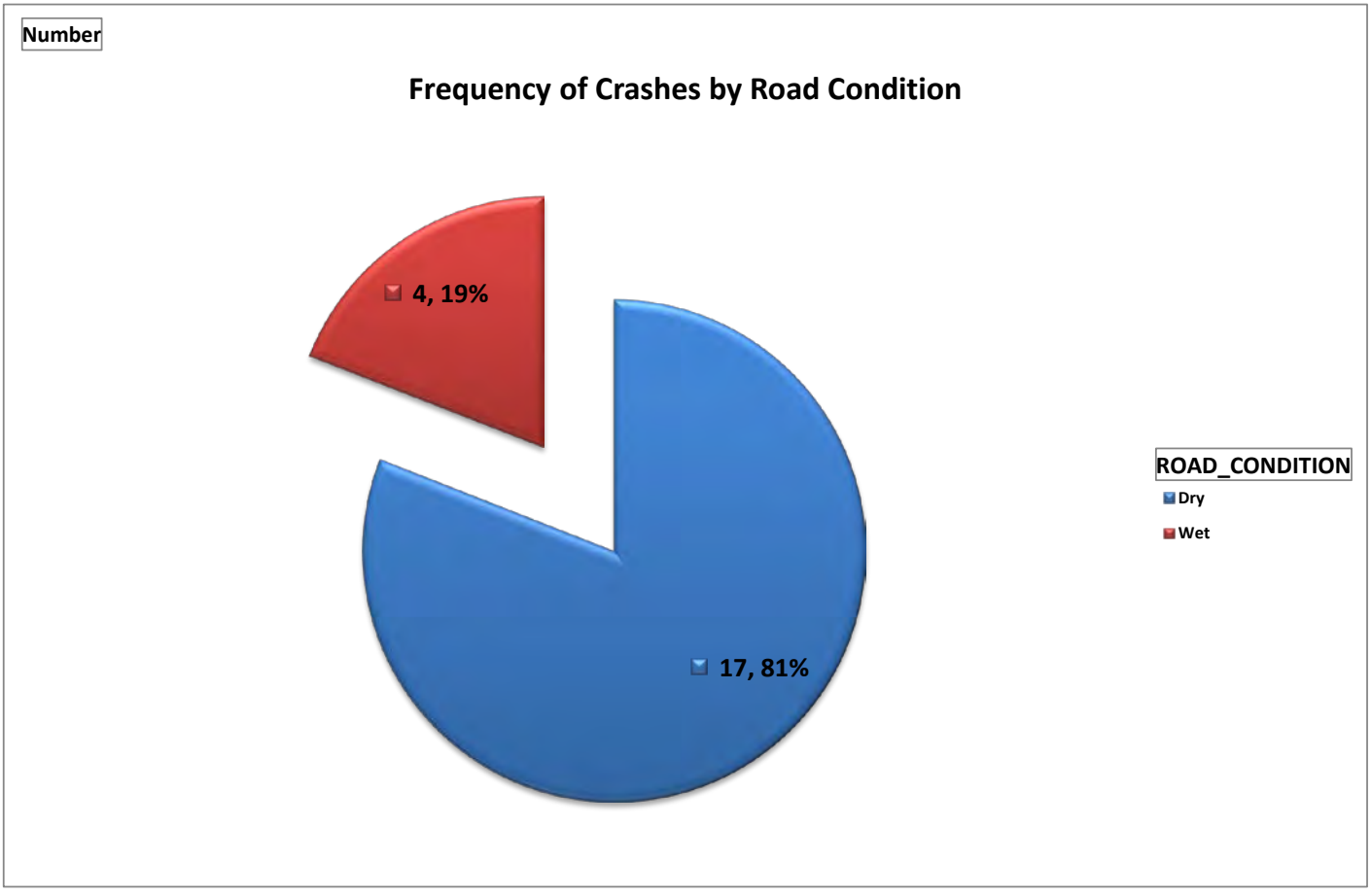
Type 'Heading' Here



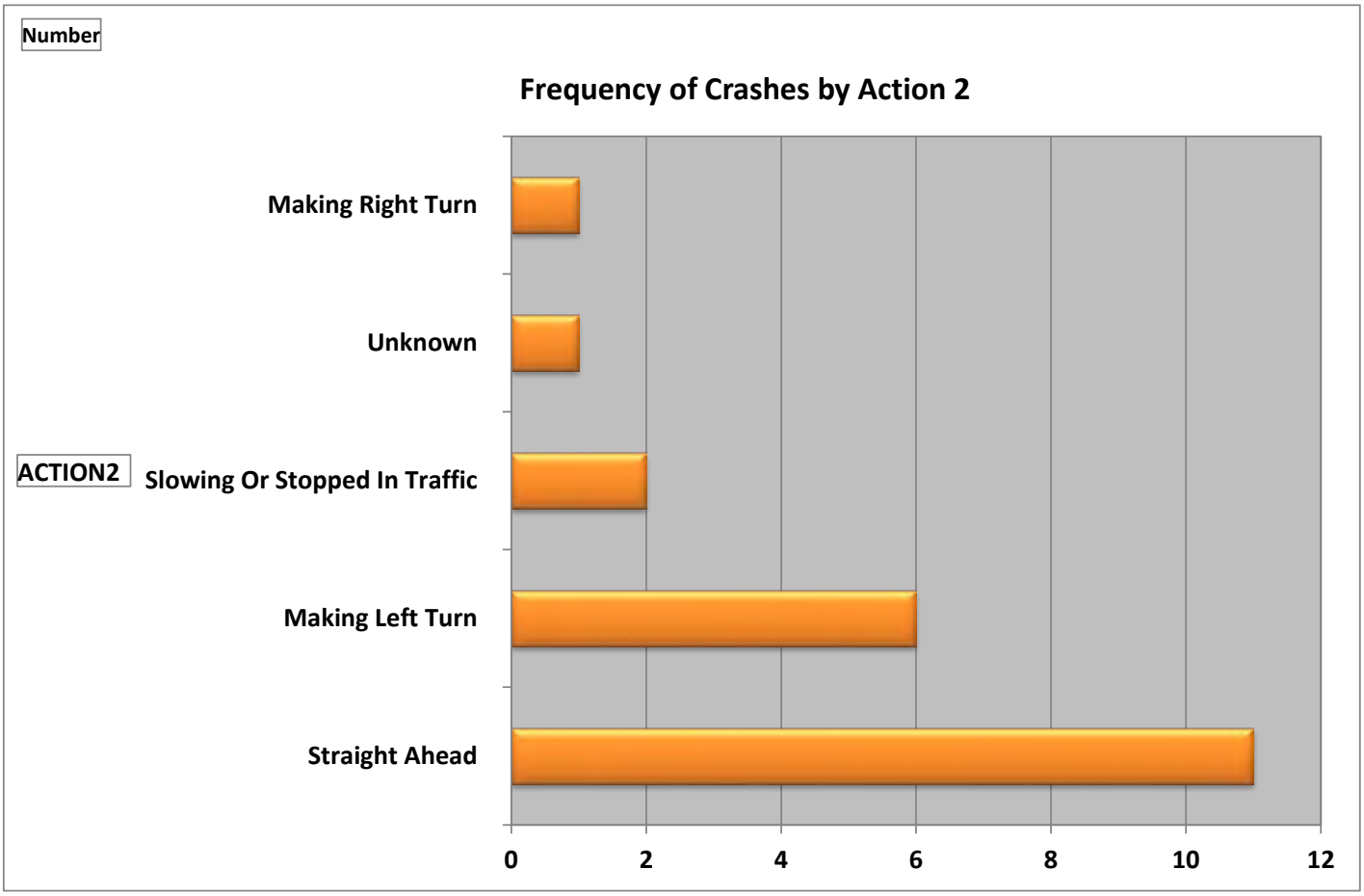


Type 'Heading' Here





Type 'Heading' Here



HCS7 All-Way Stop Control Report

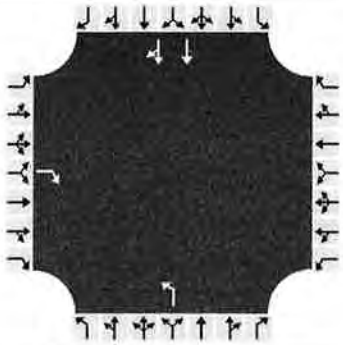
General Information

Analyst	Kevin Miller
Agency/Co.	CMT, Inc.
Date Performed	4/18/2019
Analysis Year	2015
Analysis Time Period (hrs)	0.25
Time Analyzed	Weekend Peak (noon)
Project Description	

Site Information

Intersection	Frontage at Giant City
Jurisdiction	
East/West Street	Frontage Road
North/South Street	Giant City
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume			325				445				340	45
% Thrus in Shared Lane												50
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	R						L			T	TR	
Flow Rate, v (veh/h)	353						484			185	234	
Percent Heavy Vehicles	2						2			2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20						3.20			3.20	3.20	
Initial Degree of Utilization, x	0.314						0.430			0.164	0.208	
Final Departure Headway, hd (s)	5.67						5.97			6.37	6.22	
Final Degree of Utilization, x	0.556						0.801			0.327	0.404	
Move-Up Time, m (s)	2.0						2.0			2.3	2.3	
Service Time, ts (s)	3.67						3.97			4.07	3.92	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	353						484			185	234	
Capacity	635						604			565	579	
95% Queue Length, Q_{95} (veh)	3.4						7.9			1.4	1.9	
Control Delay (s/veh)	15.5						28.7			12.1	13.1	
Level of Service, LOS	C						D			B	B	
Approach Delay (s/veh)	15.5						28.7			12.7		
Approach LOS	C						D			B		
Intersection Delay, s/veh | LOS	19.6						C					

SIMPO Safety Study

APPENDIX A6: E. GRAND AVENUE AND S. WALL ST

CMT

E. Grand Avenue and Wall Street Intersection

Intersection Priority #6

June 2019

INTRODUCTION

The E. Grand Avenue and Wall Street intersection, located within the City of Carbondale, was identified as the 6th ranked intersection within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The 4-leg intersection is currently signalized.

EXISTING CONDITIONS

The subject intersection is a 4-leg intersection with E. Grand Avenue an east/west route and Wall Street a north/south route. The adjacent land use is comprised of a mix of residential (mostly student housing), retail, and institutional property. The Southern Illinois University (SIU) Carbondale campus is directly adjacent to the west of the intersection with the Student Recreation Center accessing E. Grand Avenue from the north. The East Campus student parking lot is on the SW corner of the intersection. **Figure 1** is an aerial view of the study area intersection.

FIGURE 1: STUDY AREA

The existing conditions of the intersections are summarized below:

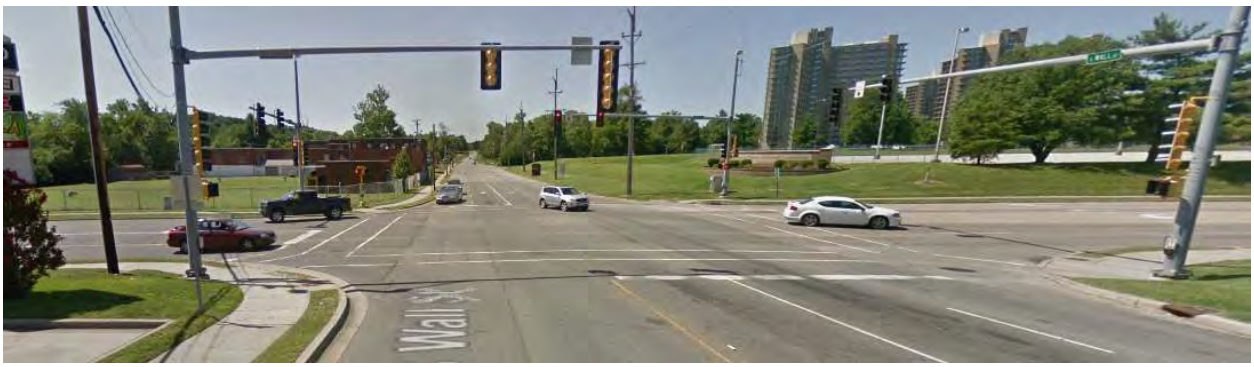
- E. Grand Avenue is a 3-lane roadway to the east having a center two way left turn lane (TWLTL), and a 4-lane roadway (2 directional lanes) to the west. The eastbound approach widens at the intersection to form 1 left turn lane, 1 through lane, and 1 right turn lane. The westbound approach widens at the intersection to form 1 left turn lane, 1 through lane, and 1 shared through/right turn lane. The posted speed on E. Grand Avenue is 30 MPH. **Photos 1 and 2** show the approaches to the intersection.
- Wall Street is a 4-lane roadway with a posted speed of 30 MPH. An exclusive left turn lane is added on both approaches to the intersection. **Photos 3 and 4** show the approaches to the intersection.
- The intersection is signalized with overhead signal heads mounted on signal supports. Supplemental signal heads mounted are on the signal supports (see Photos).
- Overhead signal heads include backplates, however no reflective borders have been used.
- All approaches to the intersection have pedestrian signals, which are activated by pedestrian pushbuttons.
- All approaches include protected/permissive left-turn phases.
- All four corners of the intersection include combination signal supports with LED street lighting.
- The average daily traffic (AADT) is 12,200 vehicles per day on E. Grand Avenue. The AADT on Wall Street is 10,200 vehicles per day.
- The profile of Wall Street is on a grade with the crest of the vertical curve 350' to the north of the intersection.

PHOTO 1: EB GRAND AVENUE APPROACH

PHOTO 2: WB GRAND AVENUE APPROACH

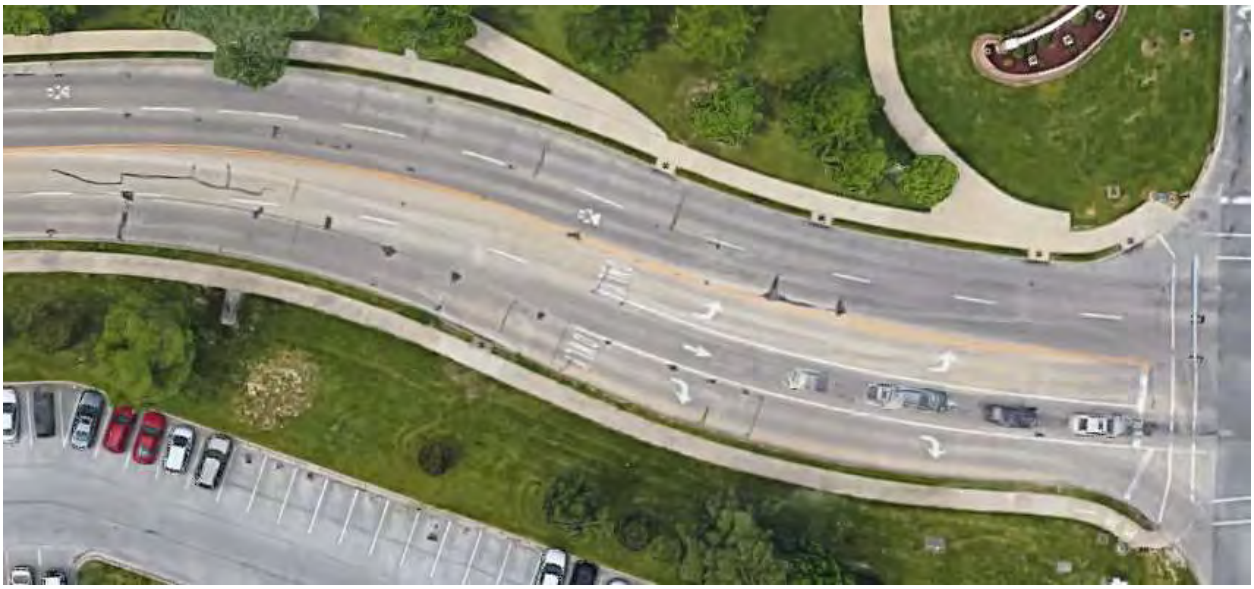
PHOTO 3: NB WALL STREET APPROACH

PHOTO 4: SB WALL STREET APPROACH



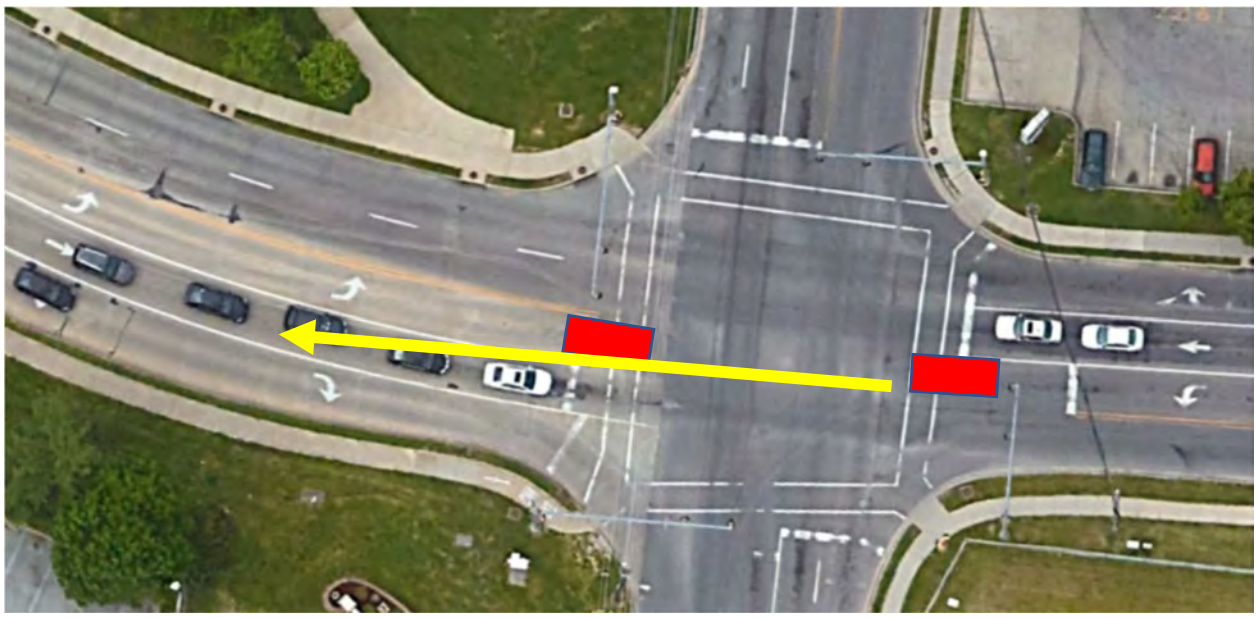
The alignment of the west leg is comprised of an S-curve (see **Figure 2**). The existing EB lane configuration at the intersection drops the inside through lane directly into the EBLT lane.

FIGURE 2: HORIZONTAL CURVES AND LANE CONFIGURATION (GRAND AVE)



The sight distance on the westbound approach is restricted by the alignment of the opposing traffic (see **Figure 3**). The available intersection sight distance (ISD) of approaching vehicles is reduced to 160 feet. The ISD for a posted speed of 30 MPH is 290 feet for a single unit delivery truck.

FIGURE 3: WB SIGHT DISTANCE (GRAND AVE)



SAFETY ANALYSIS

A total of 45 crashes occurred at the intersection over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 4**. The crash shows a significant spike in crashes in 2016. No factors were identified that contributed to this unusual crash frequency for one year.

The frequency of crashes by type on **Figure 5** shows a significant percentage of crashes (44% or 20 crashes) are angle or left-turn crashes. These are crash types typically considered to be correctable with signal control. Also note that 11% (5) of the crashes involved either a pedestrian (2) or a bicycle (3). An additional 15 crashes represented rear-end or parked vehicle crashes.

Figure 6 shows the distribution of crashes within the study area by severity. The fatal and injury crashes at the subject intersection represent 27 percent of the total crashes. **The injury crashes include 0 fatalities, 2 Type A crashes and 3 Type B crashes.**

Figure 6 shows the crashes by type and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are Northbound crashes. Eastbound vehicles were over represented in the number of rear-end crashes (8), while northbound vehicles had the highest percentage of left-turn and angle crashes (11). Pedestrian and bicycle crashes were distributed across all approaches to the intersection with no clear pattern. The southbound approach had significantly fewer crashes than the remaining three legs of the intersection.

FIGURE 4: FREQUENCY OF CRASHES BY YEAR

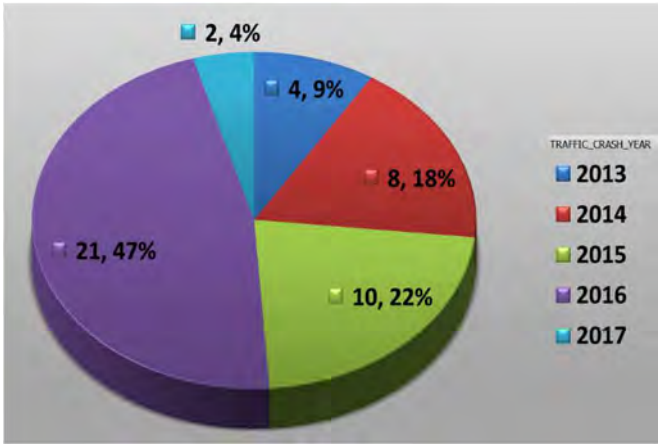


FIGURE 5: FREQUENCY OF CRASHES BY TYPE

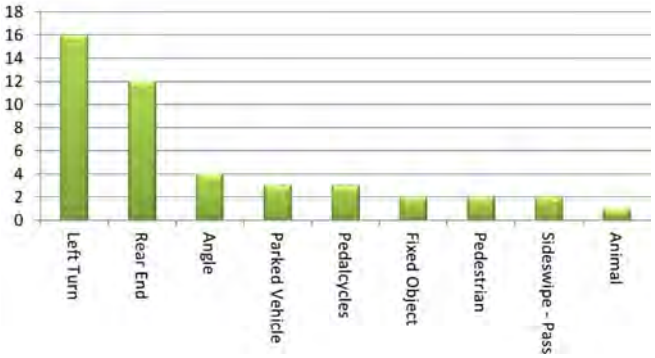


FIGURE 6: FREQUENCY OF CRASHES BY SEVERITY

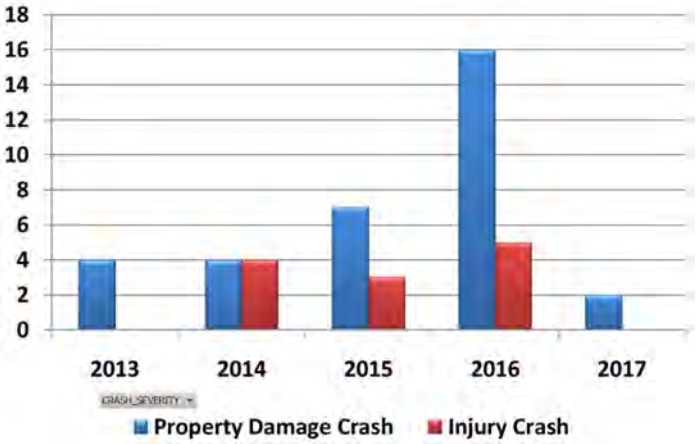
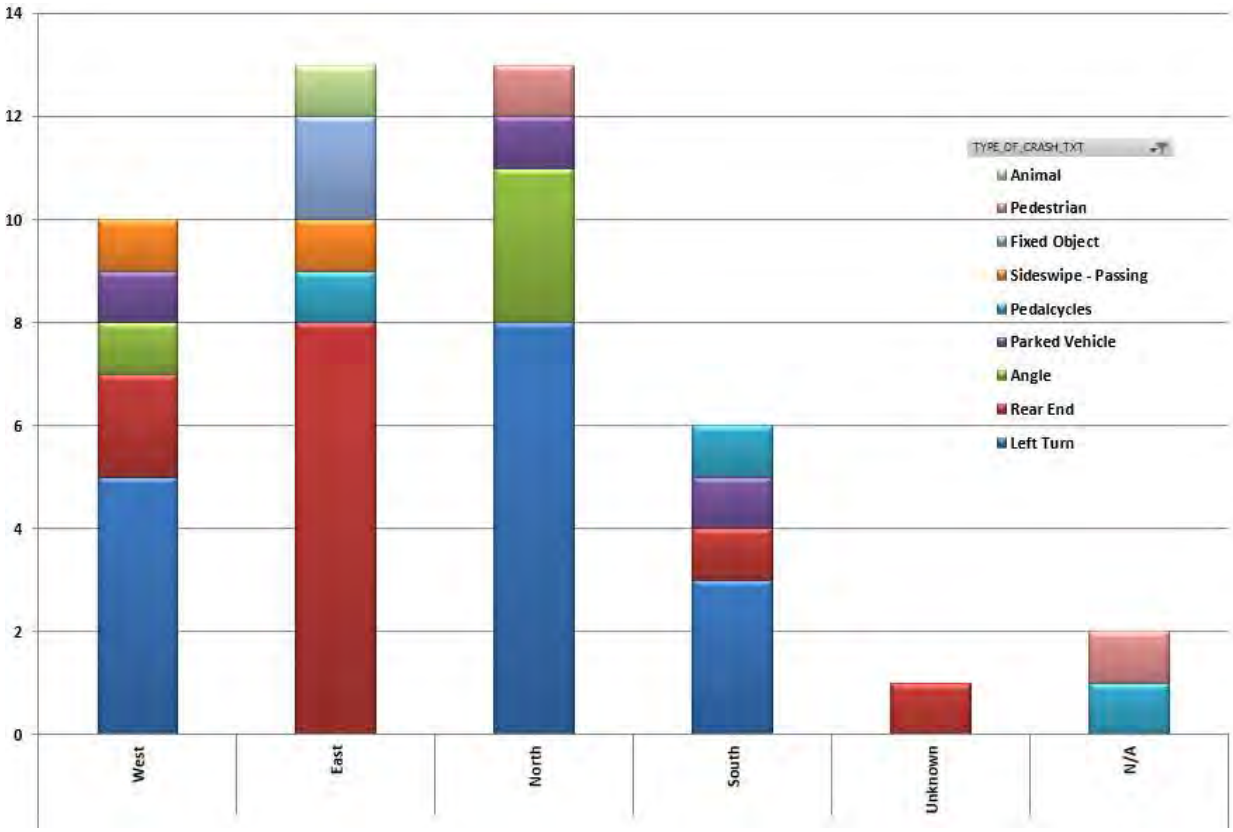
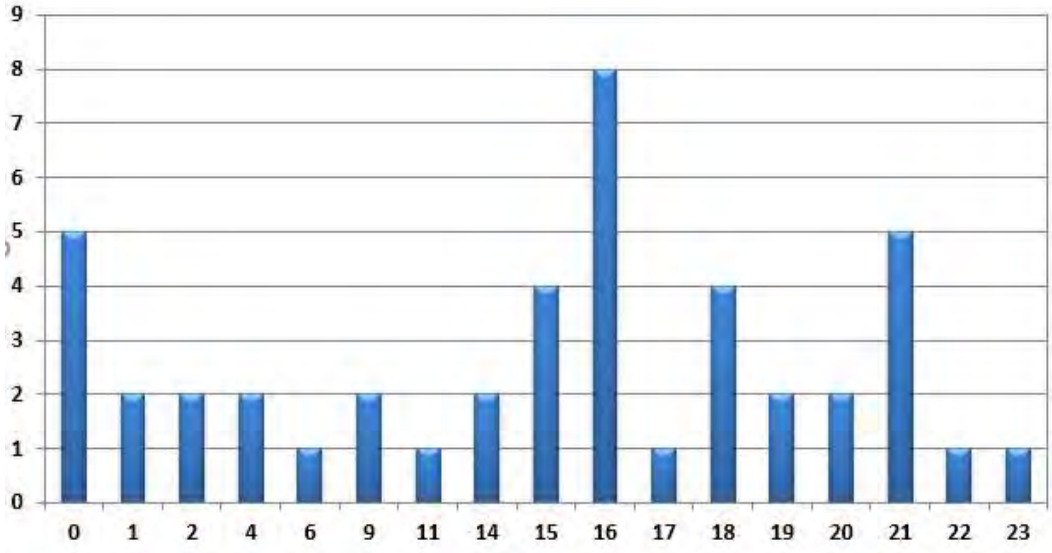


FIGURE 6: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE



The crash frequency by time of day suggests that congestion is a contributing factor to the safety performance of the study area, especially during the afternoon and evening peaks with a spike near midnight. The pattern is consistent with travel patterns in and around a university campus. **Figure 7** shows the distribution by time of day.

FIGURE 7: FREQUENCY OF CRASHES BY HOUR



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – WB PROTECTED ONLY LT PHASE

The westbound approach experienced 5 left-turn crashes. These crashes are attributed to the lack of intersection sight distance. A westbound left turning vehicle has 160 feet of available sight distance if a vehicle occupies the opposing left turn lane. To mitigate the lack of available sight distance, protected-only left-turn phasing for the westbound approach is recommended.

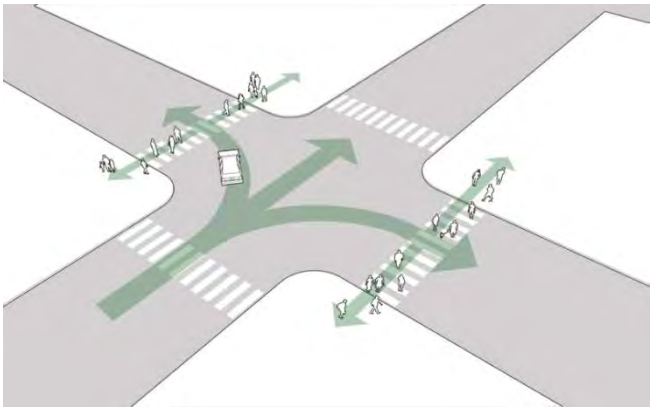
Some of the eastbound rear end crashes (8 total) may also be attributed to the reduced intersection sight distance of westbound left turning vehicles. Westbound vehicles may turn across eastbound through traffic causing eastbound vehicles to brake to avoid a collision. Following vehicles may not expect an eastbound vehicle to brake when the signal is green.

Capacity analysis should be completed to verify that the intersection performance is not degraded to the point where additional safety patters arise. Research has shown up to a 22% decrease in crashes with protected-only phasing.

SHORT TERM COUNTERMEASURE – ADDRESS PEDESTRIAN/BICYCLE CRASHES

A total of five pedestrian and bicycle crashes occurred, equaling one crash per year. Because of the proximity to the university campus, active transportation modes should be strongly considered at the study intersection. Although the direct causal factors in the ped/bike crashes are not known at this time, a leading pedestrian interval should be considered. This signal timing modification would allow pedestrians a 3 second walk interval prior to the beginning of the associated vehicular green phase. This allows the pedestrian (or bicyclist) to enter the intersection and be more visible prior to a green ball being displayed to conflicting permissive left and right-turning vehicles (see **Figure 8**). Studies have shown a 13% reduction in the likelihood of pedestrian/bicycle crashes when LPI's are implemented.

FIGURE 8: PEDESTRIAN/ VEHICLE CONFLICTS



SHORT TERM COUNTERMEASURE – NB PROTECTED ONLY LT PHASE

The northbound approach experienced 8 left turn crashes and 3 angle crashes.

Pavement widening on the southbound approach to the signalized intersection causes through vehicles to be occluded by vehicles in the SB left turn lane. **Figure 9** shows the position of vehicles in opposing left turn lanes on Wall Street. The available intersection sight distance (ISD) of approaching vehicles is reduced to 200 feet. The ISD for a posted speed of 30 MPH is 290 feet for a single unit delivery truck. **Wider vehicles or vehicles not centered in the opposing left turn lane can further reduce the available sight distance of approaching traffic.**

To mitigate the reduce intersection sight distance, a protected-only left-turn phase for the northbound approach is recommended. Capacity analysis should be completed to verify that the intersection performance is not degraded to the point where additional safety patters arise. Research has shown up to a 22% decrease in crashes with protected-only phasing.

Protected only phasing will also mitigate the NB left turn crashes involving westbound traffic (5 crashes). Traffic in the shared through-right lane on the westbound approach may not see northbound left turning traffic legally in the intersection.

Other countermeasures to implement that address the left turn and angle crashes at the intersection include the following:

- The approach speed on southbound Wall Street also may be higher than the posted speed of 30 MPH due to the profile. Clearance intervals should be revised if the 85th percentile speed on SB Wall Street exceeds 30 MPH.
- Setback stop lines to increase the start time of traffic on conflicting movements. The existing signal head to stop line distances (90 feet) will not be adversely affected by revising the stop line locations. Crosswalk widths are increased and could be upgrade to the continental style of crosswalk lines.

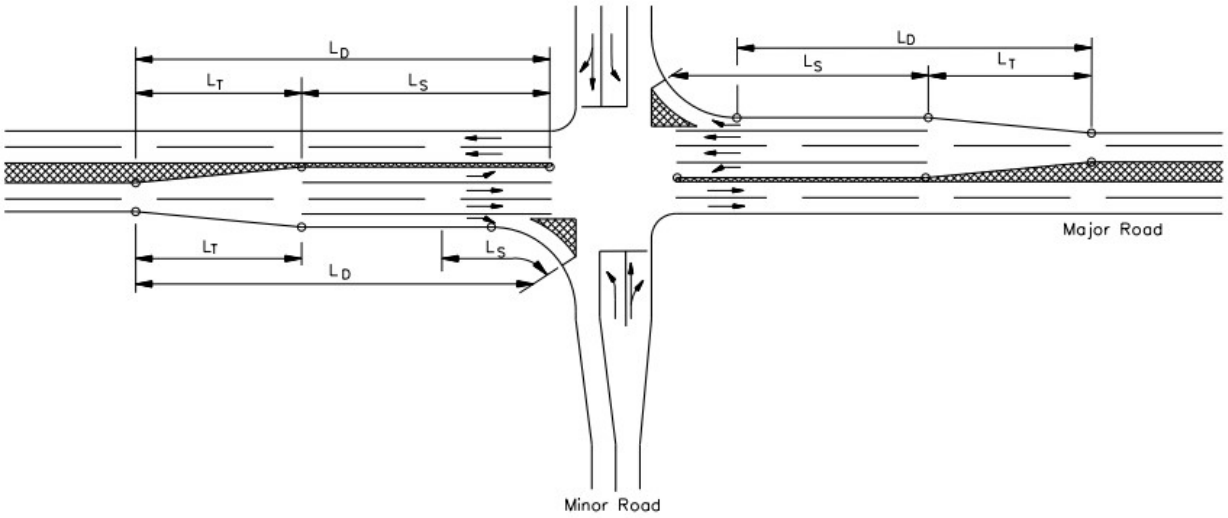
FIGURE 9: NB SIGHT DISTANCE (WALL STREET)

SHORT TERM COUNTERMEASURE – UPGRAGE EB APPROACH TRAFFIC CONTROL

Countermeasures to mitigate the rear-end crash pattern for EB E. Grand Avenue are as follows:

1. Complete additional capacity analysis to evaluate the restriping of the EB approach to form a traditional left-turn lane versus dropping the inside through lane into EBLT lane at the intersection. Follow IDOT BDE Manual 36-3.17 for the design and layout of the left turn lane (**Figure 8**). This will provide additional guidance to the driver while clarifying the lane use in advance of the intersection.

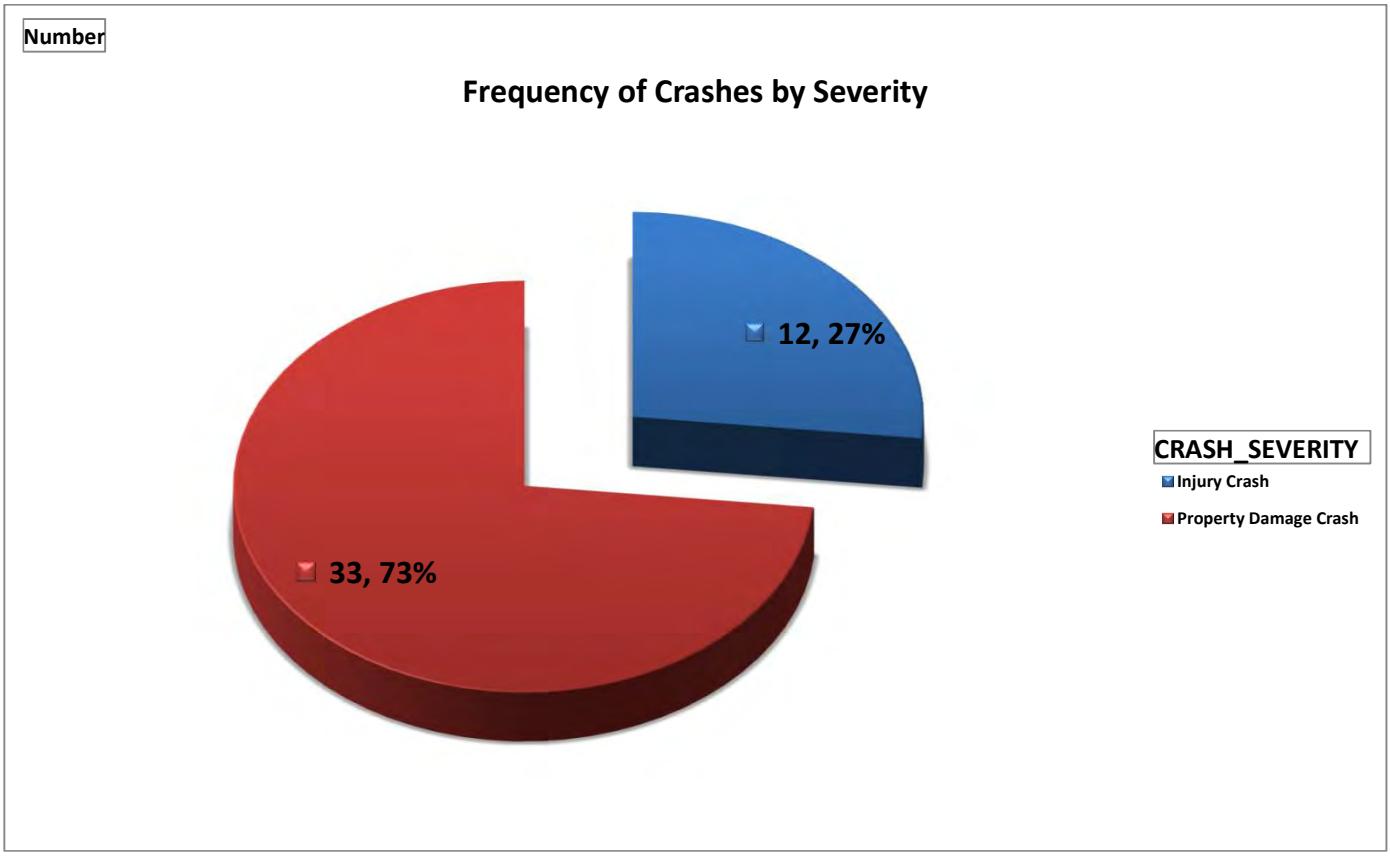
FIGURE 8: IDOT BDE MANUAL FIGURE 36-3.H

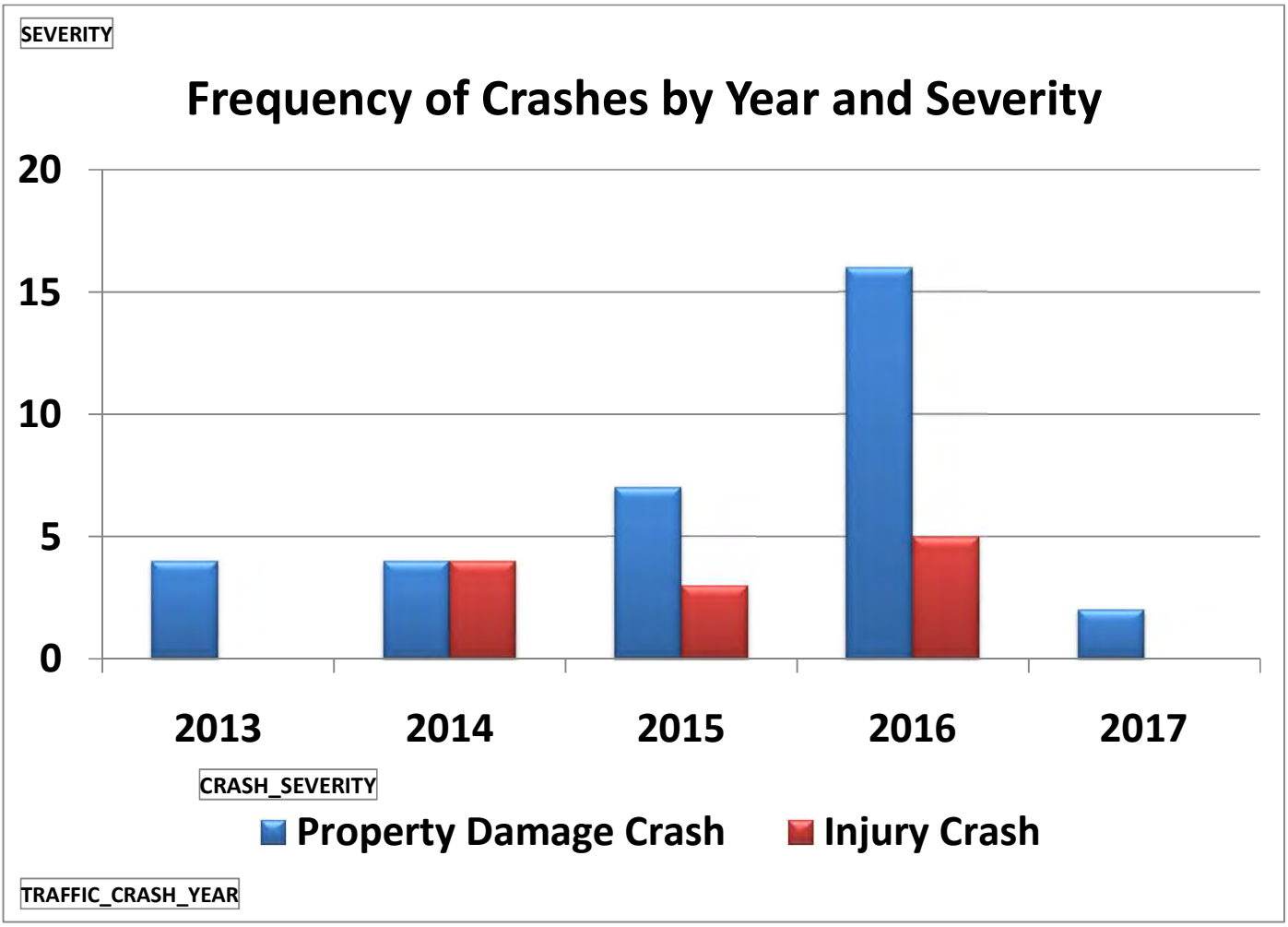


2. Add overhead advance lane use signing to delineate the lane designations 250’ in advance of the intersection.
3. Add reflective strips to the backplates on the vehicular signal heads at the intersection to further increase visibility. Research shows this improvement results in a 15% reduction in crashes.
4. Add Wavetronix advance radar detection to detect approaching platoons and effectively eliminate the dilemma zone caused by indecision when the yellow indication is displayed (some cars stop, some accelerate, causing rear-end crashes).

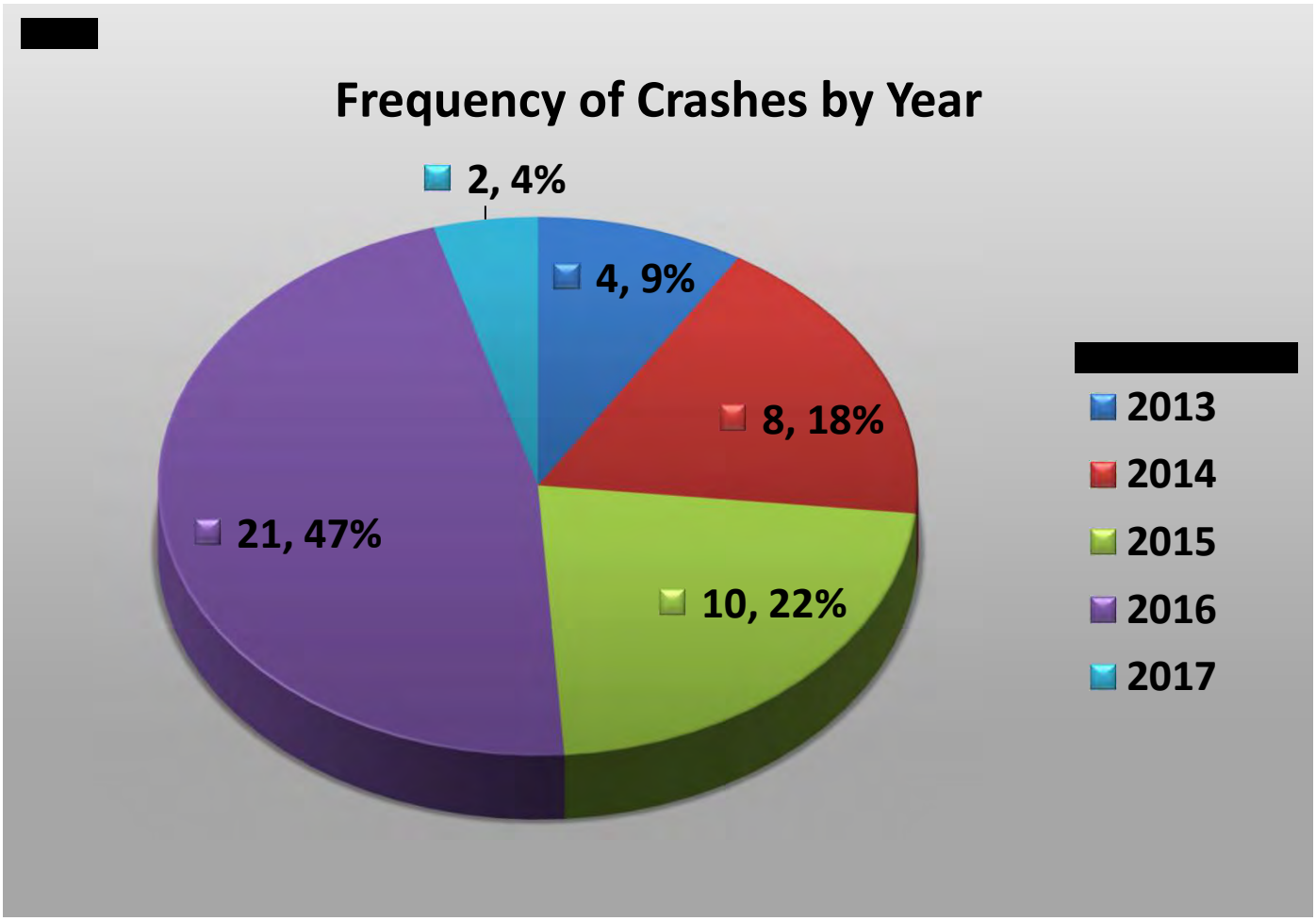
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	CITY	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701206017	17	08	13	00	Sun	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Other	Carbondale	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD
201701368879	17	01	19	15	Thu	2	0	0	Angle	Clear	Daylight	Wet		Lane Use Marking	Carbondale		Passenger	Northwest	Driverless	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201601104801	16	05	05	14	Thu	2	1	0	Angle	Clear	Daylight	Dry		No Controls	Carbondale	Normal	Passenger	West	Unknown	On Pavement (Roadway)	Passenger	North	Straight Ahead	C-Injury
201601293686	16	11	28	16	Mon	1	1	0	Pedalcyclist	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Other/Unknown	Passenger	South	Turning Right	Intersection	N/A	N/A	N/A	B-Injury
201601322345	16	01	28	19	Thu	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201601345518	16	02	10	16	Wed	2	0	0	Rear End	Snow	Dusk	Snow or Slush		Traffic Signal	Carbondale	Normal	Passenger	East	Straight Ahead	Intersection	SUV	East	Straight Ahead	PD
201601345660	16	02	10	16	Wed	2	0	0	Rear End	Snow	Dusk	Snow or Slush		Traffic Signal	Carbondale	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201601391699	16	05	26	11	Thu	2	1	0	Angle	Rain	Daylight	Wet	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Straight Ahead	Intersection	SUV	West	Straight Ahead	C-Injury
201601381210	16	04	28	14	Thu	3	0	0	Rear End	Clear	Daylight	Dry	No Defects	Lane Use Marking	Carbondale	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	PD
201601344188	16	02	10	21	Wed	2	0	0	Rear End	Snow	Darkness, Lighted Road	Ice		Traffic Signal	Carbondale	Normal	Passenger	East	Skidding/Control Loss	Intersection	SUV	East	Slow/Stop - Right Turn	PD
201601344395	16	02	10	16	Wed	2	0	0	Rear End	Snow	Daylight	Snow or Slush		Traffic Signal	Carbondale	Normal	Passenger	South	Skidding/Control Loss	On Pavement (Roadway)	Passenger	South	Slow/Stop In Traffic	PD
201601425825	16	07	01	00	Fri	1	1	0	Pedalcyclist	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Carbondale	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	N/A	N/A	N/A	B-Injury
201601426837	16	07	06	23	Wed	2	0	0	Turning	Clear	Daylight	Dry		No Controls	Carbondale	Normal	Van/Mini-Van	Northwest	Turning Right	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201601441085	16	08	07	21	Sun	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Turning Left	Intersection	Passenger	West	Straight Ahead	PD
201601459237	16	09	26	15	Mon	2	0	0	Rear End	Clear	Daylight	Dry		Traffic Signal	Carbondale	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	SUV	East	Slow/Stop In Traffic	PD
201601460454	16	09	28	19	Wed	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	West	Turning Left	Intersection	Passenger	South	Straight Ahead	PD
201601459155	16	09	29	21	Thu	2	0	0	Turning	Cloudy/Overcast	Darkness, Lighted Road	Dry		Traffic Signal	Carbondale	Normal	Pickup	North	Turning Left	Intersection	Passenger	West	Straight Ahead	PD
201601473158	16	10	20	21	Thu	2	0	0	Rear End	Rain	Darkness, Lighted Road	Wet		Traffic Signal	Carbondale	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Avoiding Vehicle/Objects	PD
201601474173	16	10	27	16	Thu	2	0	0	Rear End	Clear	Daylight	Dry		Lane Use Marking	Carbondale	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop - Left Turn	PD
201601484337	16	11	15	15	Tue	2	0	0	Turning	Rain	Daylight	Dry		Traffic Signal	Carbondale	Normal	SUV	West	Straight Ahead	Intersection	Passenger	North	Turning Left	PD
201601475760	16	10	24	18	Mon	2	0	0	Turning	Clear	Dusk	Dry		Traffic Signal	Carbondale	Normal	Pickup	Southeast	Turning Left	Intersection	Pickup	North	Straight Ahead	PD
201601503487	16	12	11	17	Sun	2	0	0	Turning	Clear	Darkness, Lighted Road	Wet	No Defects	Traffic Signal	Carbondale	Normal	Pickup	Southeast	Turning Left	Intersection	Passenger	West	Straight Ahead	PD
201601356322	16	03	09	18	Wed	1	1	0	Pedestrian	Rain	Darkness, Lighted Road	Wet		Traffic Signal	Carbondale	N/A	N/A	N/A	N/A	N/A	Passenger	Southwest	Turning Left	C-Injury
201501071675	15	03	17	09	Tue	2	0	0	Turning	Clear	Daylight	Dry		Traffic Signal	Carbondale	Normal	Bus Over 15 Passengers	South	Turning On Red	Intersection	Passenger	South	Turning Left	PD
201501235065	15	11	02	00	Mon	2	0	0	Parked Motor Vehicle				No Defects	No Controls	Carbondale	Other/Unknown	Unknown	South	Unknown	On Pavement (Roadway)	Passenger	South	Parked	PD
201501275557	15	12	06	04	Sun	2	0	0	Parked Motor Vehicle	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Carbondale	Other/Unknown	Passenger	West	Slow/Stop In Traffic	On Pavement (Roadway)	Pickup	North	Parked	PD
201501196602	15	09	22	00	Tue	2	0	0	Parked Motor Vehicle	Clear	Daylight	Dry	No Defects	No Controls	Carbondale	Other/Unknown	Unknown	North	Unknown	On Pavement (Roadway)	Passenger	North	Parked	PD
201501350309	15	10	20	16	Tue	3	2	0	Turning		Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	Northeast	Turning Left	Intersection	Passenger	West	Straight Ahead	C-Injury
201501353968	15	11	07	00	Sat	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry		Traffic Signal	Carbondale	Drug Impaired	SUV	Northwest	Turning Left	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201501353847	15	11	10	06	Tue	1	1	0	Pedestrian	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Turning Left	Intersection	N/A	N/A	N/A	C-Injury
201501340894	15	07	30	15	Thu	2	0	0	Rear End	Clear	Daylight	Dry		No Controls	Carbondale	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201501408671	15	09	27	18	Sun	2	0	0	Turning	Clear	Dusk	Dry	No Defects	No Controls	Carbondale	Fatigued	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	Northeast	Turning Left	PD
201501353822	15	11	02	20	Mon	1	1	0	Pedalcyclist	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	N/A	N/A	N/A	N/A	N/A	Passenger	Southwest	Turning On Red	A-Injury
201400255948	14	05	14	21	Wed	2	1	0	Turning	Rain	Darkness	Wet	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Turning Left	Intersection	Passenger	West	Straight Ahead	C-Injury
201400246929	14	05	28	22	Wed	2	1	0	Turning	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	Alcohol Impaired	Motor Driven Cycle	West	Straight Ahead	On Pavement (Roadway)	Pickup	South	Turning Left	A-Injury
201400206371	14	04	06	02	Sun	2	0	0	Turning	Clear	Darkness, Lighted Road	Dry		No Controls	Carbondale	Normal	Passenger	West	Turning Right	On Pavement (Roadway)	Motorcycle (Over 150cc)	West	Straight Ahead	PD
201400250459	14	05	11	02	Sun	2	0	0	Sideswipe Same Direction	Clear	Darkness	Dry	No Defects	Traffic Signal	Carbondale	Other/Unknown	Passenger	West	Changing Lanes	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201400351384	14	08	28	09	Thu	2	2	0	Turning	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	Van/Mini-Van	North	Turning Left	Intersection	Passenger	South	Straight Ahead	C-Injury
201400268707	14	05	27	18	Tue	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Traffic Signal	Carbondale	Normal	Passenger	North	Straight Ahead	Intersection	Pickup	West	Straight Ahead	B-Injury
201400415836	14	10	30	16	Thu	2	0	0	Rear End	Clear	Daylight	Dry		Traffic Signal	Carbondale	Normal	Passenger	West	Slow/Stop - Left Turn	Intersection	Passenger	West	Straight Ahead	PD
201400421438	14	11	15	04	Sat	1	0	0	Animal	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	Carbondale	Other/Unknown	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD
201301016591	13	02	07	20	Thu	2	0	0	Sideswipe Same Direction	Rain	Darkness, Lighted Road	Wet		Traffic Signal	Carbondale	Other/Unknown	Pickup	East	Straight Ahead	On Pavement (Roadway)	Bus Up to 15 Passengers	East	Slow/Stop In Traffic	PD
201301055316	13	01	23	16	Wed	4	0	0	Rear End	Clear	Daylight	Dry		No Controls	Carbondale	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201301392797	13	10	12	01	Sat	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Traffic Signal	Carbondale	Alcohol Impaired	Passenger	East	Turning Right	Off Pavement - Left				PD
201301366243	13	10	19	01	Sat	2	0	0	Rear End	Rain	Darkness, Lighted Road			Traffic Signal	Carbondale	Normal	SUV	Unknown	Skidding/Control Loss	On Pavement (Roadway)	Passenger	Unknown	Slow/Stop In Traffic	PD

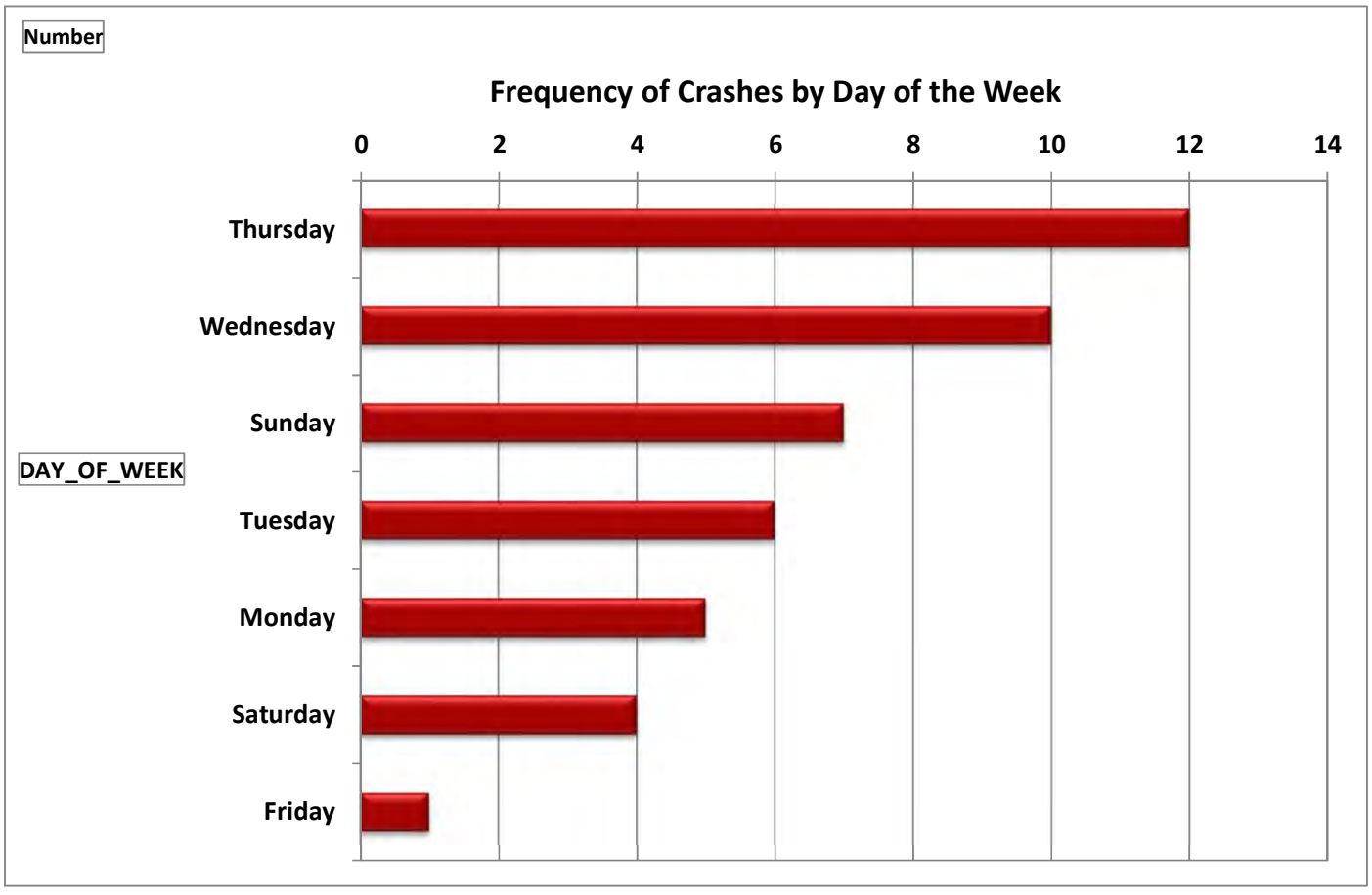
Intersection 06





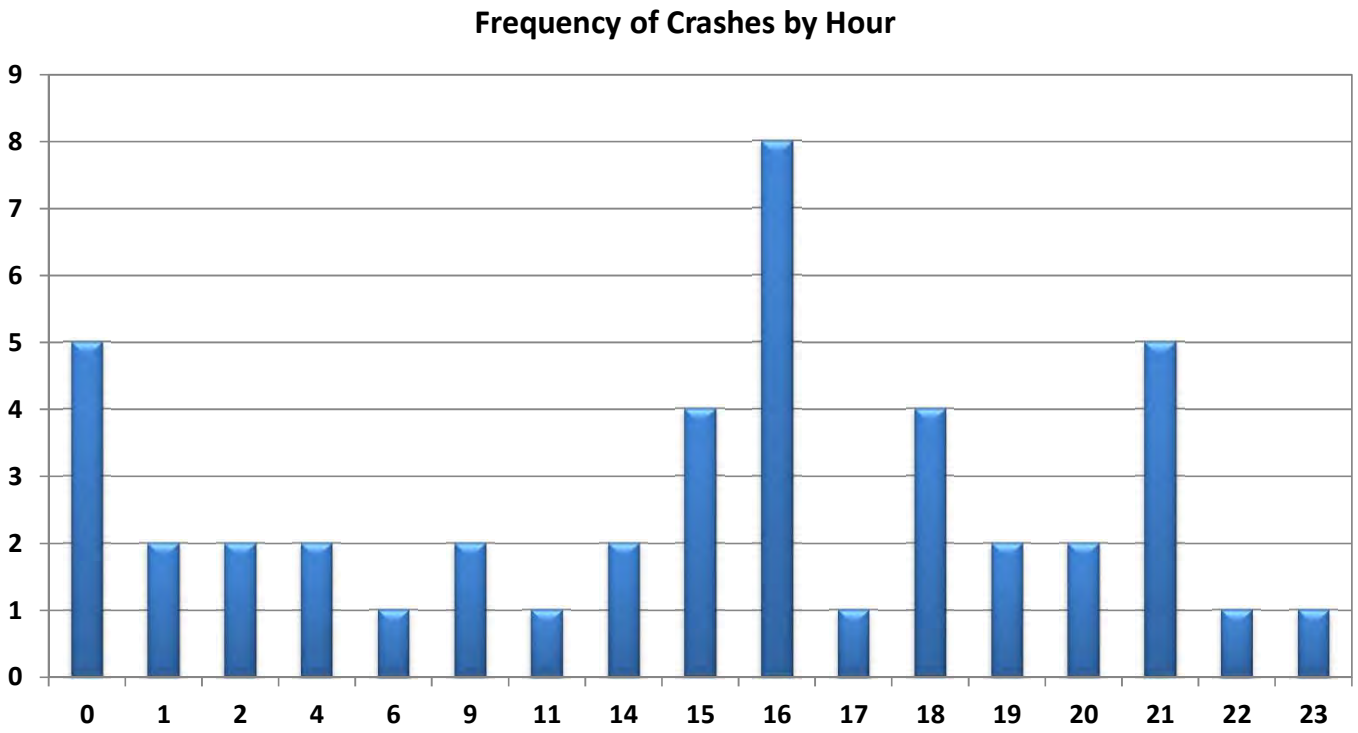
Intersection 06



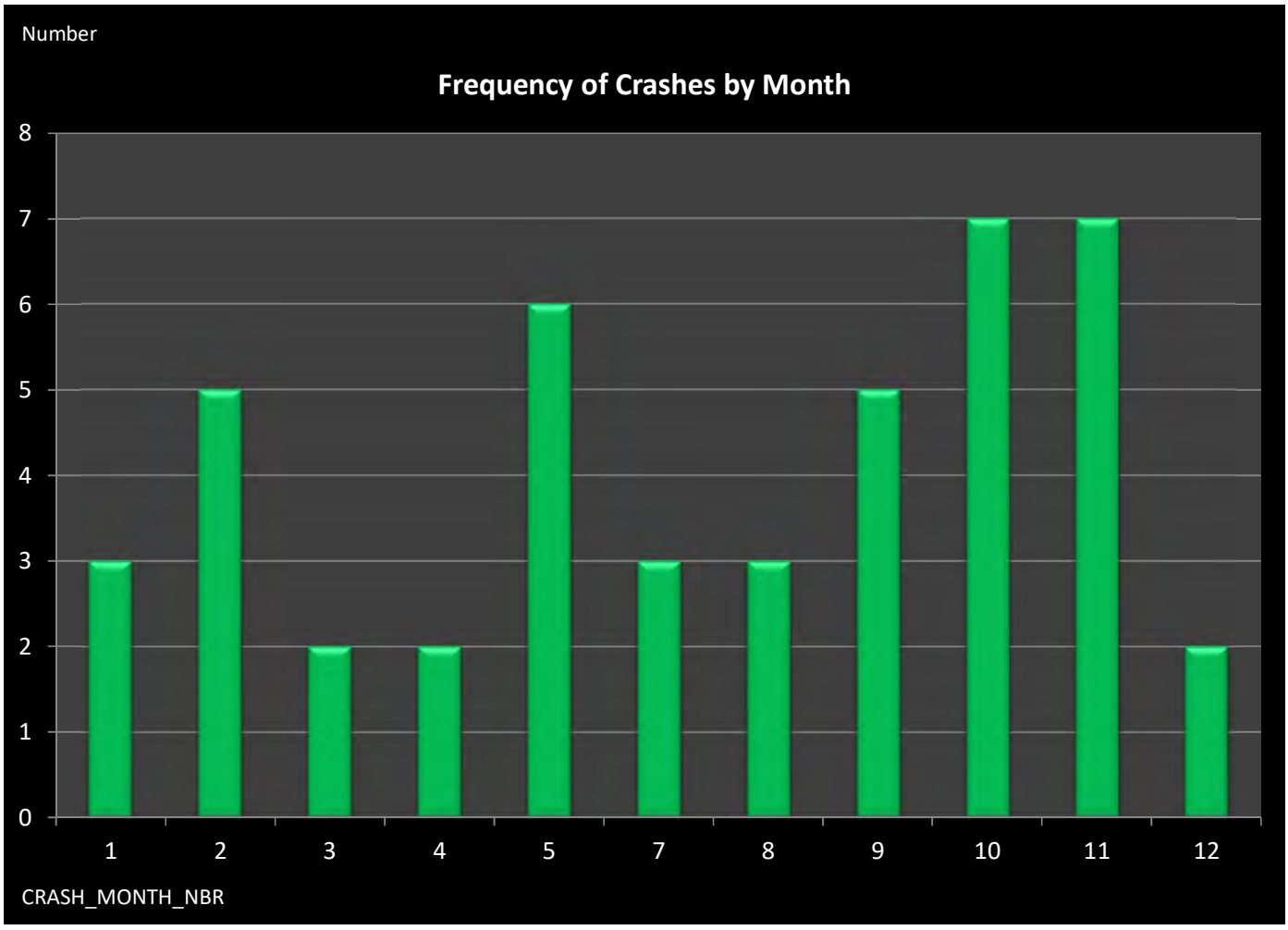


Intersection 06

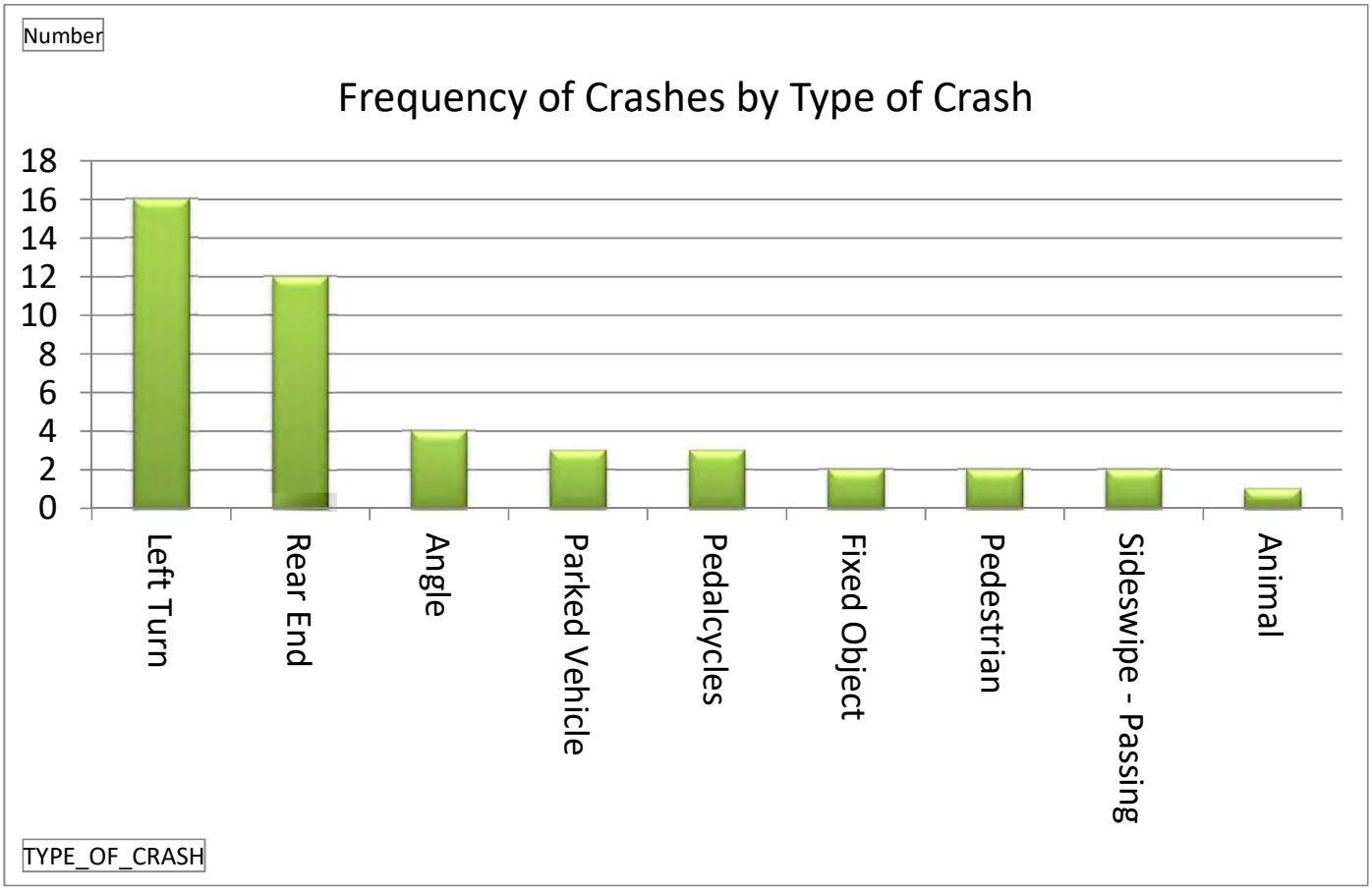
[redacted]

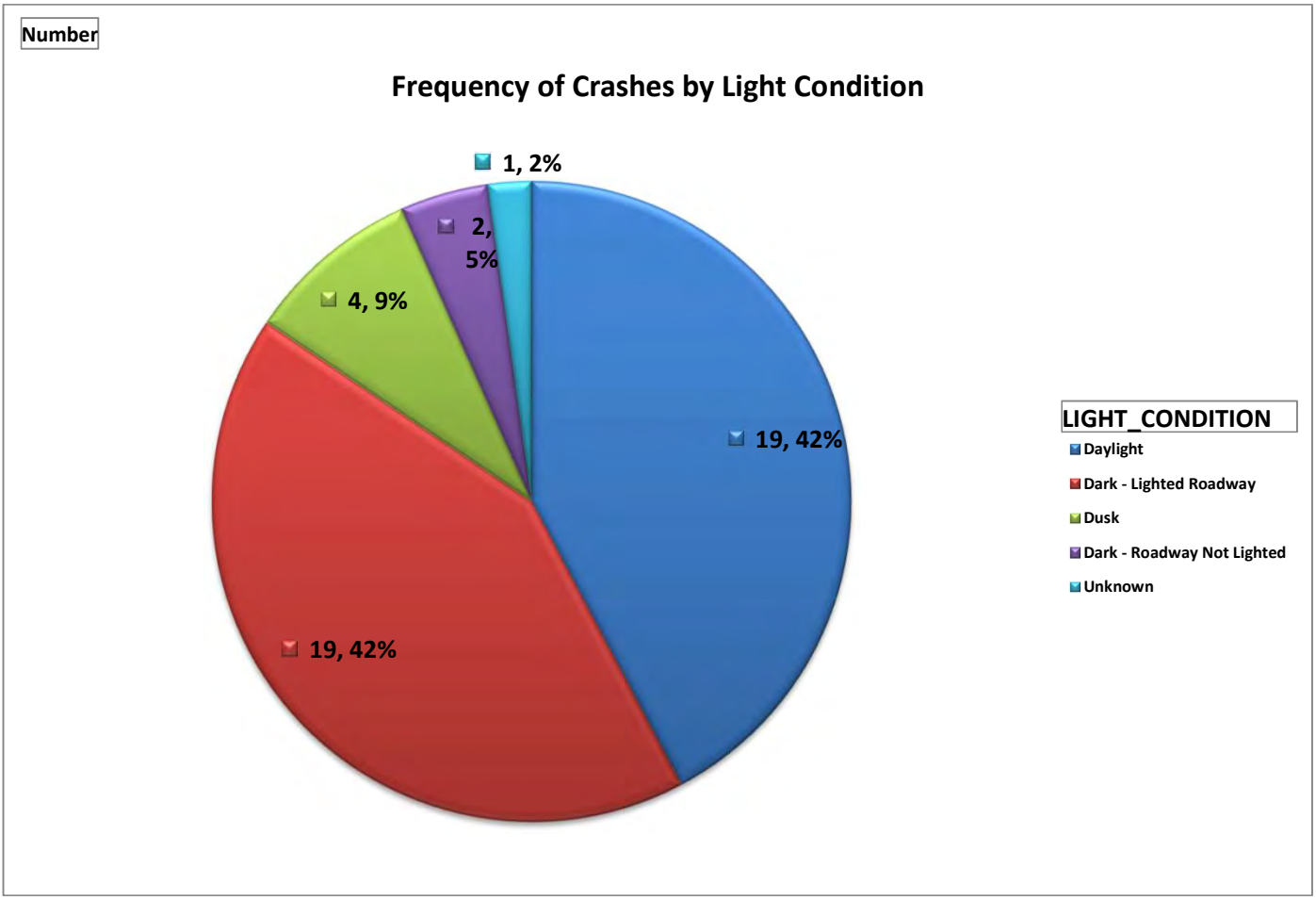


[redacted]

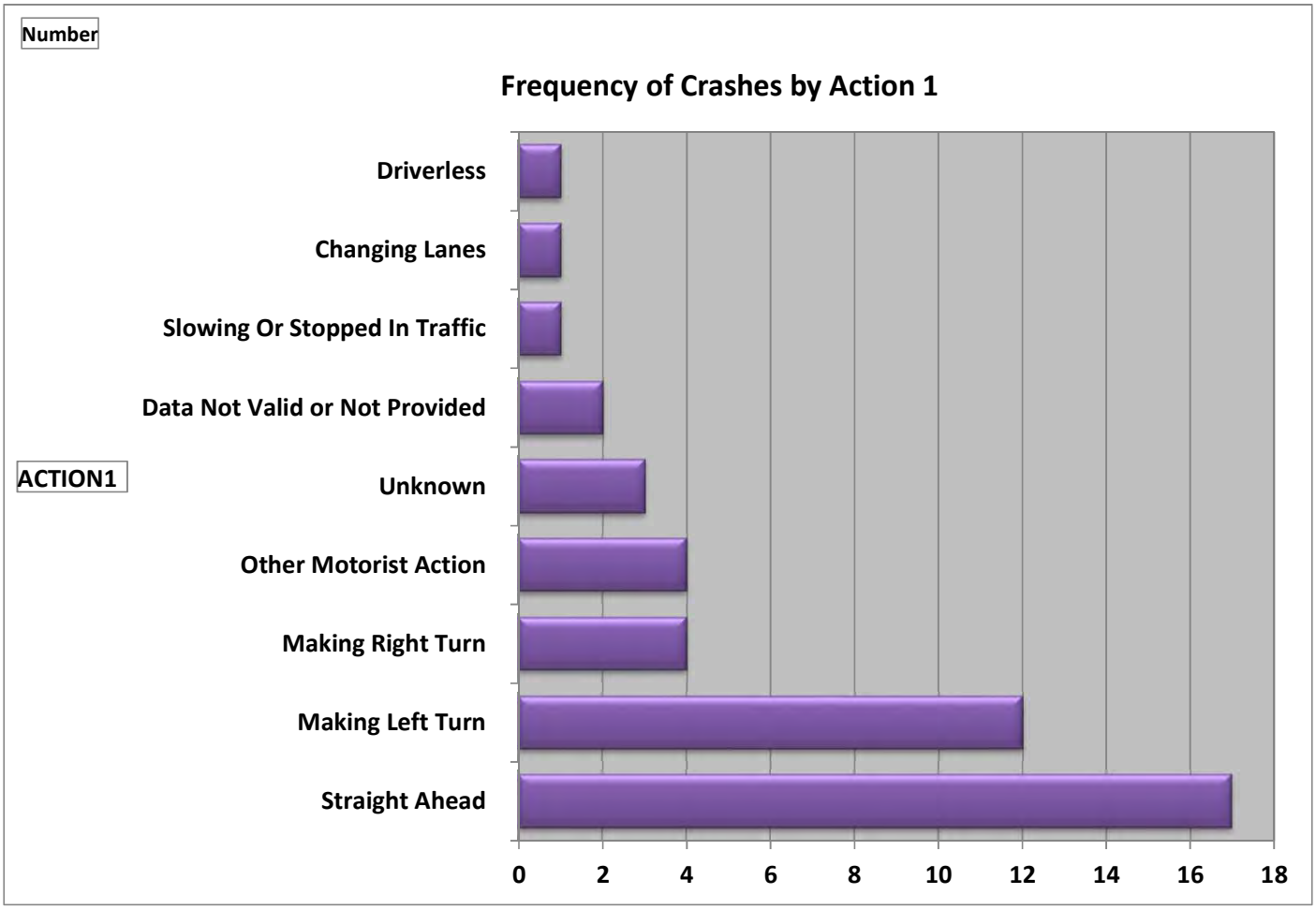


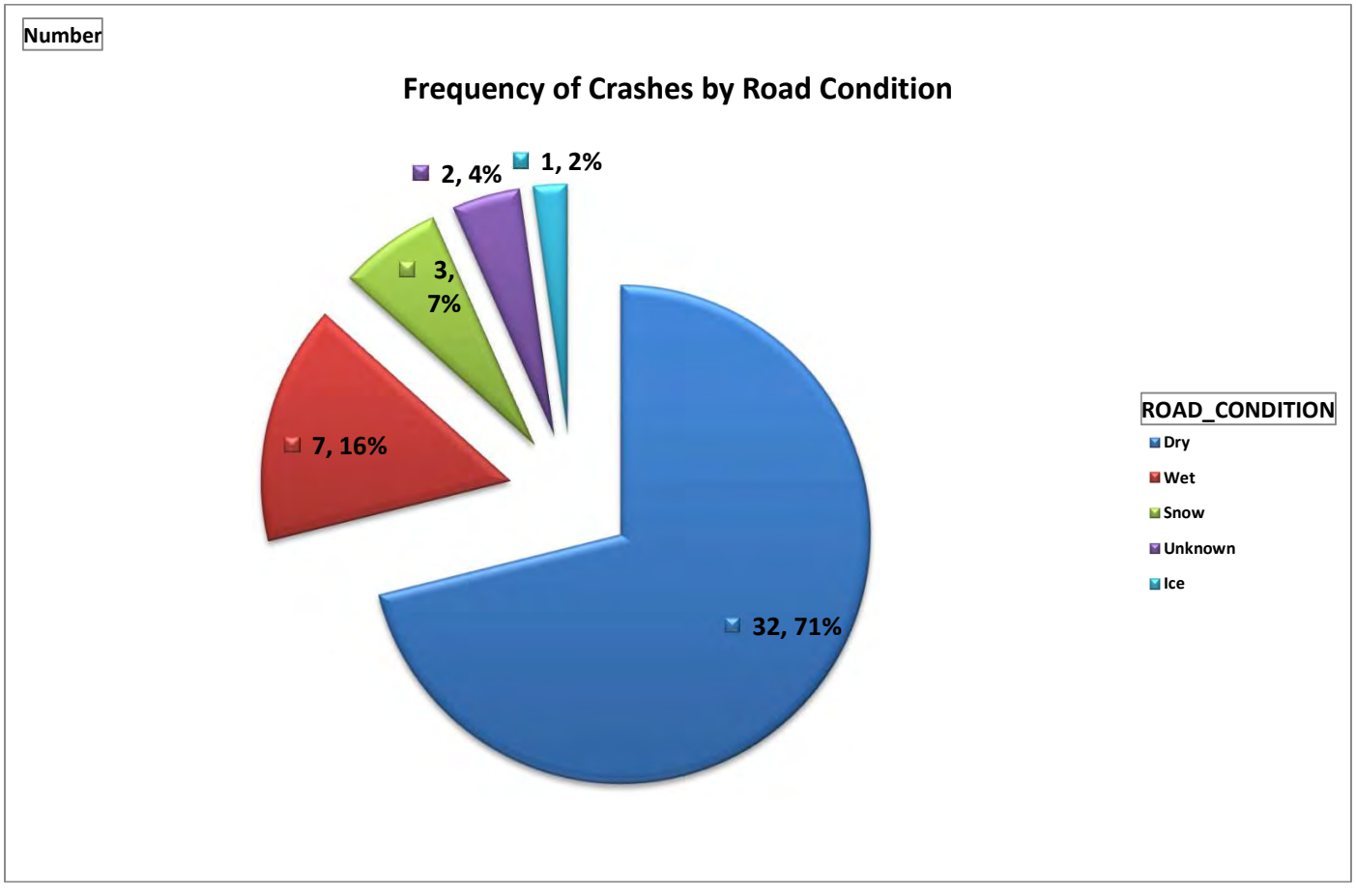
Intersection 06



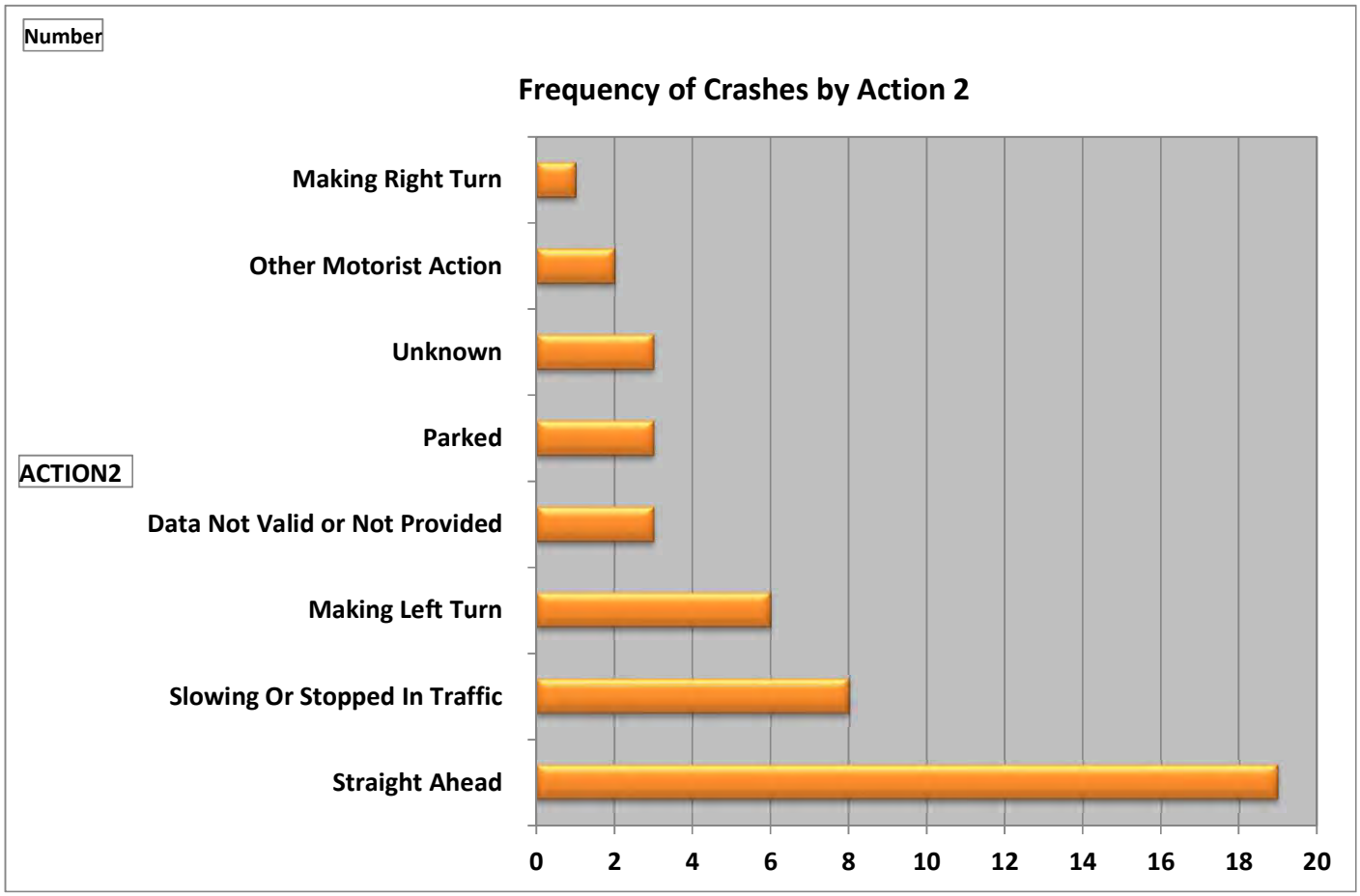


Intersection 06





Intersection 06



SIMPO SAFETY STUDY

APPENDIX B1: CRENSHAW ROAD (WILLIAMSON CO)

CMT

Crenshaw Road (Skyline Drive to Pease Road)

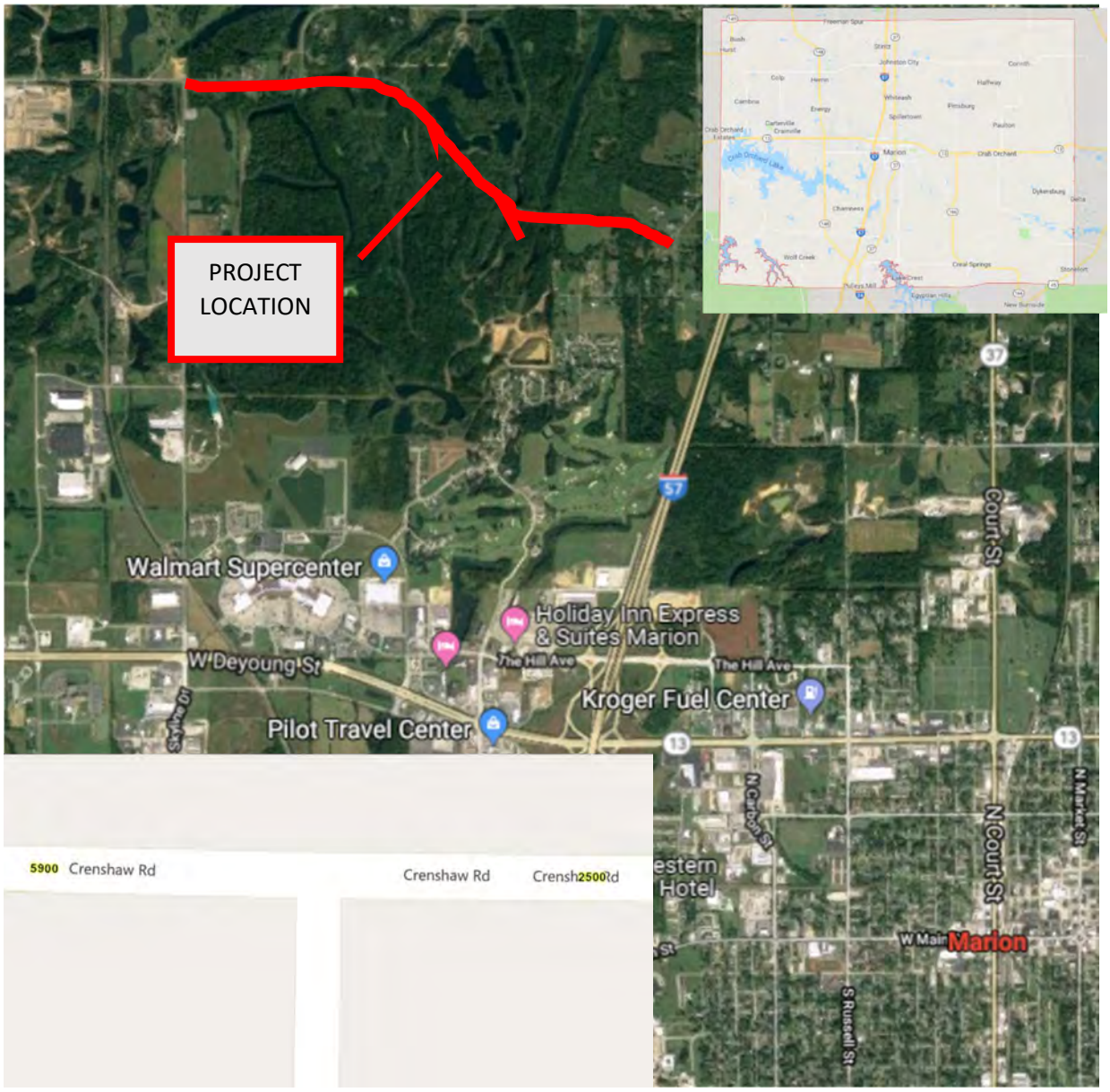
Segment Priority #1

June 2019

INTRODUCTION

The segment of Crenshaw Road located within Williamson County was identified as the highest ranked segment within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The original segment length of 1.55 miles was located between logpoint 0.40 (Decatur Road) and 1.95 (Pease Road). The study area was extended west to include the Skyline Road and Crenshaw Road intersection. The total length of this section's revised study area is 1.95 miles.

PROJECT LOCATION



EXISTING CONDITIONS

Crenshaw Road is a county route in Williamson County providing east/west connectivity between the Village of Energy, IL and IL Route 37. Land use is predominately for the Marion County landfill, thus driveway access is sparse, especially east of Decatur Road. Residential driveways exist at the west and east ends of the study area. **Figure 1** shows the study area.

Crenshaw Road is a roadway having variable width between 16 and 24 feet. Aggregate shoulders vary between 0' and 2' in width. The roadway does not have any pavement markings or warning signs with the exception of a single chevron about 300 feet west of the Pease Road intersection. **Photos 1-4** show the existing horizontal and vertical curves within the study area. The approximate location of each photo is numbered on **Figure 1.** The approximate distance from Pease Road is referenced for each photo.

FIGURE 1: STUDY AREA

PHOTO 1: NB HORIZONTAL CURVE (@ 900 FT)

PHOTO 2: NB VERTICAL/HORIZONTAL CURVE (@ 2800 FT)

PHOTO 3: HORIZONTAL CURVE (@ 3200 FT)

PHOTO 4: HORIZONTAL CURVE (@ 6400 FT)

The legal speed limit on Crenshaw Road is 55 miles per hour within the study area. A posted speed of 40 miles per hour exists for Crenshaw Road west of the Decatur Road intersection.

The Pease Road and Crenshaw Road intersection has 3-legs and is configured as a Y-intersection. The stem of the Y-intersection (Pease Road) has right of way whereas the SB Pease Road approach and the EB Crenshaw Road approach are stop controlled approaches. **Photo 5** shows the EB Crenshaw Road approach. The red circle is the stop sign for the SB Pease Road approach. The large arrow warning sign for the NB Pease Road approach obscures the shape of the stop sign. **Photo 6** shows NB Pease Road.

PHOTO 5: EB CRENSHAW RD APPROACH AT PEASE ROAD INTERSECTION

PHOTO 6: NB PEASE ROAD APPROACH AT CRENSHAW RD INTERSECTION

The Skyline Road and Crenshaw Road intersection has 3-legs and is configured as a T-intersection. The stem of the T-intersection (Skyline Road) is stop controlled whereas the Crenshaw Road approaches have right of way. The posted speed limit on Skyline Road is 50 MPH.

Skyline Road and the west leg of Crenshaw Road are part of a Class III truck route. Traffic volumes are higher for the following movements: EB right turn and NB left turn. **Photo 7** shows a typical truck turning from EB Crenshaw Road to SB Skyline Road.

Stop Ahead signs (W3-1) are located 750 feet in advance of the Skyline Road and Crenshaw Road intersection. A vertical curve on Skyline Road in advance of the intersection may reduce the available stopping sight distance for queues of vehicles stopped ahead on Skyline Road, as shown on **Photo 8**. A Be Prepared to Stop (W3-4) sign is located 1,350 feet in advance of Crenshaw Road (**Photo 9**).

A yard light is erected in the SE quadrant of the intersection.

PHOTO 7: NB SKYLINE ROAD AT CRENSHAW ROAD INTERSECTION

PHOTO 8: NB SKYLINE ROAD APPROACH (@ 750 FT IN ADVANCE OF CRENSHAW)

PHOTO 9: NB SKYLINE ROAD APPROACH (@ 1,350 FT IN ADVANCE OF CRENSHAW)

SAFETY ANALYSIS

A total of 40 crashes occurred within the study area over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**.

Figure 3A shows the distribution of crashes within the study area. A total of 22 crashes occurred at the Skyline Road and Crenshaw Road intersection which included 6 injury crashes (6-Type B crashes, 16 PDO crashes). The study area between Decatur and Pease experienced a total of 18 crashes which included 8 injury crashes (8 Type B crashes, 10 PDO crashes). The severity of crashes corresponds to the crash type – **Figure 3B** shows the frequency of fixed object crashes on the segment between Decatur Road and Pease Road.

FIGURE 2: FREQUENCY OF CRASHES BY YEAR

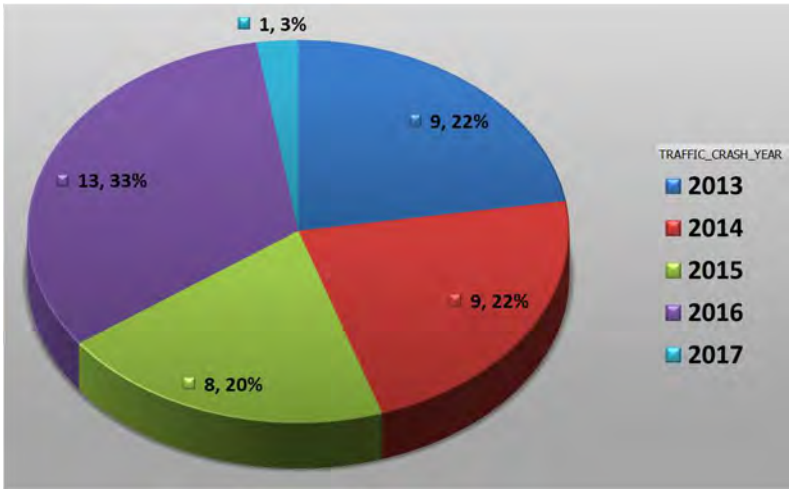


FIGURE 3A: LOCATION FREQUENCY BY SEVERITY

FIGURE 3B: LOCATION FREQUENCY BY CRASH TYPE

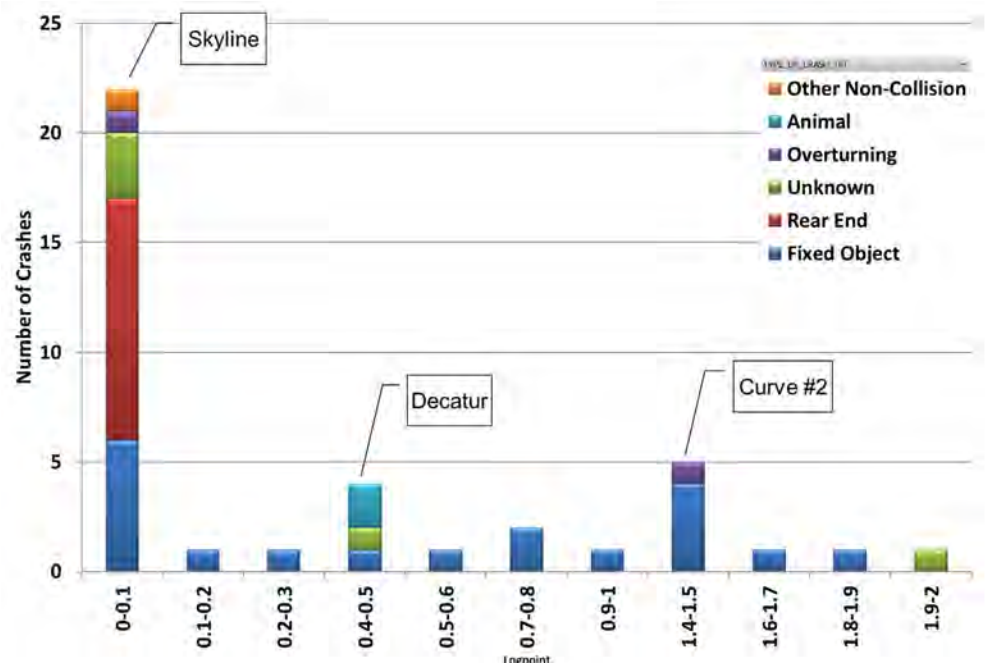


Figure 4 shows the severity of crashes by location and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are northbound crashes. **Figure 4** indicates that the majority of rear end crashes are occurring on the northbound Skyline Road approach.

FIGURE 4: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE

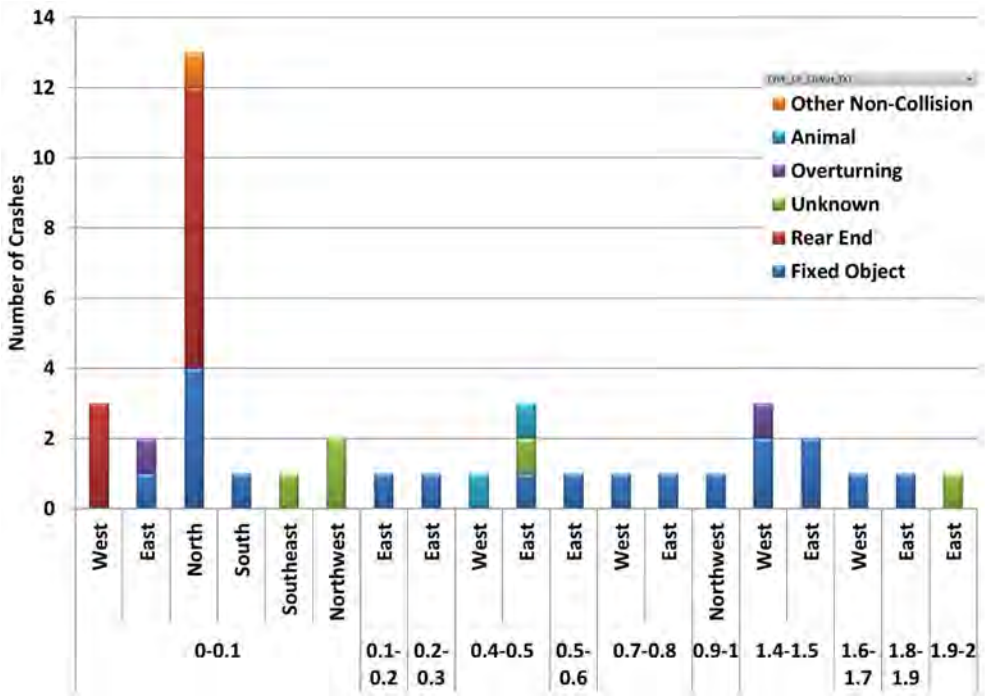


Figure 5 shows the location and severity of crashes plotted on an aerial map of the study area.

FIGURE 5: CRASH SEVERITY AND LOCATION MAP

COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE -- CRENSHAW RD FIXED OBJECT CRASHES

Installation of curve warnings signs, advisory speed plaques, and chevrons are proposed on each of the 4 curves to mitigate fixed object crashes. The severity and location of crashes shown on **Figure 4** indicate the need for curve warning signs on Crenshaw Road between Decatur Road and Pease Road. A focus area for crash mitigation is near Curve #2 shown on **Photo 2**. This location has a combination vertical and horizontal curvature that has resulted in 5 crashes over the past 5 years.

Install curve warning, speed advisory plaques, and/or chevrons in accordance with Table 2C-5 of the MUTCD along Crenshaw Road between Decatur Road and Pease Road to mitigate Fixed Object crashes.

Table 2C-5. Horizontal Alignment Sign Selection

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.

Williamson County has installed chevrons on Crenshaw Road since the study was initiated. The chevrons are located on the curves #1, #3, and #4 (**Figure 1**) which are the horizontal curves having the greatest deflection. **Photo 10** shows new chevrons along Curve #4 as shown in **Figure 1**.

PHOTO 10: CHEVRONS ON CURVE #4

Photo 11 shows chevrons on Curve #3 from the perspective of Curve #2 on northbound Crenshaw Road. **Additional chevrons along the horizontal/vertical curve of Curve #2 (red arrow) are recommended**.

PHOTO 11: CHEVRONS ON CURVE #3 (LOOKING AT CURVE #2)

Guardrail may be considered at the location of Curve #3 as shown on **Figure 1**. **Photo 12** shows the drop off that is located less than 10 feet from the edge of pavement.

PHOTO 12: CLEAR ZONE AT CURVE #3

SHORT TERM COUNTERMEASURE -- CRENSHAW RD AT PEASE ROAD

The Manual of Uniform Traffic Control Devices (MUTCD) would recommend the removal of the Two Direction Large Arrow Sign (W1-7) from the grass median at the Pease Road/Crenshaw Road intersection as shown in **Photo 5** for 2 reasons:

- Section 2C.47 of the Manual of Uniform Traffic Control Devices (MUTCD) states that the Two Direction Large Arrow Sign (W1-7) shall be installed on the far side of a T-intersection in line with, and at approximately a right angle to, traffic approaching from the stem of the T-intersection. Type 1 object markers (OM1) may be an option to increase the visibility of the island between the diverging roadways.
- Section 2B.10 of the MUTCD states that "a sign that is mounted back-to-back with a STOP or YIELD sign should stay within the edges of the STOP or YIELD sign. If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.

A long-term solution would be to align Pease Road to form a T-intersection with Crenshaw Road. Crash frequency does not support a long-term countermeasure as a safety project.

SHORT TERM COUNTERMEASURE -- CRENSHAW RD AT SKYLINE ROAD

A total of 22 crashes occurred at the Crenshaw Road and Skyline Road intersection. A majority of these crashes (12 crashes) were rear end crashes (8 crashes) and fixed object crashes (4 crashes) on the northbound approach. **Photo 8** shows the profile of Skyline Road on the northbound approach to Crenshaw Road which contributes to the safety performance of the intersection. Two short term countermeasures are proposed on the Skyline Road approach:

- Relocate the Stop Ahead sign (W3-1) signs no more than 400 feet in advance of the intersection to be consistent with Table 2C-4 of the Manual of Uniform Traffic Control Devices (MUTCD). Existing signs are located 750 feet in advance of the intersection. Section 2C.05 emphasizes that signs not be placed too far in advance of an intersection.

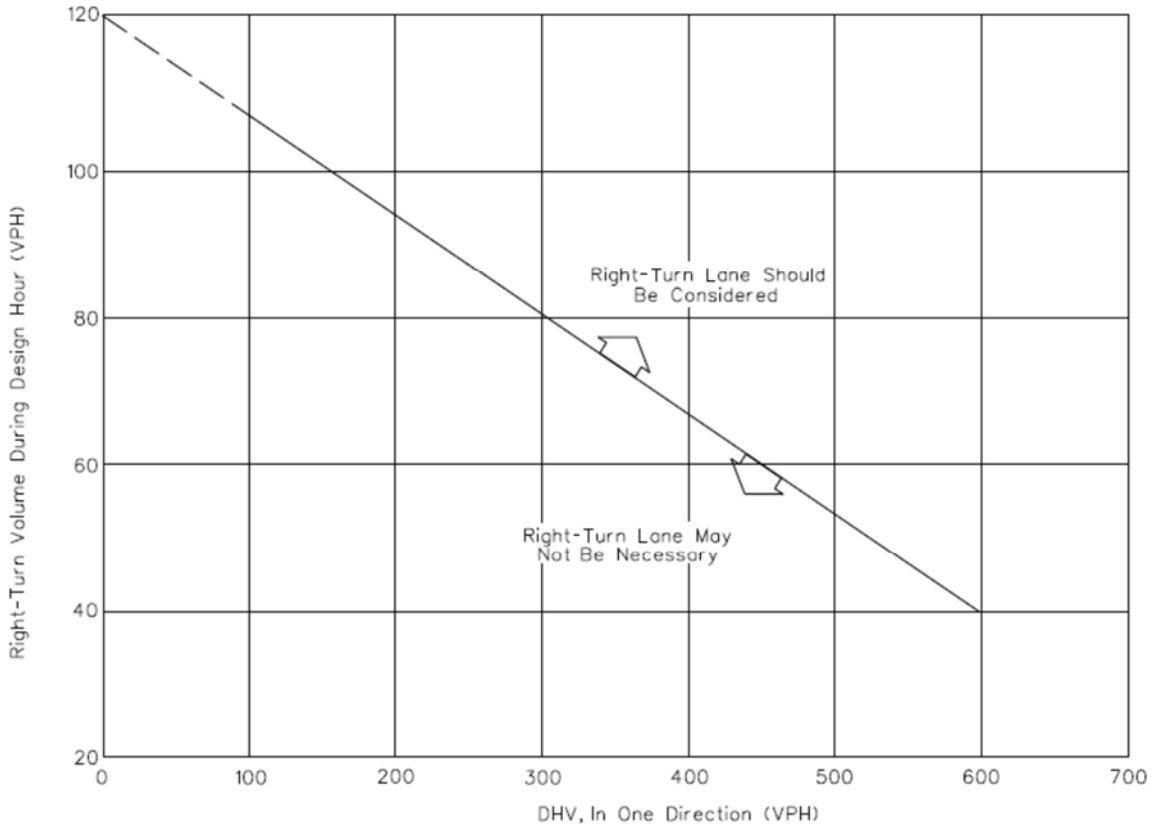
Table 2C-4. Guidelines for Advance Placement of Warning Signs

Posted or 85th-Percentile Speed	Advance Placement Distance[1]								
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]
20 mph	225 ft	100 ft[6]	N/A[5]	—	—	—	—	—	—
25 mph	325 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
30 mph	460 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
35 mph	565 ft	100 ft[6]	N/A[5]	N/A[5]	N/A[5]	—	—	—	—
40 mph	670 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—	—
45 mph	775 ft	175 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft[6]	—	—	—
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A[5]	—	—
60 mph	1,100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft[6]	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft[6]	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft[6]

- Relocate the Be Prepared to Stop sign (W3-4) from a distance of 1,350 feet to a distance of 800 feet in advance of the intersection. The W3-4 sign should be supplemented with a warning beacon and be interconnected to a queue detection system that activates the flashers when vehicles have queued within a distance of 325' from the crest of the vertical curve.

Reducing queue lengths on the Skyline Road approach would also mitigate rear end and fixed object crashes on the northbound approach. The construction of an offset right turn lane on eastbound Crenshaw Road would reduce delays to motorists on Skyline Road – Skyline Road traffic would only be delayed by yielding to eastbound through vehicles which is a relatively low volume. Existing Skyline Road traffic must yield to the majority of eastbound vehicles (including right turning vehicles in the shared lane). **Figure 6** shows the right turn lane warrant (Figure 36-3.A) in the IDOT Bureau of Design manual.

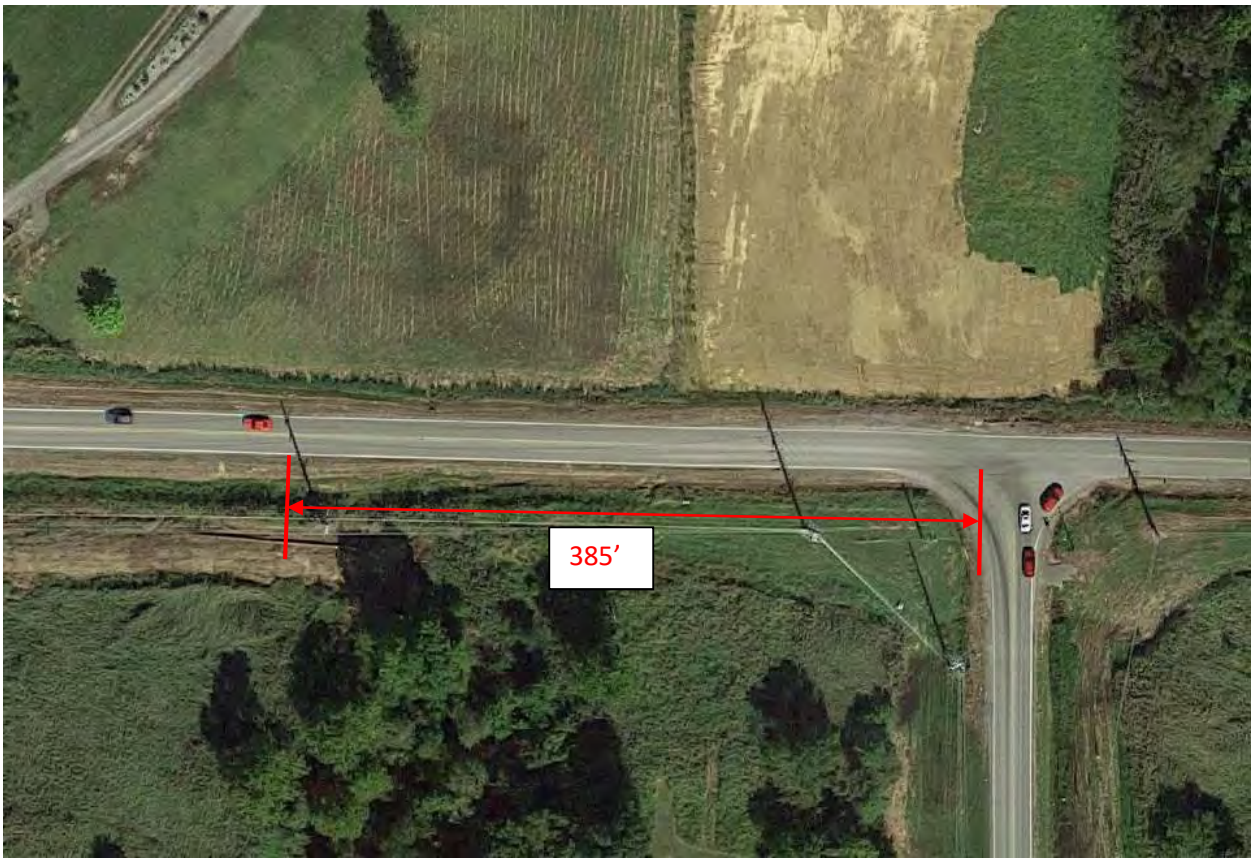
FIGURE 6: EB RIGHT TURN LANE WARRANT



The right turn lane length of 385 feet would provide deceleration for a 45 MPH design speed. The right turn lane should also be offset to provide intersection sight distance of eastbound through vehicles from the Skyline Road approach – occlusion of eastbound vehicles by large trucks in the right turn lane should be avoided. **Figure 7** shows the proposed length of a right turn lane at the Crenshaw and Skyline Road intersection on an aerial map.

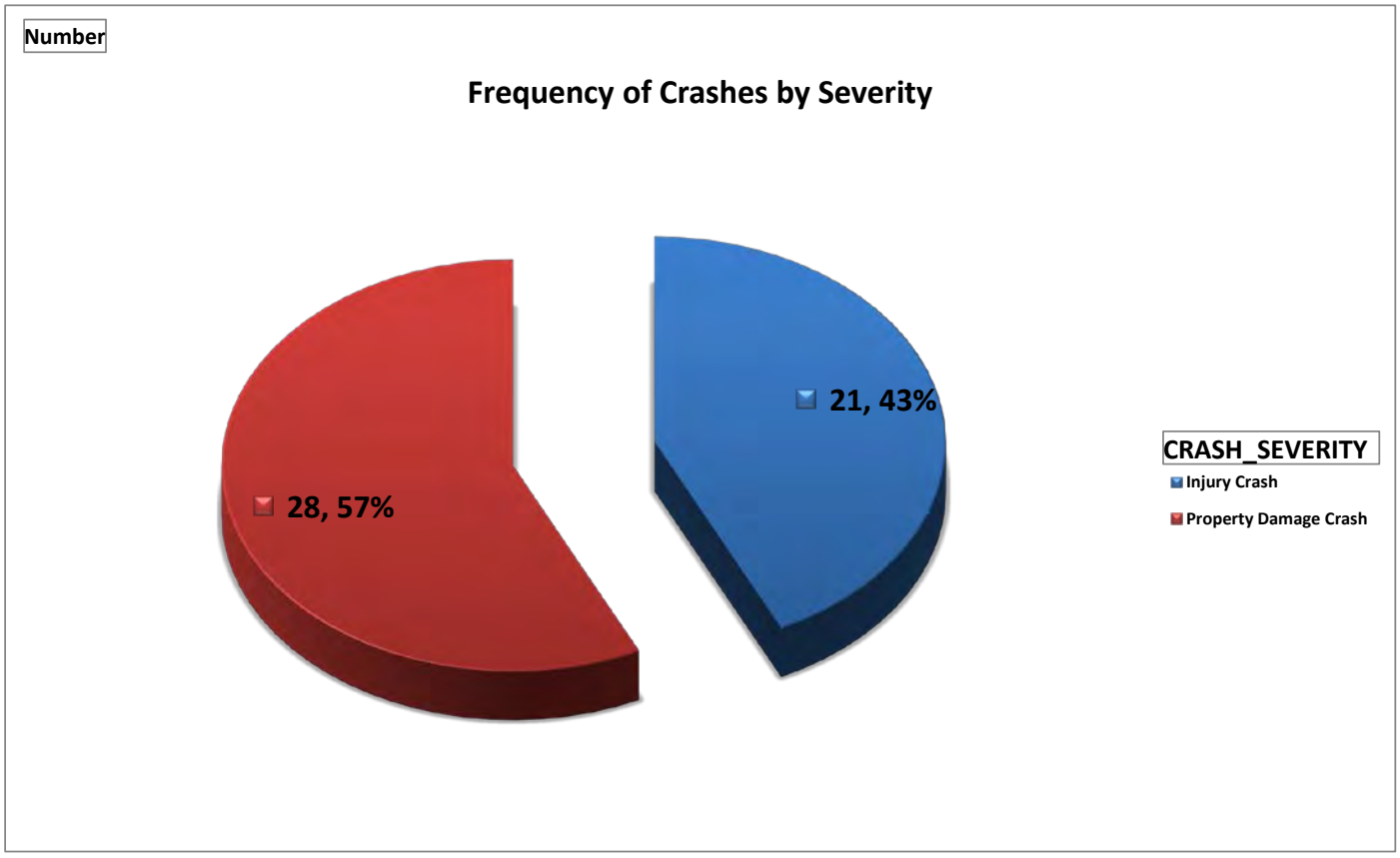
Signal warrant analysis also should be performed to determine if the intersection meets one or more of the volume-based criteria for signalization.

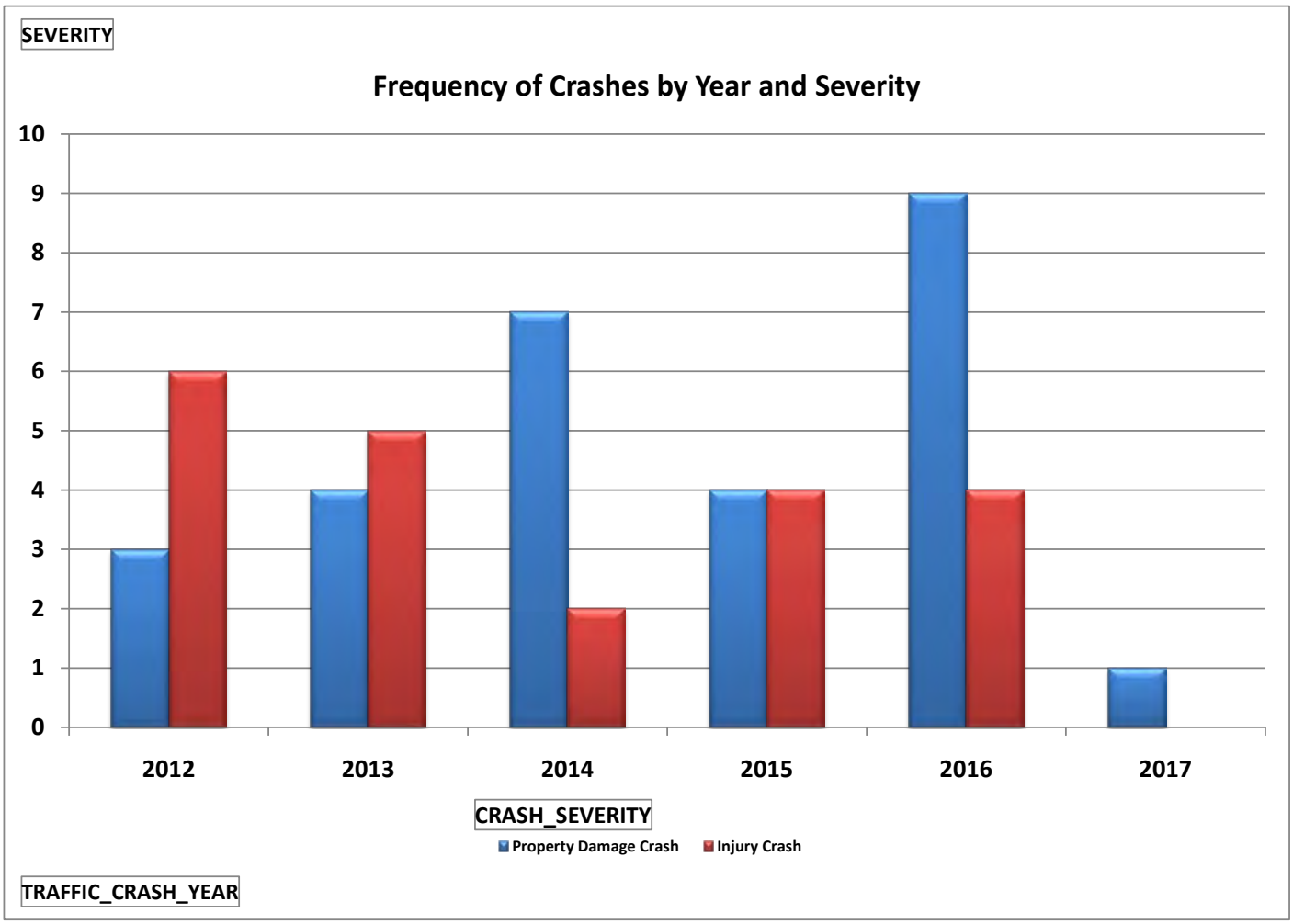
FIGURE 7: EB RIGHT TURN LANE



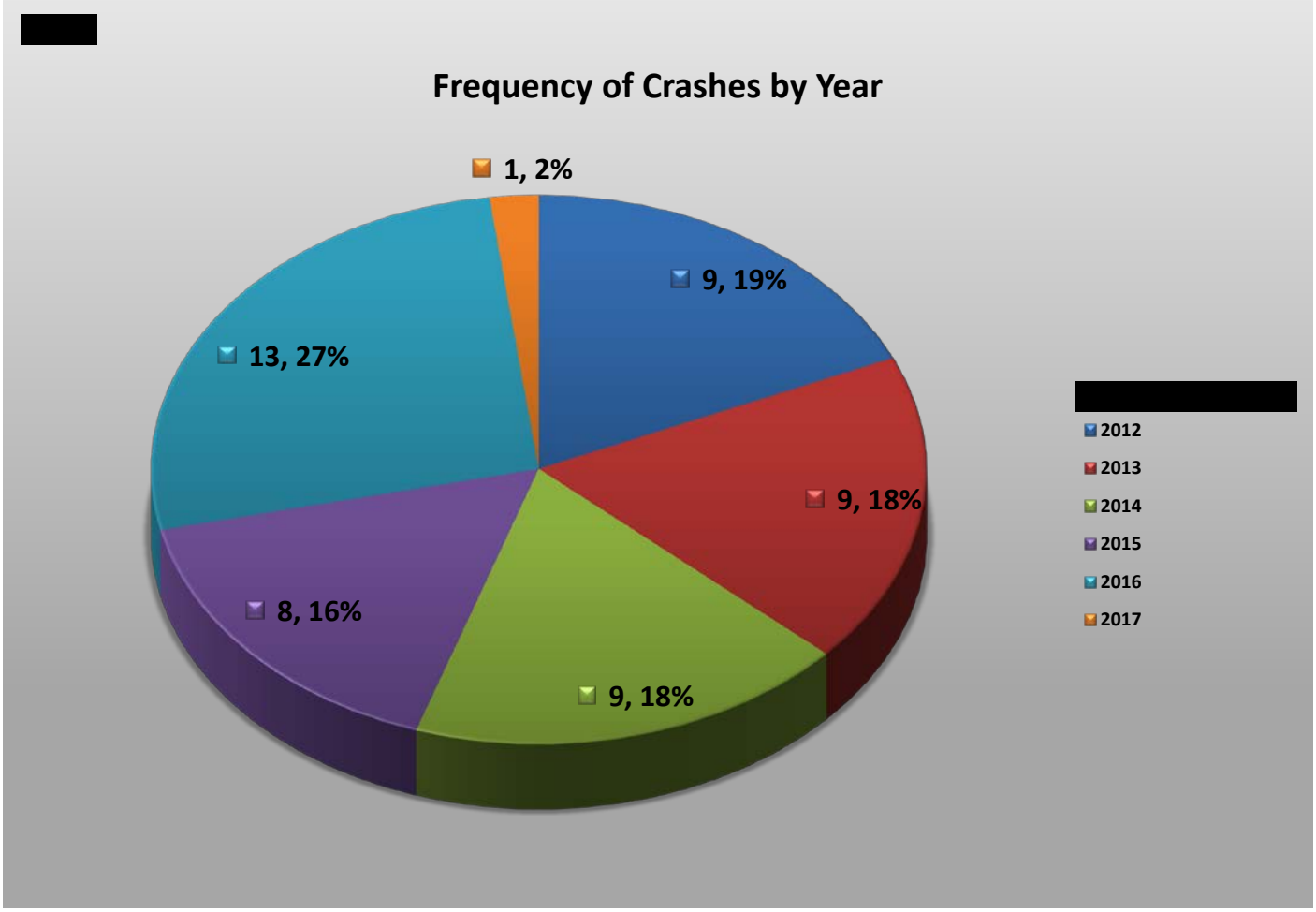
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701328883	17	12	02	02	Sat	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.42000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD
201601010901	16	01	02	20	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.17000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				PD
201601052765	16	02	26	17	Fri	2	2	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	B-Injury
201601052742	16	02	26	23	Fri	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	Off Pavement - Right				PD
201601043801	16	02	14	16	Sun	1	0	0	Fixed Object	Clear	Daylight	Snow or Slush		No Controls	1.65000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				PD
201601105592	16	05	06	12	Fri	1	1	0	Fixed Object	Clear	Daylight	Dry	Worn Surface	No Controls	0.93000000000	Normal	Motorcycle (Over 150cc)	Northwest	Skidding/Control Loss	Off Pavement - Right				B-Injury
201601139230	16	06	20	09	Mon	1	0	0	Fixed Object				No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Motor Driven Cycle	South	Unknown	Off Pavement - Right				PD
201601140580	16	06	21	15	Tue	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Slow/Stop In Traffic	On Pavement (Roadway)	Passenger	Northeast	Slow/Stop - Right Turn	PD
201601177807	16	08	03	20	Wed	1	1	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.50000000000	Normal	Motorcycle (Over 150cc)	East	Skidding/Control Loss	Off Pavement - Left				A-Injury
201601169108	16	07	22	16	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Slow/Stop In Traffic	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201601243529	16	10	12	23	Wed	1	0	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Passenger	North	Straight Ahead	Off Pavement - Right				PD
201601211488	16	09	09	12	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	B-Injury
201601282695	16	11	23	08	Wed	1	0	0	Animal	Rain	Daylight	Wet	No Defects	No Controls	0.47000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)				PD
201601245693	16	10	19	06	Wed	2	0	0	Rear End	Clear	Darkness, Lighted Road	Wet	No Defects	Other	0.00000000000	Normal	Van/Mini-Van	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	PD
201501022190	15	01	20	01	Tue	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Alcohol Impaired	Passenger	North	Straight Ahead	Other				PD
201501022180	15	01	25	07	Sun	1	0	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	0.25000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Left				PD
201501058333	15	03	18	20	Wed	1	1	0	Overturned	Rain	Darkness	Wet	No Defects	No Controls	1.45000000000	Normal	Passenger	West	Skidding/Control Loss	Off Pavement - Right				B-Injury
201501073186	15	04	15	17	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Straight Ahead	On Pavement (Roadway)	SUV	North	Slow/Stop In Traffic	PD
201501134506	15	07	12	04	Sun	1	1	0	Fixed Object	Clear	Darkness	Dry	Worn Surface	No Controls	1.89000000000	Fatigued	Passenger	East	Skidding/Control Loss	Off Pavement - Left				A-Injury
201501215510	15	10	14	09	Wed	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	1.45000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				A-Injury
201501264619	15	11	30	16	Mon	2	0	0	Turning	Rain	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	Southeast	Turning Right	On Pavement (Roadway)	Pickup	North	Slow/Stop - Left Turn	PD
201501225902	15	10	23	22	Fri	1	1	0	Overturned	Clear	Darkness	Dry	No Defects	No Controls	0.05000000000	Alcohol Impaired	Passenger	East	Skidding/Control Loss	Off Pavement - Right				B-Injury
201400007289	14	01	07	13	Tue	2	0	0	Rear End	Clear	Daylight	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Tractor With Semi-Trailer	North	Starting In Traffic	On Pavement (Roadway)	Passenger	North	Starting In Traffic	PD
201400223131	14	04	19	19	Sat	2	2	0	Turning	Clear	Dusk	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	Northwest	Turning Left	On Pavement (Roadway)	Passenger	East	Straight Ahead	B-Injury
201400247364	14	05	21	13	Wed	2	0	0	Turning	Clear	Daylight	Dry	No Defects		0.42000000000	Normal	Passenger	East	Passing/Overtaking	On Pavement (Roadway)	Passenger	North	Turning Left	PD
201400307161	14	06	10	17	Tue	3	0	0	Rear End	Clear	Dusk	Dry	No Defects	No Controls	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Straight Ahead	PD
201400211245	14	04	10	02	Thu	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.74000000000	Normal	Passenger	East	Turning Left	Other				PD
201400362174	14	07	25	19	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Pickup	Northwest	Turning Left	Intersection	Passenger	South	Turning Left	PD
201400287001	14	08	21	16	Thu	1	1	0	Fixed Object	Clear	Daylight	Other	No Defects	No Controls	1.43000000000	Normal	Passenger	West	Straight Ahead	Off Pavement - Right				B-Injury
201400362647	14	12	24	18	Wed	2	0	0	Rear End	Clear	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201400395850	14	09	20	16	Sat	2	0	0	Turning	Clear	Daylight	Dry	No Defects	No Controls	1.94000000000	Normal	Passenger	East	Turning Right	On Pavement (Roadway)	Pickup	West	Straight Ahead	PD
201301145660	13	06	29	22	Sat	1	2	0	Fixed Object	Rain	Darkness	Wet	No Defects	No Controls	0.76000000000	Normal	Passenger	West	Skidding/Control Loss	Off Pavement - Right				A-Injury
201301119183	13	04	17	15	Wed	4	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.00000000000	Normal	Pickup	West	Straight Ahead	Other	Passenger	West	Straight Ahead	A-Injury
201301049812	13	01	14	16	Mon	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	1.43000000000	Normal	SUV	East	Avoiding Vehicle/Objects	Off Pavement - Left				B-Injury
201301161955	13	07	30	21	Tue	1	0	0	Fixed Object	Rain	Darkness	Wet	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Pickup	East	Avoiding Vehicle/Objects	Off Pavement - Right				PD
201301149870	13	07	26	19	Fri	1	1	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	0.42000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				C-Injury
201301081639	13	04	18	15	Thu	1	0	0	Fixed Object	Rain	Daylight	Wet	No Defects	No Controls	1.42000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Left				PD
201301268751	13	07	13	05	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	North	Straight Ahead	Other				PD
201301251095	13	06	26	15	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	SUV	North	Starting In Traffic	On Pavement (Roadway)	Passenger	North	Slow/Stop In Traffic	PD
201301380360	13	11	03	00	Sun	1	1	0	Other Non-Collision	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Other/Unknown	Pickup	North	Straight Ahead	Other				B-Injury

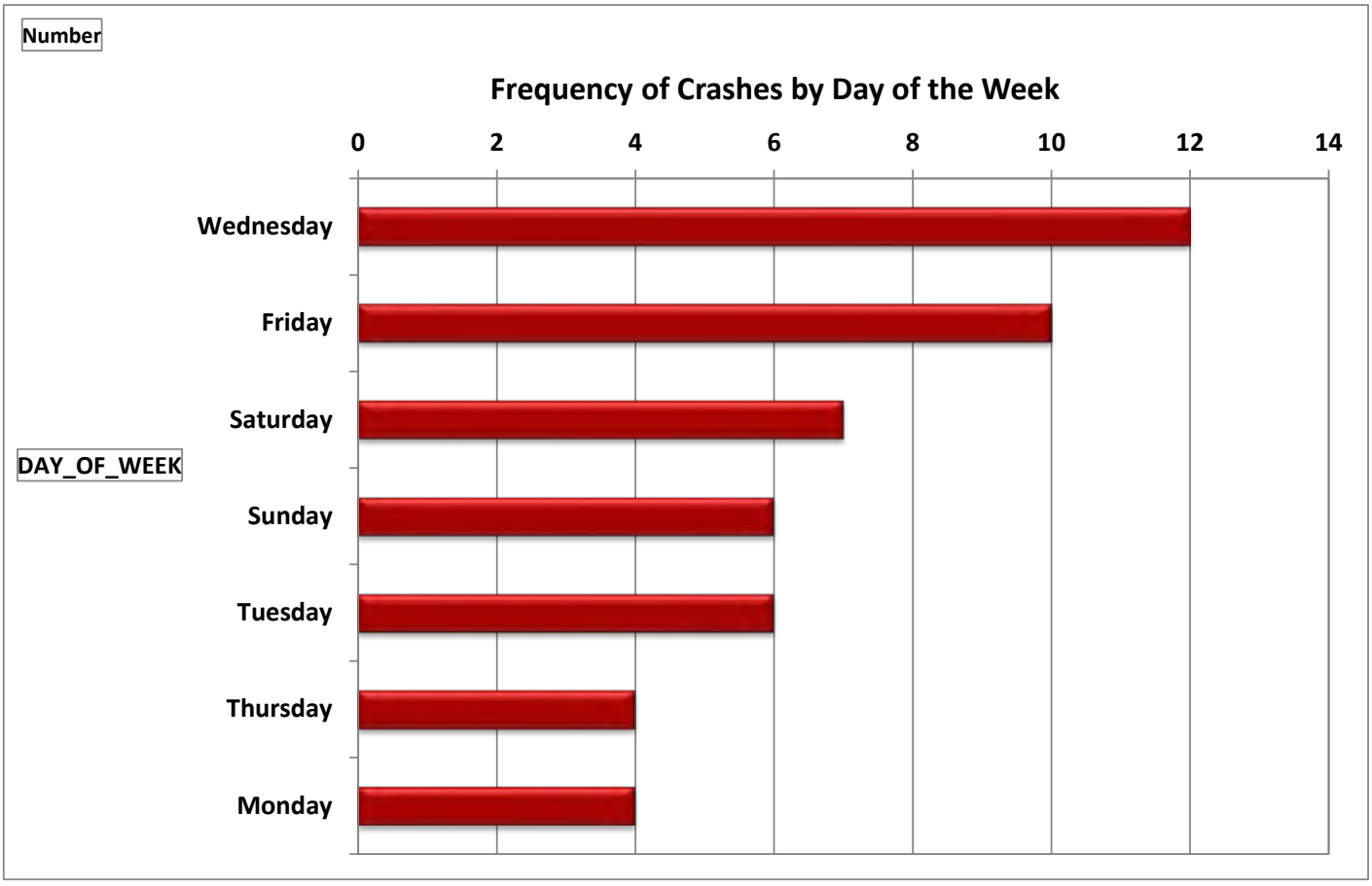
Link 01


Number
Frequency of Crashes by Severity
21, 43%
28, 57%
CRASH_SEVERITY
Injury Crash
Property Damage Crash


SEVERITY
Frequency of Crashes by Year and Severity
10
9
8
7
6
5
4
3
2
1
0
2012
2013
2014
2015
2016
2017
CRASH_SEVERITY
Property Damage Crash
Injury Crash
TRAFFIC_CRASH_YEAR

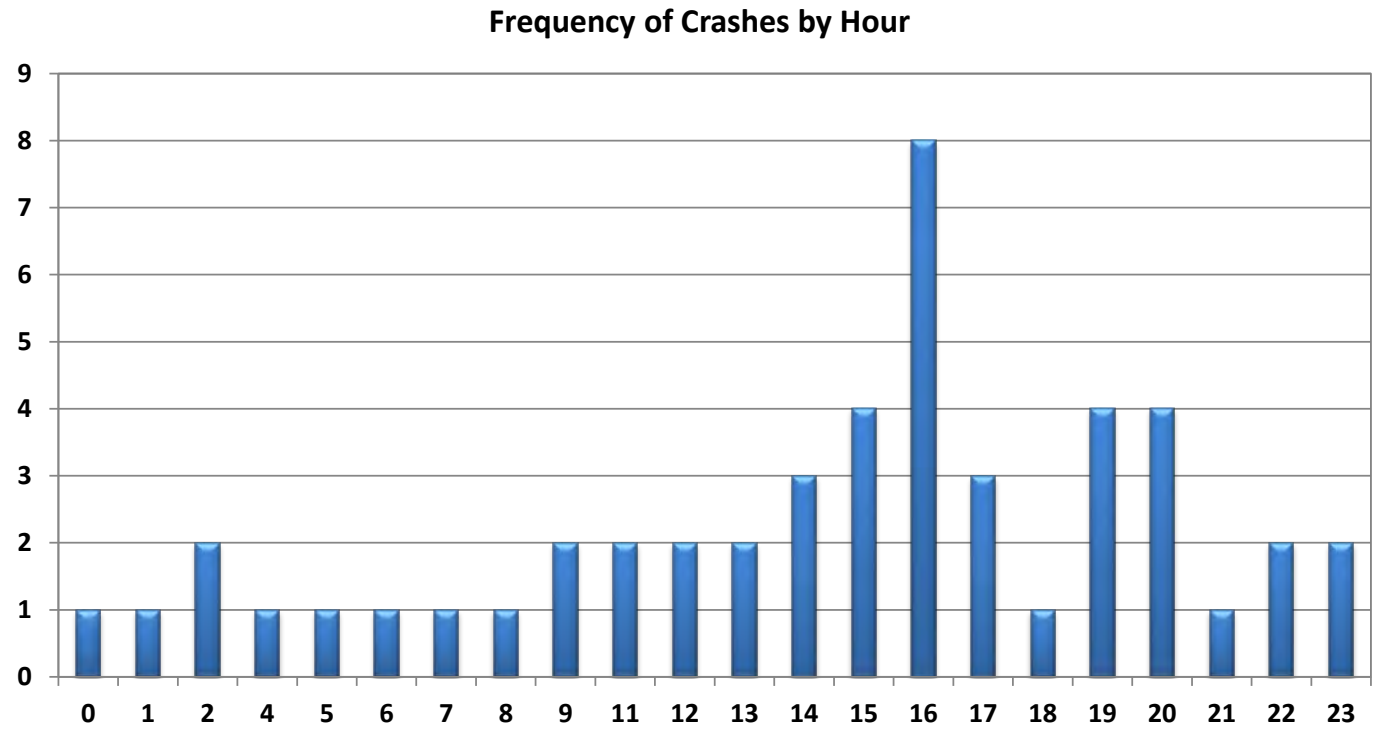
Link 01


Frequency of Crashes by Year
1, 2%
9, 19%
13, 27%
9, 18%
8, 16%
9, 18%
2012
2013
2014
2015
2016
2017

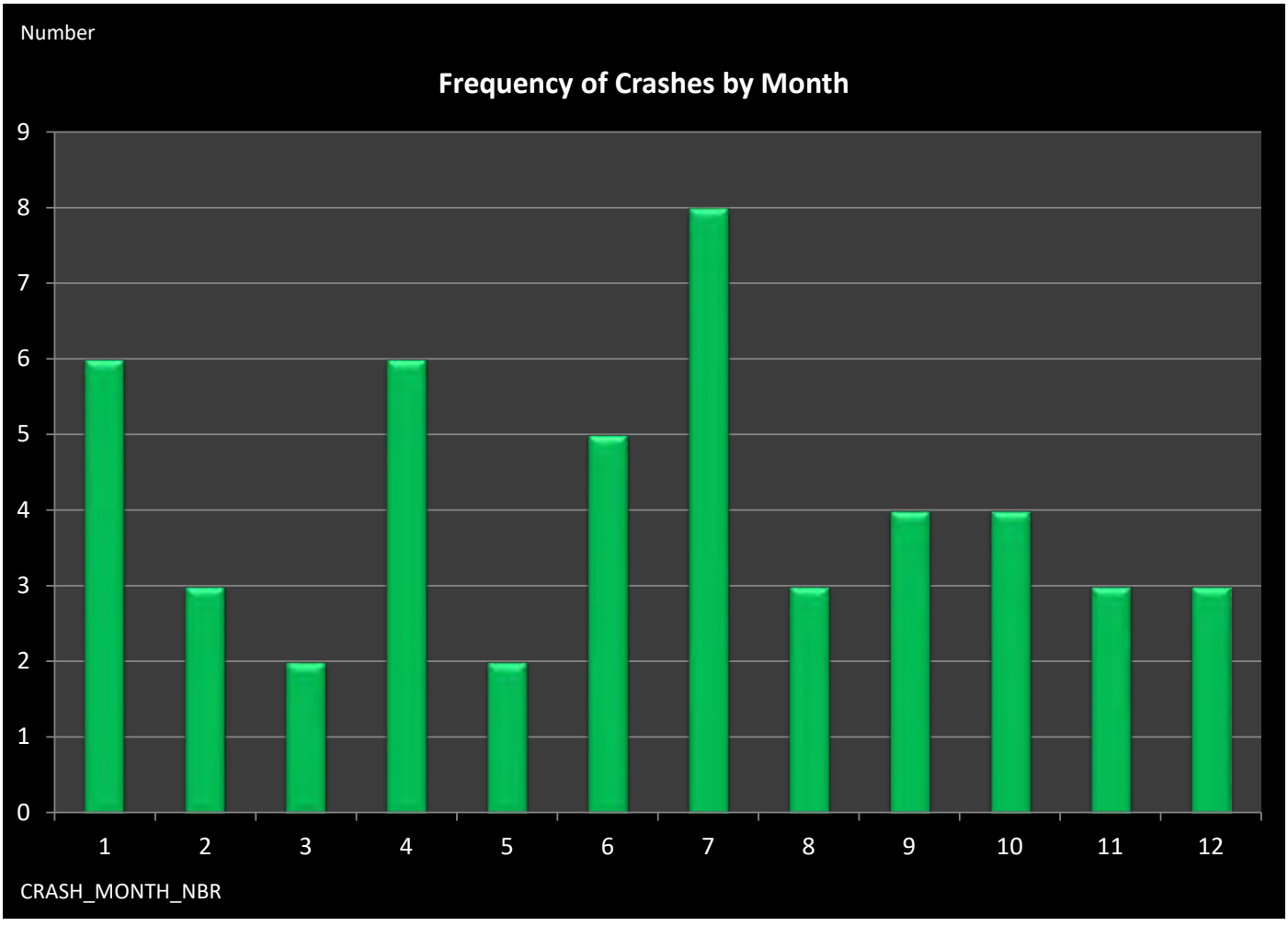

Number
Frequency of Crashes by Day of the Week
0
2
4
6
8
10
12
14
Wednesday
Friday
Saturday
DAY_OF_WEEK
Sunday
Tuesday
Thursday
Monday

Link 01

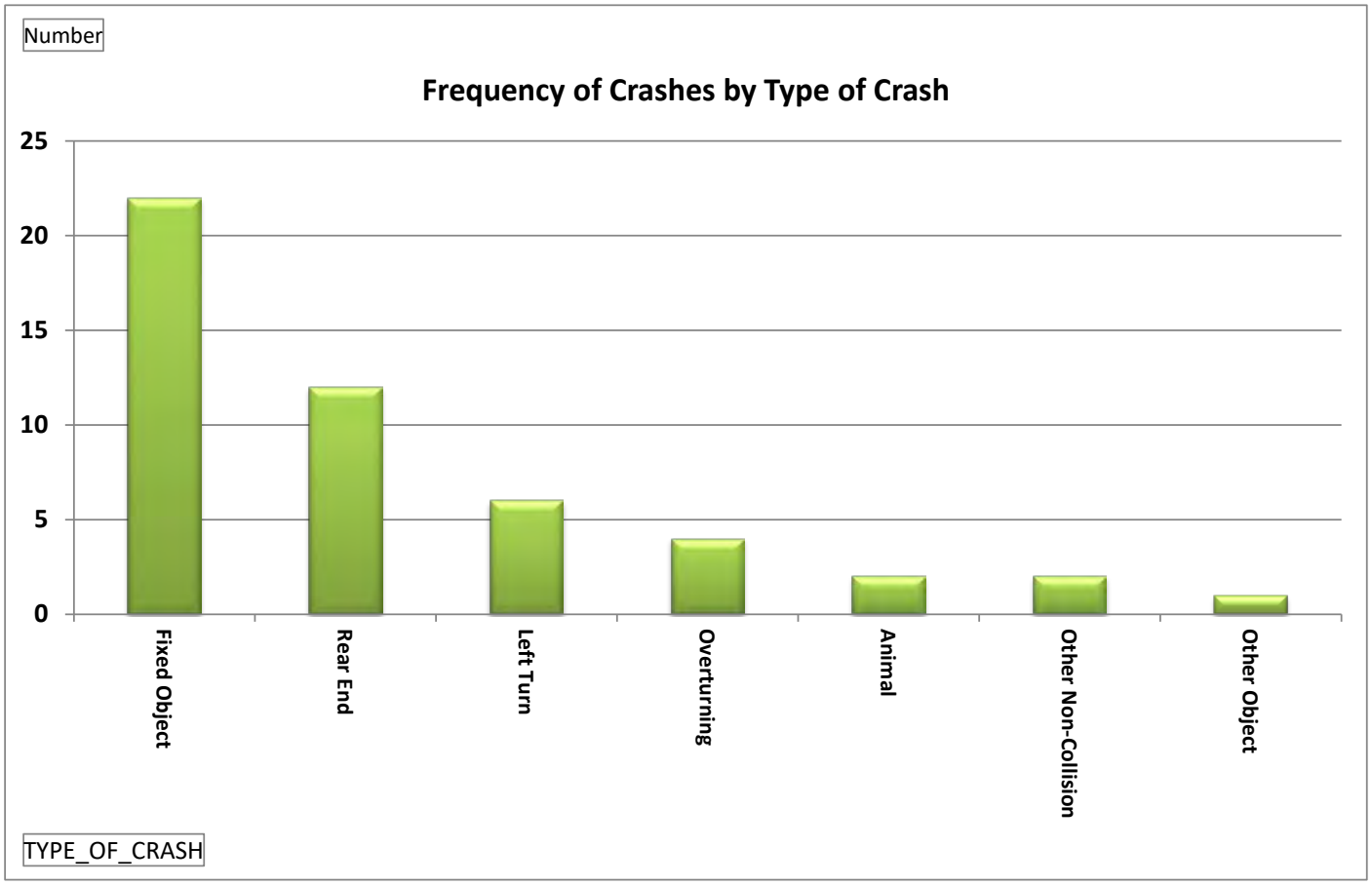
[redacted]

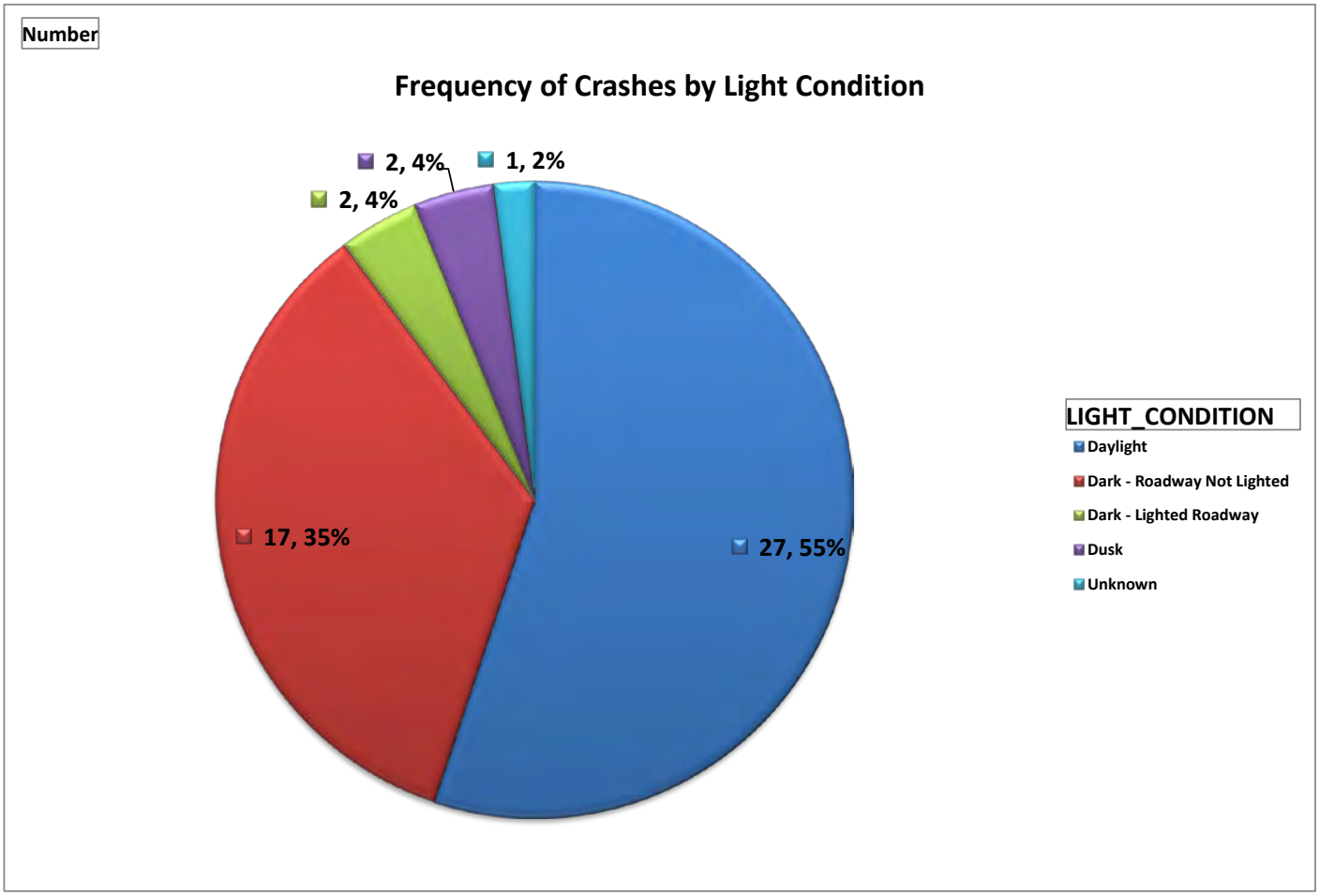


[redacted]

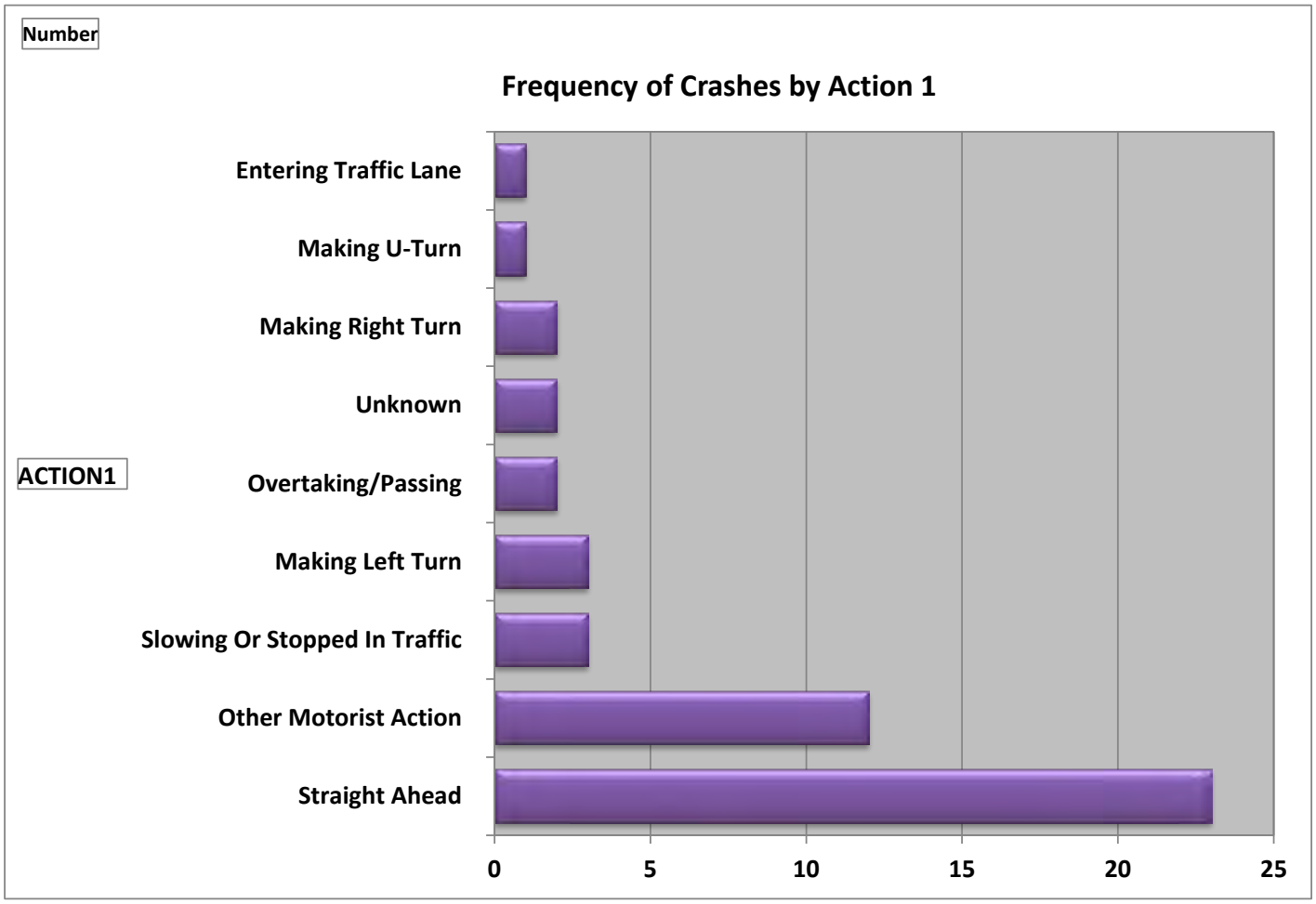


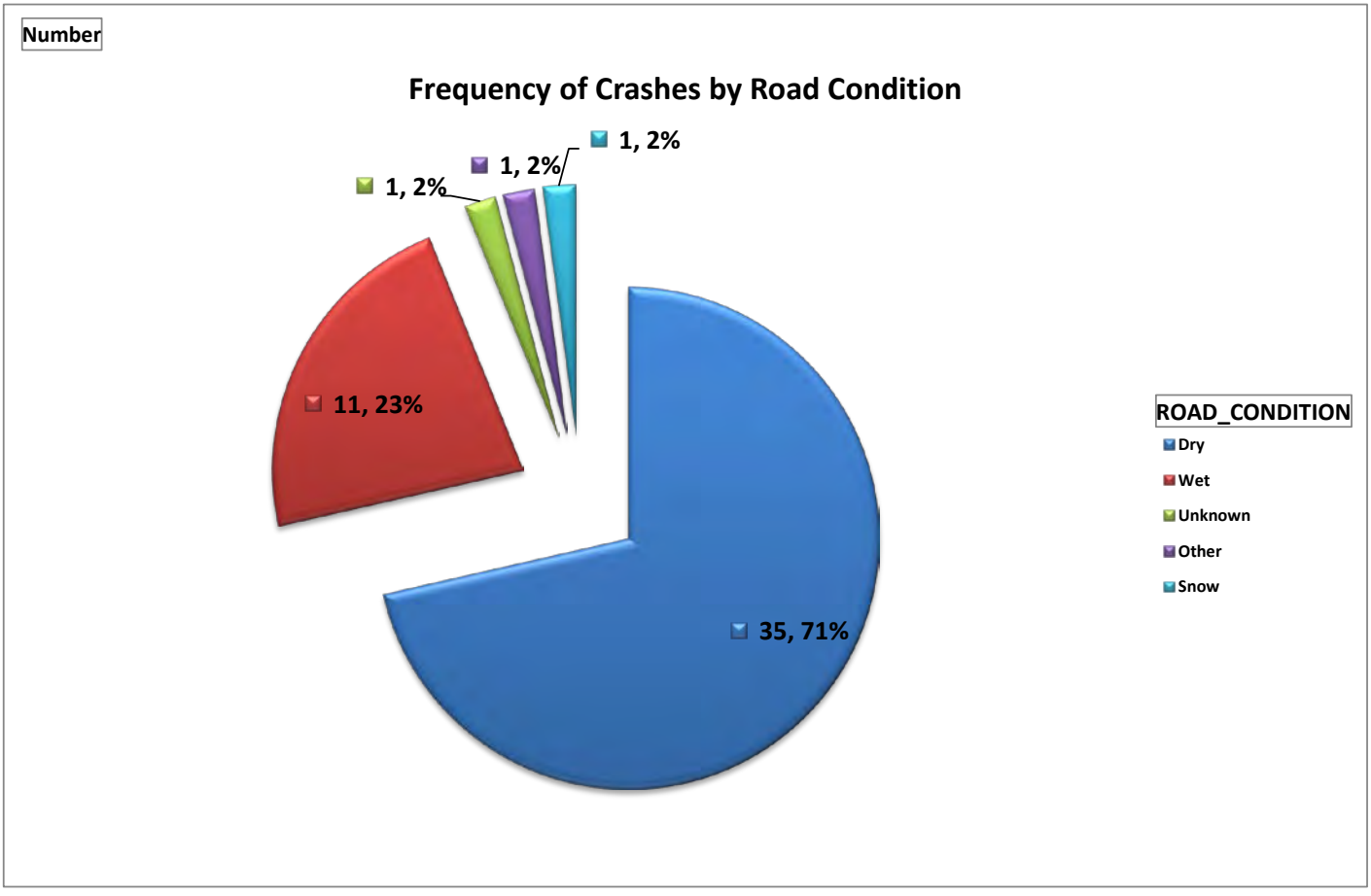
Link 01


Number
Frequency of Crashes by Type of Crash
25
20
15
10
5
0
Fixed Object
Rear End
Left Turn
Overturning
Animal
Other Non-Collision
Other Object
TYPE_OF_CRASH

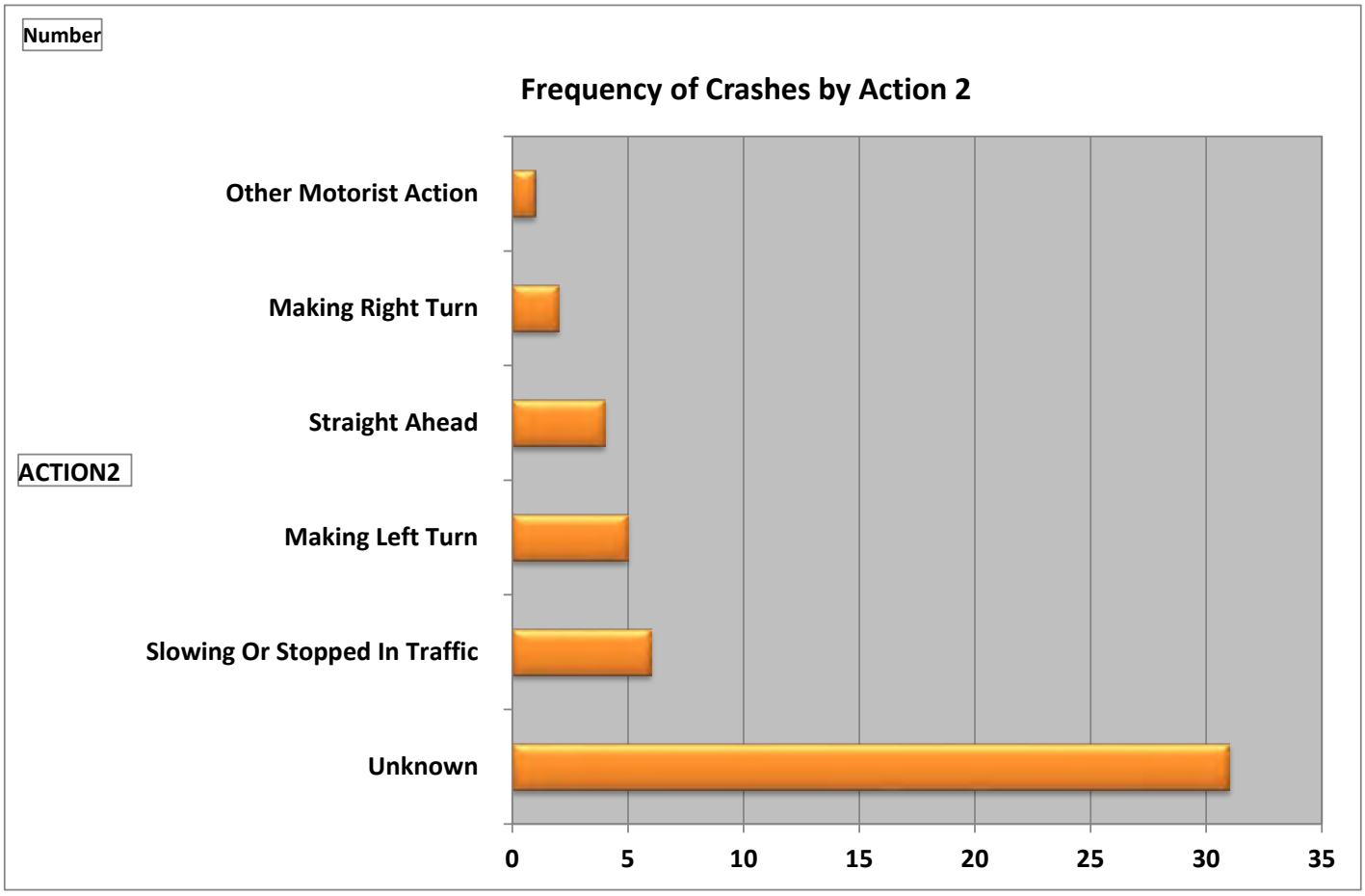

Number
Frequency of Crashes by Light Condition
2, 4%
1, 2%
2, 4%
17, 35%
27, 55%
LIGHT_CONDITION
Daylight
Dark - Roadway Not Lighted
Dark - Lighted Roadway
Dusk
Unknown

Link 01


Number
Frequency of Crashes by Action 1
Entering Traffic Lane
Making U-Turn
Making Right Turn
Unknown
Overtaking/Passing
Making Left Turn
Slowing Or Stopped In Traffic
Other Motorist Action
Straight Ahead
ACTION1
0
5
10
15
20
25


Number
Frequency of Crashes by Road Condition
1, 2%
1, 2%
1, 2%
11, 23%
35, 71%
ROAD_CONDITION
Dry
Wet
Unknown
Other
Snow

Link 01


Number
Frequency of Crashes by Action 2
Other Motorist Action
Making Right Turn
Straight Ahead
ACTION2
Making Left Turn
Slowing Or Stopped In Traffic
Unknown
0
5
10
15
20
25
30
35

SIMPO Safety Study

APPENDIX B2: E. PLEASANT HILL ROAD (CARBONDALE TWP/JACKSON CO)

CMT

E Pleasant Hill Road (Wall Street to Warren Road)

Segment Priority #2

June 2019

INTRODUCTION

The segment of East Pleasant Hill Road located within Carbondale Township/Jackson County was identified as the 2nd ranked segment within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The segment length of 0.80 miles is located between log points 1.56 (Wall Street) and 2.36 (Warren Road).

EXISTING CONDITIONS

E. Pleasant Hill Road is a county route in Carbondale Township/Jackson County providing east/west connectivity between Giant City Road and US Route 51. Land use is a mix between residential and undeveloped parcels. About 30 residential driveways exist within the 0.80 mile length of the study area. Items of interest are shown on a study area map (**Figure 1**):

1. An arboretum is located on the south leg of the Wall Street intersection
2. A school is located on the south side of E. Pleasant Hill Road (east of Wall Street). A special/custom sign combination of Do Not Pass and the school speed zone sign are posted 300 feet in advance of the school (**Photo 1**).
3. The Warren Road intersection is a 3-way stop controlled intersection. Benz Road is a private driveway that forms a 4th leg. Vertical curves exist on the Warren Road approach and the WB E Pleasant Hill Road approach **(Photo 2**). Stop Ahead signs exist on Warren Road about 500 feet in advance of the intersection.

FIGURE 1: STUDY AREA

PHOTO 1: WB SCHOOL SPEED LIMIT SIGN

PHOTO 2: EB E. PLEASANT HILL ROAD AT WARREN ROAD

E. Pleasant Hill Road is a curbed roadway having an overall width of 31 feet from back to back of curb. A double yellow centerline is the primary pavement marking with the exception of the westbound approach to Wall Street -- a second westbound lane and a painted median is added to shadow an opposing left-turn lane (**Photo 3**). The eastbound approach of the E. Pleasant Hill and Wall Street intersection has an exclusive left-turn lane and a through lane.

The Wall Street approach has 2 lanes – an exclusive left and right-turn lane. Wall Street is stop controlled whereas E. Pleasant Hill Road has right of way. The stop line for the southbound right turn is set forward of the intersection as shown in **Photo 4**. The intersection was signalized at one time, but all equipment has been removed except for the pedestal mounted controller in the NE quadrant.

PHOTO 3: WB E. PLEASANT HILL ROAD AT WALL STREET

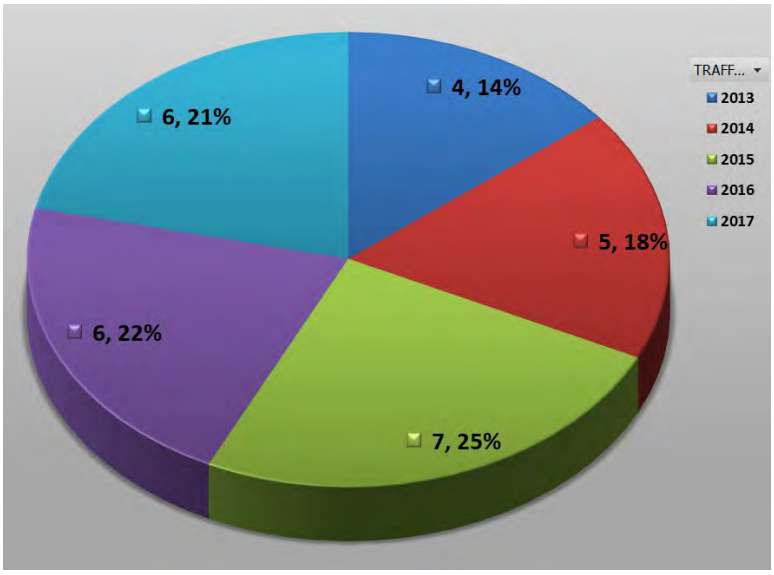
PHOTO 4: WALL STREET STOP LINE (RIGHT LANE ONLY)

The posted speed limit on E. Pleasant Hill Road, Warren Road, and Wall Street is 30 miles per hour within the study area. The speed limit is 20 miles per hour within a 600 ft segment near the Wall Street intersection. Field observations noted operating speeds are higher than the posted speed limit.

SAFETY ANALYSIS

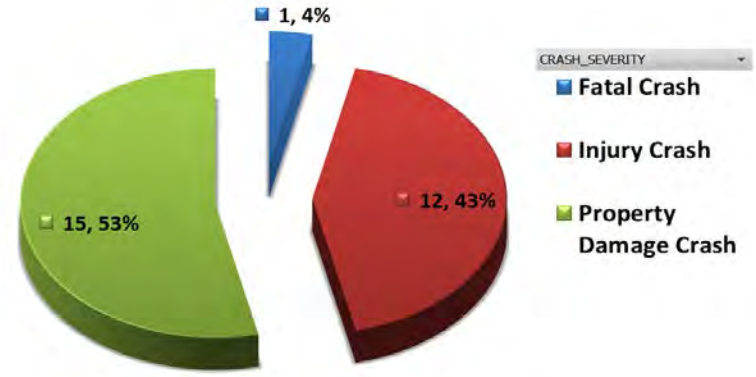
A total of 28 crashes occurred within the study area over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**. The crash frequency is distributed evenly across all study years indicating that the normal variation of crashes over time does not occur within the study area.

FIGURE 2: FREQUENCY OF CRASHES BY YEAR



The severity of crashes on **Figure 3** shows that a fatal crash occurred at the E. Pleasant Hill Road and Warren Road intersection. The single vehicle crash occurred on Sunday, July 9, 2017 and involved a pickup truck traveling eastbound on E. Pleasant Hill Road. After hitting a wood utility pole on the NW quadrant of the intersection, the vehicle collided with a parked car in a driveway of an adjacent residence.

FIGURE 3: FREQUENCY OF CRASHES BY YEAR



The fatal and injury crashes within the study area represent 47 percent of the total crashes. The injury crashes comprise 19 Type B crashes. The percentage of injury crashes are even higher if the data is limited to 3 years: 12 of the 19 crashes between 2015 and 2017 were injury crashes (63 percent).

Figure 4 shows the distribution of crashes within the study area by severity. A total of 8 crashes occurred at the Wall Street and E. Pleasant Hill Road intersection which included 3 injury crashes (3-Type B crashes, 5 PDO crashes). The highest percentage of injury crashes occurred at 2 locations between Wall Street and Warren Road:

- Log point 1.66 to 1.86: 50% injury crashes. Intersections within this segment include Oak Hills Lane, Black Lane, and Frost Drive.
- Log point 2.06 to 2.16 (5 crashes): 80% injury crashes. Blackjack Trail provides access to the Pleasant Hill mobile home park (south side of road). Pleasant Woods is an access to several single family homes located on the north side of the road.

Figure 5 shows the severity of crashes by location and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are northbound crashes. **Figure5** indicates that rear end crashes occur in both directions near the Blackjack Trail intersection.

FIGURE 4: LOCATION FREQUENCY BY SEVERITY

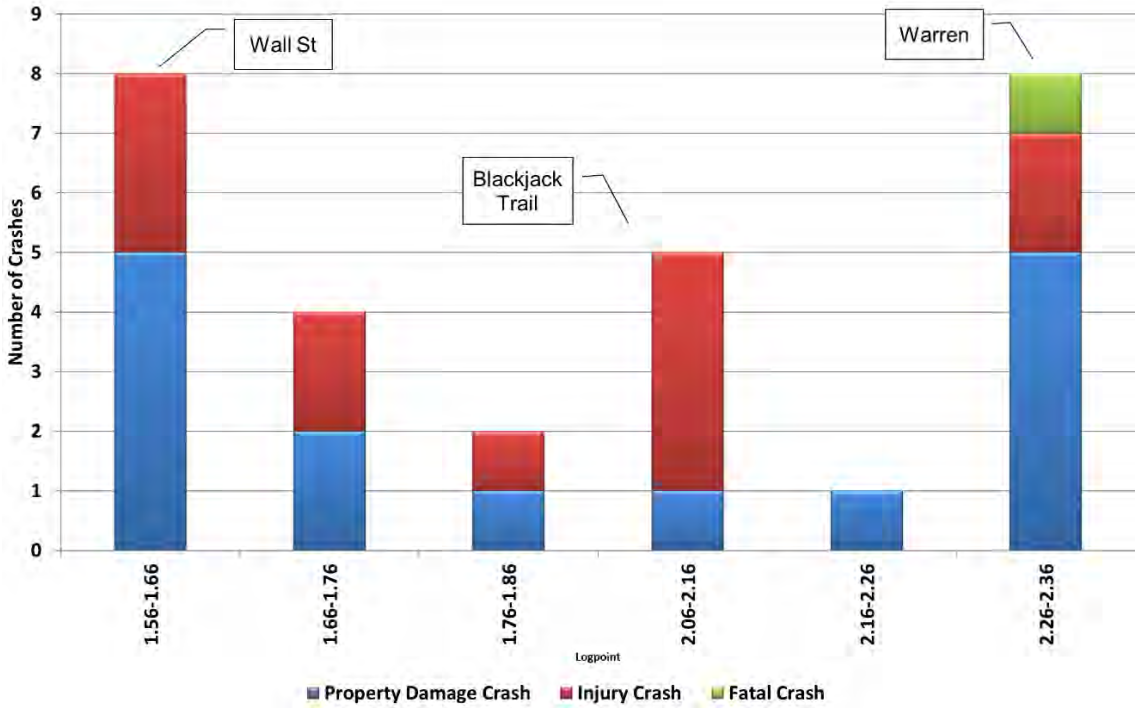


FIGURE 5: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE

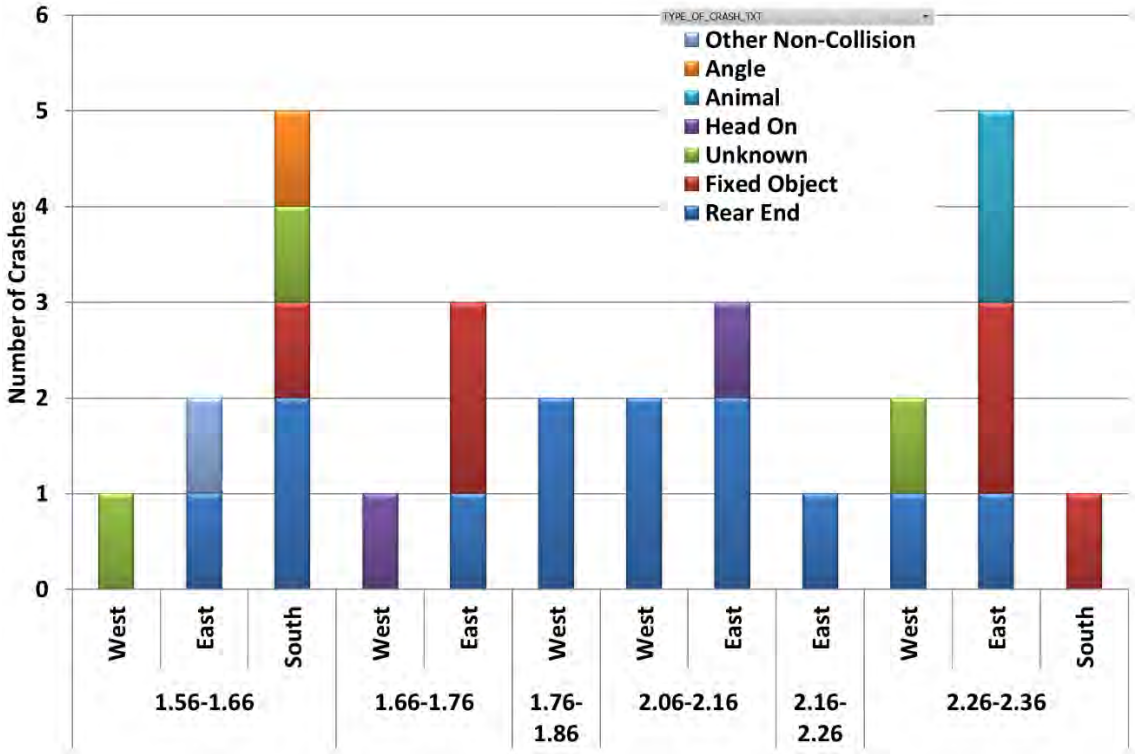


Figure 6 shows the location and severity of crashes plotted on an aerial map of the study area.

FIGURE 6: CRASH SEVERITY AND LOCATION MAP

The crashes' frequency by time of day suggests that congestion is not a contributing factor to the safety performance of the study area. **Figure 7** shows the distribution by time of day. Similarly, crashes by day of week (**Figure 8**) do not suggest peak hour congestion as a contributing factor – crashes on Sunday and Saturday are as frequent as crashes during a weekday.

FIGURE 7: FREQUENCY OF CRASHES BY HOUR

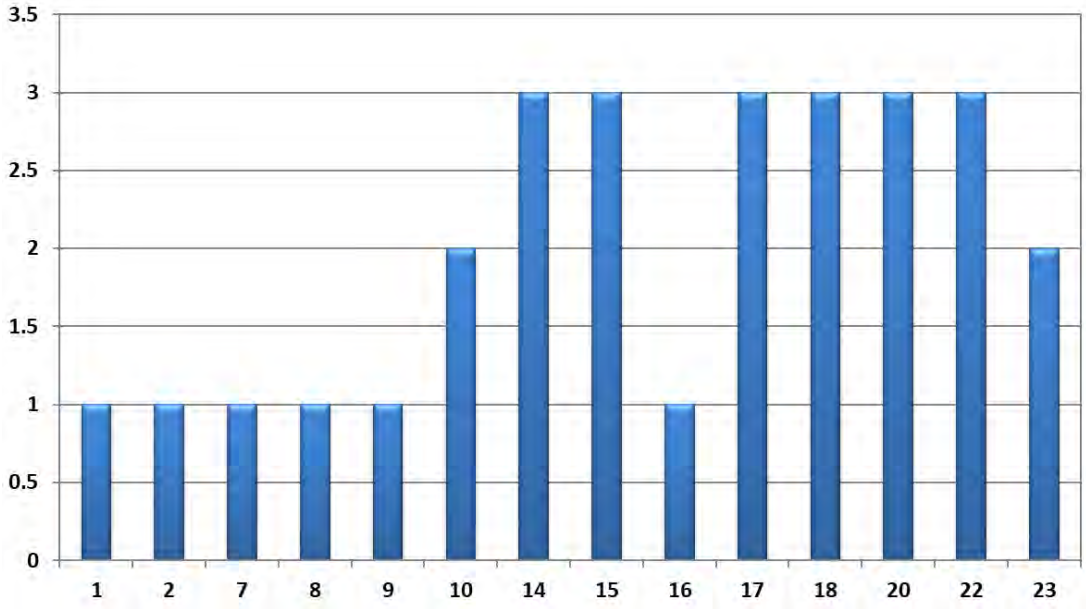
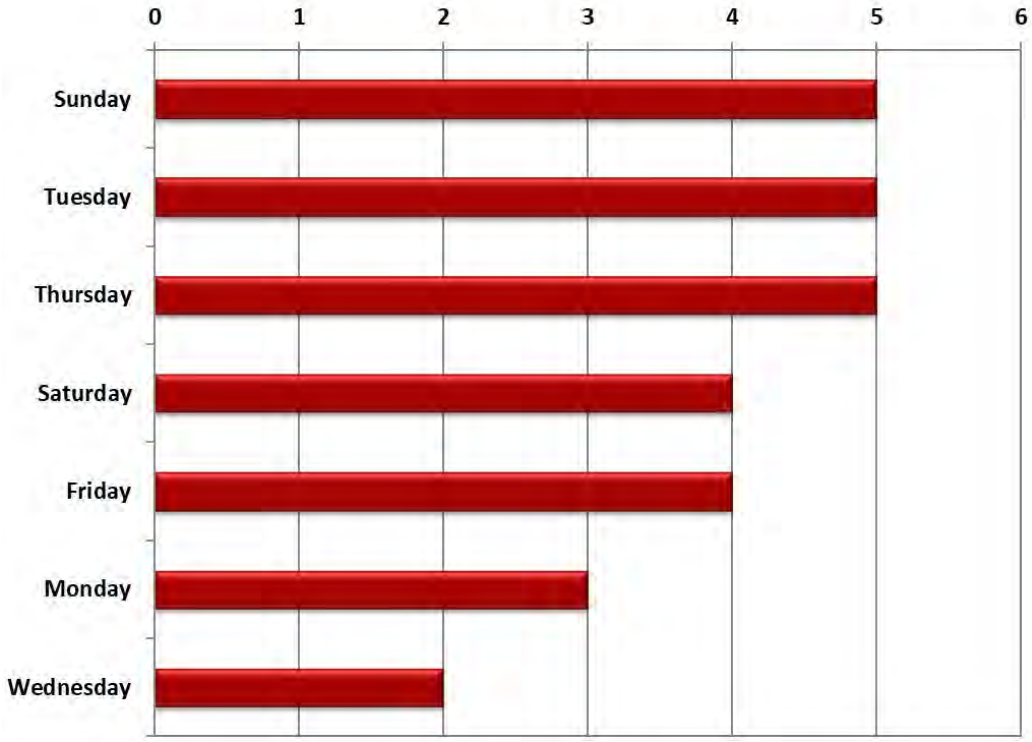


FIGURE 8: FREQUENCY OF CRASHES BY DAY OF WEEK



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – WALL STREET INTERSECTION

The majority of crashes occurred on the southbound approach of Wall Street. Reducing the size of the intersection is proposed by channelizing right turn movements on the southbound and westbound approaches. The channelized right turn movements provide the following benefits:

- Reduces delay to southbound traffic on Wall Street. The southbound right turn movement would operate as a free flow or yield movement.
- Delays on E. Pleasant Hill Road are not affected. The additional lane functions as a defacto right turn lane.
- Vehicles in the adjacent turn lanes on the Wall Street approach restrict intersection sight distance. The channelized islands would increase visibility of left turning vehicles from Wall Street to eastbound E. Pleasant Hill Road.

Figure 9 shows a schematic plan of the proposed improvements to the E. Pleasant Hill Road and Wall street intersection. Dual stop signs can be mounted on the raised medians for the Wall Street approach. Yield signs can be installed for the westbound right turn movement on E. Pleasant Hill Road.

FIGURE 8: WALL STREET COUNTERMEASURE

SHORT TERM COUNTERMEASURE – WARREN ROAD AT E. PLEASANT HILL ROAD

A total of 8 crashes occurred at the Warren Road and E. Pleasant Hill Road intersection. The majority of crashes (6 crashes) were rear end crashes and fixed object crashes (3 crashes) distributed on all 3 approaches to the intersection. Three short term countermeasures are proposed at the subject intersection:

- Relocate the Stop Ahead sign (W3-1) signs no more than 175 feet in advance of the intersection to be consistent with Table 2C-4 of the Manual of Uniform Traffic Control Devices (MUTCD). Existing signs are located 500 feet in advance of the intersection. Section 2C.05 emphasizes that signs not be placed too far in advance of an intersection.

Table 2C-4. Guidelines for Advance Placement of Warning Signs

Posted or 85th-Percentile Speed	Advance Placement Distance[1]								
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]
20 mph	225 ft	100 ft[6]	N/A[5]	—	—	—	—	—	—
25 mph	325 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
30 mph	460 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
35 mph	565 ft	100 ft[6]	N/A[5]	N/A[5]	N/A[5]	—	—	—	—
40 mph	670 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—	—
45 mph	775 ft	175 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft[6]	—	—	—
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A[5]	—	—
60 mph	1,100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft[6]	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft[6]	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft[6]

- Relocate the stop line on the Warren Road approach to be 20 feet from edge of E. Pleasant Hill Road. Start up times are increased and turning movements better accommodated with the change. Sight distance is adequate for a stop condition on all 3 approaches.

- Add a stop sign to the Benz Road approach

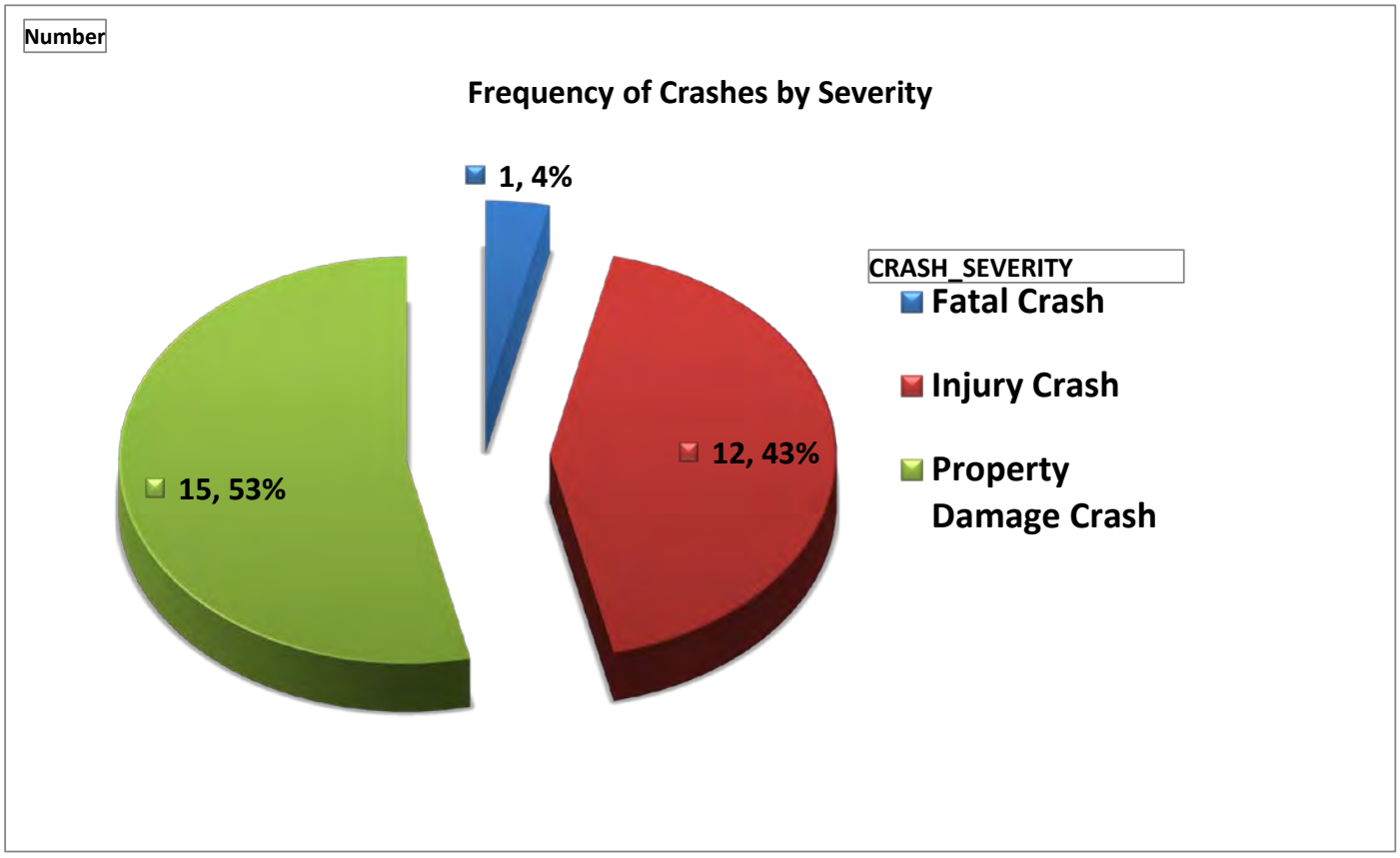
SHORT TERM COUNTERMEASURE –E. PLEASANT HILL ROAD

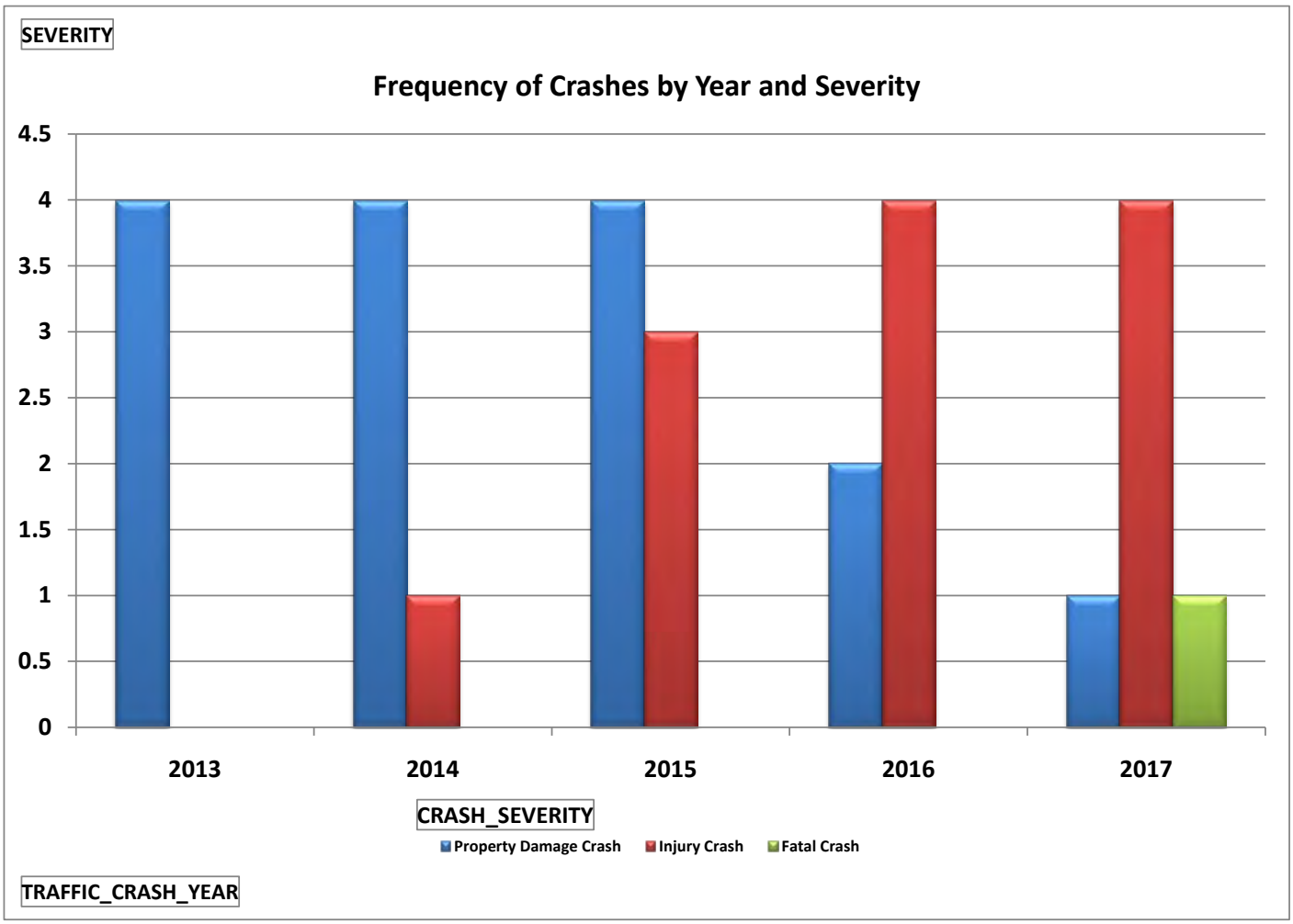
E. Pleasant Hill Road is a wide 2-lane roadway (13 ft lanes plus 2 ft shoulder) with numerous driveways and side streets. Turning movements are common from the shared lanes. Operating speeds are likely above the posted speed limit of 30 miles per hour resulting in higher-speed rear-end crashes or fixed object crashes attributed to motorists attempting to avoid stopped traffic.

A painted median is proposed on E. Pleasant Hill Road to reduce operating speeds – including a 6 ft median and 10 ft lane widths adjacent to the curb/gutter section. FHWA documentation has found this to reduce fatal crashes on rural and urban roads by 20 percent. A total of 12 crashes (7 injury) crashes would be mitigated by this countermeasure.

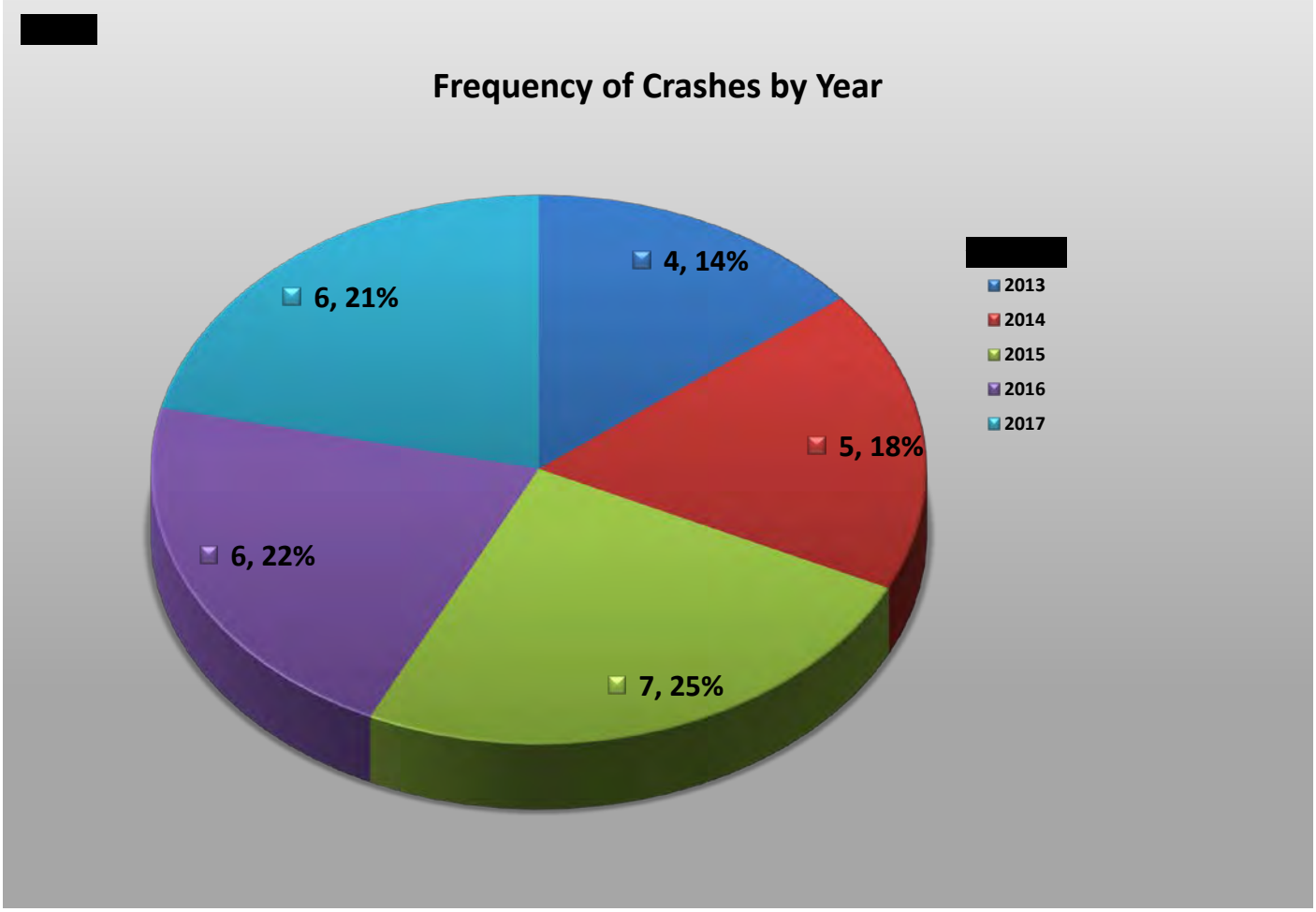
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701043568	17	02	17	10	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	2.33000000000	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Straight Ahead	B-Injury
201701304527	17	11	05	17	Sun	2	3	0	Head On	Clear	Dusk	Wet	No Defects	No Controls	2.10000000000	Normal	Pickup	East	Driving Wrong Way	On Pavement (Roadway)	SUV	West	Straight Ahead	A-Injury
201701187475	17	07	09	22	Sun	2	0	1	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	2.33000000000	Other	Pickup	East	Other	Off Pavement - Left	Passenger	East	Parked	Fatal
201701312636	17	11	19	20	Sun	2	2	0	Rear End	Clear	Darkness	Dry	No Defects	No Controls	2.10000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	B-Injury
201701272749	17	10	17	15	Tue	4	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	2.19000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201701338543	17	12	15	15	Fri	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	1.77000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	C-Injury
201601103858	16	05	07	23	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	1.70000000000	Drug Impaired	Passenger	East	Skidding/Control Loss	Off Pavement - Left				PD
201601157563	16	07	08	10	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	1.72000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop - Right Turn	PD
201601227197	16	09	21	20	Wed	2	3	0	Rear End	Clear	Darkness	Dry	No Defects	No Controls	2.09000000000	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Pickup	East	Slow/Stop In Traffic	B-Injury
201601224720	16	09	15	01	Thu	1	1	0	Other Non-Collision	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	1.64000000000	Alcohol Impaired	Pickup	East	Skidding/Control Loss	On Pavement (Roadway)				A-Injury
201601265448	16	11	07	18	Mon	1	1	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	1.72000000000	Illness	Passenger	East	Backing	Off Pavement - Right				B-Injury
201601406535	16	06	09	17	Thu	2	1	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	1.56000000000	Normal	Passenger	South	Straight Ahead	Intersection	Motorcycle (Over 150cc)	West	Straight Ahead	A-Injury
201501039208	15	01	15	08	Thu	1	0	0	Fixed Object	Snow	Daylight	Snow or Slush		Stop Sign/Flasher	2.33000000000	Other/Unknown	Passenger	East	Slow/Stop In Traffic	On Pavement (Roadway)				PD
201501280667	15	04	06	14	Mon	2	0	0	Rear End	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	2.33000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Right Turn	PD
201501303672	15	05	02	22	Sat	2	1	0	Head On	Clear	Darkness	Dry	No Defects	No Controls	1.72000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	B-Injury
201501255134	15	03	12	14	Thu	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	1.56000000000	Normal	Passenger	West	Passing/Overtaking	Intersection	Passenger	South	Turning Left	PD
201501305554	15	05	19	16	Tue	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	2.11000000000	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	C-Injury
201501305463	15	05	02	23	Sat	2	0	0	Rear End	Clear	Darkness	Dry	No Defects	Lane Use Marking	1.83000000000	Normal	SUV	West	Backing	On Pavement (Roadway)	Passenger	Unknown	Slow/Stop In Traffic	PD
201501338843	15	08	04	15	Tue	2	1	0	Rear End	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	1.56000000000	Normal	Passenger	South	Slow/Stop In Traffic	Intersection	Passenger	South	Slow/Stop In Traffic	C-Injury
201400067965	14	01	07	07	Tue	2	0	0	Turning	Clear	Daylight	Snow or Slush	No Defects	Stop Sign/Flasher	1.56000000000	Normal	Passenger	South	Turning Right	On Pavement (Roadway)	Pickup	West	Straight Ahead	PD
201400095563	14	02	02	14	Sun	2	0	0	Rear End	Snow	Daylight	Snow or Slush	No Defects	No Controls	1.56000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	PD
201400096261	14	02	03	18	Mon	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	2.33000000000	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)				PD
201400283916	14	05	28	22	Wed	1	3	0	Fixed Object	Clear	Darkness, Lighted Road	Dry	No Defects	Stop Sign/Flasher	2.33000000000	Alcohol Impaired	SUV	South	Straight Ahead	Off Pavement - Right				A-Injury
201400347346	14	11	08	02	Sat	1	0	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	1.56000000000	Normal	Passenger	South	Turning Left	Other				PD
201301114974	13	02	12	17	Tue	2	0	0	Rear End	Clear	Dusk	Dry		Stop Sign/Flasher	1.56000000000	Normal	Passenger	South	Straight Ahead	On Pavement (Roadway)	Passenger	South	Slow/Stop - Right Turn	PD
201301160928	13	08	23	18	Fri	2	0	0	Turning	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	2.33000000000	Normal	Passenger	West	Straight Ahead	Intersection	Passenger	South	Turning Left	PD
201301151514	13	07	18	09	Thu	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	2.08000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Slow/Stop - Left Turn	PD
201301209763	13	05	12	20	Sun	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	2.33000000000	Other/Unknown	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD

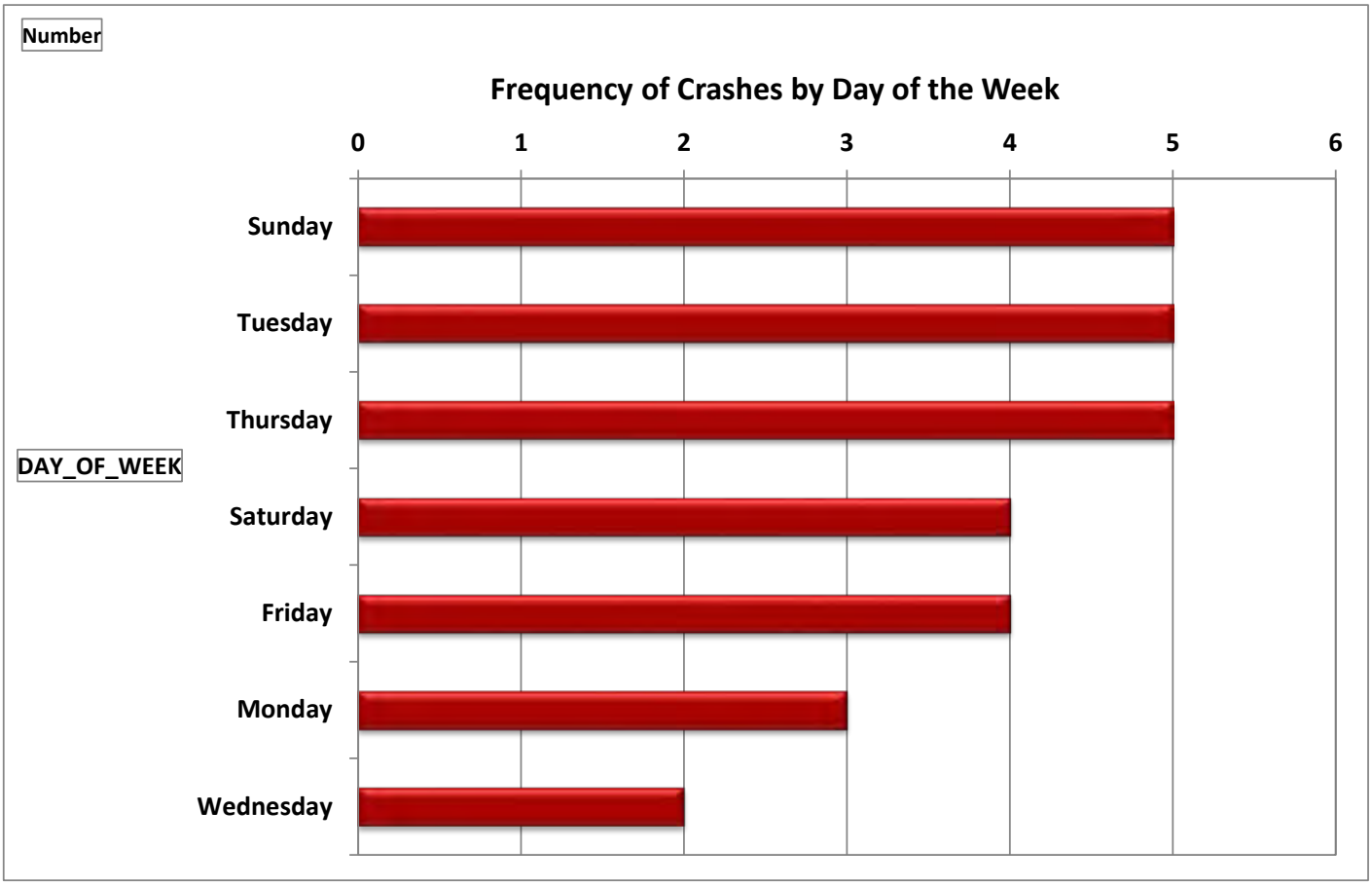
Link 02


Number
Frequency of Crashes by Severity
1, 4%
12, 43%
15, 53%
CRASH_SEVERITY
Fatal Crash
Injury Crash
Property Damage Crash


SEVERITY
Frequency of Crashes by Year and Severity
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
2013
2014
2015
2016
2017
CRASH_SEVERITY
Property Damage Crash
Injury Crash
Fatal Crash
TRAFFIC_CRASH_YEAR

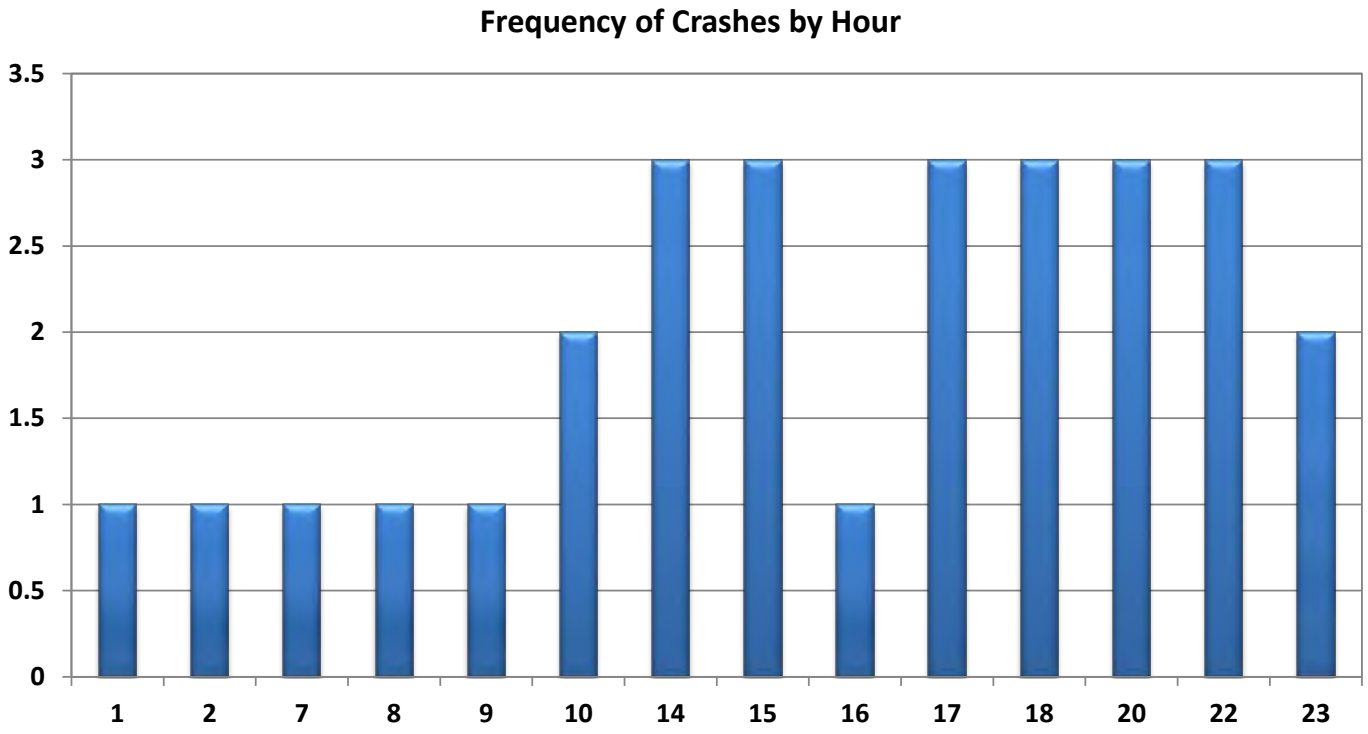
Link 02


Frequency of Crashes by Year
4, 14%
5, 18%
7, 25%
6, 22%
6, 21%
2013
2014
2015
2016
2017

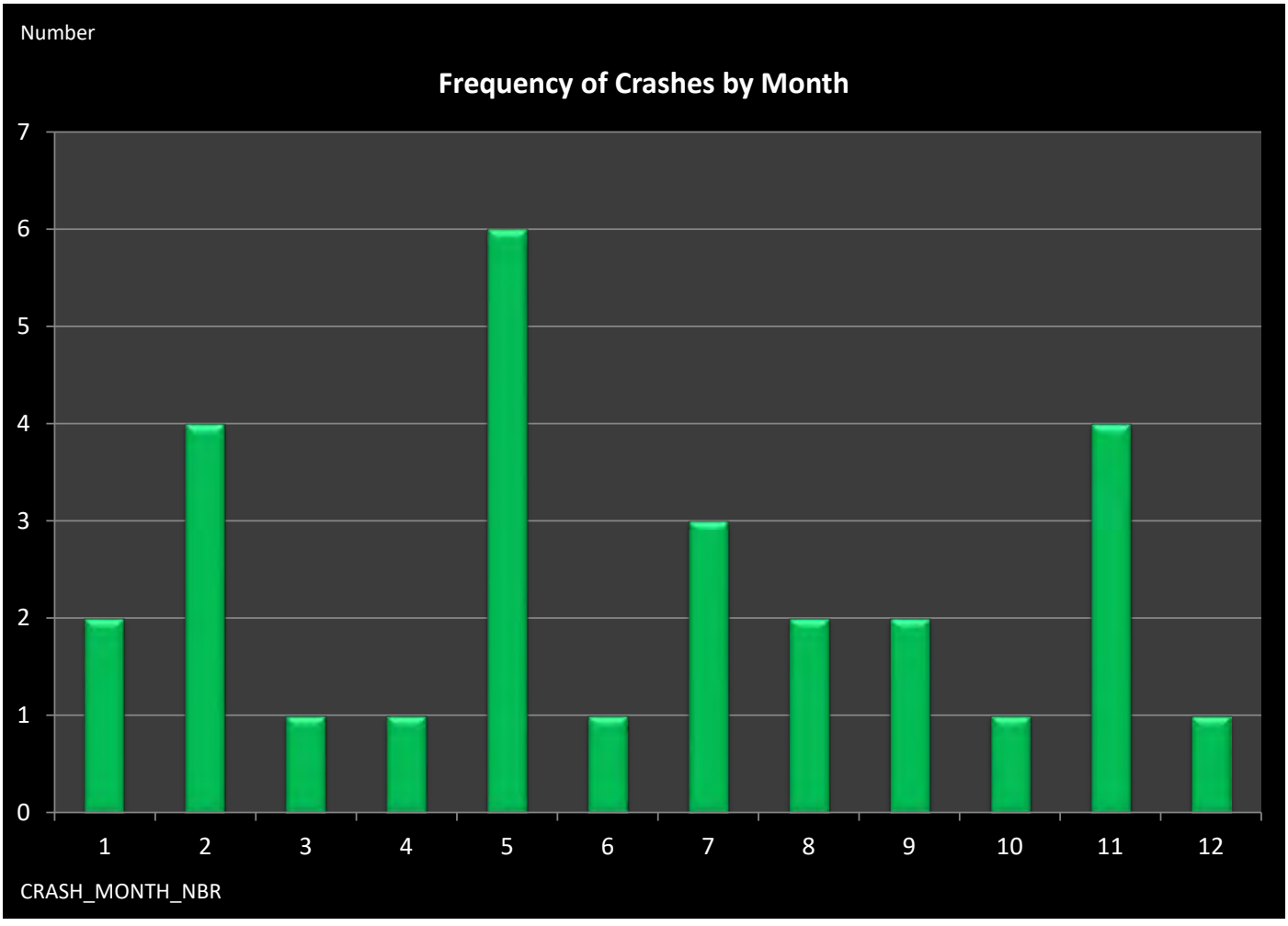

Number
Frequency of Crashes by Day of the Week
0
1
2
3
4
5
6
Sunday
Tuesday
Thursday
DAY_OF_WEEK
Saturday
Friday
Monday
Wednesday

Link 02

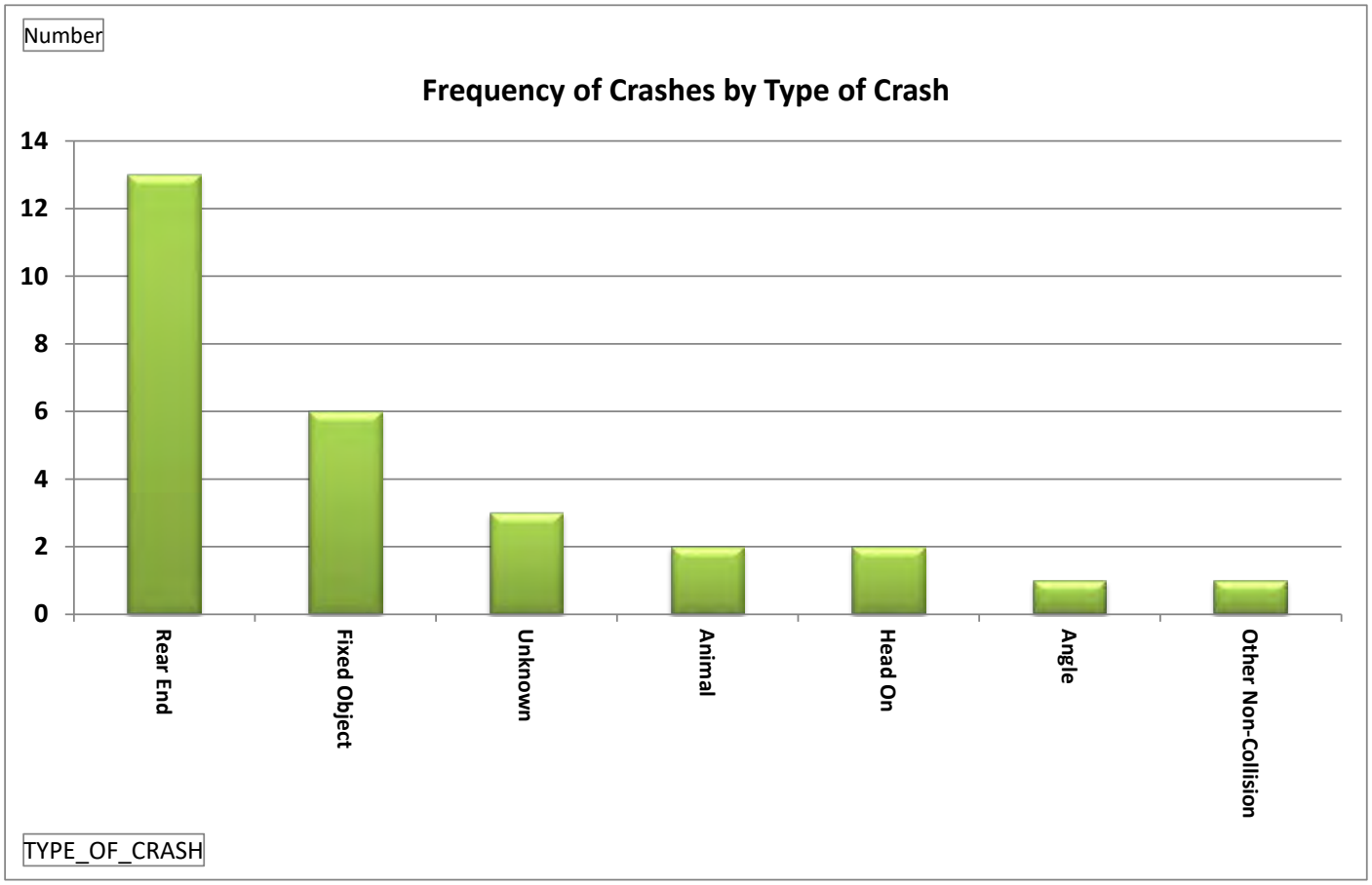
[redacted]

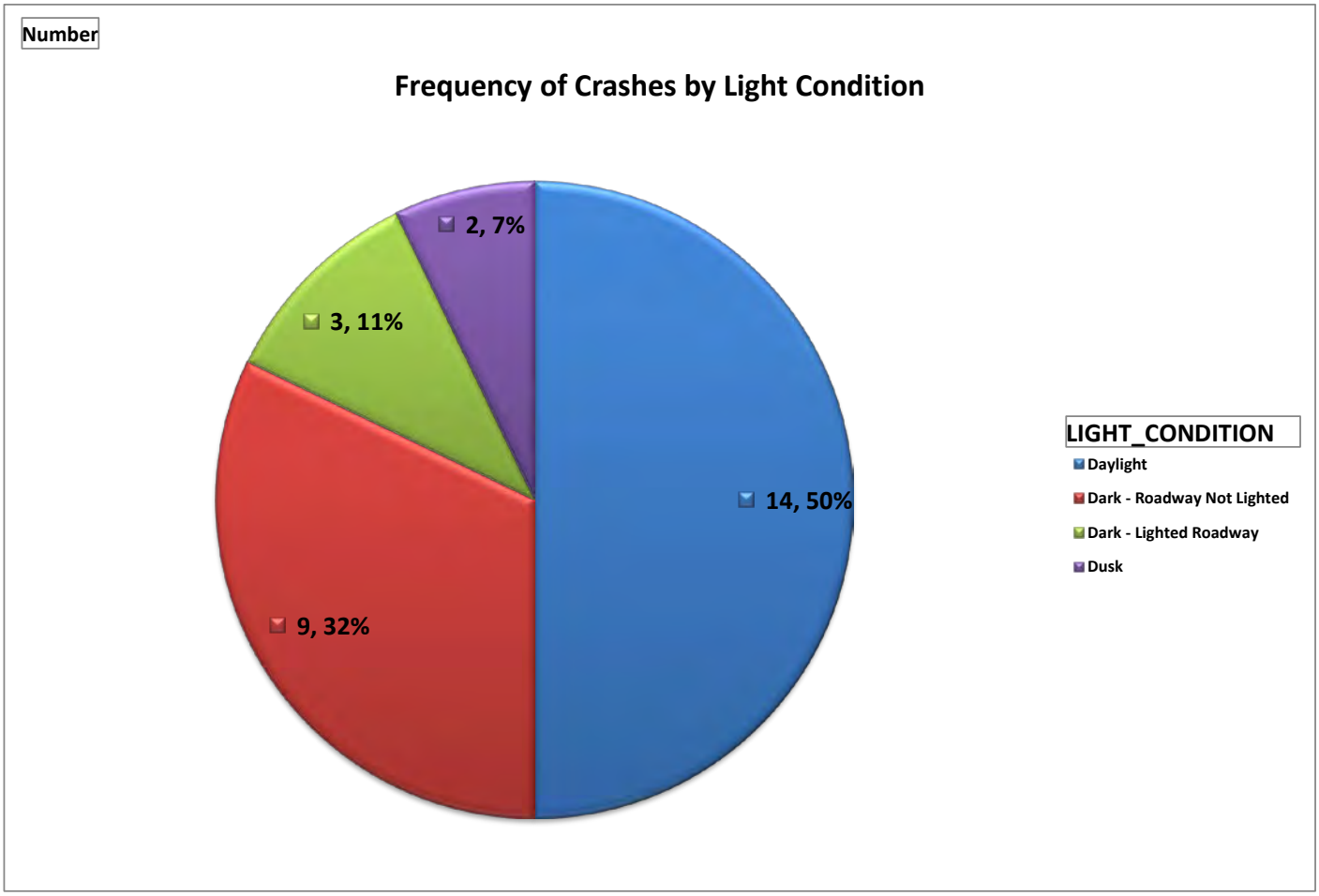


[redacted]

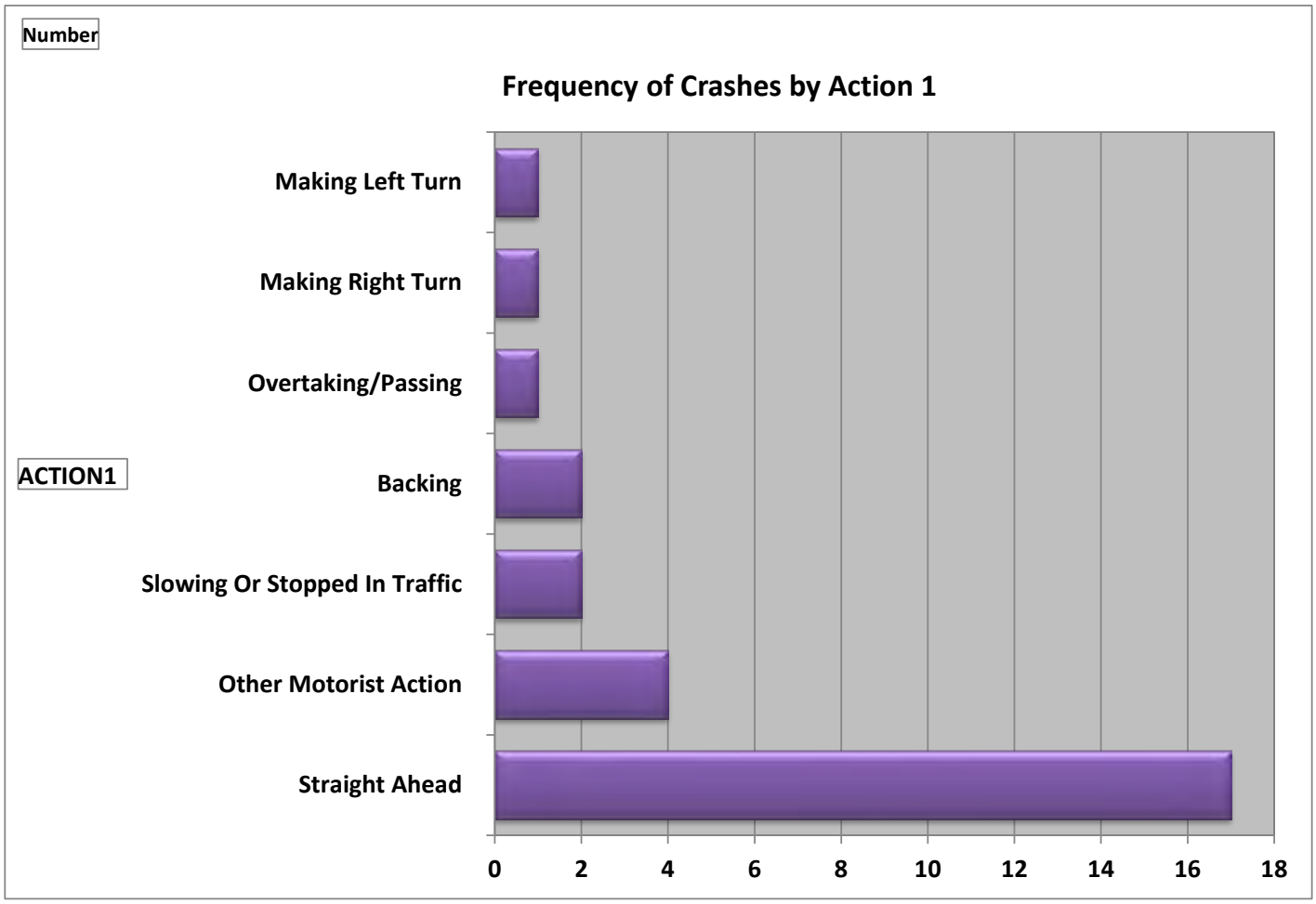


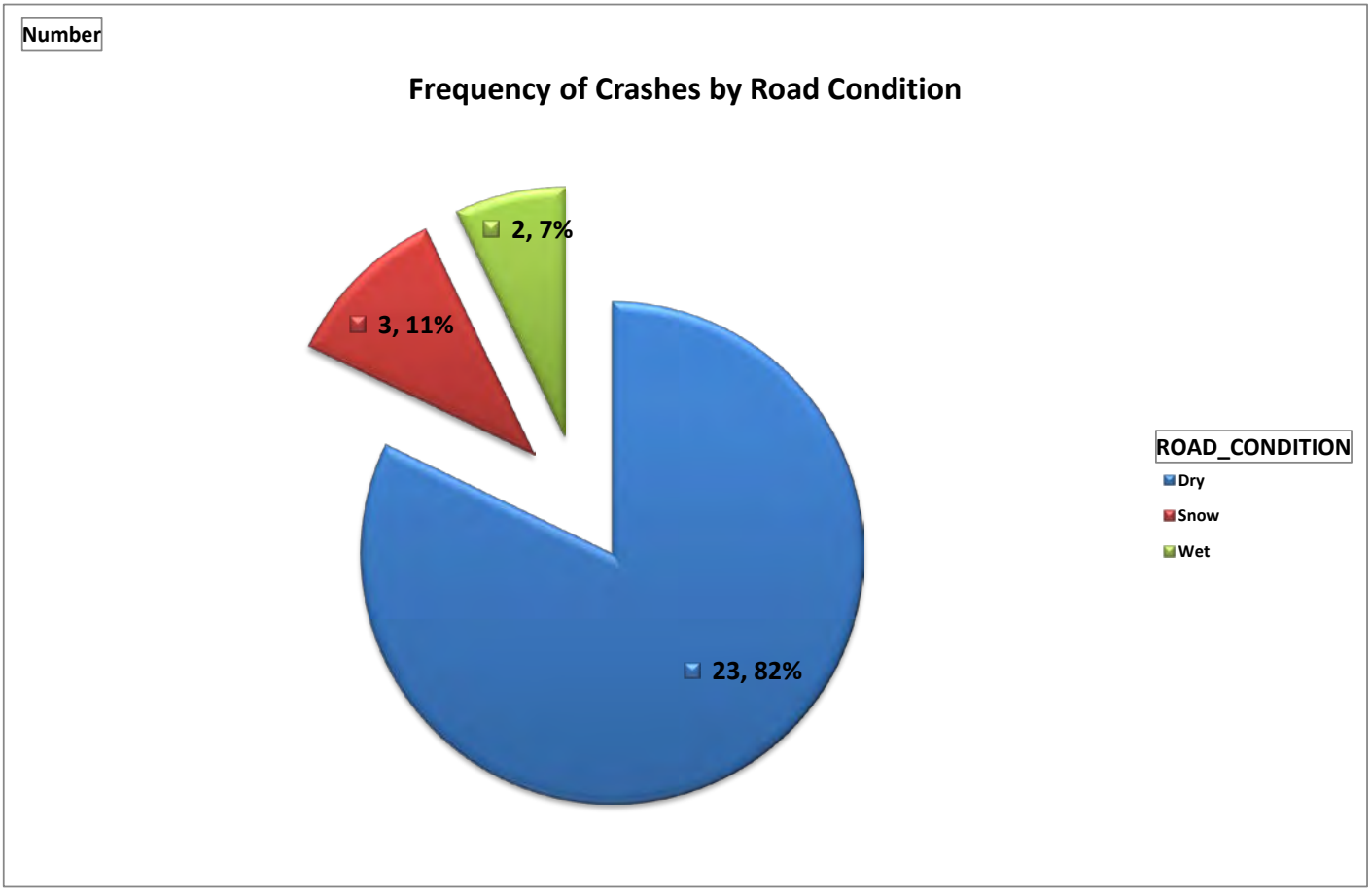
Link 02


Number
Frequency of Crashes by Type of Crash
14
12
10
8
6
4
2
0
Rear End
Fixed Object
Unknown
Animal
Head On
Angle
Other Non-Collision
TYPE_OF_CRASH

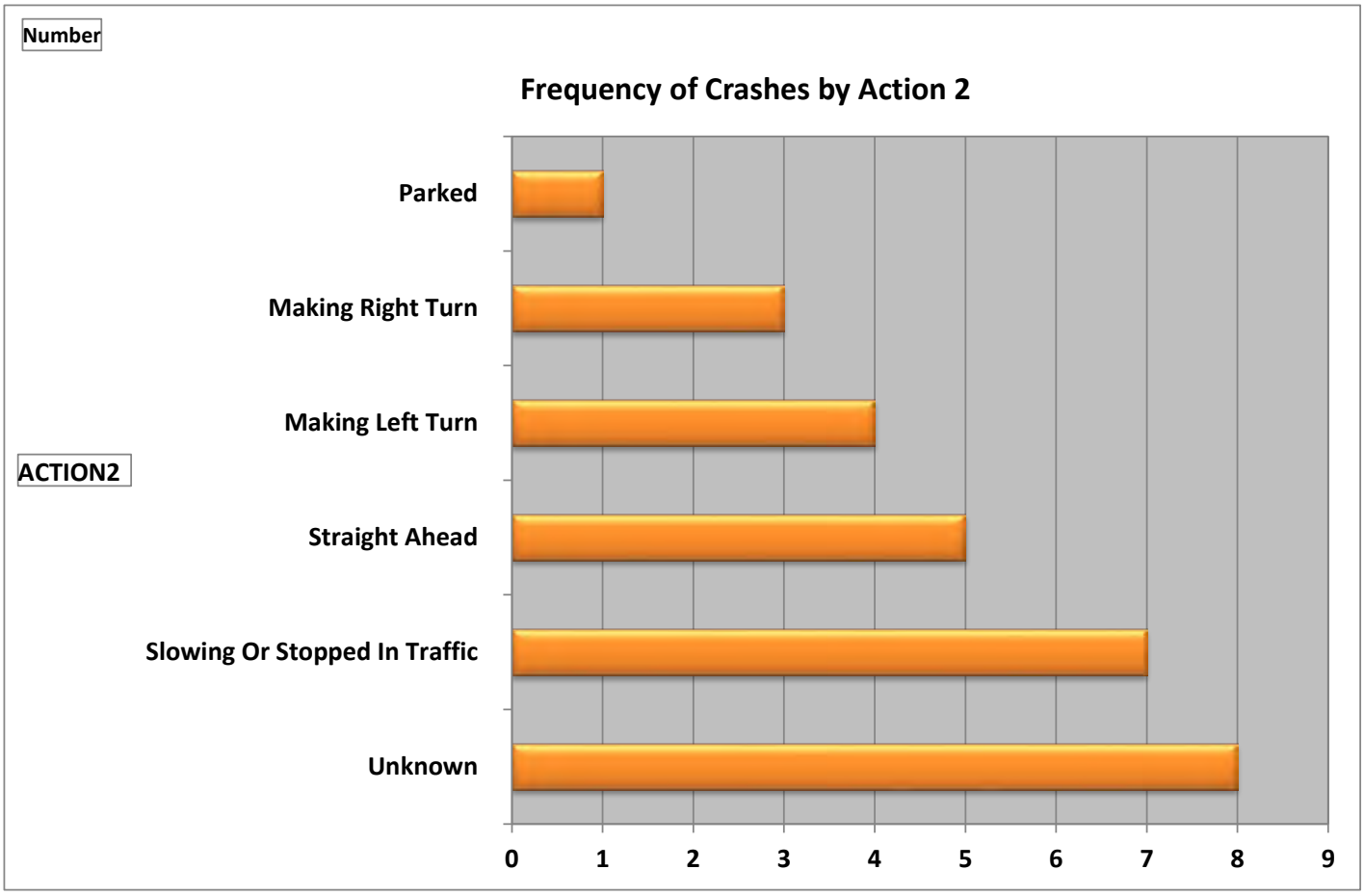

Number
Frequency of Crashes by Light Condition
2, 7%
3, 11%
14, 50%
9, 32%
LIGHT_CONDITION
Daylight
Dark - Roadway Not Lighted
Dark - Lighted Roadway
Dusk

Link 02


Number
Frequency of Crashes by Action 1
Making Left Turn
Making Right Turn
Overtaking/Passing
ACTION1
Backing
Slowing Or Stopped In Traffic
Other Motorist Action
Straight Ahead
0
2
4
6
8
10
12
14
16
18


Number
Frequency of Crashes by Road Condition
2, 7%
3, 11%
23, 82%
ROAD_CONDITION
Dry
Snow
Wet

Link 02


Number
Frequency of Crashes by Action 2
Parked
Making Right Turn
Making Left Turn
ACTION2
Straight Ahead
Slowing Or Stopped In Traffic
Unknown
0
1
2
3
4
5
6
7
8
9

SIMPO Safety Study

APPENDIX B3: VAUGHN ROAD (DESOTO TWP/JACKSON CO)

CMT

Vaughn Road (Reed Station Road to 1,000 ft west of Meridian Road/Vermont Road)

Segment Priority #3

June 2019

INTRODUCTION

The segment of Vaughn Road located within DeSoto Township in Jackson County was identified as the 3rd ranked segment within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The segment length of 0.56 miles is located between log point 0.0 (Reed Station Road) and 0.65 (1,000 feet west of Meridian Road/Vermont Road).

EXISTING CONDITIONS

Vaughn Road is a township route in Jackson County providing local access to property northeast of Carbondale. Land use is predominately agricultural. A limited number of residential land uses also access the study area roadway. The average annual daily traffic (AADT) on Vaughn Road is 750 vehicles per day. **Figure 1** shows the study area.

Vaughn Road is a roadway having an approximate width of 18 feet. Aggregate shoulders vary between 0 and 2 feet. The roadway does not have pavement markings. Existing curve warning signs include an advance turn sign (W1-1) with an advisory plaque of 20 MPH and a large arrow sign (W1-6) at the turns. **Photos 1-4** show the existing horizontal curves within the study area. The approximate location of each photo is numbered on **Figure 1.** The approximate distance from each curve is referenced for each photo.

FIGURE 1: STUDY AREA

PHOTO 1: WB VAUGHN ROAD (@ 350 FT FROM CURVE)

PHOTO 2: WB VAUGHN AT NORTH CURVE

PHOTO 3: NB VAUGHN ROAD (@ 550 FT FROM NORTH CURVE)

PHOTO 4: SB VAUGHN ROAD (@ 300 FT FROM SOUTH CURVE)

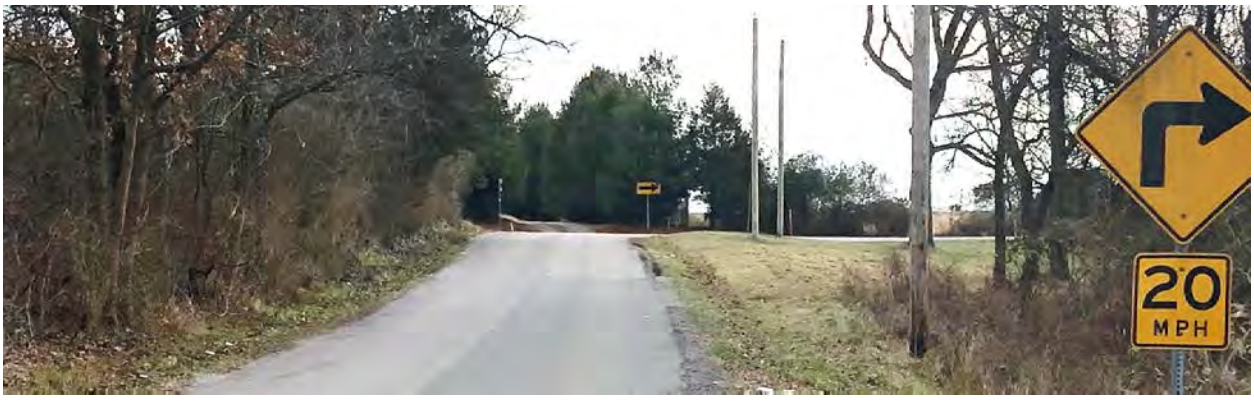


PHOTO 5: SB VAUGHN ROAD AT SOUTH CURVE

PHOTO 6: EB VAUGHN ROAD (@ 300 FT FROM SOUTH CURVE)

The legal speed limit on Crenshaw Road is 55 miles per hour within the study area.

The radius of the south curve is 60 feet measured along the center of road. The radius of the north curve is 105 feet measured along the center of road. A minimum radius of 86 feet requires 4% superelevation as noted in IDOT Design Guide Figure 32.3D to meet a design speed of 20 MPH.

TABLE 1: IDOT FIGURE 32-3.D

e (%)	V = 20 mph R(ft)	V = 25 mph R(ft)	V = 30 mph R(ft)	V = 35 mph R(ft)	V = 40 mph R(ft)	V = 45 mph R(ft)	V = 50 mph R(ft)
NC	> 1410	> 2050	> 2830	> 3730	> 4770	> 5930	> 7220
1.5	1410	2050	2830	3730	4770	5930	7220
2.0	902	1340	1880	2490	3220	4040	4940
2.2	723	1110	1580	2120	2760	3480	4280
2.4	513	838	1270	1760	2340	2980	3690
2.6	388	650	1000	1420	1930	2490	3130
2.8	308	524	817	1170	1620	2100	2660
3.0	251	433	681	982	1370	1800	2290
3.2	209	363	576	835	1180	1550	1980
3.4	175	307	490	714	1010	1340	1720
3.6	147	259	416	610	865	1150	1480
3.8	122	215	348	512	730	970	1260
4.0	86	154	250	371	533	711	926
	R_{min} = 86 ft	R_{min} = 154 ft	R_{min} = 250 ft	R_{min} = 371 ft	R_{min} = 533 ft	R_{min} = 711 ft	R_{min} = 926 ft

SAFETY ANALYSIS

A total of 8 crashes occurred within the study area over a 5-year period (2013-2017). The frequency of crashes by year is summarized on **Figure 2**. No crashes occurred on Vaughn Road within the study limits in 2015 or 2017. The curve warning signs shown on **Photos 1-6** were erected after February 2016.

Figure 3A shows the distribution of crashes within the study area. A total of 8 crashes occurred within the study area which included 1 fatal crash and 1 Type B injury crash.

A single vehicle motorcycle crash resulting in 2 fatalities occurred on Sunday, August 28, 2016 around 8:00 AM. A southbound motorcycle left the roadway and struck a tree at the south curve.

Figure 3B shows the frequency of fixed object crashes on the segment between Reed Station Road and 1,000 ft west of Meridian Road/ Vermont Road.

FIGURE 2: FREQUENCY OF CRASHES BY YEAR

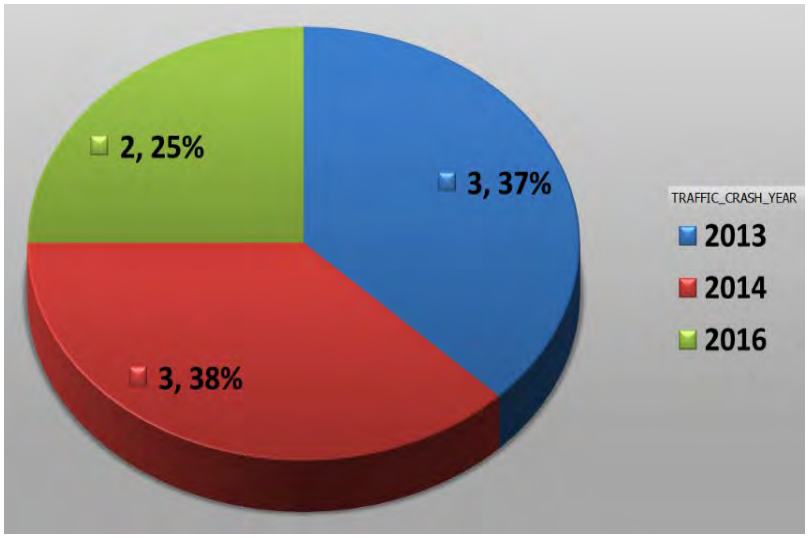


FIGURE 3A: LOCATION FREQUENCY BY SEVERITY

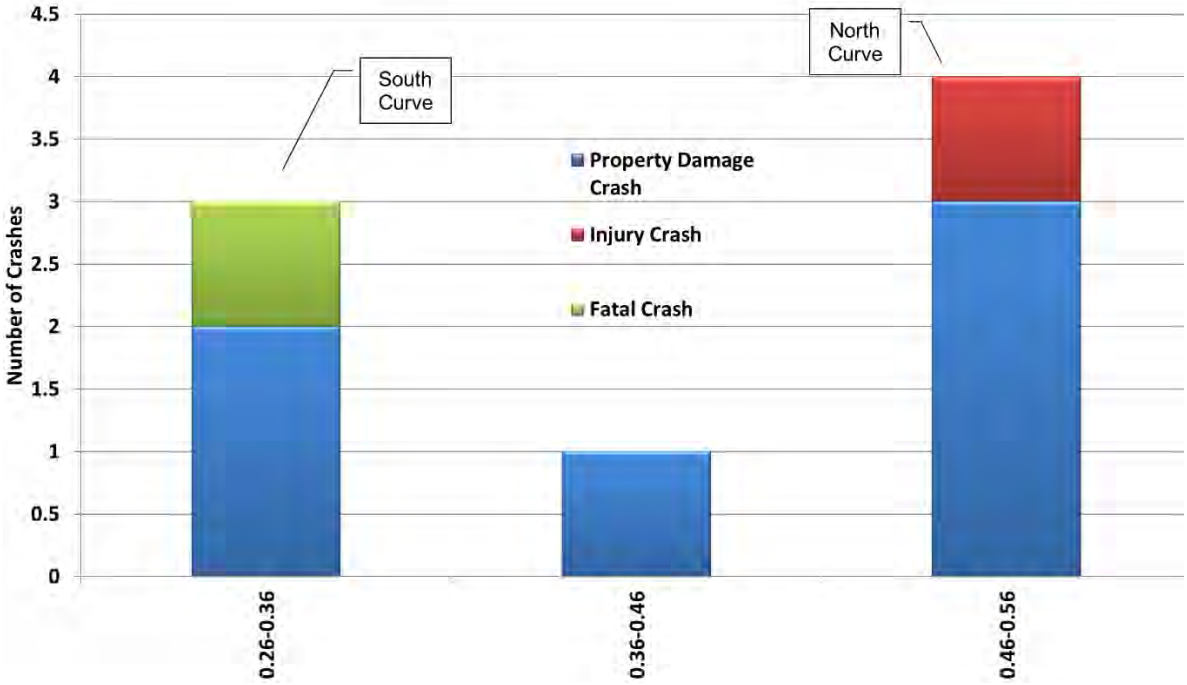


FIGURE 3B: LOCATION FREQUENCY BY CRASH TYPE

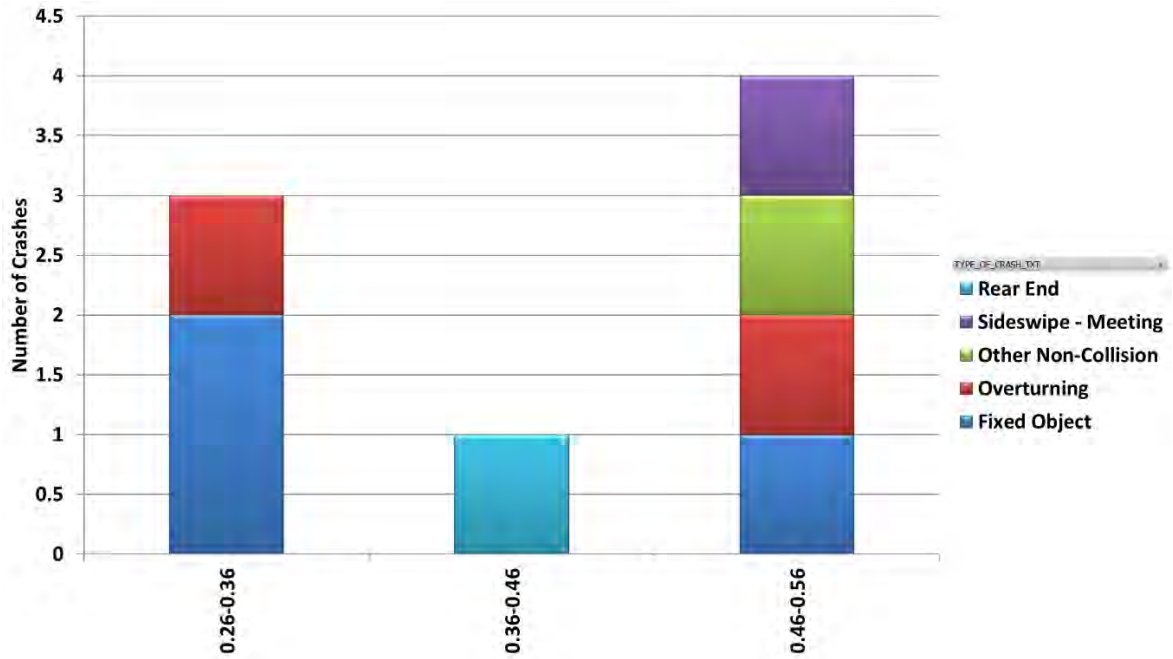


Figure 4 shows the severity of crashes by location and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as north are northbound crashes.

FIGURE 4: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE

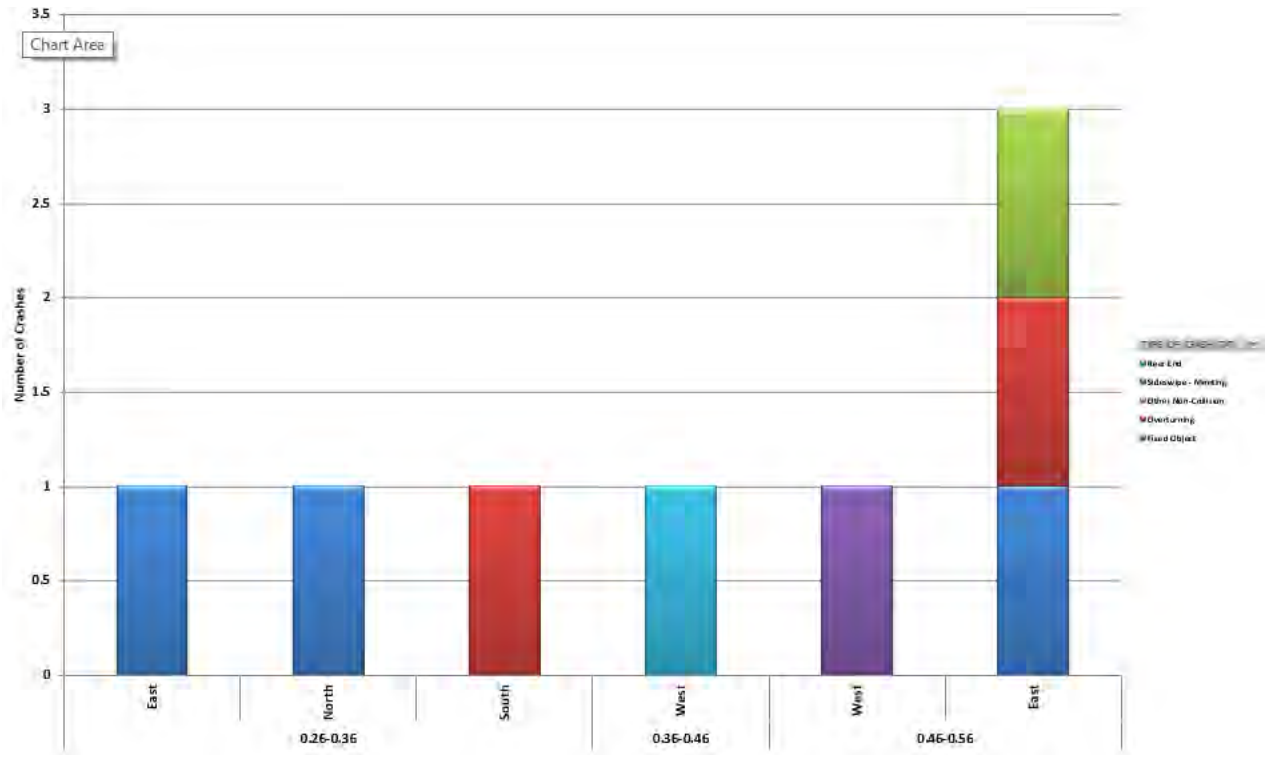
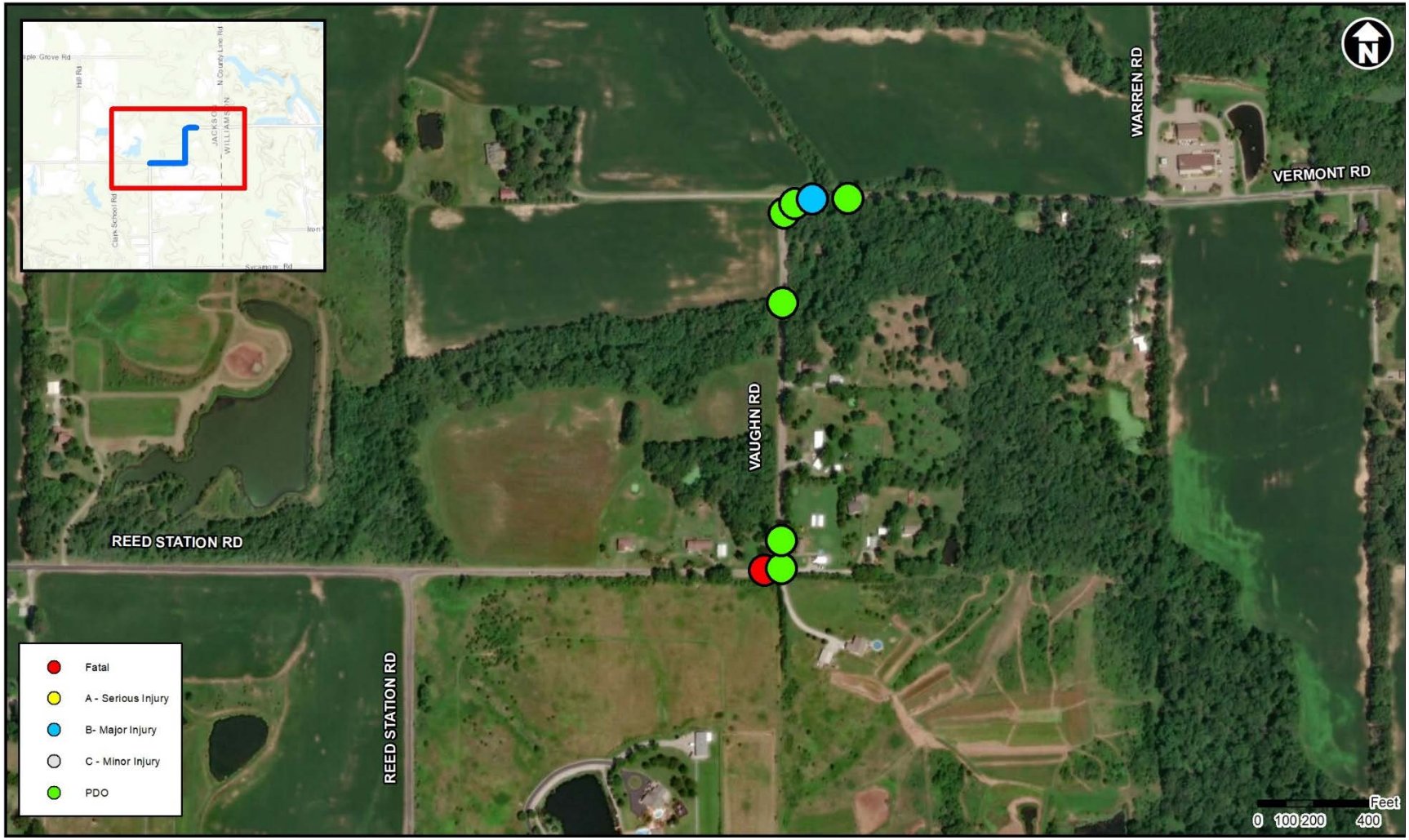


Figure 5 shows the location and severity of crashes plotted on an aerial map of the study area.

FIGURE 5: CRASH SEVERITY AND LOCATION MAP



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

The MUTCD suggests that curve warning signs may be used on roadways having an AADT less than 1,000 vehicles. Curve warning signs were erected in 2016. No crashes occurred in 2017 or 2018. Two refinements to the traffic control plan in place may be considered:

- Table 2C-5 of the MUTCD states that the use of chevrons is an option to supplement a large arrow sign. Locations where the large arrow sign placement is not directly in front of the travel lane may be supplemented with chevrons.

Table 2C-5. Horizontal Alignment Sign Selection

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

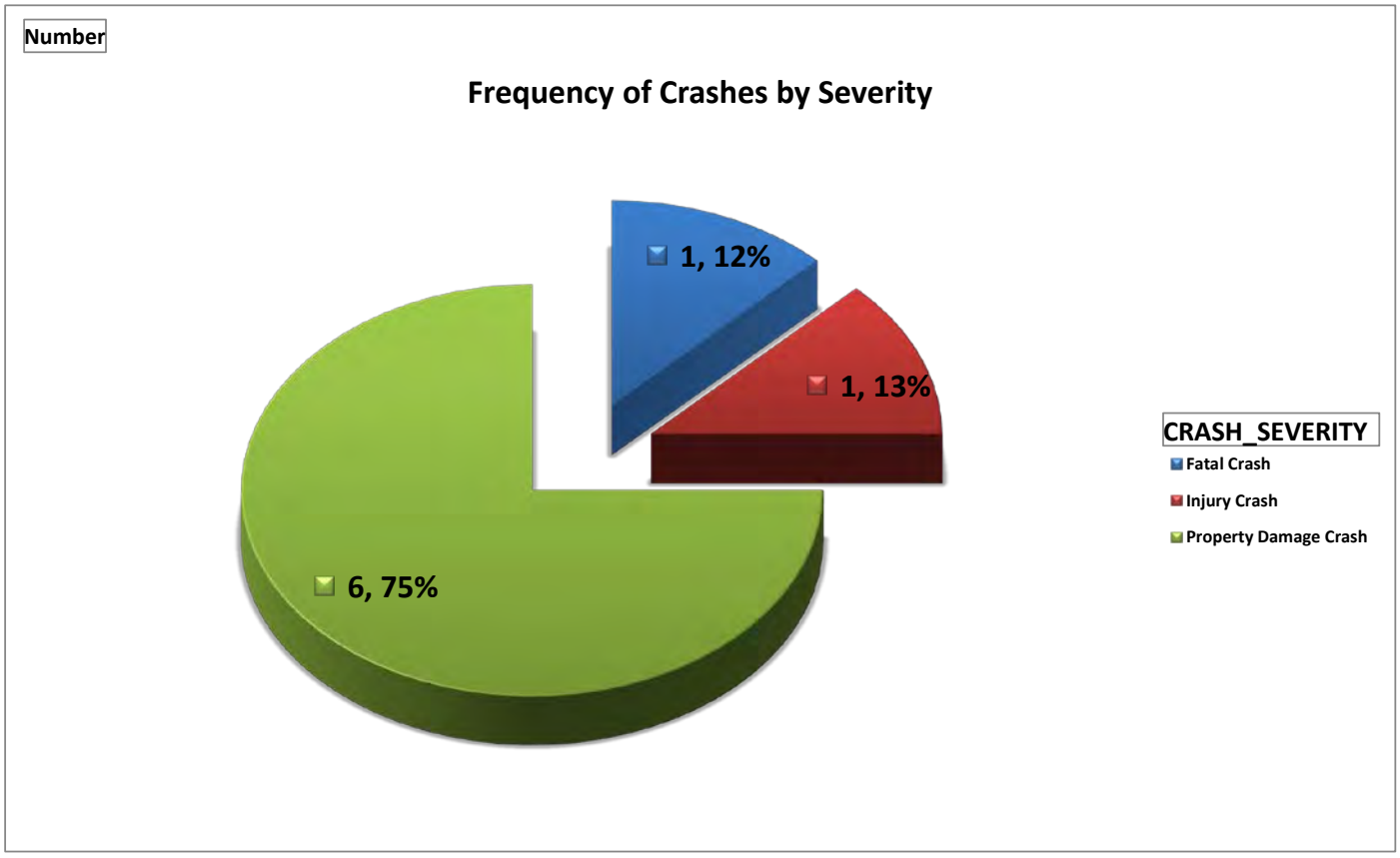
Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

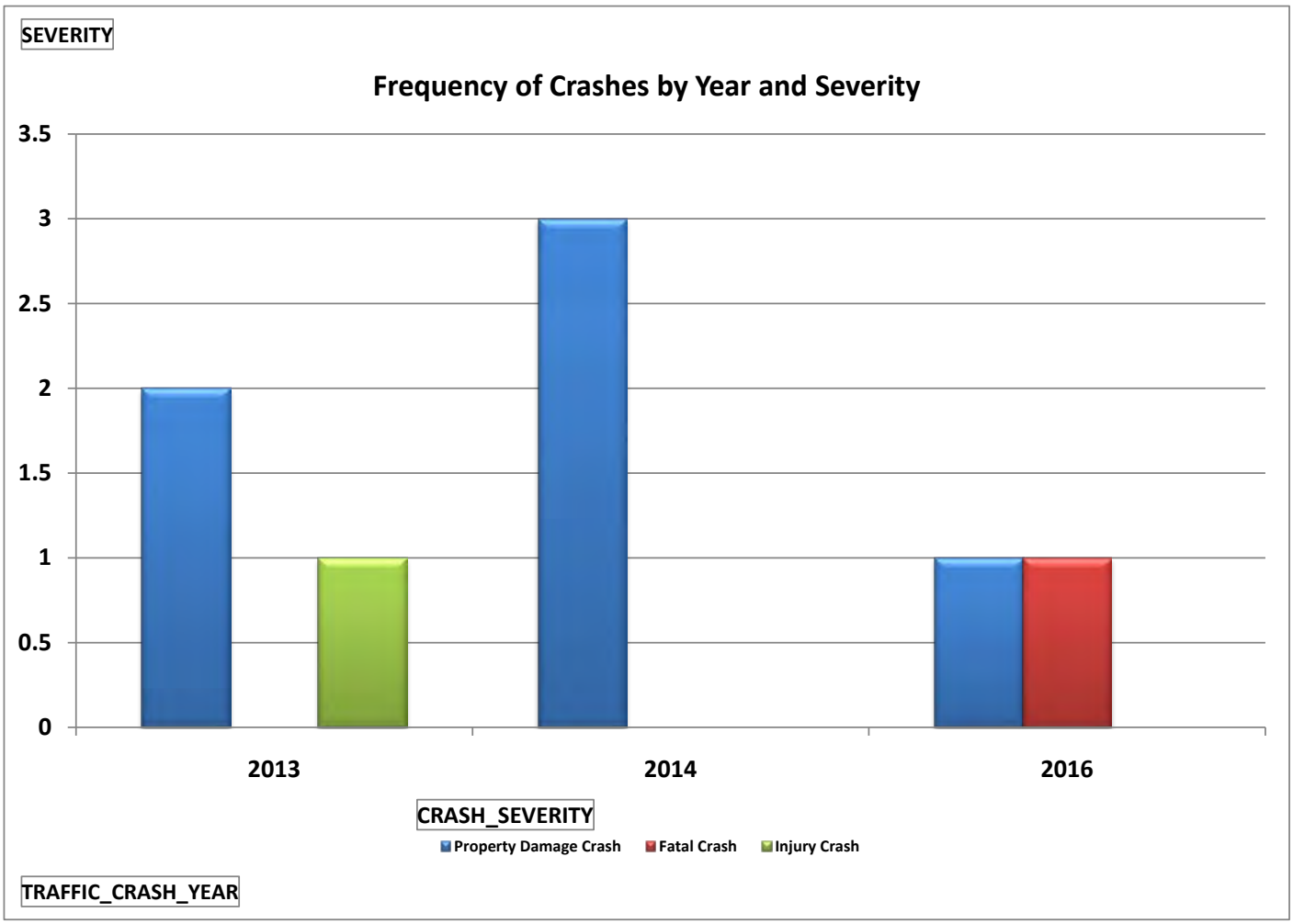
See Section 2C.06 for roadways with less than 1,000 ADT.

- In the absence of a ball bank study to evaluate advisory speeds at each curve, a reduction of the advisory speed from 20 MPH may be considered. IDOT design criteria for a 20 MPH curve is less than the posted advisory speed. The existing roadway width may be justification to post a lower advisory speed in addition to the existing radius and superelevation.

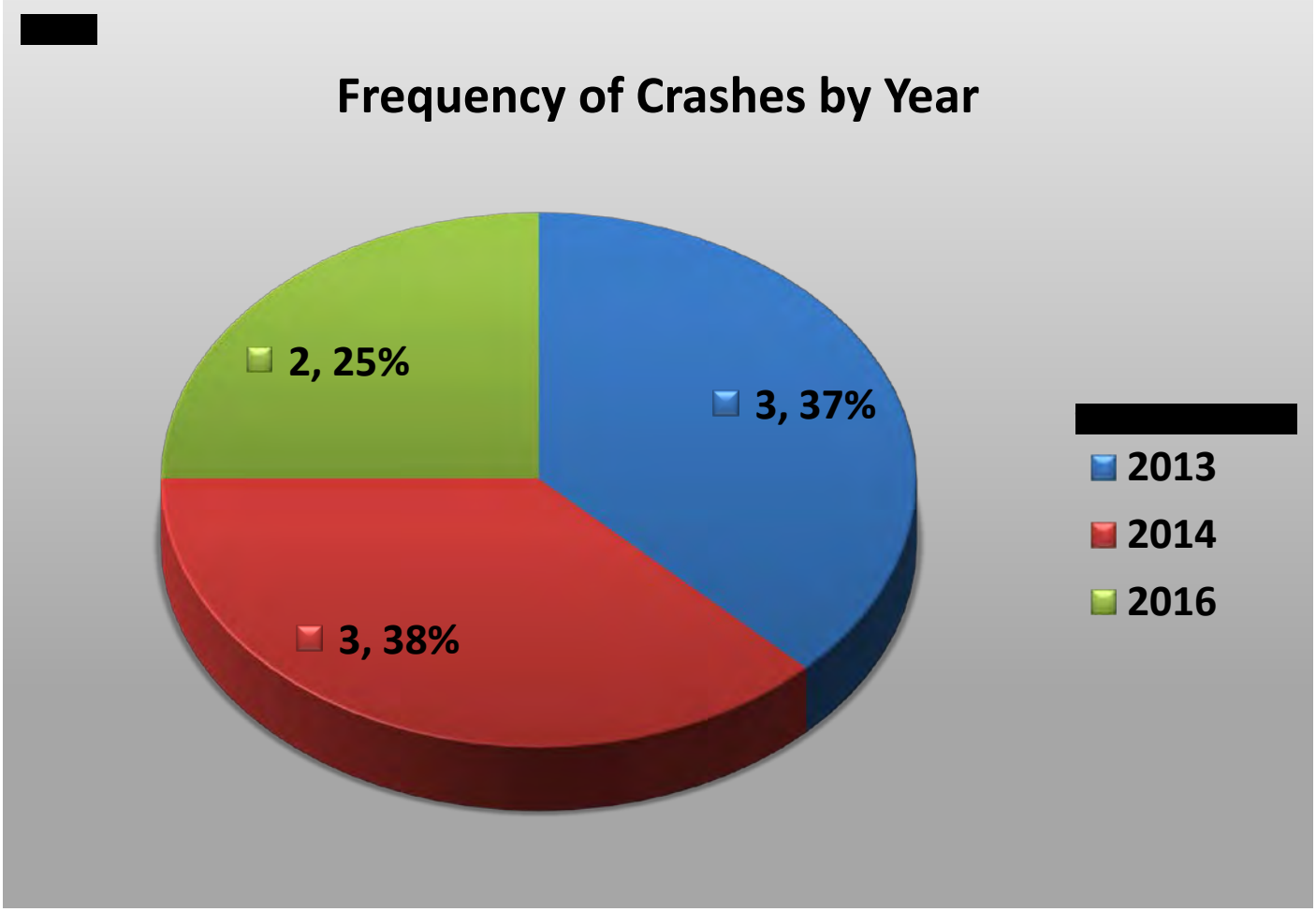
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201601207434	16	08	28	08	Sun	1	0	2	Overturned	Clear	Daylight	Dry	No Defects	Other Warning Sign	0.26000000000	Drug Impaired	Motorcycle (Over 150cc)	South	Negotiating A Curve	Off Pavement - Left				Fatal
201601438553	16	08	12	17	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.44000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	West	Slow/Stop In Traffic	PD
201400070404	14	01	09	19	Thu	1	0	0	Fixed Object	Clear	Darkness	Snow or Slush	No Defects	No Controls	0.26000000000	Normal	Passenger	East	Skidding/Control Loss	Off Pavement - Right				PD
201400132546	14	03	04	03	Tue	1	0	0	Other Non-Collision	Snow	Darkness	Ice	No Defects	No Controls	0.50000000000	Other/Unknown	Passenger	East	Skidding/Control Loss	Other				PD
201400191718	14	03	29	01	Sat	1	0	0	Overturned	Rain	Darkness	Wet	No Defects	No Controls	0.55000000000	Normal	Pickup	East	Skidding/Control Loss	Off Pavement - Left				PD
201301121769	13	04	19	02	Fri	1	0	0	Fixed Object	Clear	Darkness	Wet	No Defects	No Controls	0.28000000000	Other/Unknown	Passenger	North	Negotiating A Curve	Off Pavement - Left				PD
201301167588	13	03	10	15	Sun	2	0	0	Sideswipe Opposite Direction	Rain	Daylight	Wet		No Controls	0.51000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	East	Straight Ahead	PD
201301317903	13	09	03	17	Tue	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	0.52000000000	Normal	Passenger	East	Skidding/Control Loss	Off Pavement - Left				B-Injury

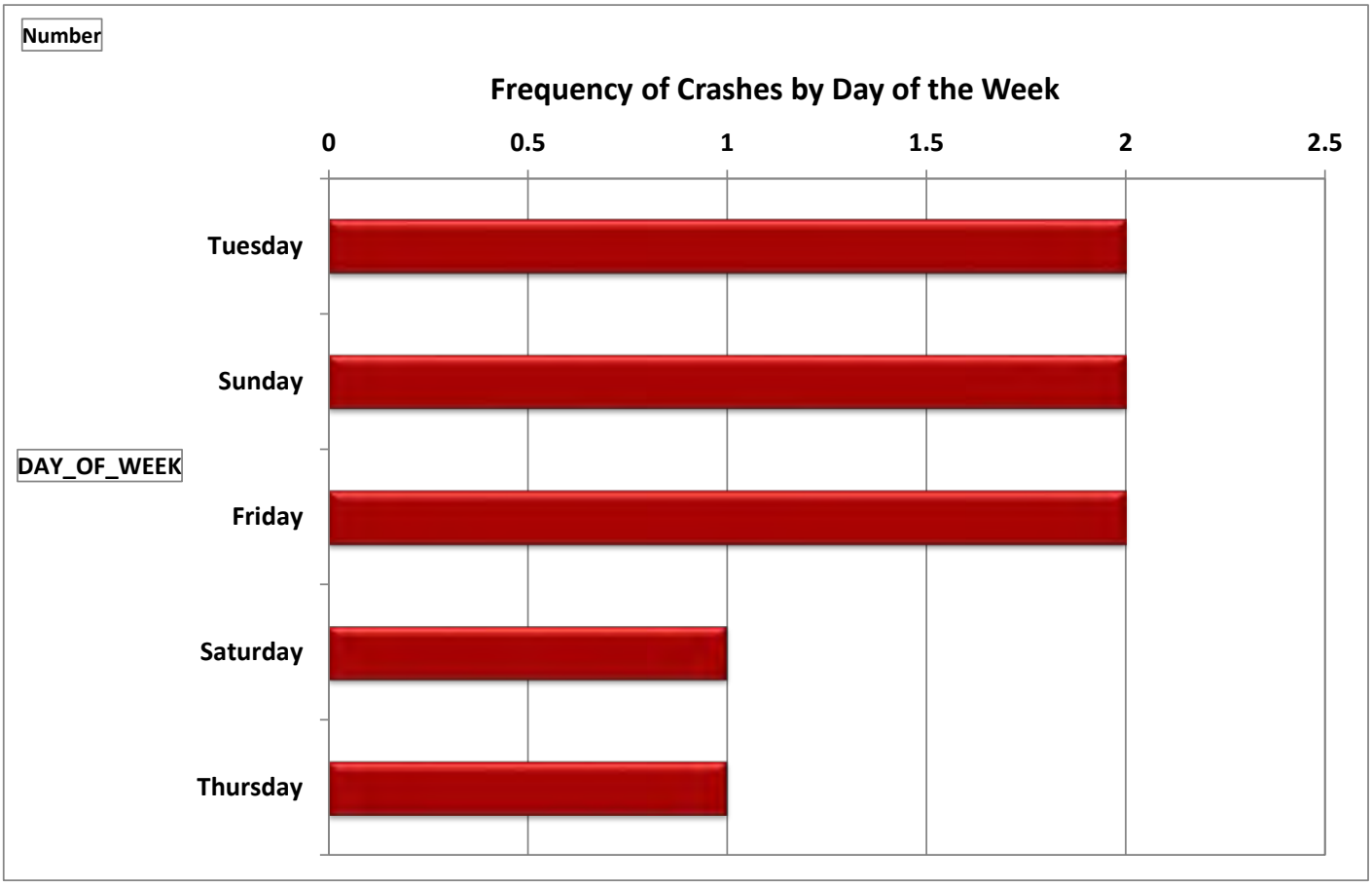
Link 03


Number
Frequency of Crashes by Severity
1, 12%
1, 13%
6, 75%
CRASH_SEVERITY
Fatal Crash
Injury Crash
Property Damage Crash


SEVERITY
Frequency of Crashes by Year and Severity
3.5
3
2.5
2
1.5
1
0.5
0
2013
2014
2016
CRASH_SEVERITY
Property Damage Crash
Fatal Crash
Injury Crash
TRAFFIC_CRASH_YEAR

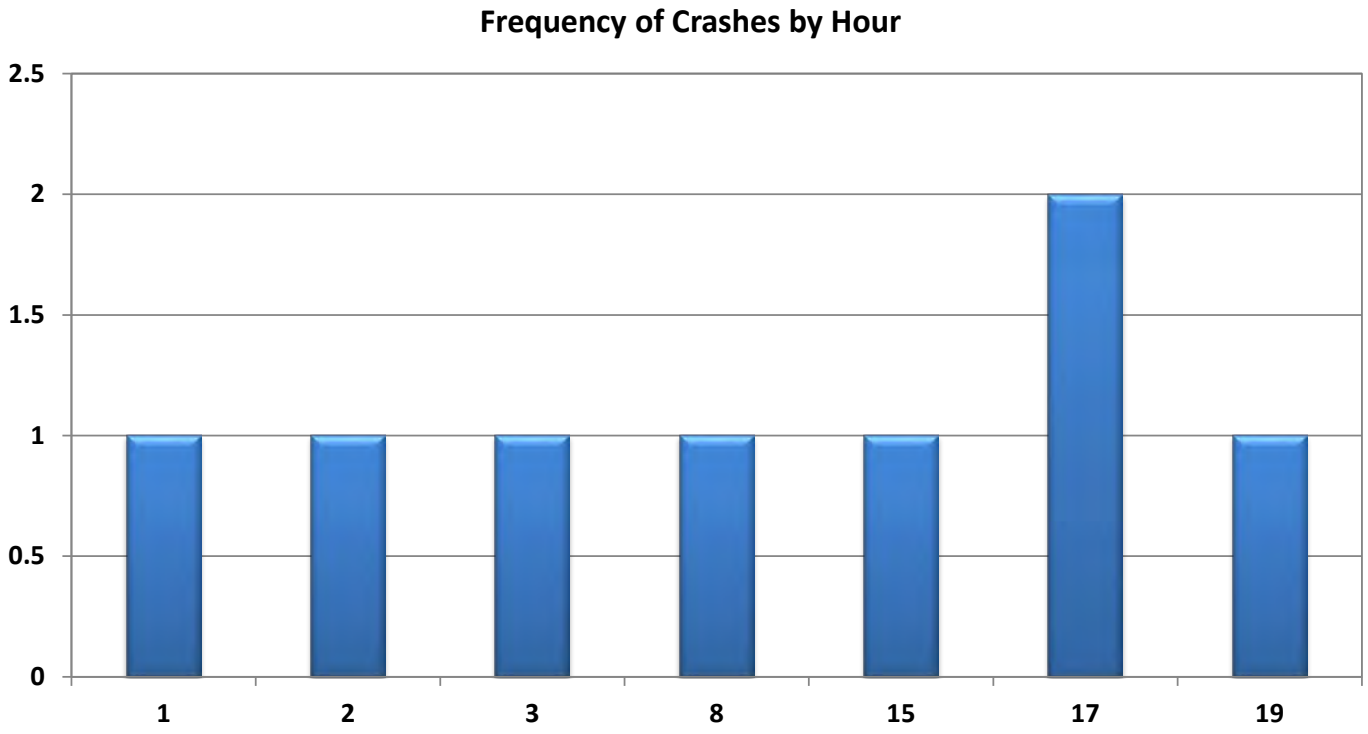
Link 03


Frequency of Crashes by Year
2, 25%
3, 37%
3, 38%
2013
2014
2016

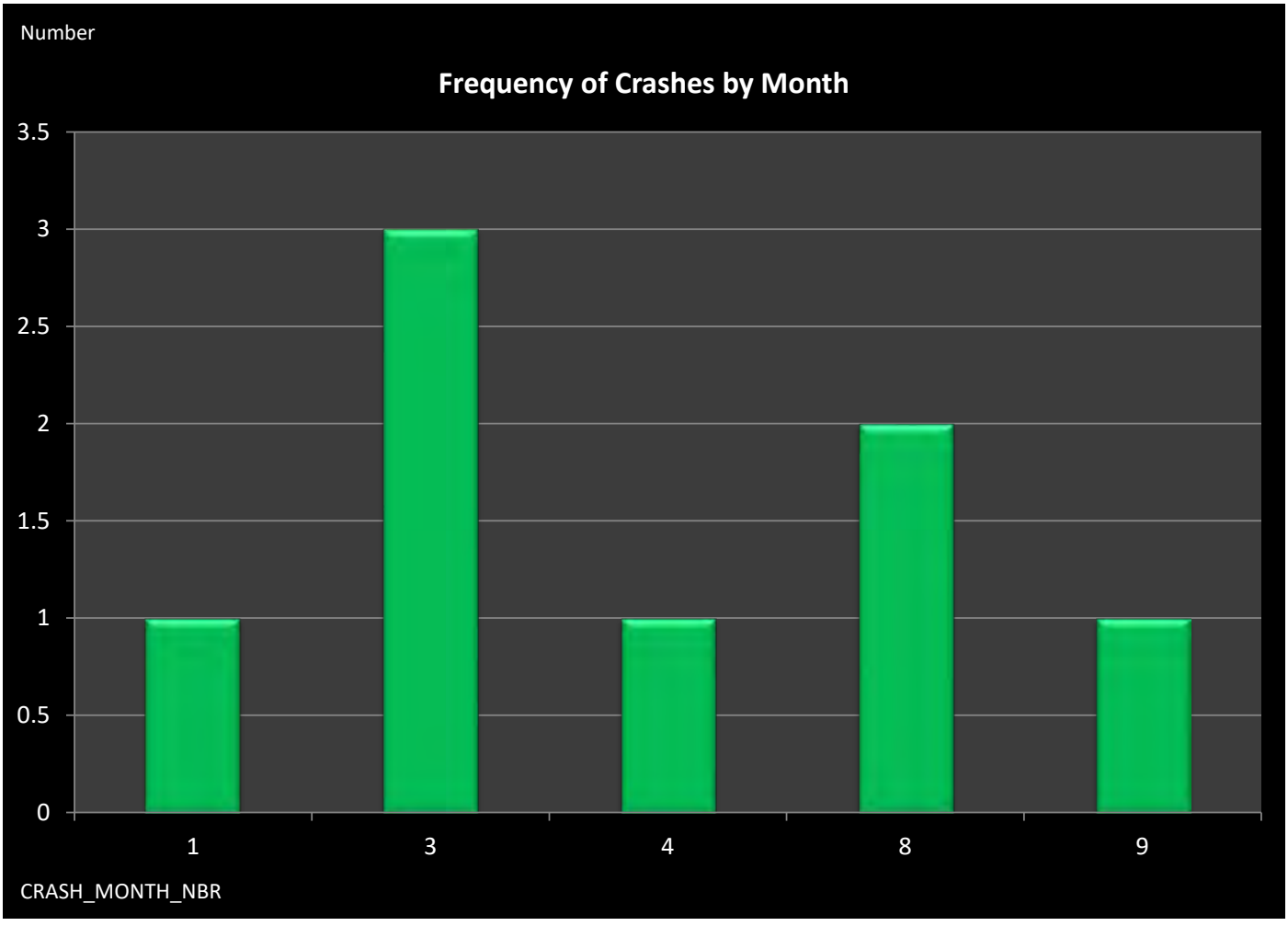

Number
Frequency of Crashes by Day of the Week
0
0.5
1
1.5
2
2.5
Tuesday
Sunday
DAY_OF_WEEK
Friday
Saturday
Thursday

Link 03

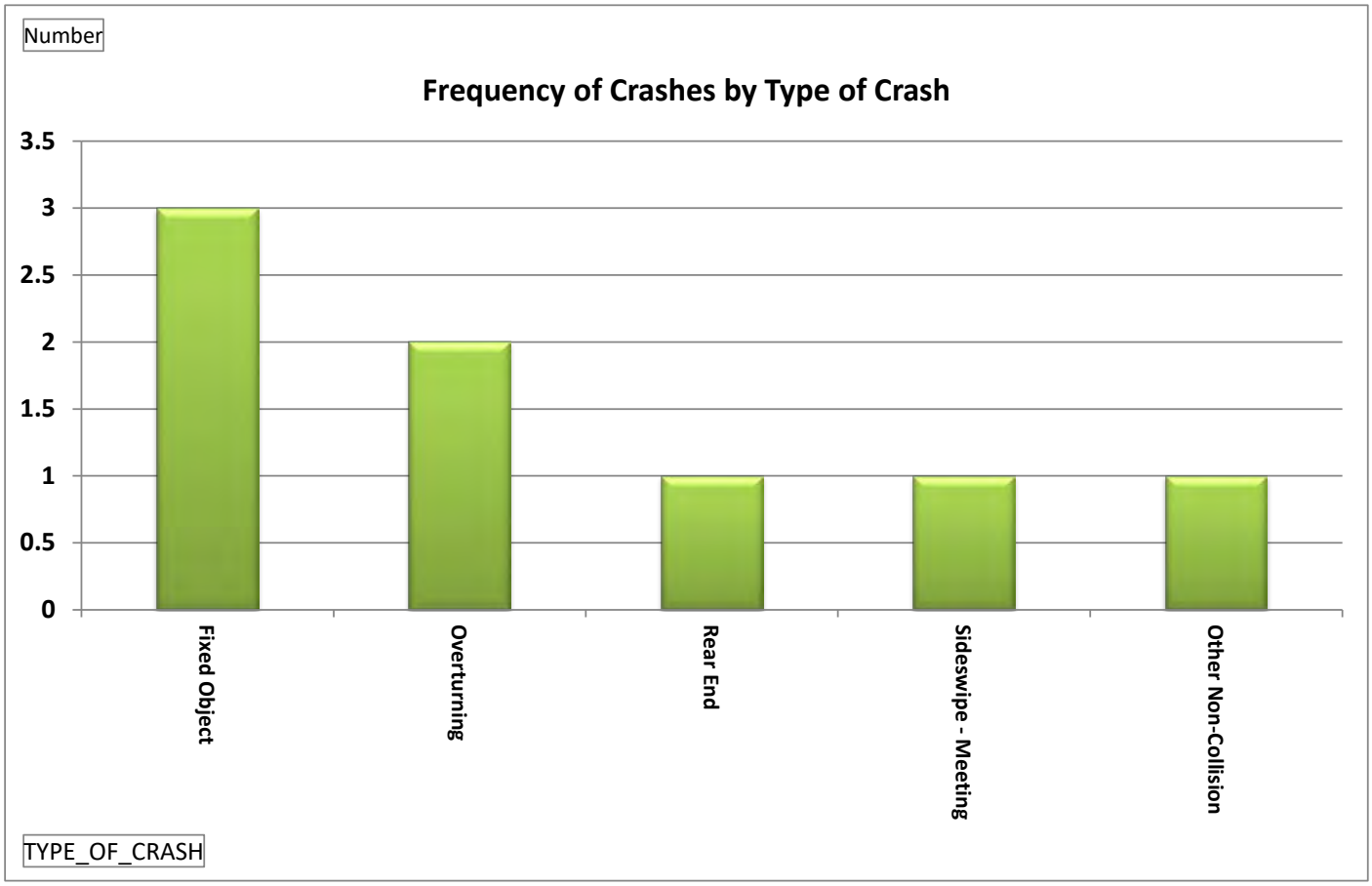
[redacted]

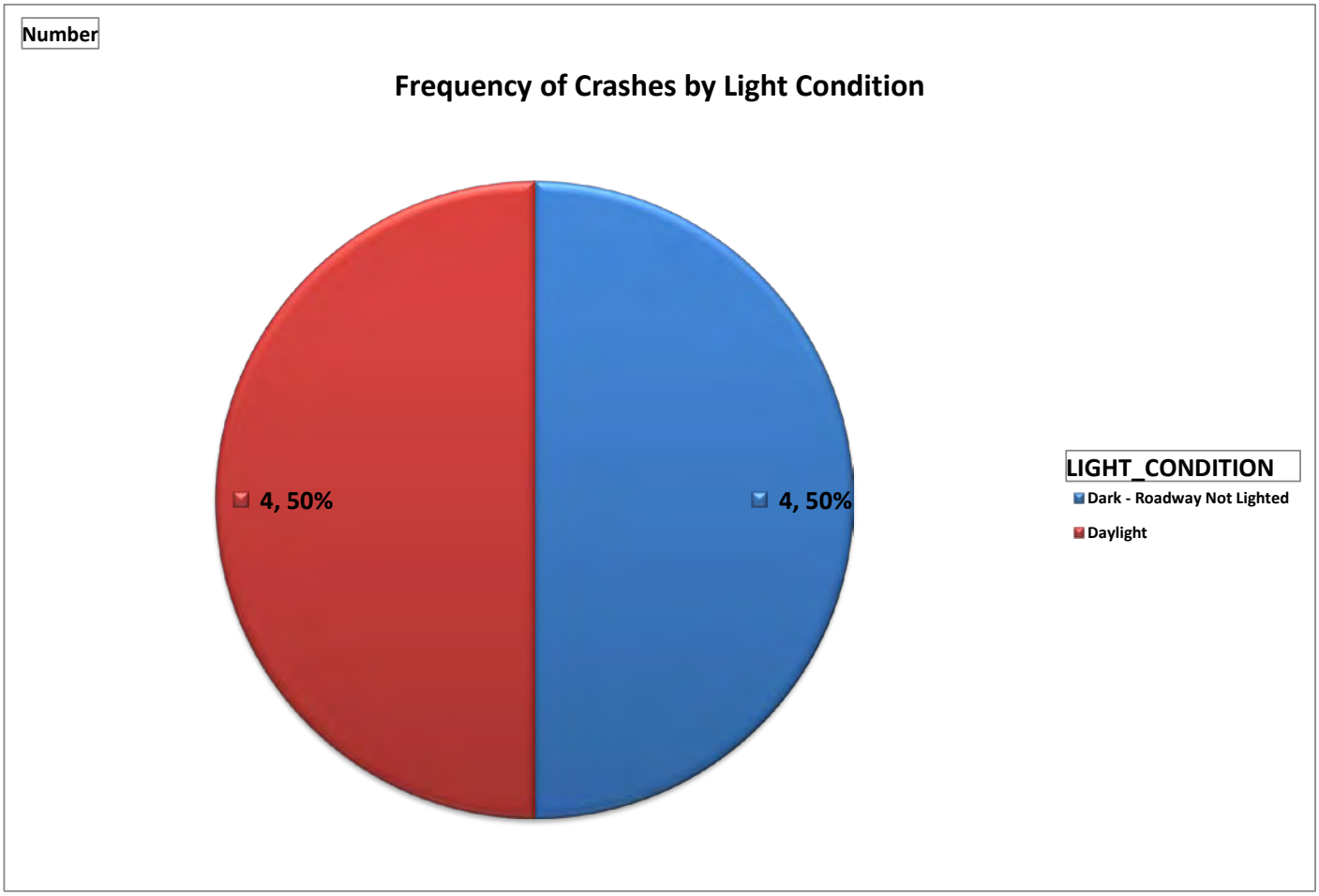


[redacted]

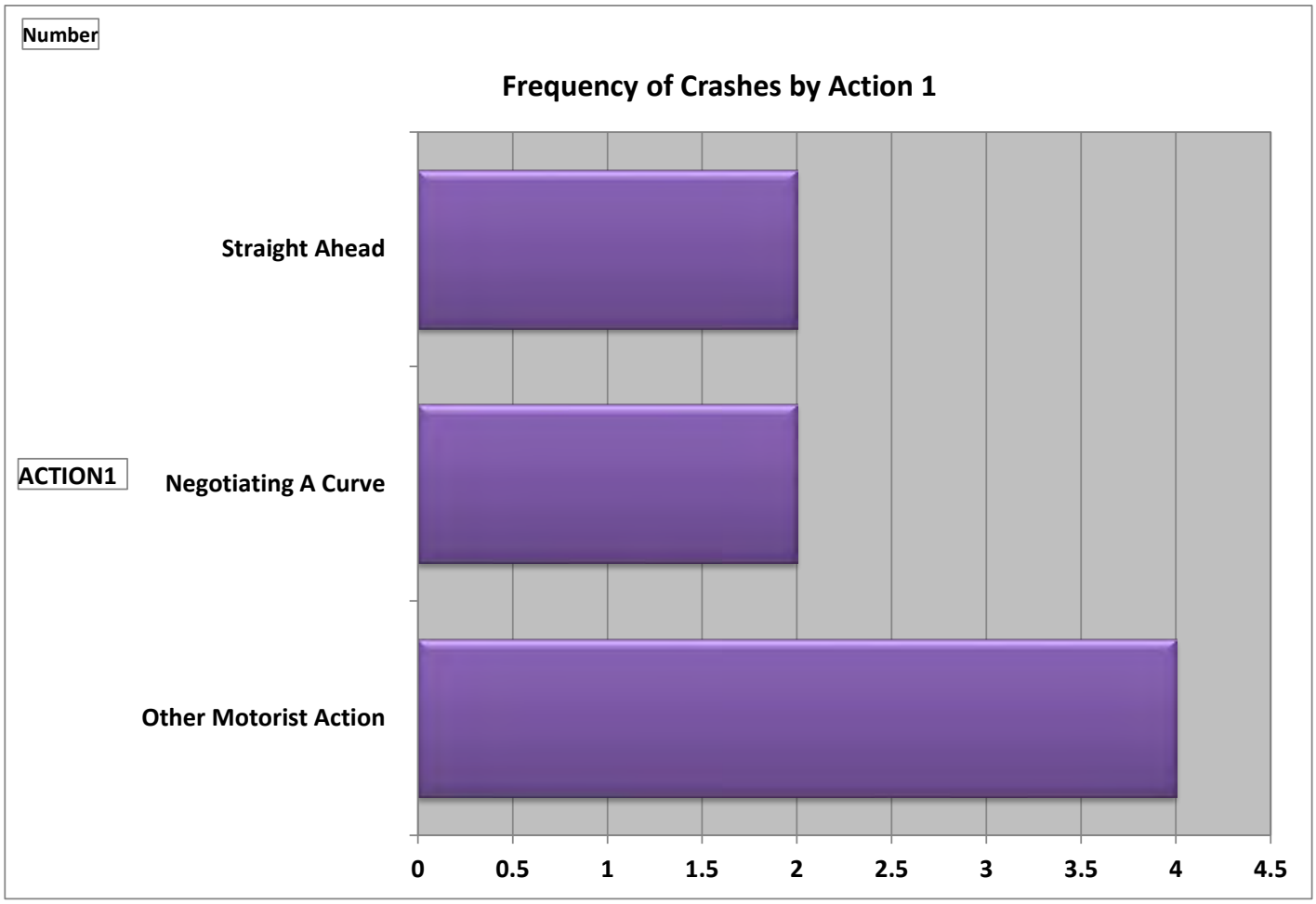


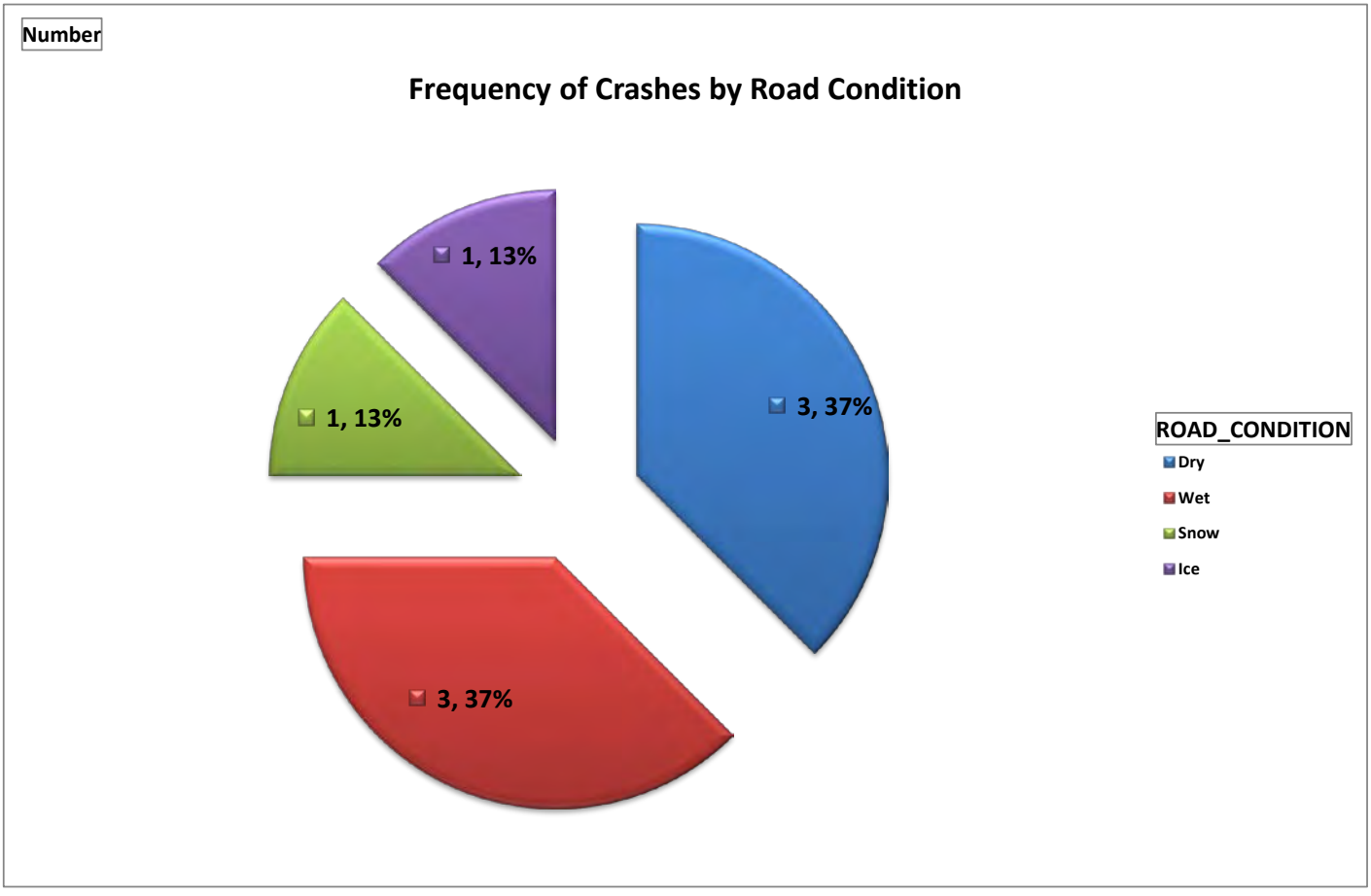
Link 03


Number
Frequency of Crashes by Type of Crash
3.5
3
2.5
2
1.5
1
0.5
0
Fixed Object
Overturning
Rear End
Sideswipe - Meeting
Other Non-Collision
TYPE_OF_CRASH

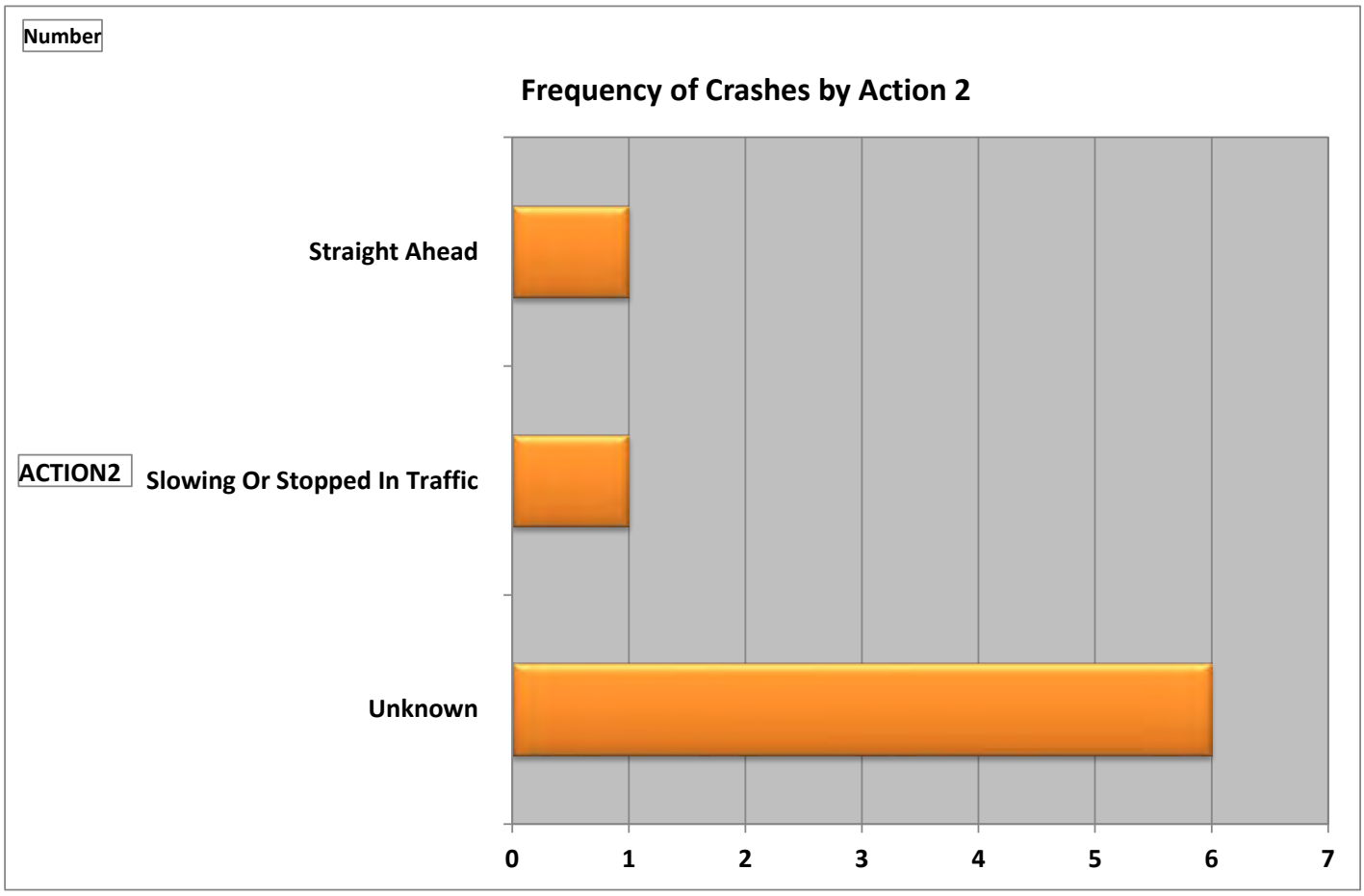

Number
Frequency of Crashes by Light Condition
4, 50%
4, 50%
LIGHT_CONDITION
Dark - Roadway Not Lighted
Daylight

Link 03


Number
Frequency of Crashes by Action 1
Straight Ahead
ACTION1
Negotiating A Curve
Other Motorist Action
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5


Number
Frequency of Crashes by Road Condition
1, 13%
1, 13%
3, 37%
3, 37%
ROAD_CONDITION
Dry
Wet
Snow
Ice

Link 03


Number
Frequency of Crashes by Action 2
Straight Ahead
ACTION2
Slowing Or Stopped In Traffic
Unknown
0
1
2
3
4
5
6
7

SIMPO Safety Study

APPENDIX B4: W. HERRIN ROAD (CITY OF HERRIN)

CMT

W. Herrin Road (Allen Road/N. 43rd Street to N. 35th Street)

Segment Priority #4

June 2019

INTRODUCTION

The segment of W. Herrin Road located within the City of Herrin was identified as the 4th ranked segment within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The segment length of 0.46 miles is located between Allen Road/ N. 43rd Street and N. 35th Street. The study area was expanded to 0.60 miles by including two priority intersections at the west and east ends of the study area, respectively: Allen Road/ N. 43rd Street and N. 35th Street.

EXISTING CONDITIONS

W. Herrin Road is a 2-lane roadway in the City of Herrin providing east west connectivity between the City of Herrin and Cambria Road. Land use is a mix between residential (south side) and commercial development (north side). About 8 access points exist within the 0.60 mile length of the study area. Items of interest are shown on the study area map (**Figure 1**):

1. The east access to the Herrin Elementary School is located 500 feet west of the Allen Road/ N. 43rd Street intersection. The driveway to the school is signalized. See **Photo 1.**
2. The Allen Road/ N. 43rd Street intersection is unsignalized with the Allen Road approach stop controlled. The Royal Oak trailer park driveway is offset 25 feet west of Allen Road See **Figure 2**.
3. The driveway access to Blue Blaze residential community services up to 60 parcels. The access point is 50 feet wide and is located 600 ft east of the Allen Road/ N. 43rd Street intersection. See **Figure 3**.
4. The N. 35th Street intersection is unsignalized with the N. 35th Street approaches stop controlled.

FIGURE 1: STUDY AREA

The posted speed limit on W. Herrin Road is 45 miles per hour within the study area

PHOTO 1: NB ALLEN ROAD/ N. 43RD STREET LOOKING WEST

FIGURE 2: ROYAL OAK/ALLEN ROAD OFFSET

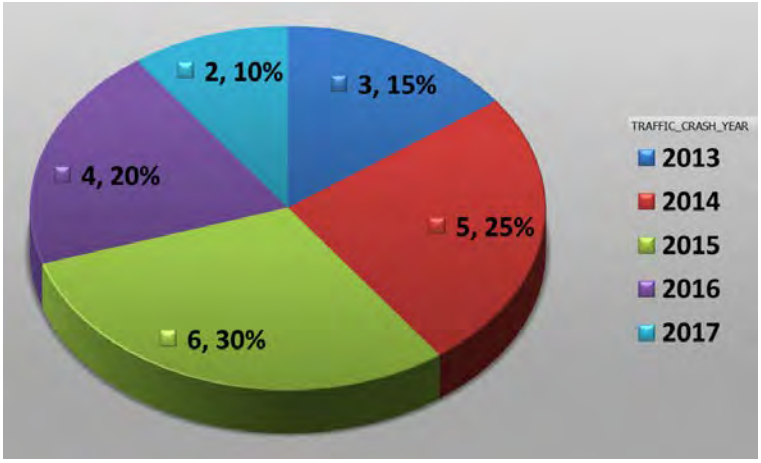
W. Herrin Road is a 2-lane roadway having lane widths of 12 feet and paved shoulders of 4 feet. Passing is permitted within the study area with a 4" yellow skip dash marking. W. Herrin Road was resurfaced in August 2013.

FIGURE 3: BLUE BLAZE DRIVEWAY

SAFETY ANALYSIS

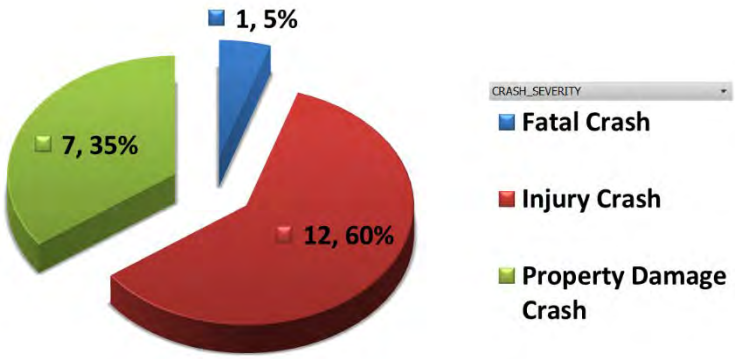
A total of 20 crashes occurred within the study area over a 5-year period (2013-2017). Animal crashes comprised 16 additional crashes which were removed from the dataset for purposes of this safety analysis. The frequency of crashes by year is summarized on **Figure 4**. The crash frequency varies between 2 and 6 crashes. No factors were identified to explain why the highest number of crashes (6) occurred in 2016.

FIGURE 4: FREQUENCY OF CRASHES BY YEAR



The severity of crashes on **Figure 5** shows that a motorcyclist was killed at the W. Herrin Road and N. 35th Street intersection. The crash occurred at 9:48 PM on Sunday, July 4, 2017 and involved a motorcycle traveling eastbound on W. Herrin Road. A vehicle turning left from N. 35th Street pulled in front of the motorcyclist resulting in a fatality.

FIGURE 5: FREQUENCY OF CRASHES BY SEVERITY



The fatal and injury crashes within the study area represent 65 percent of the total crashes. The injury crashes comprise 5 Type A crashes and 4 Type B crashes. **Figure 6** shows the distribution of crashes within the study area by location and severity. The highest percentage of injury crashes occurred at 2 locations within the limits of the study area:

- Allen Road/ N. 43rd Street intersection (logpoint 0.24 to 0.34). A total of 8 crashes occurred at this location and they included 6 injury crashes.
- N. 35th Street intersection (logpoint 0.74 to 0.84). A total of 9 crashes occurred at this location and they included 5 injury crashes and 1 fatality.

FIGURE 6: LOCATION FREQUENCY BY SEVERITY

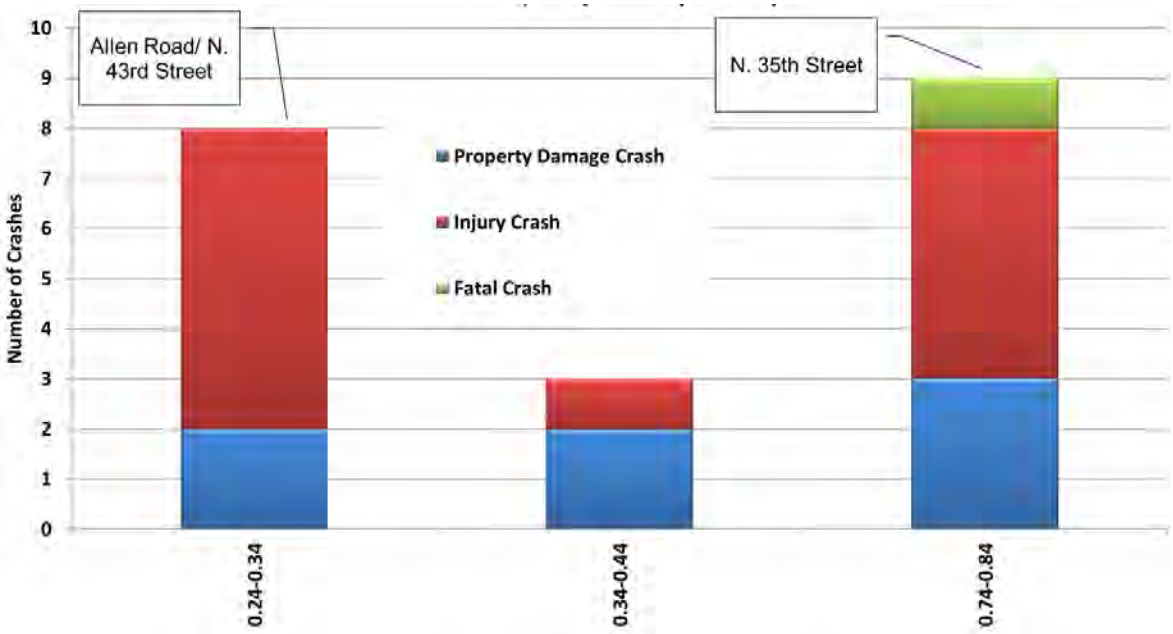


Figure 7 shows the severity of crashes by location and direction. The direction indicates the direction of travel prior to the crash such that crashes coded as west are westbound crashes. The number of rear end and fixed object crashes are indicative of stopped or slow traffic on a roadway without stop or signal

control. Left turning vehicles on the 2-lane roadway result in queues that form at the most significant access points within the study area. Operating speeds of 45 MPH or higher contribute to crash severity.

FIGURE7: LOCATION FREQUENCY BY DIRECTION AND CRASH TYPE

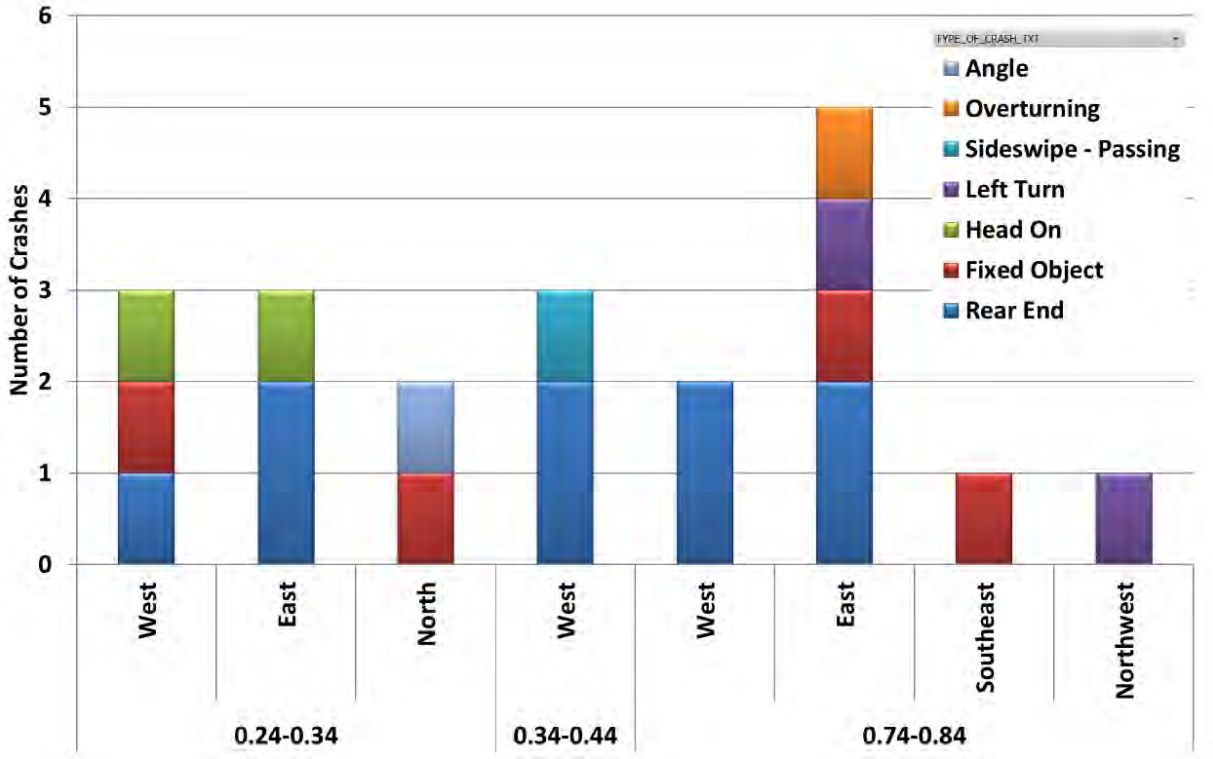


Figure 8 shows the distribution by time of day. The crash frequency by time of day suggests that traffic associated with the school is a contributing factor to the safety performance of the study area. A higher number of crashes occur in the 7:00 AM, 2:00 PM, and 4:00 PM time frames.

Figure 9 shows the location and severity of crashes plotted on an aerial map of the study area (including animal crashes).

FIGURE 8: FREQUENCY OF CRASHES BY HOUR

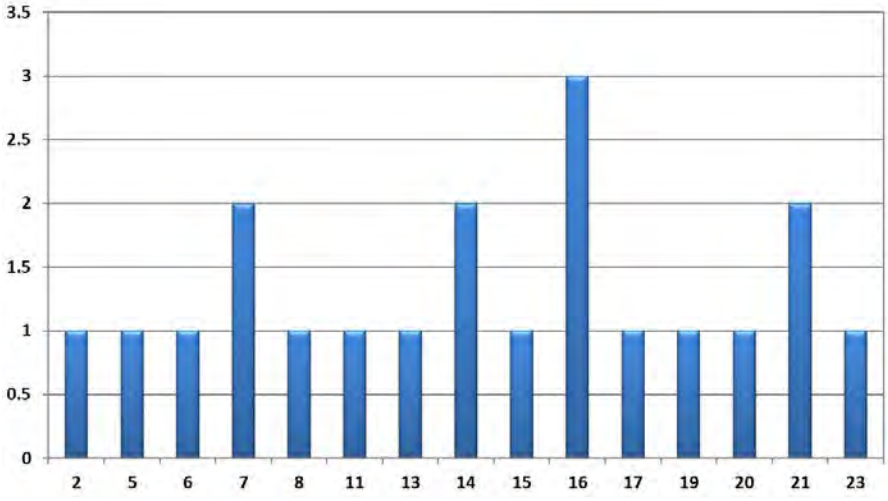
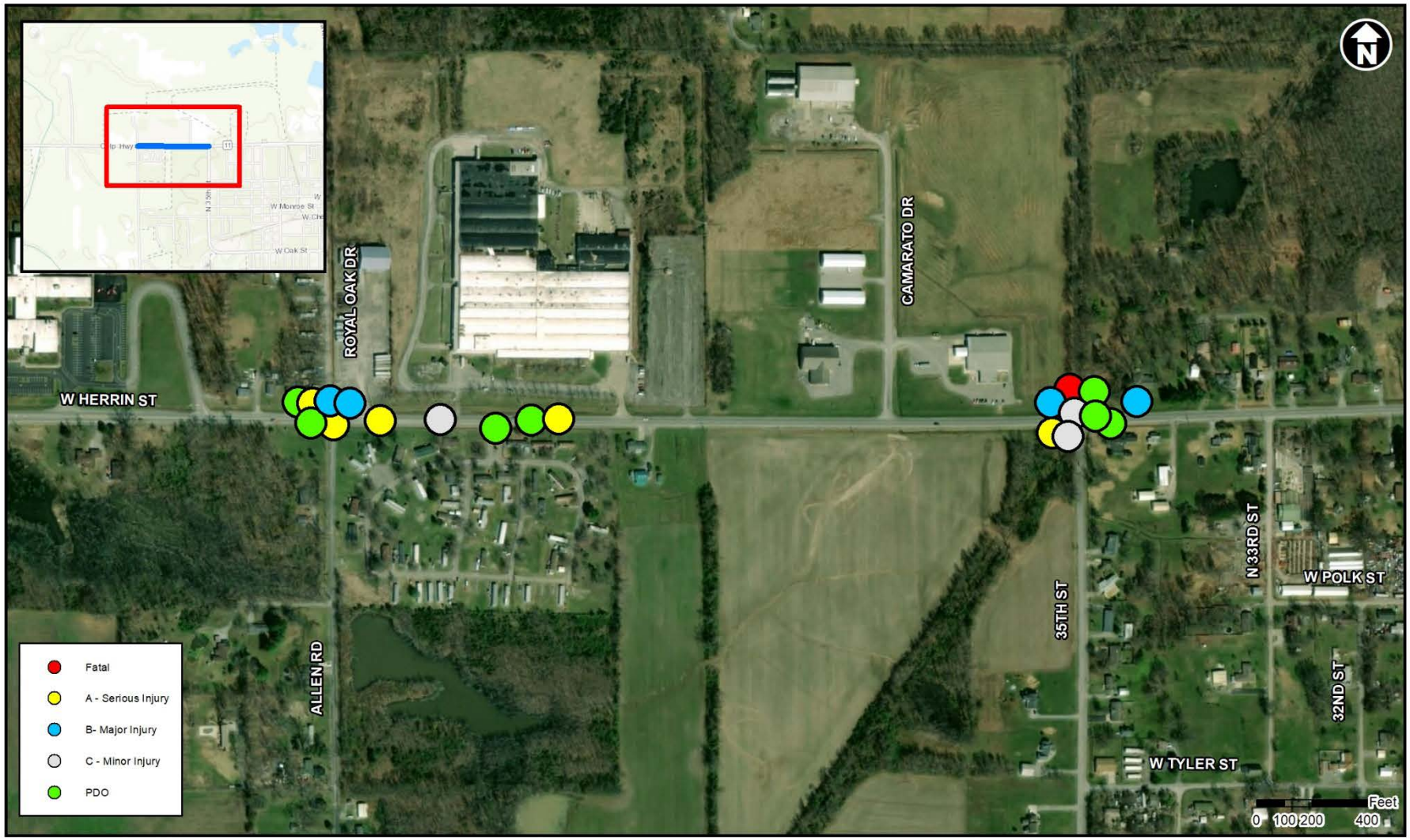


FIGURE 9: CRASH SEVERITY AND LOCATION MAP



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Illinois Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – NO PASSING ZONE

The Illinois vehicle code Section 11-706 prohibits passing within 100 feet of or traversing any intersection or railroad grade crossing. The MUTCD section Section 3B.02 states that where the distance between successive no-passing zones is less than 400 feet, no-passing markings should connect the zones. The minimum distance where passing is allowed between intersections is 600 feet. The frequency of intersections supports converting W. Herrin Street to a no passing zone between the following locations, as a minimum.

- 100 feet west of Allen Road/ N. 43rd Street to 100 feet east of Blue Blaze Trail (900 feet). Total no-passing zone length is 2,600 feet due to the adjacent no-passing zone in front of Herrin Elementary School
- 100 feet west of Camarato Drive to N. 29th Street (2,200 feet).

A passing zone would remain between Blue Blaze Trail and Camarato Drive (1,200 feet). The no passing zone would be located on segments of W. Herrin Road having the majority of crashes. **Figure 10** shows the minimum limits of the no-passing zone (yellow line).

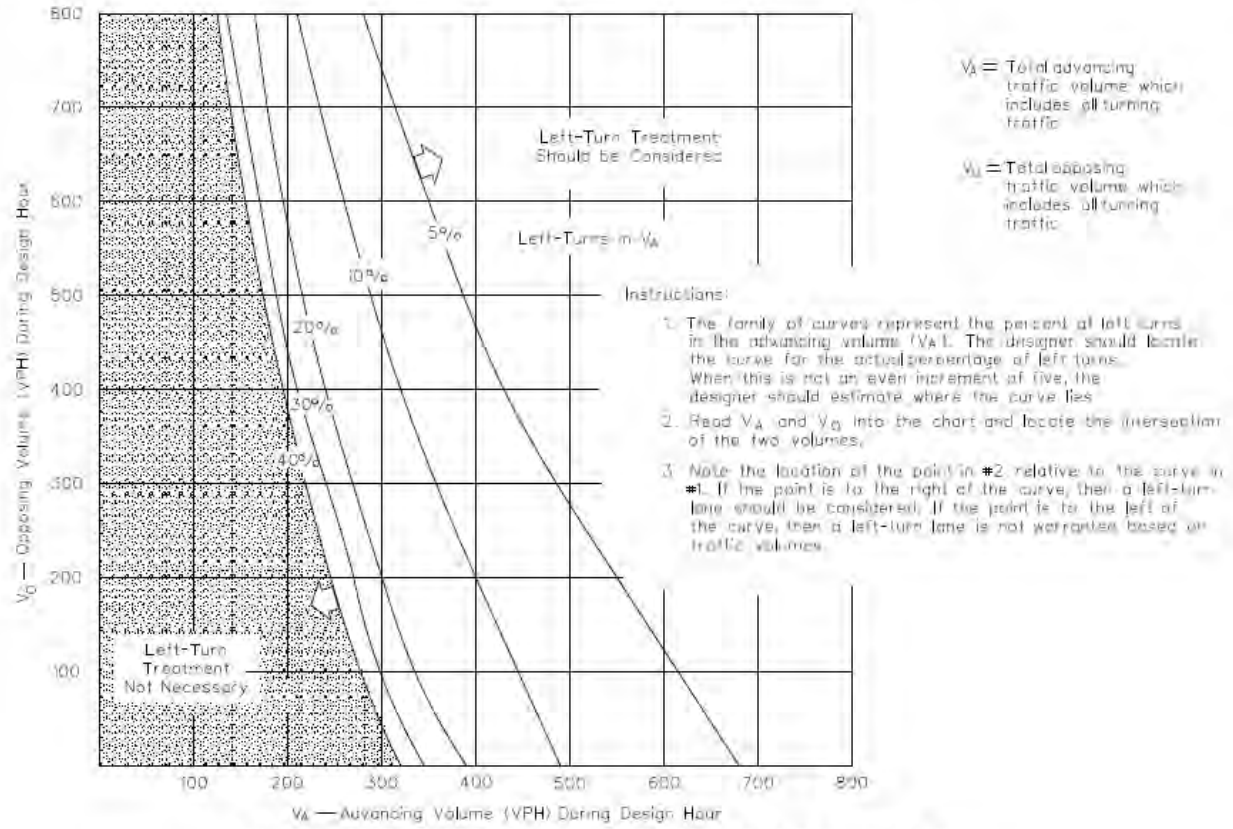
FIGURE10: NO PASSING ZONE LOCATIONS

MEDIUM TERM COUNTERMEASURE – AUXILIARY LEFT TURN LANES

A total of 12 crashes or 60% were identified with the potential to be mitigated with the construction of an auxiliary left-turn lane. The crash type to be mitigated were a combination of rear end, fixed object, and turning crashes within the study area. One Type A injury crash and 3 Type B injury crashes were included with the 12 mitigated crashes.

Guidelines for auxiliary left turn lanes on W. Herrin Street from the IDOT Bureau of Design and Environment Manual are shown in **Figure 11**. Traffic data would need to be obtained to confirm if auxiliary left turn lanes meet IDOT guidelines at the critical intersections having safety performance issues: Allen Road/ N. 43rd Street, Blue Blaze Trail, and N. 35th Street. Knowing that W. Herrin Street has an AADT of 6,500 vehicles, left turn volumes would need to be in the 20% range to meet volume-based warrants. The safety performance at critical intersections may support implementation of left turn lanes if close to the thresholds shown in **Figure 11**.

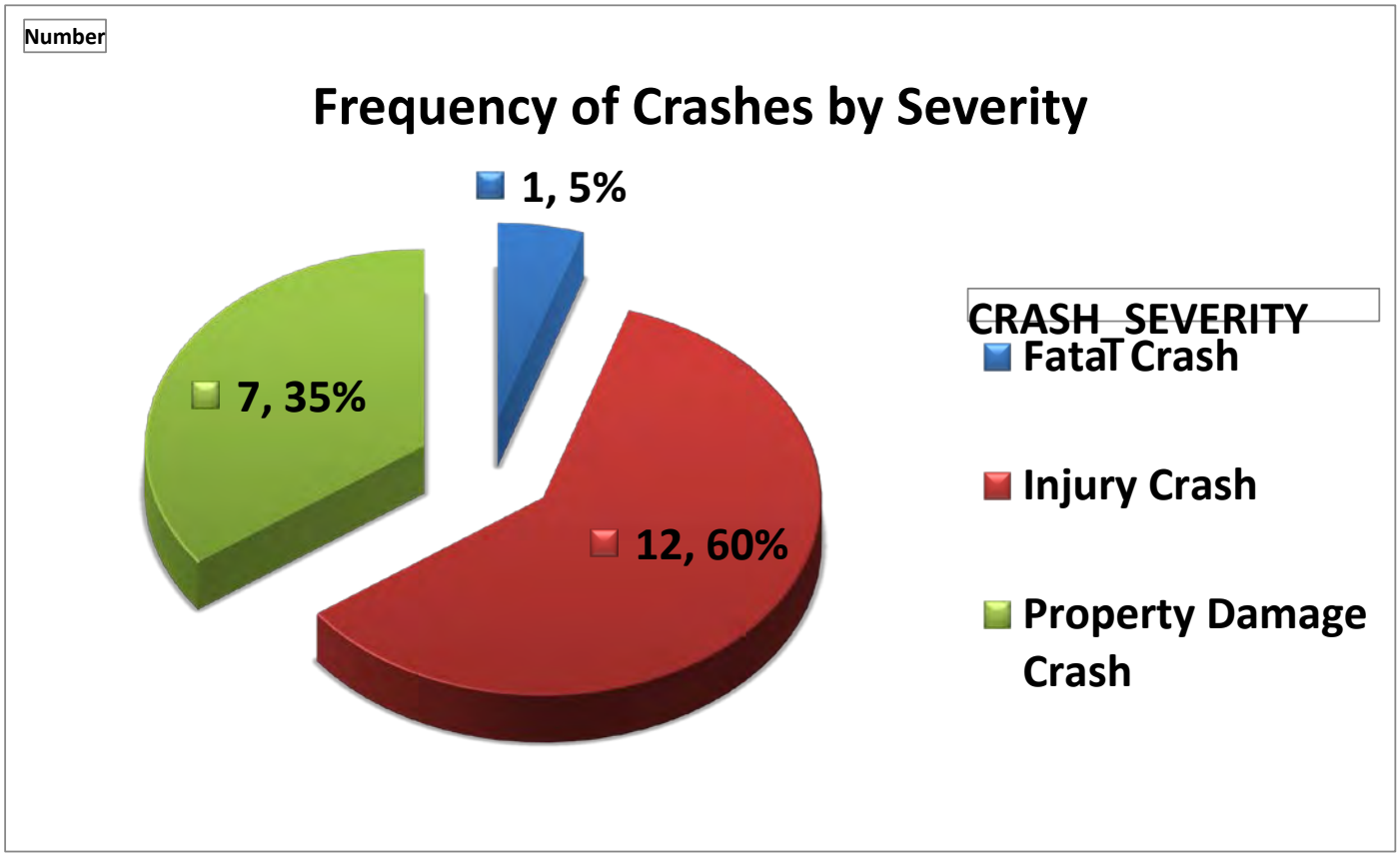
FIGURE11: LEFT TURN LANE GUIDELINES (IDOT FIGURE 36-3.E)

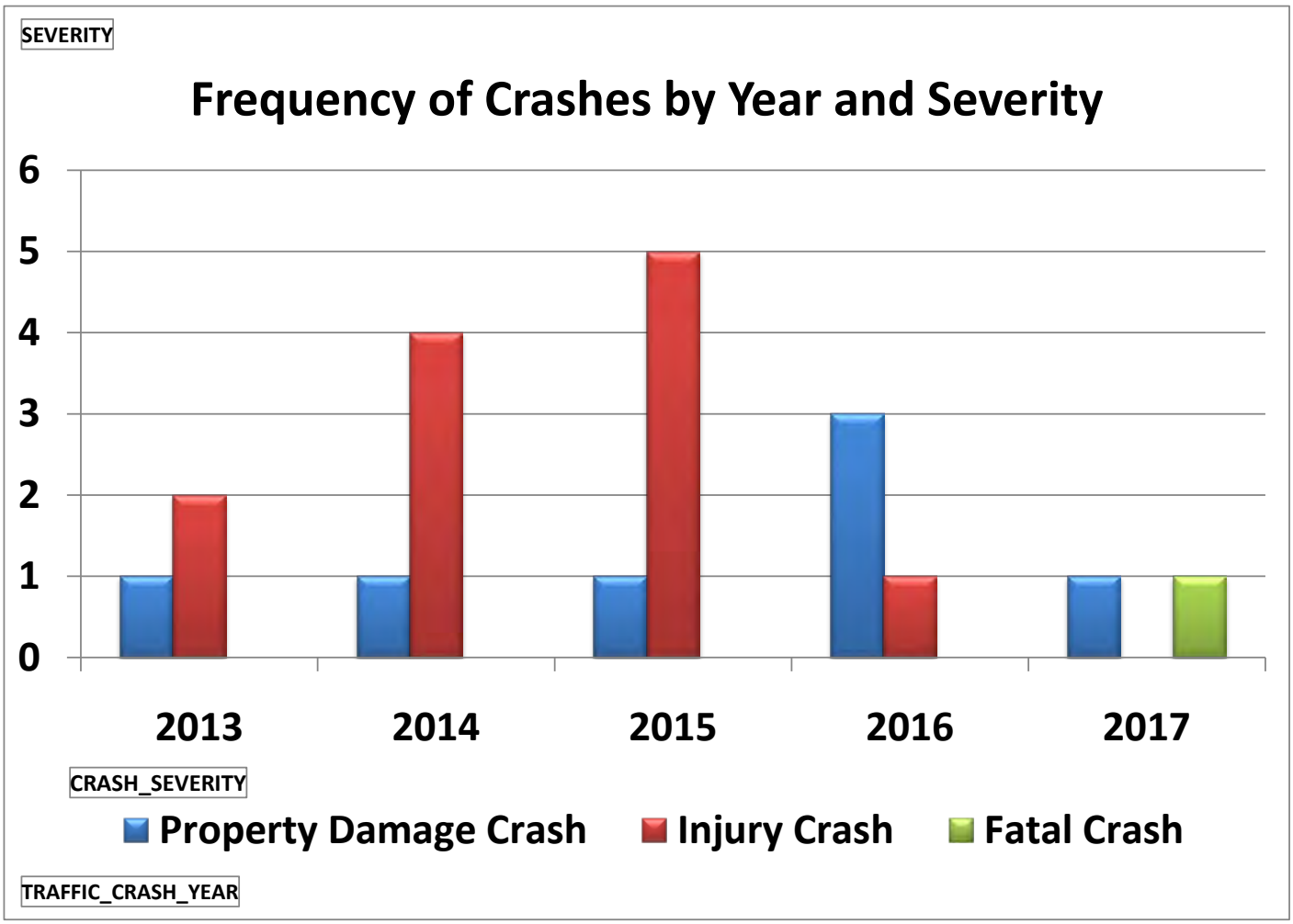


VOLUME GUIDELINES FOR LEFT-TURN LANES AT UNSIGNALIZED INTERSECTIONS ON TWO-LANE HIGHWAYS (50 mph Design Speed)

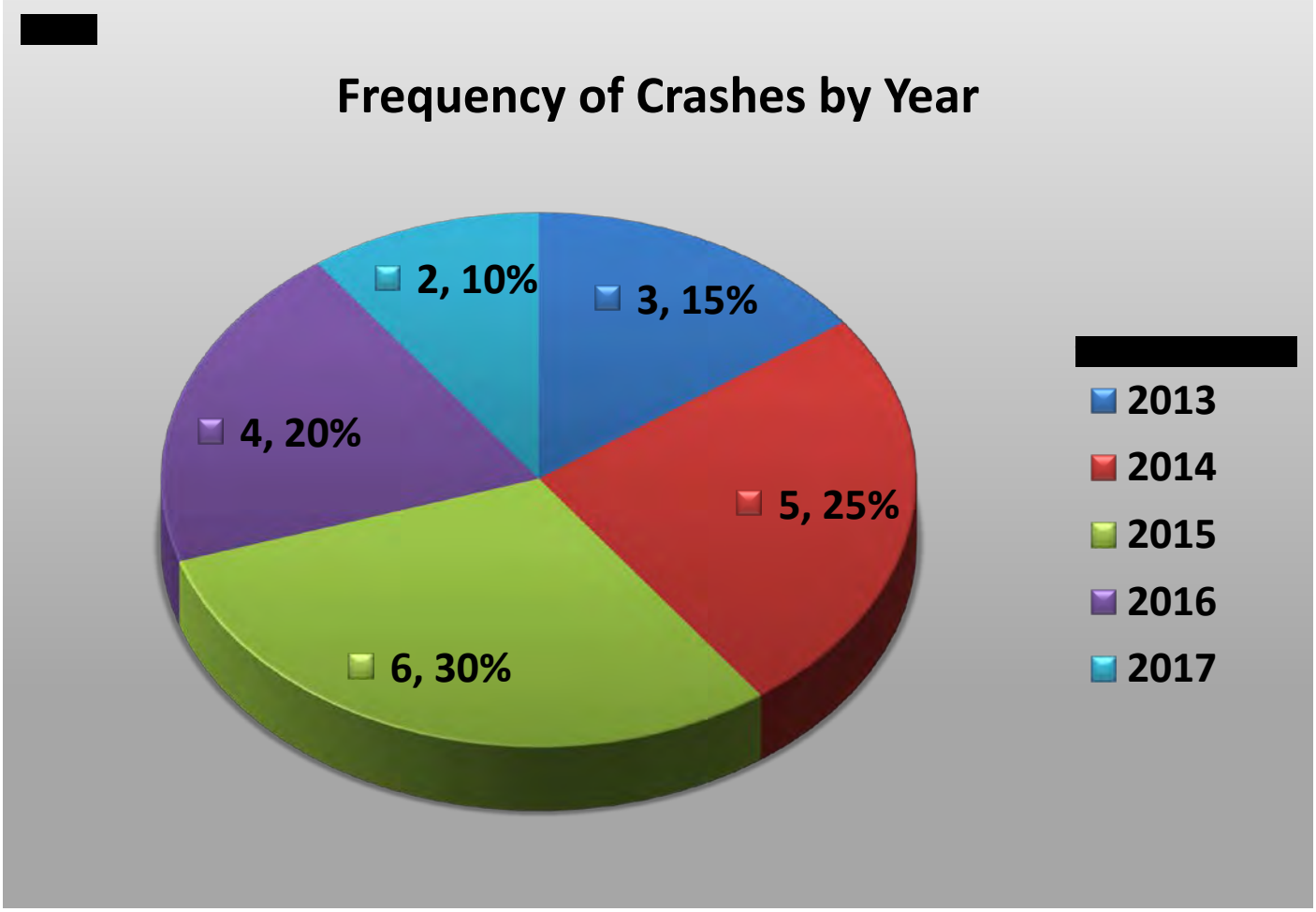
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701193883	17	07	04	21	Tue	2	3	1	Turning	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.76000000000	Normal	Passenger	Northwest	Turning Left	Intersection	Motorcycle (Over 150cc)	East	Straight Ahead	Fatal
201701299514	17	11	03	19	Fri	1	0	0	Animal	Clear	Darkness	Dry	No Defects	Lane Use Marking	0.72000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)				PD
201701363374	17	01	05	07	Thu	2	0	0	Angle	Snow	Daylight	Snow or Slush	No Defects	Stop Sign/Flasher	0.24000000000	Normal	SUV	North	Slow/Stop - Right Turn	Intersection	SUV	East	Straight Ahead	PD
201601313322	16	01	15	08	Fri	2	0	0	Rear End	Rain	Daylight	Wet	No Defects	No Controls	0.76000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Straight Ahead	PD
201601451396	16	10	27	18	Thu	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.76000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)				PD
201601477826	16	10	28	16	Fri	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.38000000000	Other/Unknown	Passenger	West	Straight Ahead	On Pavement (Roadway)	Pickup	West	Straight Ahead	PD
201601456755	16	09	03	13	Sat	3	3	0	Sideswipe Same Direction	Clear	Daylight	Dry	No Defects	Lane Use Marking	0.41000000000	Other/Unknown	SUV	West	Merging	On Pavement (Roadway)	Passenger	West	Straight Ahead	A-Injury
201601489002	16	11	15	23	Tue	2	0	0	Rear End	Clear	Darkness	Dry	No Defects	No Controls	0.35000000000	Other/Unknown	Unknown	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop - Left Turn	PD
201501185159	15	01	14	18	Wed	1	0	0	Animal	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	0.43000000000	Other/Unknown	Passenger	West	Straight Ahead	On Pavement (Roadway)				PD
201501187057	15	01	15	06	Thu	2	2	0	Head On	Snow	Dawn	Snow or Slush	No Defects	No Controls	0.25000000000	Normal	Passenger	West	Other	On Pavement (Roadway)	Passenger	East	Straight Ahead	A-Injury
201501186726	15	01	15	07	Thu	1	1	0	Fixed Object	Snow	Daylight	Snow or Slush	No Defects	Stop Sign/Flasher	0.76000000000	Normal	Pickup	Southeast	Turning Right	Off Pavement - Left				B-Injury
201501187068	15	01	15	06	Thu	1	0	0	Animal	Snow	Daylight	Ice	No Defects	No Controls	0.74000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)				PD
201501264962	15	02	03	21	Tue	2	3	0	Head On	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	0.26000000000	Alcohol Impaired	Pickup	East	Driving Wrong Way	On Pavement (Roadway)	Passenger	West	Straight Ahead	A-Injury
201501377460	15	10	06	23	Tue	1	0	0	Animal	Fog/Smoke/Haze	Darkness	Dry	No Defects	No Controls	0.41000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)				PD
201501376716	15	08	08	20	Sat	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.73000000000	Normal	Pickup	East	Straight Ahead	On Pavement (Roadway)				PD
201501377159	15	09	23	19	Wed	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.74000000000	Normal	Pickup	West	Straight Ahead	On Pavement (Roadway)				PD
201501354030	15	10	17	19	Sat	1	1	0	Fixed Object	Clear	Darkness	Dry	No Defects	Stop Sign/Flasher	0.24000000000	Other/Unknown	Passenger	North	Straight Ahead					A-Injury
201501361676	15	03	16	05	Mon	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.52000000000	Normal	Passenger	West	Straight Ahead	On Pavement (Roadway)				PD
201501355052	15	10	23	14	Fri	2	2	0	Turning	Rain	Daylight	Wet	No Defects	Stop Sign/Flasher	0.76000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	SUV	East	Turning Right	B-Injury
201501460880	15	08	15	02	Sat	1	0	0	Fixed Object	Fog/Smoke/Haze	Darkness	Dry	No Defects	Lane Use Marking	0.74000000000	Normal	Passenger	East	Straight Ahead	Off Pavement - Right				PD
201400163022	14	03	20	03	Thu	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.32000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)				PD
201400293878	14	10	08	15	Wed	2	0	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.25000000000	Normal	SUV	East	Straight Ahead	On Pavement (Roadway)	SUV	East	Other	PD
201400285507	14	09	29	14	Mon	1	1	0	Overturned	Clear	Daylight	Dry	No Defects	No Controls	0.75000000000	Normal	Van/Mini-Van	East	Skidding/Control Loss	Off Pavement - Right				A-Injury
201400352426	14	07	10	04	Thu	1	1	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.74000000000	Normal	Motorcycle (Over 150cc)	East	Straight Ahead	On Pavement (Roadway)				A-Injury
201400359994	14	07	22	20	Tue	2	2	0	Rear End	Clear	Dusk	Dry	No Defects	No Controls	0.24000000000	Had Been Drinking	Passenger	West	Straight Ahead	Intersection	Passenger	West	Slow/Stop - Left Turn	B-Injury
201400430939	14	11	12	16	Wed	3	1	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.76000000000	Normal	Van/Mini-Van	West	Straight Ahead	On Pavement (Roadway)	Passenger	West	Slow/Stop In Traffic	C-Injury
201400460988	14	12	28	22	Sun	1	0	0	Animal	Clear	Darkness	Dry	No Defects	No Controls	0.62000000000	Normal	SUV	West	Straight Ahead	On Pavement (Roadway)				PD
201400450728	14	12	14	17	Sun	1	1	0	Fixed Object	Clear	Darkness	Dry	No Defects	No Controls	0.24000000000	Other/Unknown	Passenger	West	Other	Off Pavement - Left				B-Injury
201301115722	13	04	05	05	Fri	2	0	0	Rear End	Clear	Darkness	Dry	No Defects	No Controls	0.76000000000	Normal	Passenger	East	Straight Ahead	Intersection	Passenger	East	Slow/Stop - Right Turn	PD
201301163629	13	08	29	11	Thu	2	2	0	Rear End	Clear	Daylight	Dry	No Defects	No Controls	0.32000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Passenger	East	Slow/Stop In Traffic	C-Injury
201301157084	13	08	15	16	Thu	3	2	0	Rear End	Clear	Daylight	Dry		Police/Flagman	0.74000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	East	Slow/Stop In Traffic	C-Injury

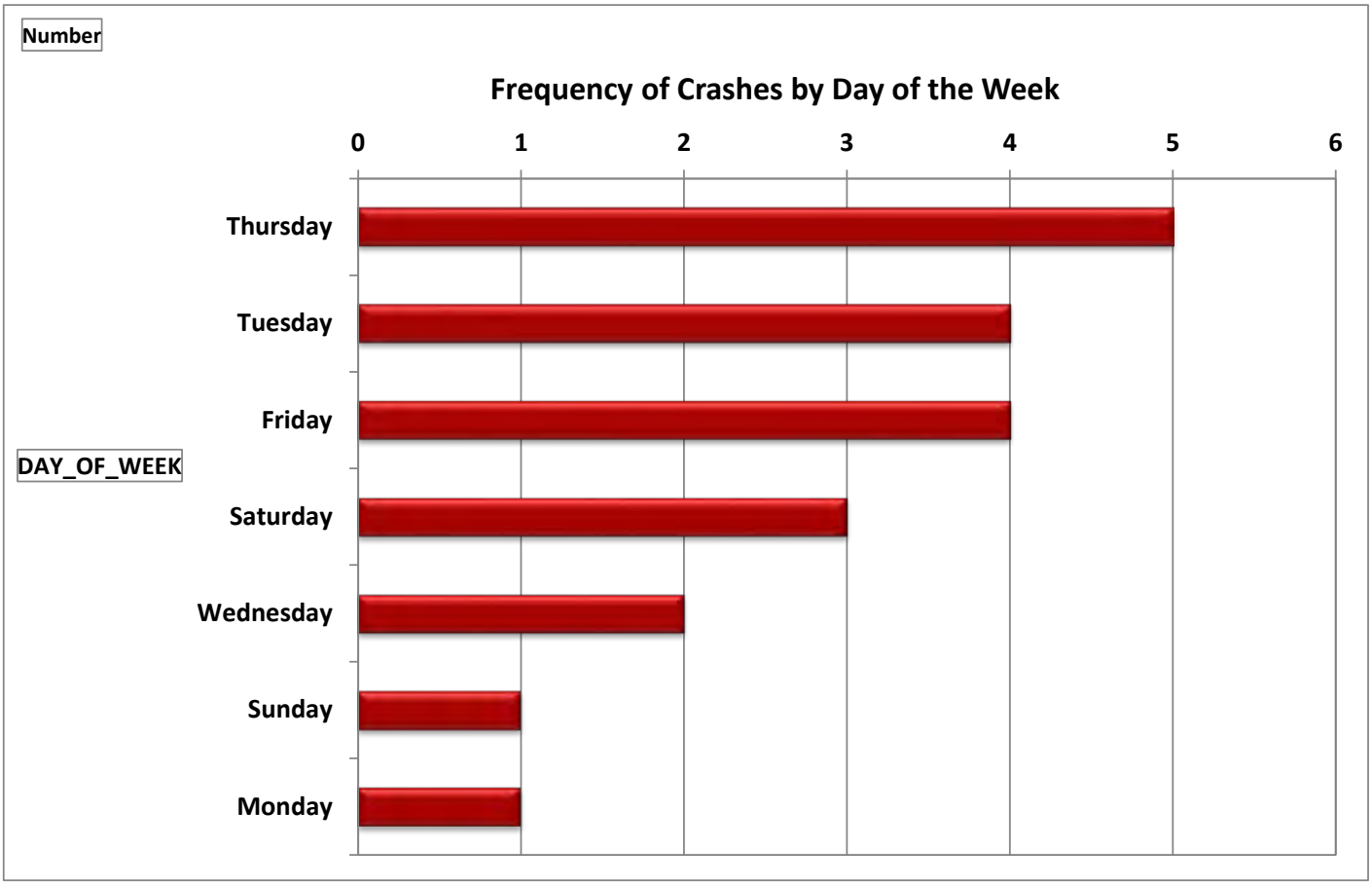
Link 04


Number
Frequency of Crashes by Severity
1, 5%
7, 35%
12, 60%
CRASH_SEVERITY
Fatal Crash
Injury Crash
Property Damage Crash


SEVERITY
Frequency of Crashes by Year and Severity
6
5
4
3
2
1
0
2013
2014
2015
2016
2017
CRASH_SEVERITY
Property Damage Crash
Injury Crash
Fatal Crash
TRAFFIC_CRASH_YEAR

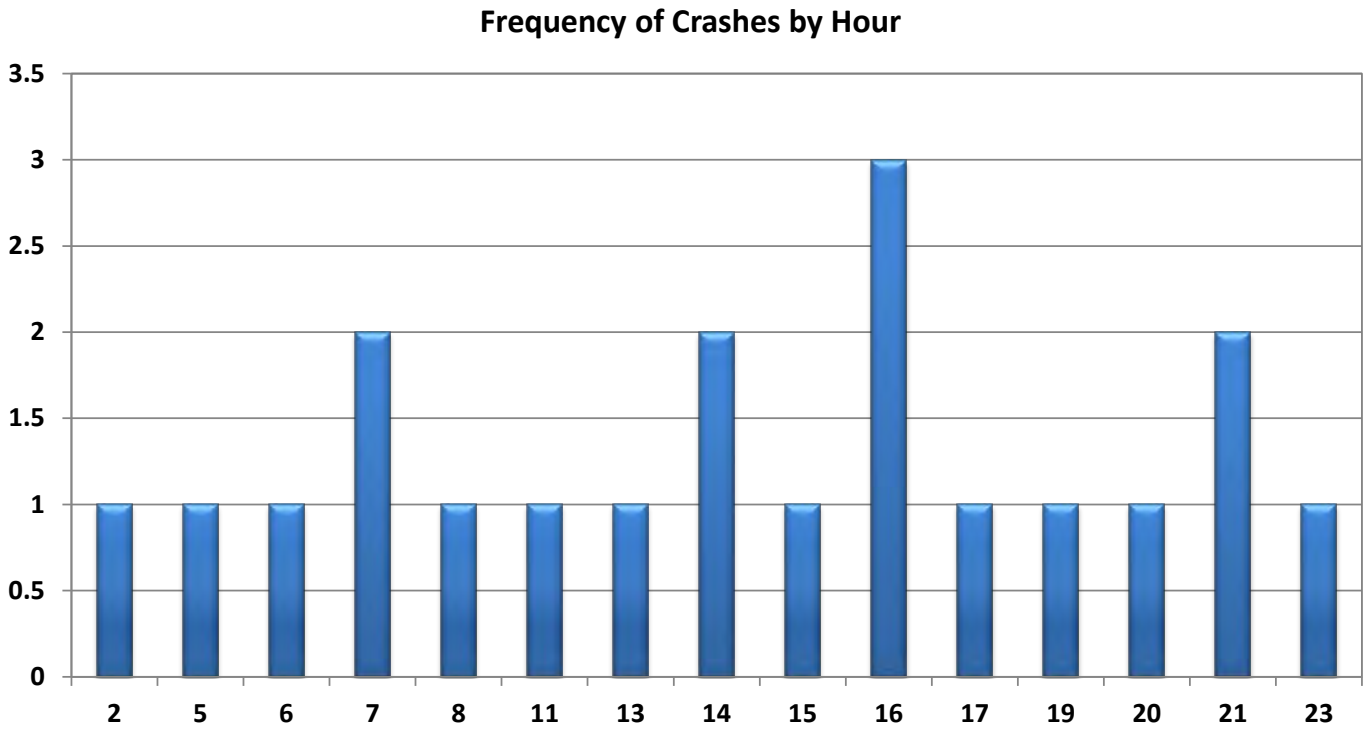
Link 04


Frequency of Crashes by Year
2, 10%
3, 15%
4, 20%
5, 25%
6, 30%
2013
2014
2015
2016
2017

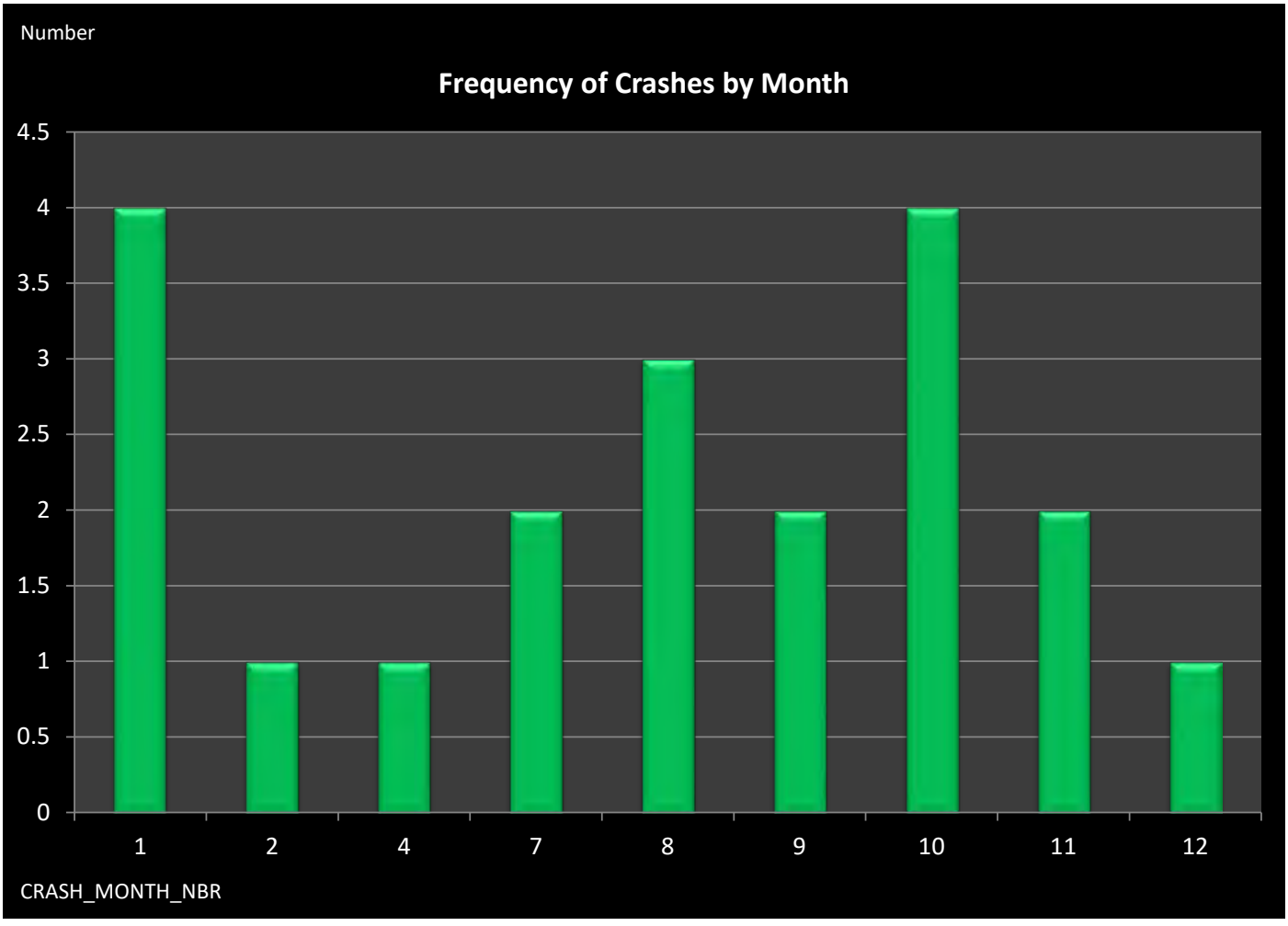

Number
Frequency of Crashes by Day of the Week
0
1
2
3
4
5
6
Thursday
Tuesday
Friday
DAY_OF_WEEK
Saturday
Wednesday
Sunday
Monday

Link 04

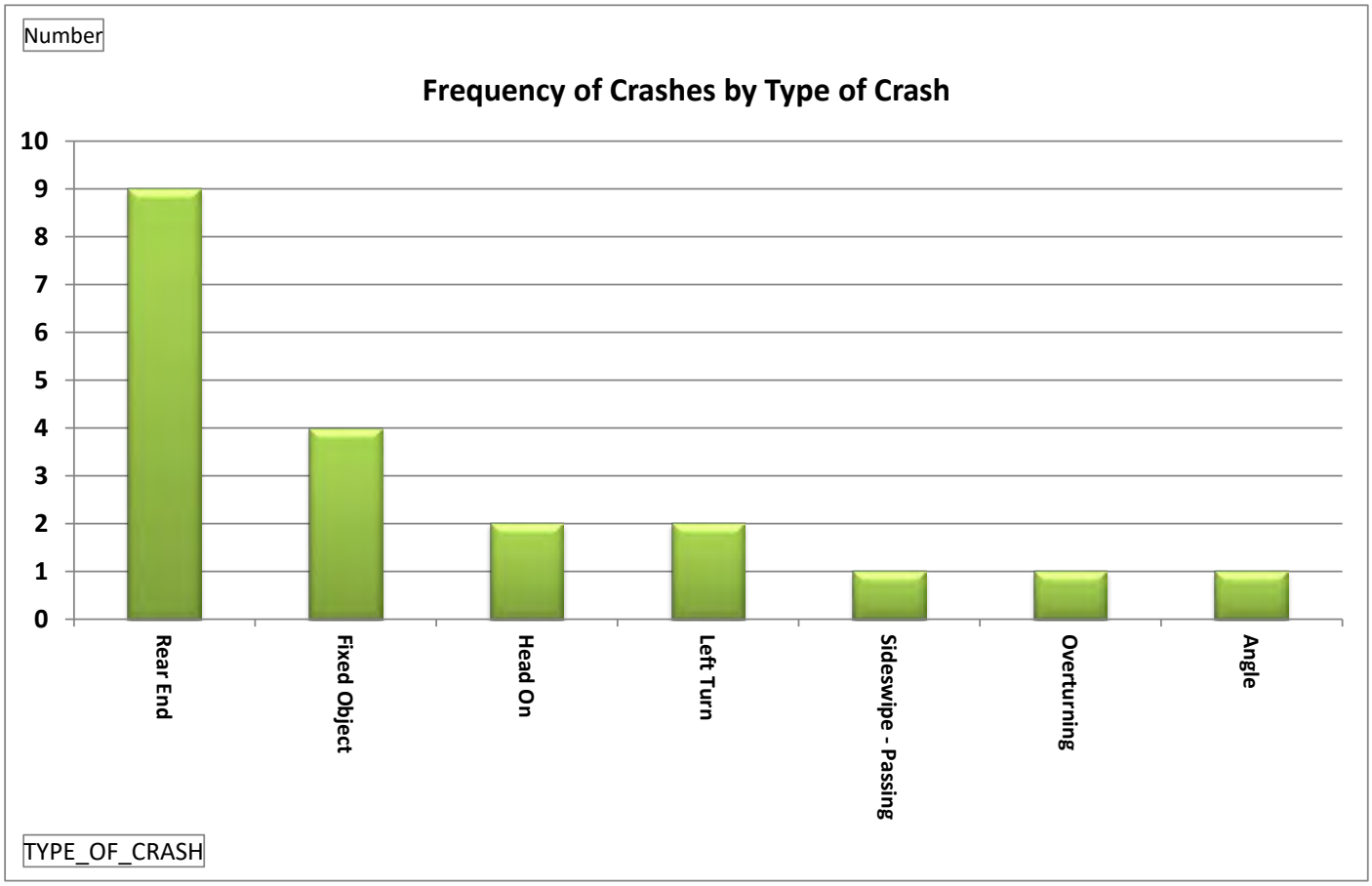
[redacted]

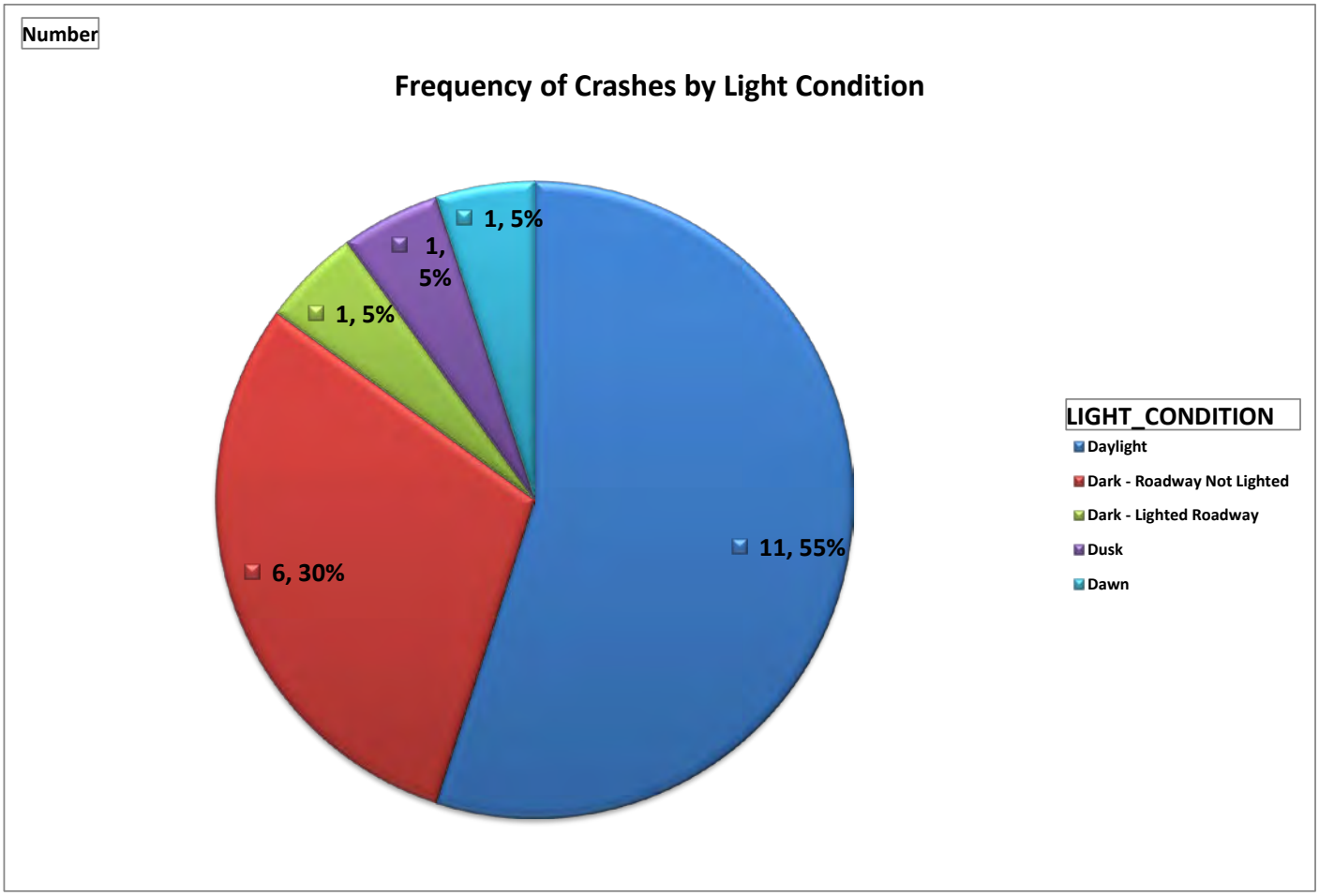


[redacted]

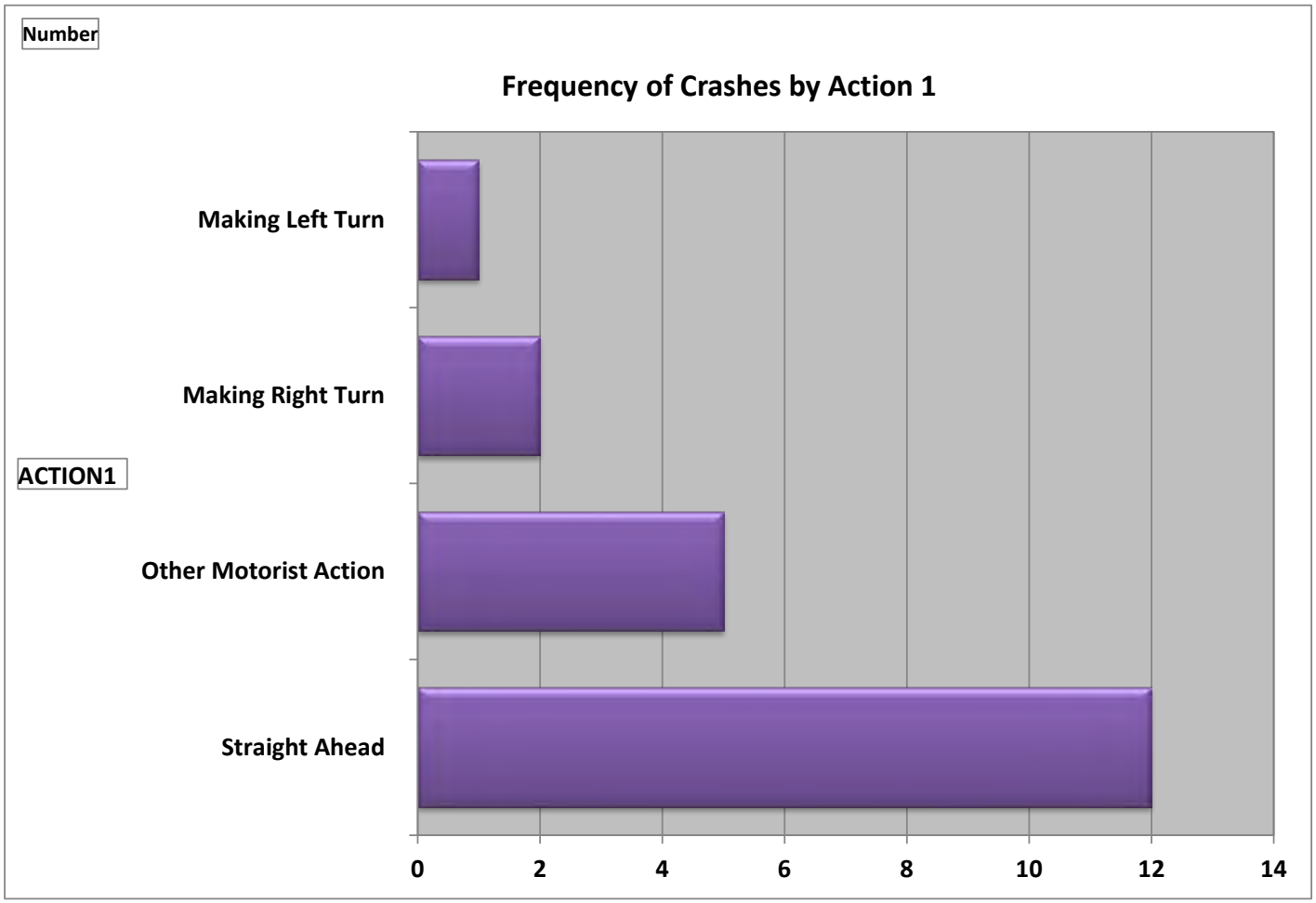


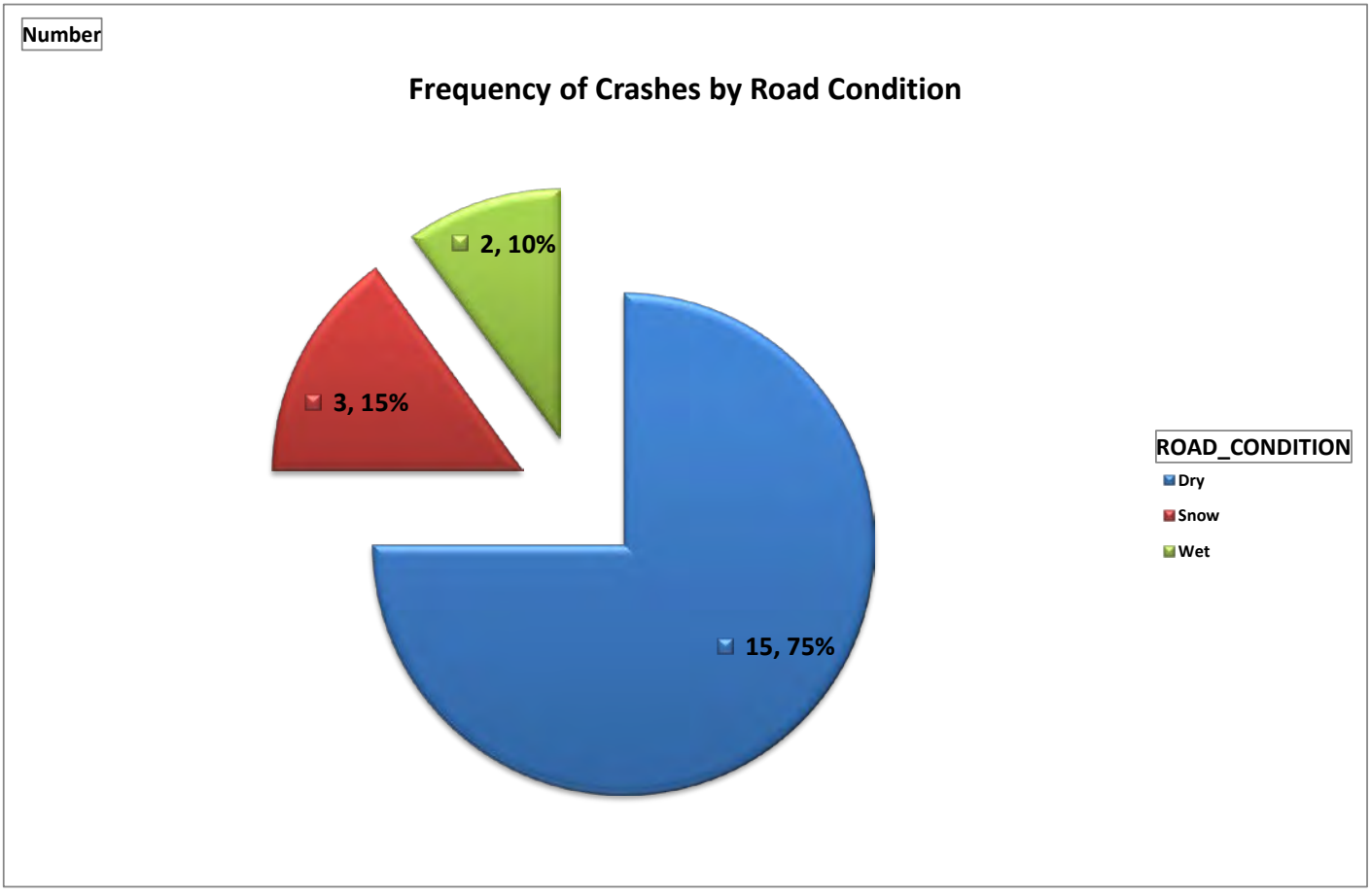
Link 04


Number
Frequency of Crashes by Type of Crash
10
9
8
7
6
5
4
3
2
1
0
Rear End
Fixed Object
Head On
Left Turn
Sideswipe - Passing
Overturning
Angle
TYPE_OF_CRASH

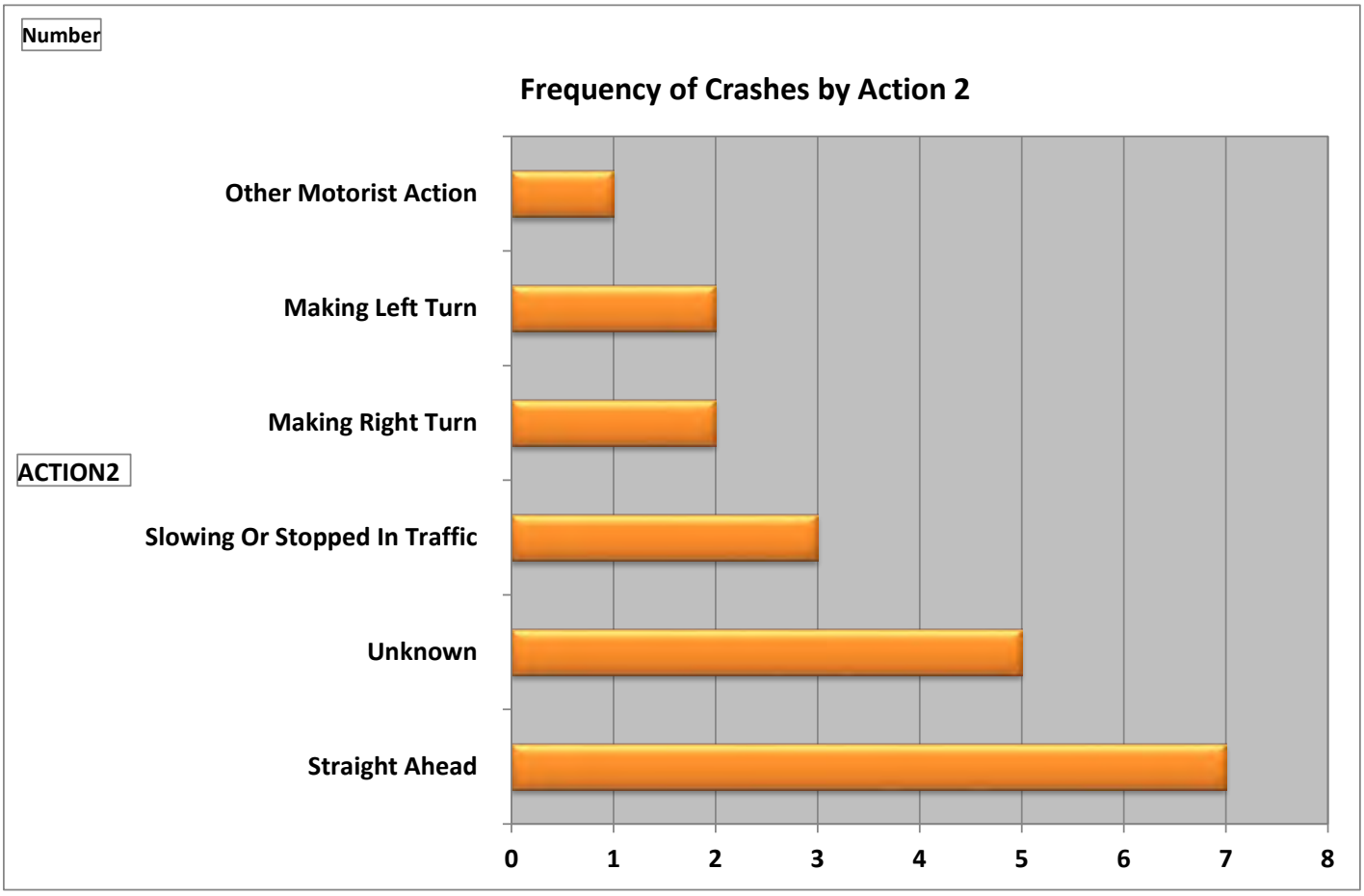

Number
Frequency of Crashes by Light Condition
1, 5%
1, 5%
1, 5%
11, 55%
6, 30%
LIGHT_CONDITION
Daylight
Dark - Roadway Not Lighted
Dark - Lighted Roadway
Dusk
Dawn

Link 04


Number
Frequency of Crashes by Action 1
Making Left Turn
Making Right Turn
ACTION1
Other Motorist Action
Straight Ahead
0
2
4
6
8
10
12
14


Number
Frequency of Crashes by Road Condition
2, 10%
3, 15%
15, 75%
ROAD_CONDITION
Dry
Snow
Wet

Link 04


Number
Frequency of Crashes by Action 2
Other Motorist Action
Making Left Turn
Making Right Turn
ACTION2
Slowing Or Stopped In Traffic
Unknown
Straight Ahead
0
1
2
3
4
5
6
7
8

SIMPO Safety Study

APPENDIX B5: N. MARION STREET (JACKSON CO/ CITY OF CARBONDALE)

Marion Street (Fisher Street to Glade Lane)

Segment Priority #5

June 2019

INTRODUCTION

The segment of Marion Street located within Jackson County was identified as the 5th ranked segment within the Southern Illinois Metropolitan Planning Organization (SIMPO) jurisdiction. The original segment had a length of 0.52 miles. The study area was extended north to Glade Lane and south to the Fisher Street intersection. The total study area length is 1.1 miles, of which 0.6 miles in located in the City of Carbondale.

EXISTING CONDITIONS

The section of Marion Street within Jackson County extends from the city limits to Glade Lane at the north end of the study area. Land use is predominately agricultural. The section of Marion Street within the City of Marion extends from the city limits to Fisher Street at the south end of the study area. Land use is predominately industrial and residential in this section.

Marion Street is a roadway having variable width of 20 to 24 feet. Aggregate shoulders vary between 0 and 2 feet in width. The roadway is a two-lane facility with a centerline stripe in most locations. **Photos 1-4** show the existing horizontal and vertical curves within the study area. The approximate location of each photo is numbered on **Figure 1.** The approximate distance from Glade Lane is referenced for each photo.

Items of interest are shown on the study area map (**Figure 1**):

1. The horizontal curve at the north end of the study area (**Photo 1**) has advance curve signs and chevrons on the outside of the curve. A vertical curve exists within the horizontal curve limits and is the location of a former railroad crossing of the Illinois Central railroad. A centerline is painted south of the vertical curve.
2. Photo 2 shows the curve at the north end of the study area looking north. The vertical alignment adds a level of complexity to the curve.
3. A Winding Road (W1-5) sign is used as shown in **Photo 3**. The Winding Road (W1-5) sign may be used instead of multiple Turn (W1-1) or Curve (W1-2) signs where there are three or more changes in roadway alignment each separated by a tangent distance of less than 600 feet. While there are 3 changes in roadway alignment, the next curve is located about 600 feet south suggesting that separate signs are possible.
4. **Photo 4** shows the curve at the south end of the study area. The advance sign for this curve in the southbound direction is shown on **Photo 3** – 1,700 feet north of this location.
5. **Photo 5** shows that a vertical curve exists at the horizontal curve on the south end of the study area similar to the north end.

FIGURE 1: STUDY AREA

PHOTO 1: SB VERTICAL/HORIZONTAL CURVE (@ 700 FT)

PHOTO 2: NB VERTICAL/HORIZONTAL CURVE (@ 1000 FT)

PHOTO 3: HORIZONTAL CURVE (@ 2900 FT)

PHOTO 4: HORIZONTAL CURVE (@ 4600 FT)

PHOTO 4: SB VERTICAL CURVE (@ 4800 FT)

The legal speed limit on Marion Street is 55 miles per hour within the Jackson County section of the study area. A posted speed of 30 miles per hour exists for Marion Street within the City of Marion.

SAFETY ANALYSIS

A total of 7 crashes occurred within the study area over a 5-year period (2013-2017). The severity of crashes is summarized on **Figure 2**. One fatality occurred at the north end of the study area.

A fatality occurred Sunday, July 23, 2017 when an SUV lost control of the vehicle north of the north curve. The crash report was coded as the vehicle navigating a curve before rolling over. The driver was drug impaired. The curve shown in **Photo 1 and 2** has an advisory speed of 30 MPH.

One other Type B injury crash occurred near Glade Lane. The single vehicle crash occurred when a northbound vehicle drove off the right side of the road and struck a tree.

FIGURE 2: SEVERITY OF CRASHES

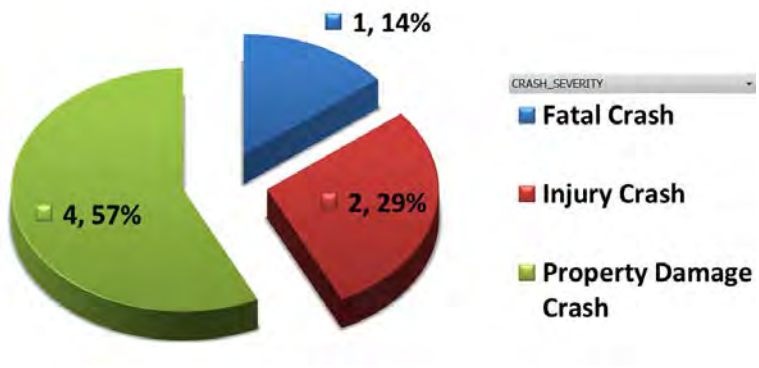
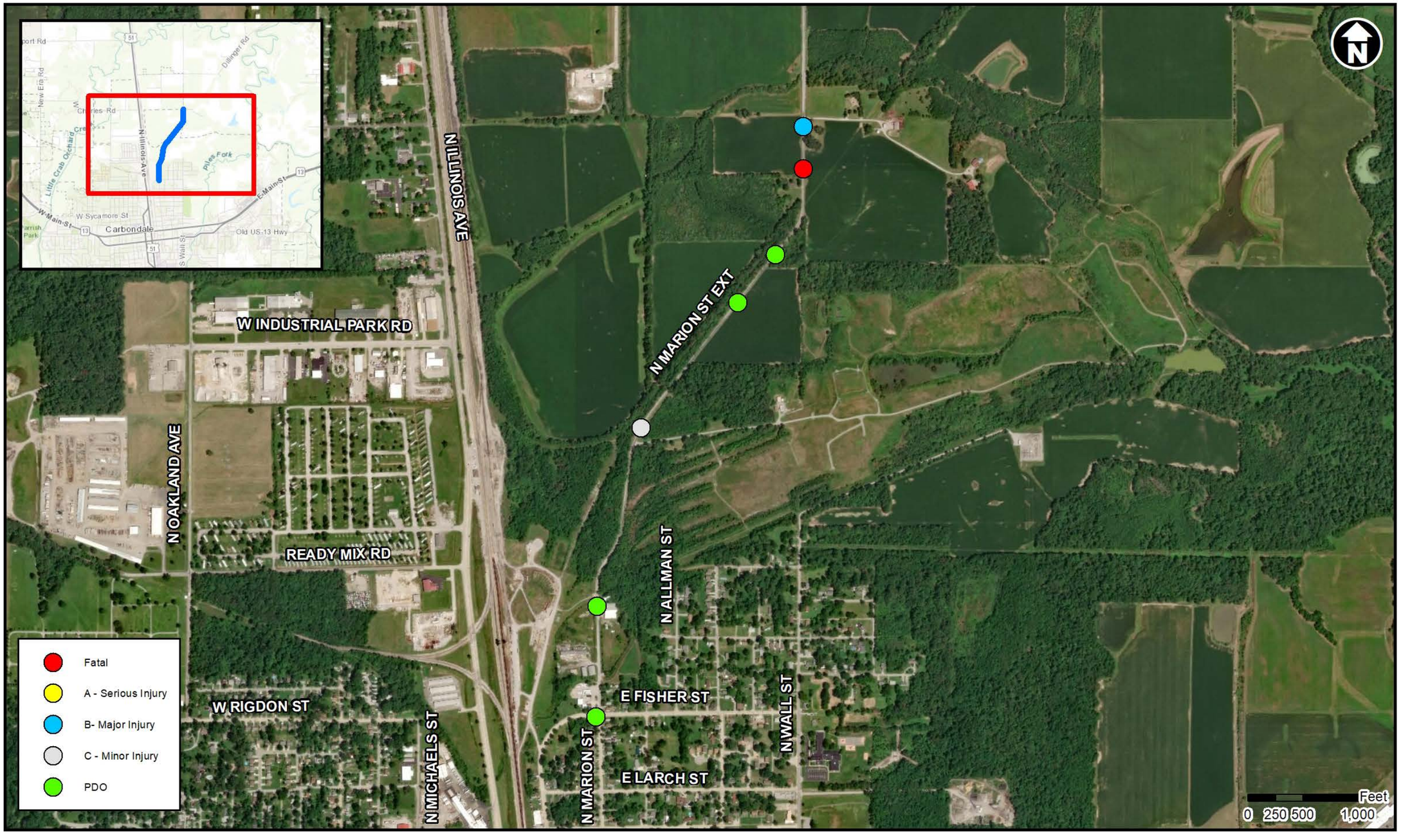


Figure 3 shows the location and severity of crashes plotted on an aerial map of the study area. The majority of crashes are single vehicle crashes where the vehicle leaves the roadway.

FIGURE 5: CRASH SEVERITY AND LOCATION MAP



COUNTERMEASURES

Countermeasures are identified that improve safety performance by focusing on the crash types having the greatest potential for mitigation. Additional countermeasures may be suggested to minimize potential safety issues that may not be directly linked to historical crash patterns—these countermeasures take a more systemic approach to enhancing safety. These types of countermeasures are low cost and focus on signing and pavement markings not consistent with the Manual of Uniform Traffic Control Devices (MUTCD). Compliance with the MUTCD will reduce driver workload thus improve safety performance.

SHORT TERM COUNTERMEASURE – NORTH CURVE ADVISORY SPEED

The horizontal and vertical curve shown in **Photos 1 and 2** has a 250 ft radius. A ball bank study to confirm the advisory speed at this location is recommended. Four crashes occurred in proximity to this curve.

A medium-term countermeasure would be to reconstruct the curve by revising the profile on Marion Street. The vertical curve adds a level of complexity to the driving task that could be removed thus improve safety performance.

SHORT TERM COUNTERMEASURE – SOUTH CURVE WARNING SIGNS

Photo 3 shows the Winding Road sign with an advisory plaque of 30 MPH. The use of the W1-5 sign meets the MUTCD guidance when a roadway changes direction more than 3 times. Install curve warning, speed advisory plaques, and/or chevrons in accordance with Table 2C-5 of the MUTCD along Marion Street especially for the south end of the study area.

- Convert the Winding Road sign to a standard Curve Warning sign (W1-2) for the curve shown in Photo 3. The tangent length is about 600 feet which is the minimum distance between successive curves. Installing more targeted curve warning is recommended when possible.

Table 2C-5. Horizontal Alignment Sign Selection

Type of Horizontal Alignment Sign	Difference Between Speed Limit and Advisory Speed				
	5 mph	10 mph	15 mph	20 mph	25 mph or more
Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)	Recommended	Required	Required	Required	Required
Advisory Speed Plaque (W13-1P)	Recommended	Required	Required	Required	Required
Chevrons (W1-8) and/or One Direction Large Arrow (W1-6)	Optional	Recommended	Required	Required	Required
Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp	Optional	Optional	Recommended	Required	Required

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.

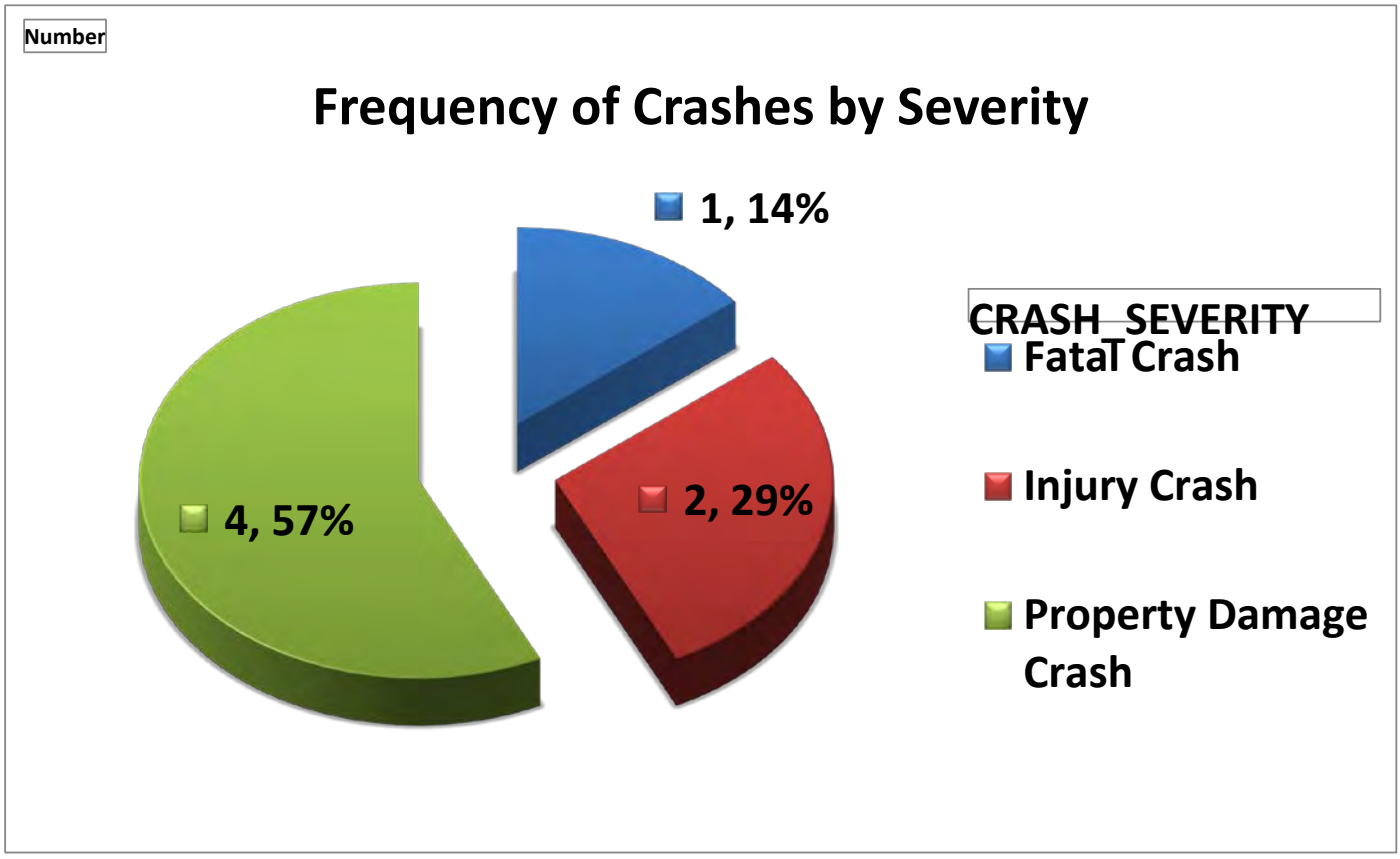
- Add a reverse curve sign for the 2 curves at the south end of the study area. The smallest radius curve is 215 feet. The vertical curve at the south end of the study area is less critical than the north end – the vertical curve at the north end is located within the limits of the horizontal curve.
- The addition of chevrons is proposed for the south curve due, in part, to the vertical curve and the size of the radius.
- Relocate warning signs no more than 225 feet in advance of the curves to be consistent with Table 2C-4 of the Manual of Uniform Traffic Control Devices (MUTCD). Existing signs are located 400 feet in advance. Section 2C.05 emphasizes that signs not be placed too far in advance of the condition .

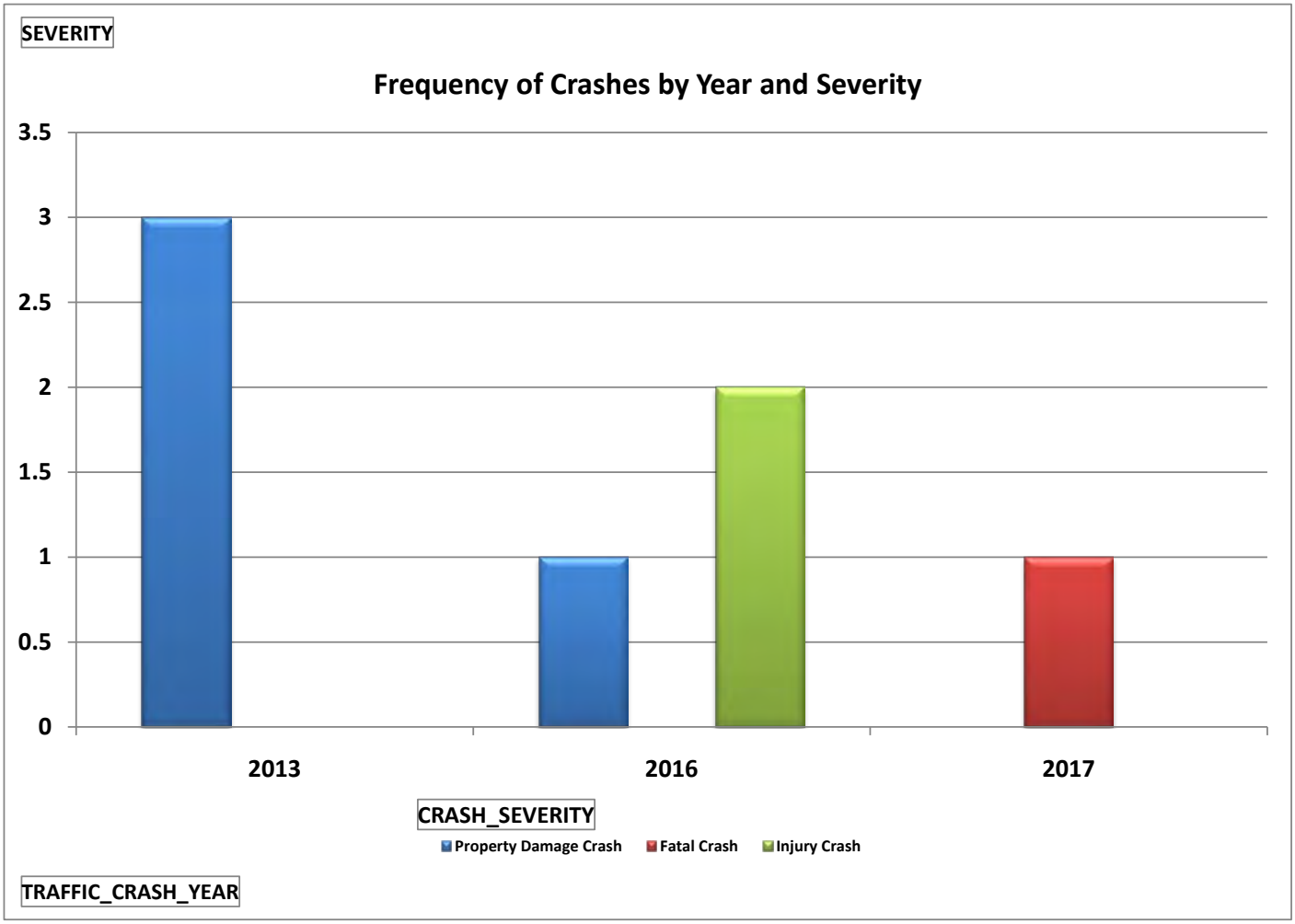
Table 2C-4. Guidelines for Advance Placement of Warning Signs

Posted or 85th-Percentile Speed	Advance Placement Distance[1]								
	Condition A: Speed reduction and lane changing in heavy traffic[2]	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0[3]	10[4]	20[4]	30[4]	40[4]	50[4]	60[4]	70[4]
20 mph	225 ft	100 ft[6]	N/A[5]	—	—	—	—	—	—
25 mph	325 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
30 mph	460 ft	100 ft[6]	N/A[5]	N/A[5]	—	—	—	—	—
35 mph	565 ft	100 ft[6]	N/A[5]	N/A[5]	N/A[5]	—	—	—	—
40 mph	670 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—	—
45 mph	775 ft	175 ft	125 ft	100 ft[6]	100 ft[6]	N/A[5]	—	—	—
50 mph	885 ft	250 ft	200 ft	175 ft	125 ft	100 ft[6]	—	—	—
55 mph	990 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A[5]	—	—
60 mph	1,100 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft[6]	—	—
65 mph	1,200 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft[6]	—
70 mph	1,250 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	1,350 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft[6]

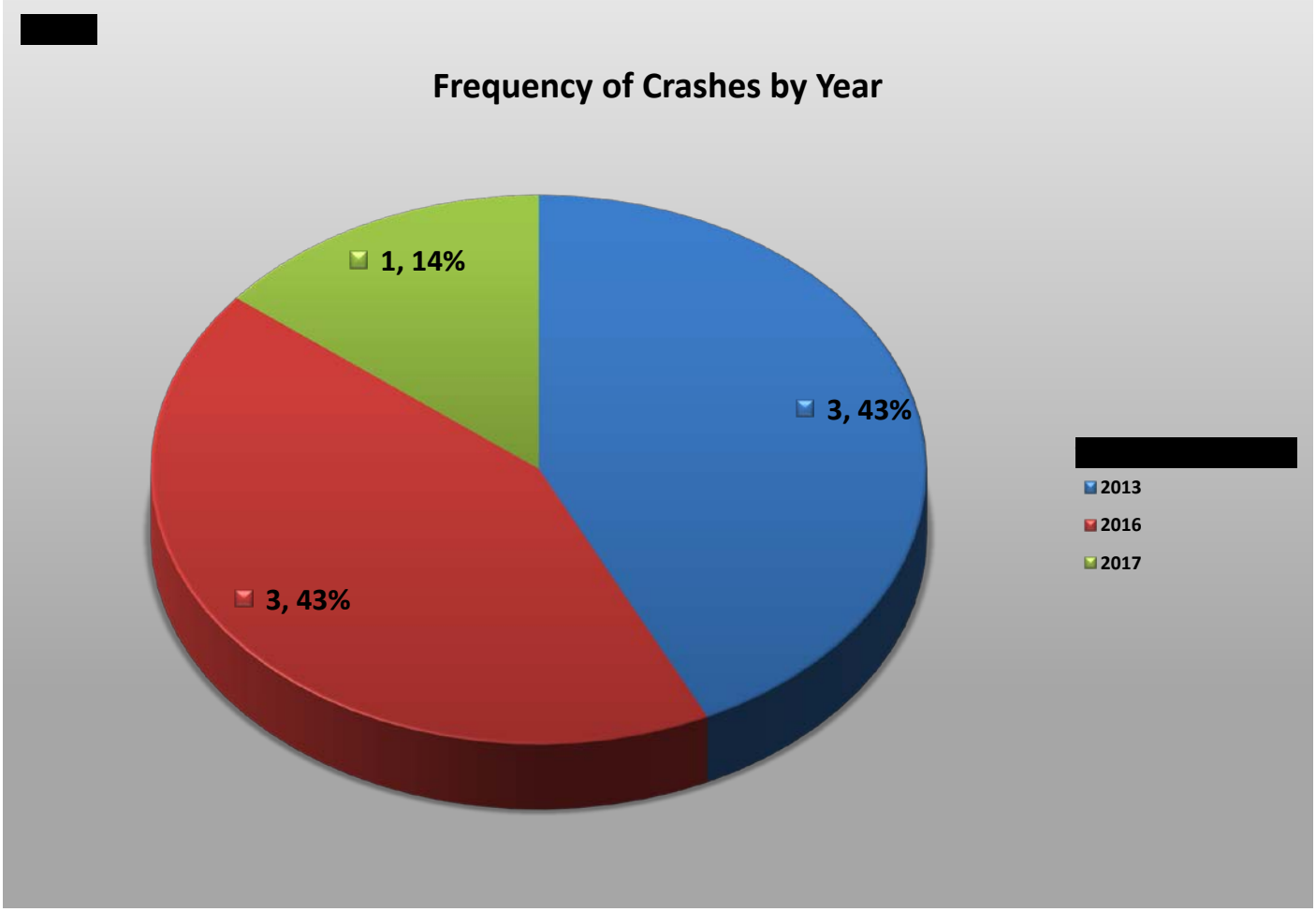
CASE_ID	YEAR	MONTH	DAY	HOUR	DOW	NUM_VEH	INJURIES	FATALITIES	COLL_TYPE	WEATHER	LIGHTING	SURF_COND	RD_DEFECT	TRAF_CNTRL	MILE	DRIVER_1	VEH1_TYPE	VEH1_DIR	VEH1_MANUV	VEH1_LOC1	VEH2_TYPE	VEH2_DIR	VEH2_MANUV	REC_TYPE
201701187785	17	07	23	19	Sun	1	2	1	Overturned	Clear	Daylight	Dry	No Defects	No Controls	1.05000000000	Drug Impaired	SUV	North	Negotiating A Curve	Off Pavement - Right				Fatal
201601312955	16	01	15	13	Fri	1	1	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	1.06000000000	Normal	Passenger	North	Unknown	Off Pavement - Right				B-Injury
201601440589	16	08	24	02	Wed	2	1	0	Angle	Clear	Darkness, Lighted Road	Dry	No Defects	No Controls	0.51000000000	Normal	Passenger	South	Slow/Stop In Traffic	Off Pavement - Right	SUV	Unknown	Slow/Stop In Traffic	C-Injury
201601472653	16	10	02	04	Sun	1	0	0	Fixed Object		Darkness			No Controls	0.19000000000	Other/Unknown	Passenger	North	Avoiding Vehicle/Objects	Off Pavement - Right				PD
201301041532	13	01	07	20	Mon	1	0	0	Overturned	Clear	Darkness	Dry	No Defects	No Controls	0.89000000000	Normal	Passenger	West	Skidding/Control Loss	Off Pavement - Right				PD
201301142807	13	05	28	10	Tue	2	0	0	Angle	Clear	Daylight	Dry	No Defects	Stop Sign/Flasher	0.00000000000	Normal	Passenger	East	Straight Ahead	On Pavement (Roadway)	Van/Mini-Van	North	Straight Ahead	PD
201301331652	13	09	17	09	Tue	1	0	0	Fixed Object	Clear	Daylight	Dry	No Defects	No Controls	0.78000000000	Normal	Passenger	North	Avoiding Vehicle/Objects	Off Pavement - Right				PD

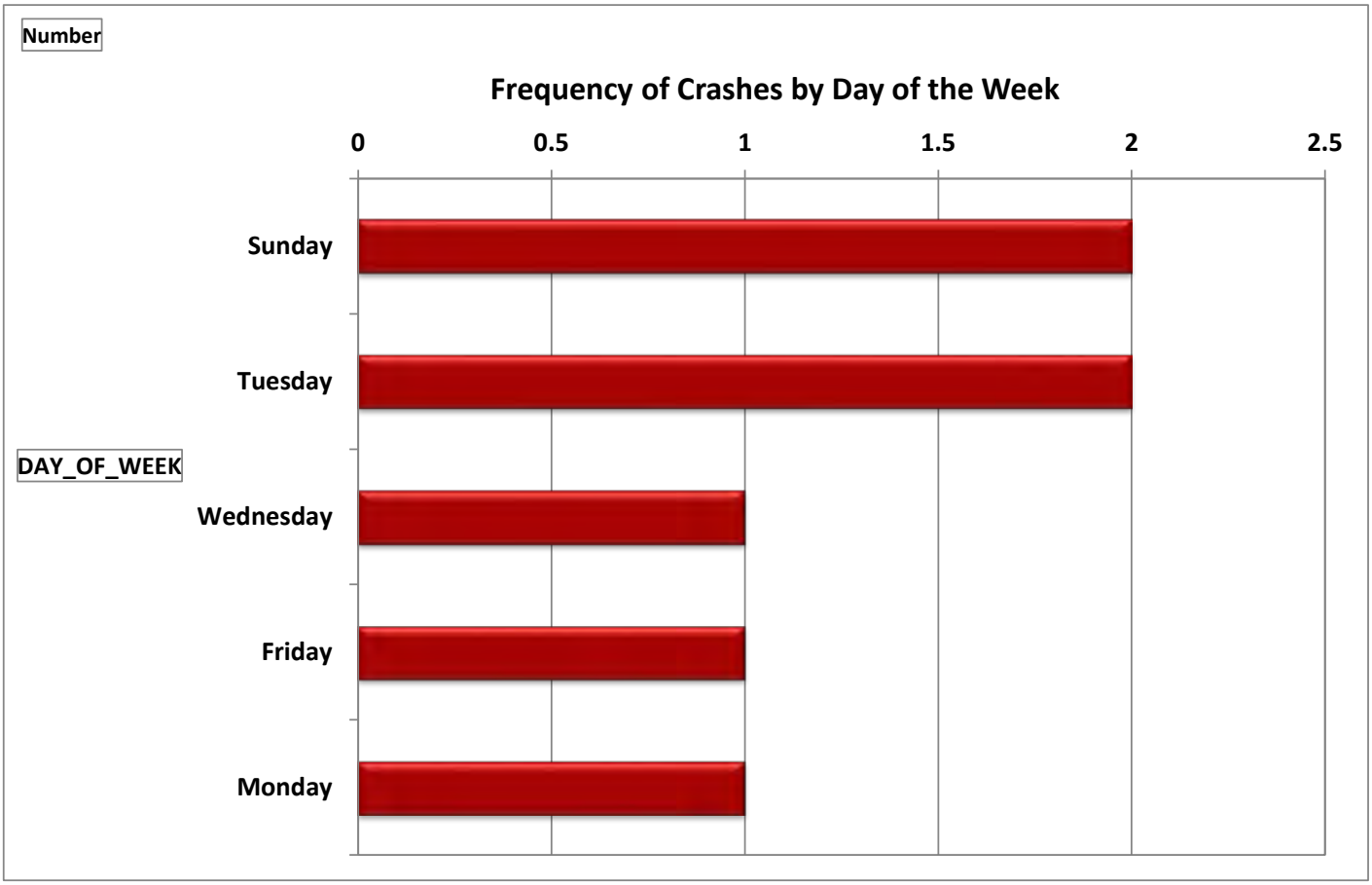
Link 05


Number
Frequency of Crashes by Severity
1, 14%
2, 29%
4, 57%
CRASH_SEVERITY
Fatal Crash
Injury Crash
Property Damage Crash


SEVERITY
Frequency of Crashes by Year and Severity
3.5
3
2.5
2
1.5
1
0.5
0
2013
2016
2017
CRASH_SEVERITY
Property Damage Crash
Fatal Crash
Injury Crash
TRAFFIC_CRASH_YEAR

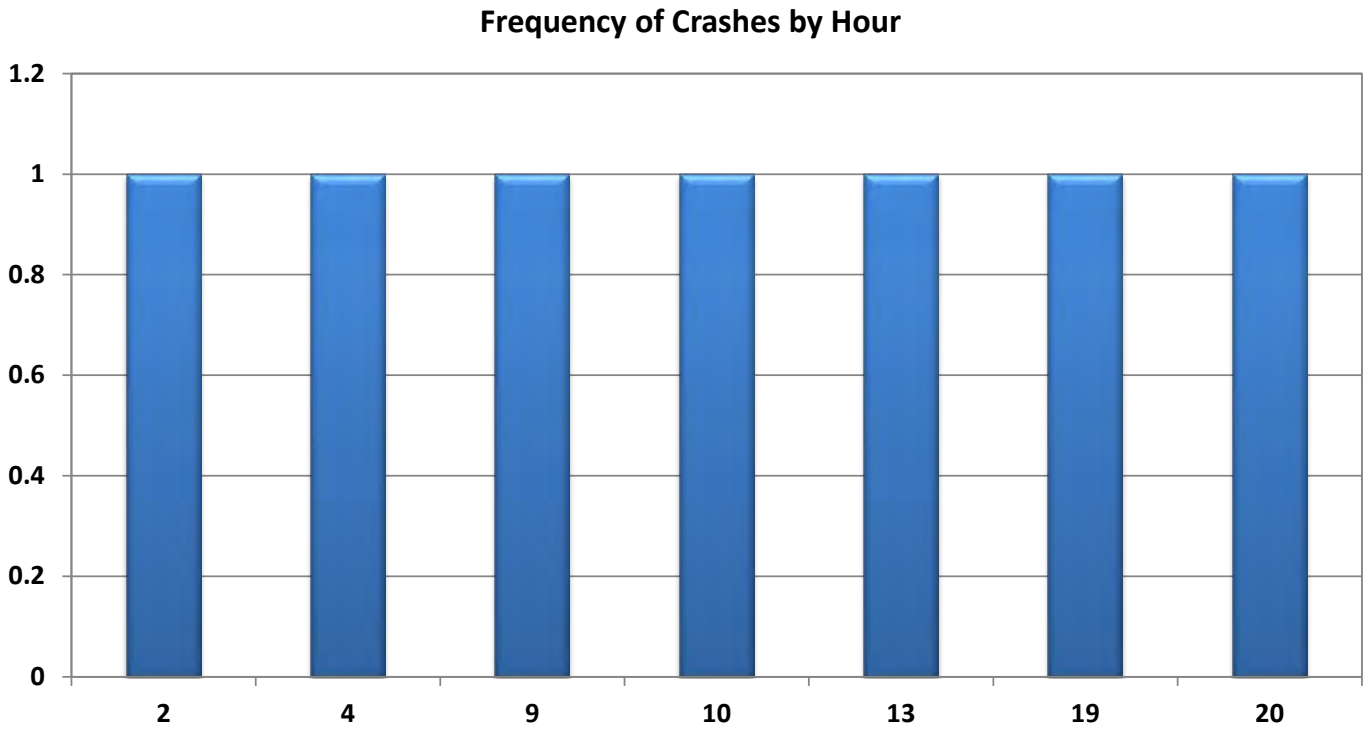
Link 05


Frequency of Crashes by Year
1, 14%
3, 43%
3, 43%
2013
2016
2017

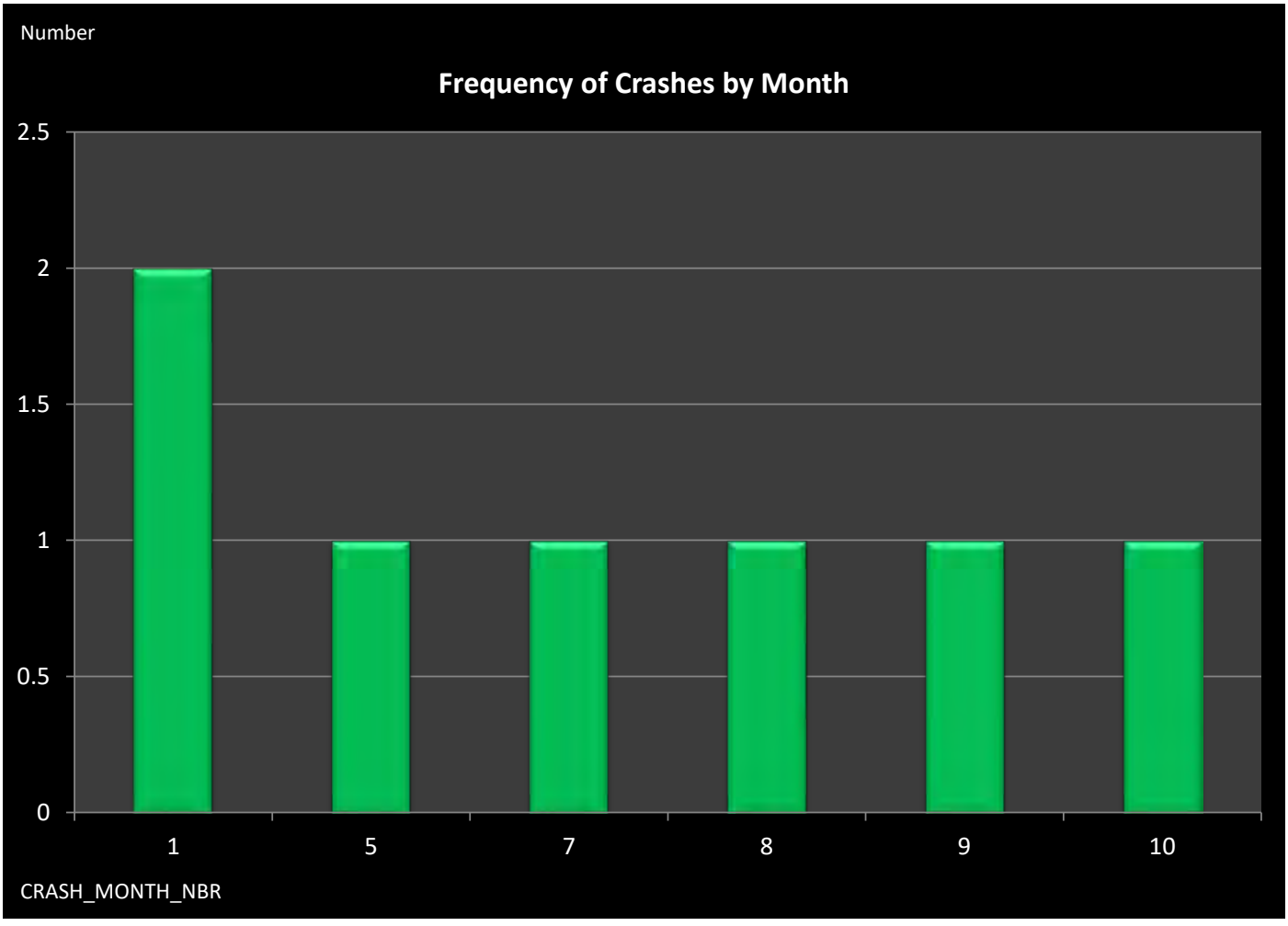

Number
Frequency of Crashes by Day of the Week
0
0.5
1
1.5
2
2.5
Sunday
Tuesday
DAY_OF_WEEK
Wednesday
Friday
Monday

Link 05

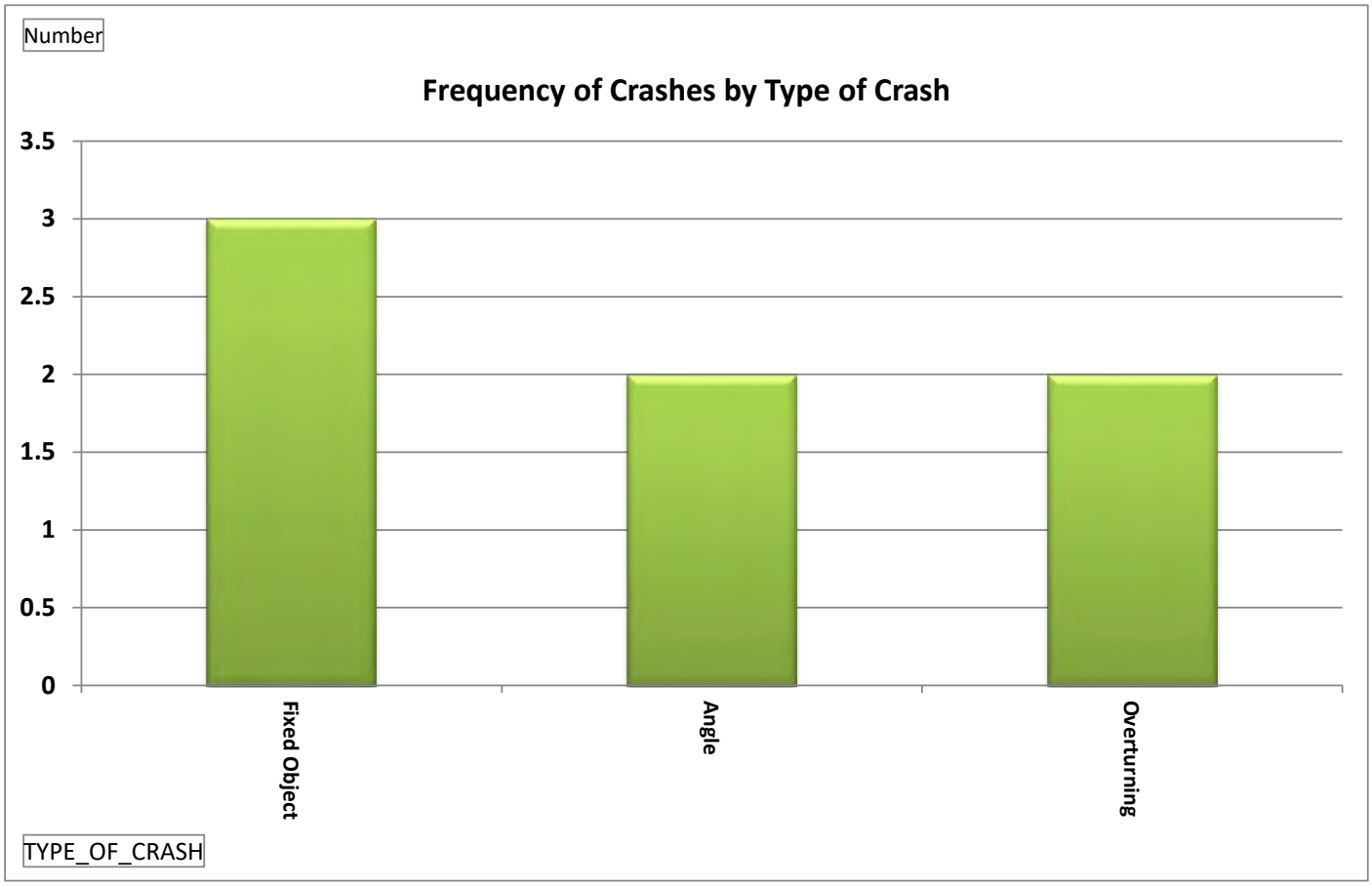
[redacted]

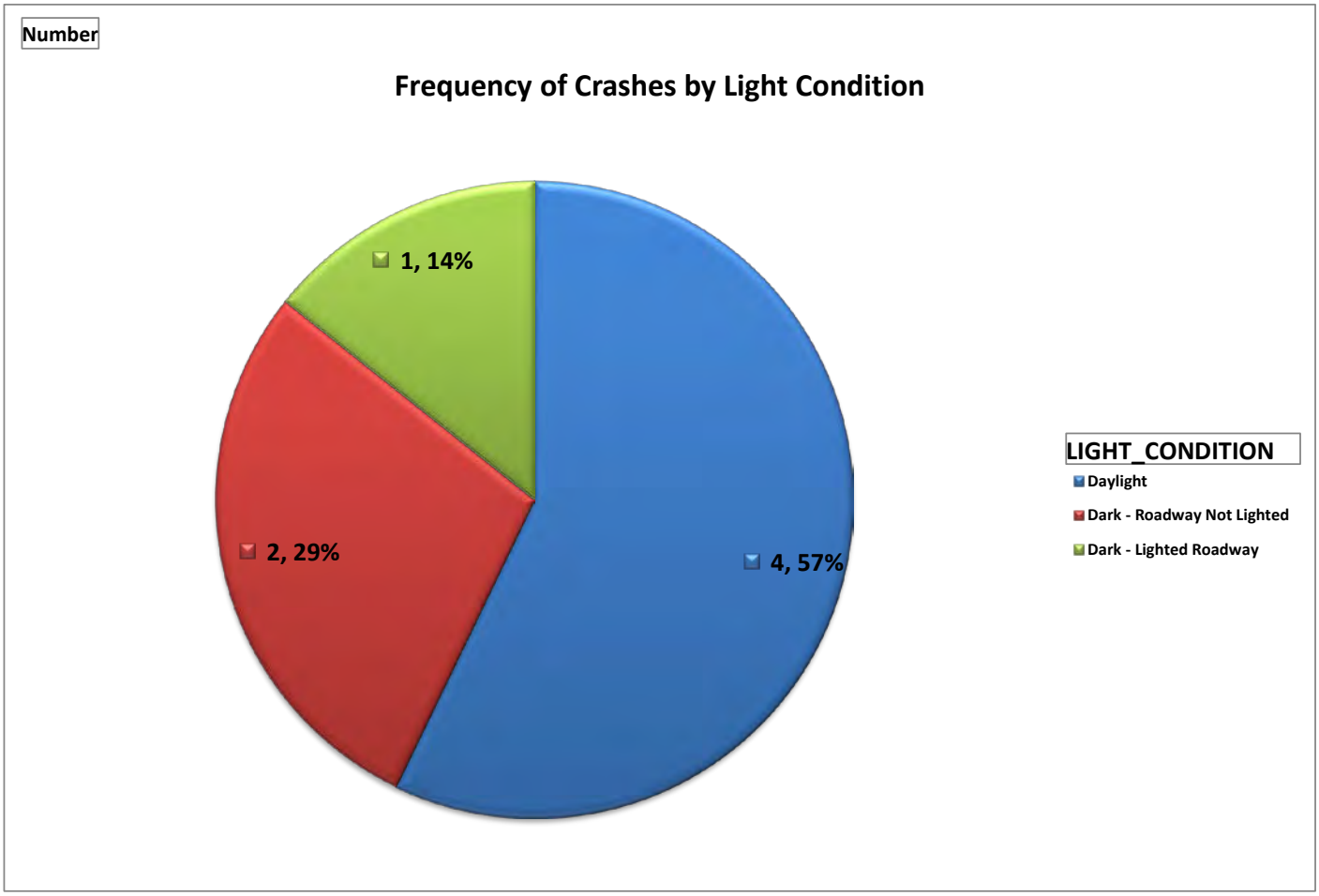


[redacted]

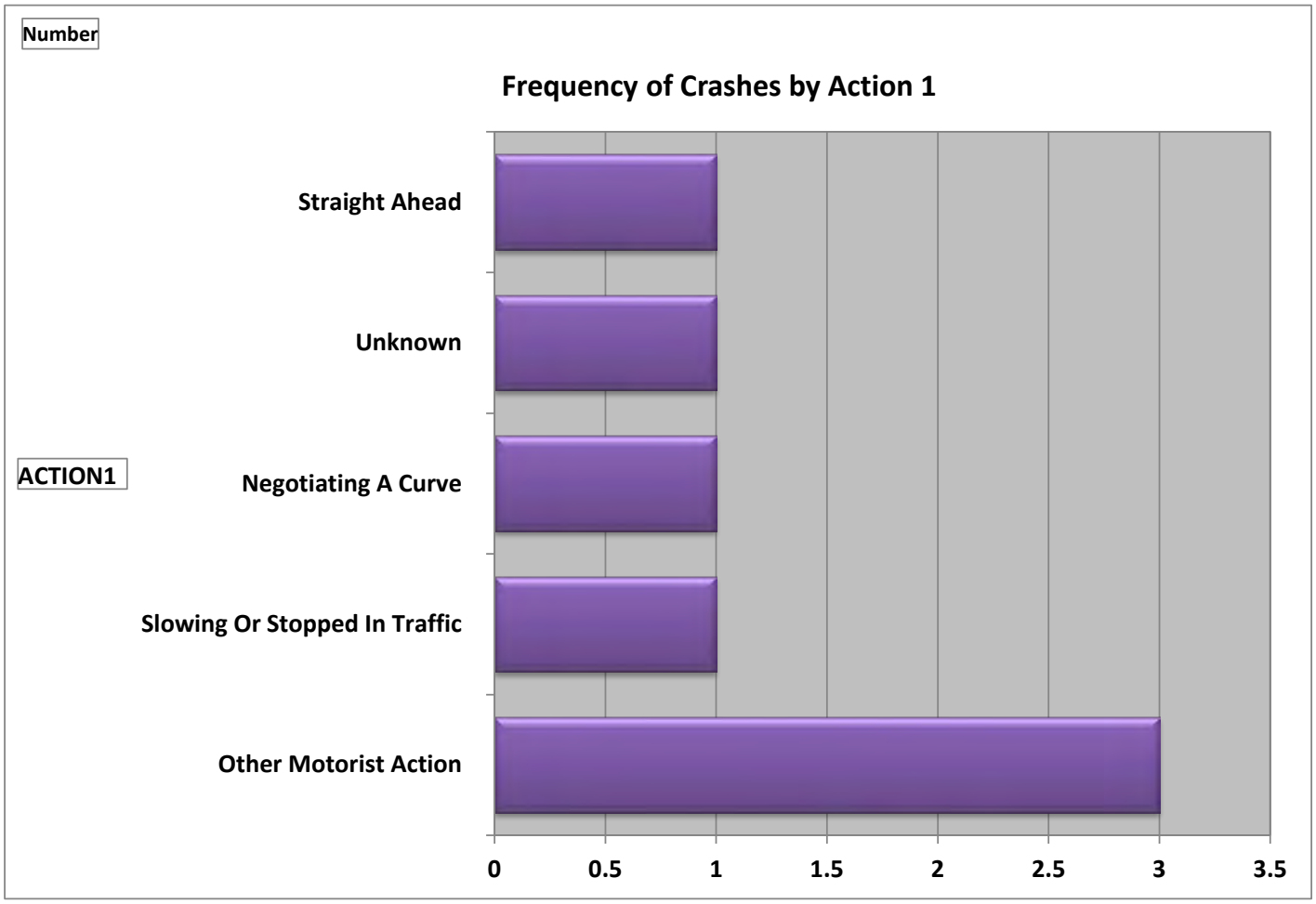


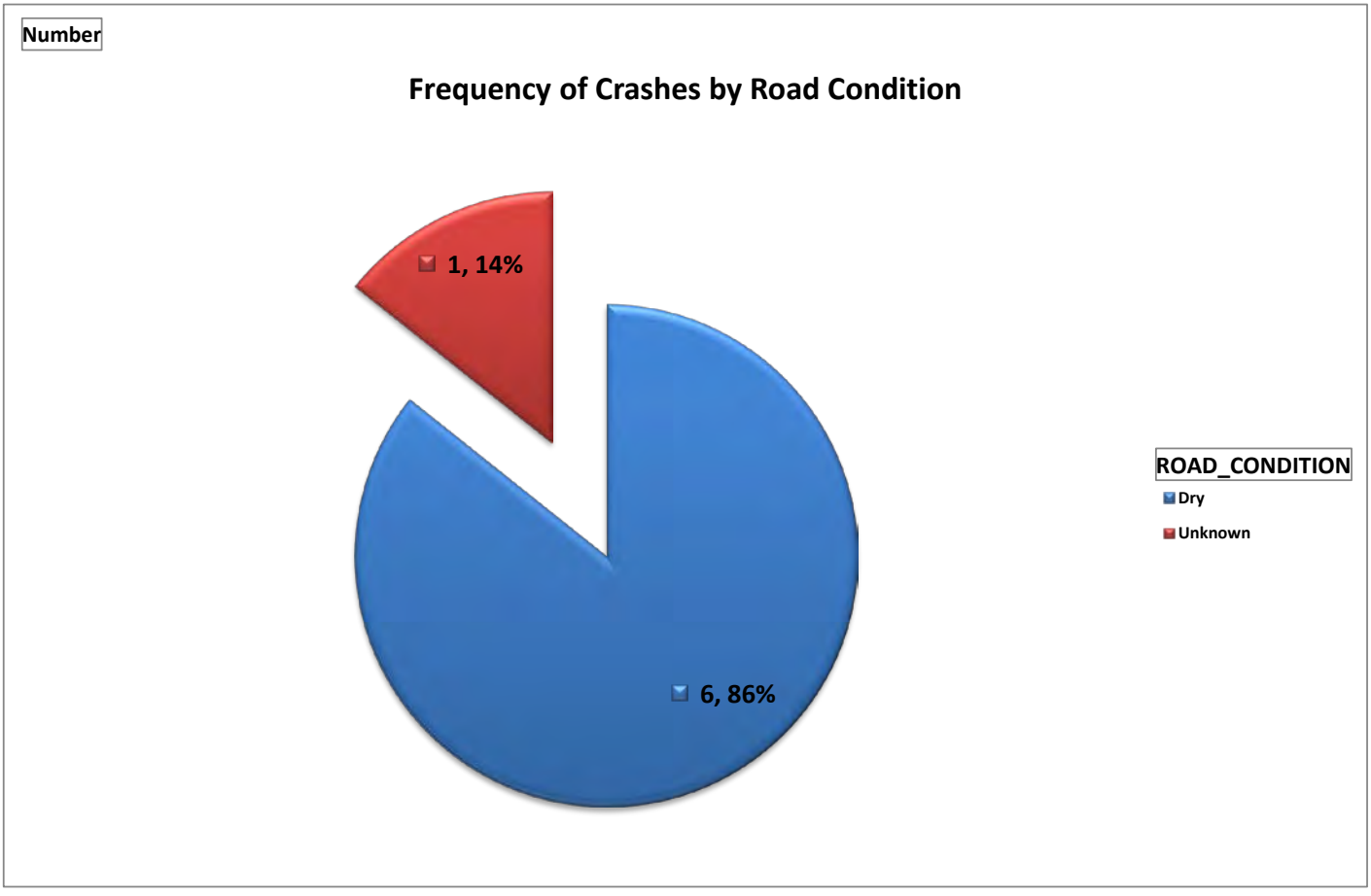
Link 05


Number
Frequency of Crashes by Type of Crash
3.5
3
2.5
2
1.5
1
0.5
0
Fixed Object
Angle
Overturning
TYPE_OF_CRASH

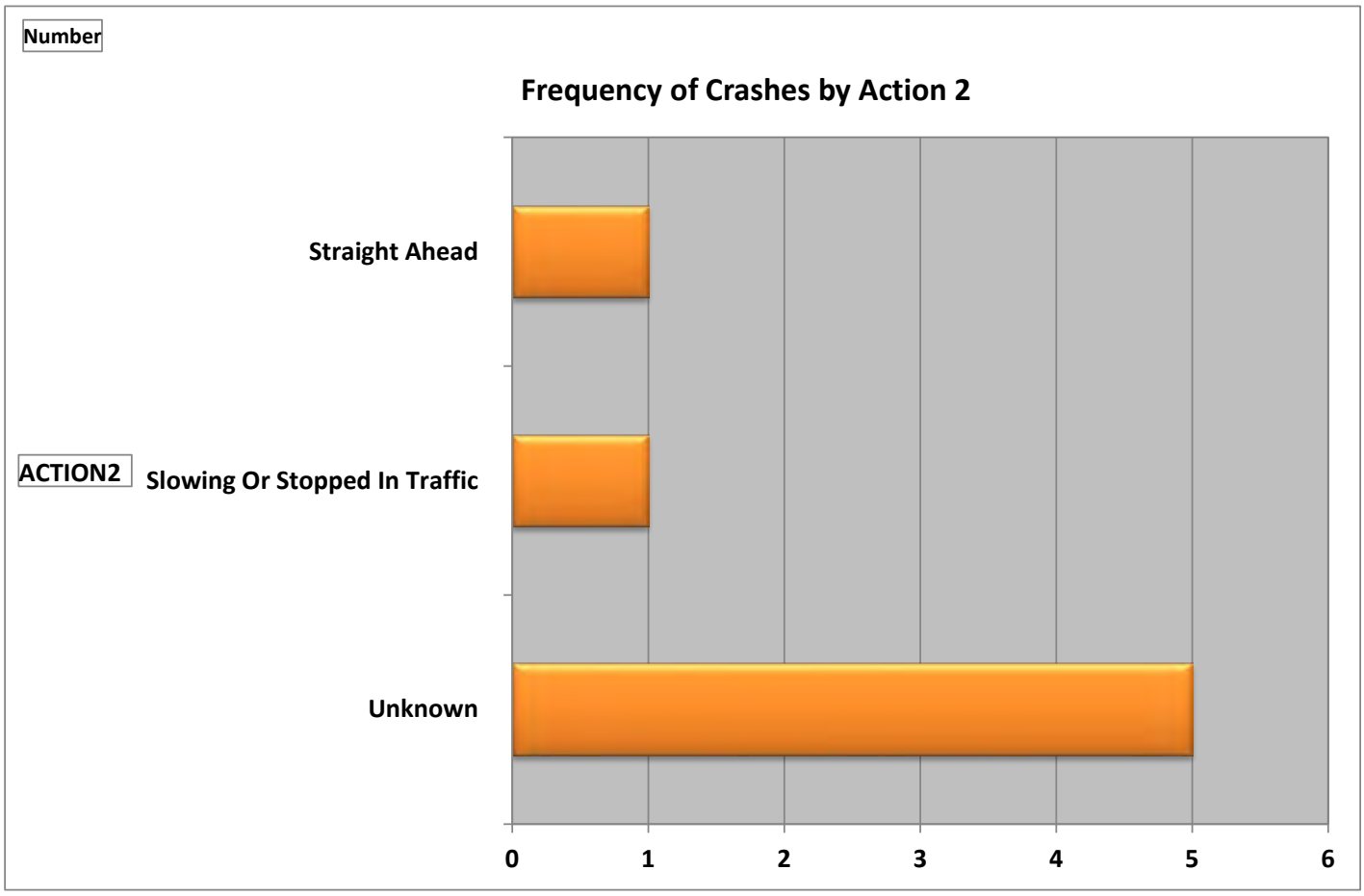

Number
Frequency of Crashes by Light Condition
1, 14%
2, 29%
4, 57%
LIGHT_CONDITION
Daylight
Dark - Roadway Not Lighted
Dark - Lighted Roadway

Link 05


Number
Frequency of Crashes by Action 1
Straight Ahead
Unknown
ACTION1
Negotiating A Curve
Slowing Or Stopped In Traffic
Other Motorist Action
0
0.5
1
1.5
2
2.5
3
3.5


Number
Frequency of Crashes by Road Condition
1, 14%
6, 86%
ROAD_CONDITION
Dry
Unknown

Link 05


Number
Frequency of Crashes by Action 2
Straight Ahead
ACTION2
Slowing Or Stopped In Traffic
Unknown
0
1
2
3
4
5
6