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Chapter 1– Introduction

Collier County, the Collier Metropolitan Planning Organization (MPO) and the individual jurisdictions in Collier County have a long history of recognizing the role of safe pedestrian and bicycle facilities in their planning efforts. In 1996, the City of Naples developed and published its *Traffic Accident Statistics Report* to understand the causes of crashes between motor vehicles and other modes.

The MPO's *Comprehensive Pathways Plan*, last updated in 2012, was developed to assist the Pathways Advisory Committee (PAC) in identifying and prioritizing pedestrian and bicycle projects for funding. In the *Comprehensive Pathways Plan*, safety was identified as both an overall goal and a factor by which to evaluate projects for funding prioritization. The Collier MPO Board has voiced support for this goal as well, both in adopting the Plan and in supporting more recent planning efforts. The MPO has also undertaken several *Walkable Communities Studies*. The results of these studies are then integrated into the *Comprehensive Pathways Plan*.

The purpose of this Pedestrian and Bicycle Safety Study is to summarize the tasks of the pedestrian and bicycle safety project. This project provides an analysis of recent bicycle and pedestrian crash data which will enable the MPO and the jurisdictions to identify future pathways improvement projects and other safety initiatives to improve the safety of walkers and bicyclists. This *Pedestrian and Bicycle Safety Study* is comprised of three parts, each intended to better understand the challenges of walking and bicycling in Collier County. The first part of the report summarizes the analysis of 1,067 pedestrian and bicycle crash

Figure 1: Collier MPO Comprehensive Pathways Plan

reports covering five year period from January 2008 to December 2012. The second part describes and summarizes results from public surveys on bicycle and pedestrian crash risks as a supplemental input for understanding the bicycle and pedestrian crash issues in Collier County. The third part of the report includes an analysis of crash locations to identify high-crash corridors and recommendations for including safety more quantitatively in the PAC's project selection process. When reviewed together, the crash report analysis and the survey results create a more complete understanding of the countywide walking and bicycling environment. The evaluation methodology, based specifically on safety, gives the PAC a way to respond directly to the safety goal.
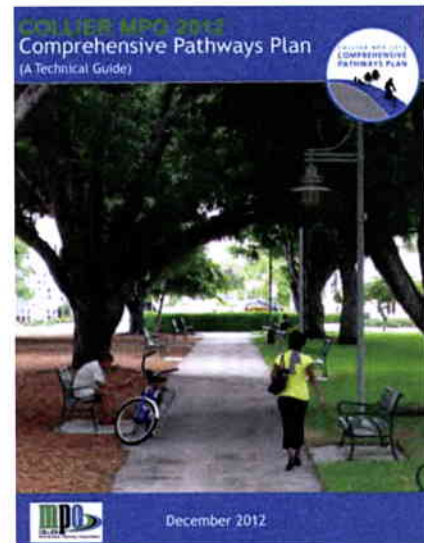
Crash Data Source and Qualifiers

Unless noted otherwise, crash records used to compile this report were obtained from the Collier County Crash Data Management System (CDMS). The primary data source for the CDMS is the Florida Department of Highway Safety and Motor Vehicles. Data from the FDOT "All Roads Crash GIS Shapefiles" includes geo-located crash records for the State Highway System, city-maintained roads and county-maintained roads, viewable with typical Geographic Information Systems (GIS) software . As a rule, this data contains nearly all

crashes where an injury or fatality occurs; however, some crashes that included only property damage may not be included in this dataset. As such, the crash data used for this report should be treated as a very complete sample but not as a complete census of all bicycle and pedestrian crashes.

Other data qualifiers include discrepancies between the way that the data is coded using the various data fields in the crash report and the written narrative and diagram that describe the crash event. Florida crash reports include over 100 data points where the responding law enforcement personnel must choose the most appropriate value/descriptor from a list. While the best efforts are made by the reporting officer to accurately reflect what happened, it is often hard to capture the complexity of the crash circumstances using the coded data fields and so the coded data may not exactly match what is written in the crash report narrative. In the case of severe injury and fatal crashes where the walker or bicyclist is unable to speak for himself or herself, it is up to the officer to piece together what happened. In the case of a fatality that occurred after the report was initially filed, the databases may not be updated to reflect the fatality, resulting in discrepancies in the data. All of this is noted not to discount the validity of the data captured from the reports, but to highlight that crash data analysis is a complex endeavor that should be undertaken with an understanding of the context.

Unreported Crashes

Because bicycle and pedestrian crashes do not always result in a motor vehicle insurance claim, crashes that do not involve an injury that requires emergency medical care are less likely to be reported than "property damage only" crashes between two or more motor

vehicles. This is consistent with a 2007 study by Rune Elvik and Anne Borger Mysen, who surveyed 13 crash reporting methodologies in thirteen countries. They found that while 95 percent of all fatal injuries are captured in official crash reports, the number of reported crashes decreases with the severity of the crash, with as few as 25 percent of slight injury crashes being reported.[1] Elvik's study considered all crashes, not just bicycle or pedestrian crashes. A similar 1998 study completed by Jane Stutts and William Hunter found that bicyclists who were hospitalized

Figure 2: Bicyclist crossing Airport Pulling Road mid-block

or killed were 1.4 times more likely to be reported in state traffic crash files than incidents were bicyclists received emergency treatment but were not admitted to a hospital.[2]

To help understand the potential for bicycle and pedestrian crash "under-reporting" in Collier County, a survey was developed and distributed to identify the extent to which cyclists and pedestrians either experienced unreported crash incidents or "near misses." The survey and the results are included in Chapter 2.

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[1] Incomplete Accident Reporting: Meta-Analysis of Studies Made in 13 Countries. Rune Elvik & Anne Borger Mysen, TRB Volume 1665, p 133-140, 2007.

[2] Police Reporting of Pedestrians and Bicyclists Treated in Hospital Emergency Rooms. Stutts, J.C. and Hunter, W.W., TRB Issue Number 1635, p.88-92; 1998.

Approach to the Crash Data Analysis

For this analysis, the Crash Data Management System (CDMS) was used to analyze crash data from 2008 through 2012. While this database collects a wide array of coded crash attribute data, a subset of approximately 250 report narratives and collision diagrams were reviewed manually to assess the crash data trends and patterns beyond what could be derived from a review of the coded crash data alone.

In cases where a bicycle or pedestrian crash had been recorded in the CDMS but had not been located, the location was determined as part of this project. In a few cases when a crash location wasn't entered, it was located on a map and the location added to the table allowing for a more precise analysis of crash locations. Generally, additional attention was directed at crash reports that documented an incapacitating injury or fatality.

Chapter 2 – Pedestrian and Bicycle Crash Data Analysis

In order to better understand what is occurring on the roadways in Collier County, crash report data was analyzed. The following charts and related discussions describe aspects including: the following.

- Time of day
- Day of week, month and year
- Bicyclist and pedestrian age
- Crash location in the County
- Weather conditions, lighting
- Location on the roadway
- Presence or absence of a traffic control device
- Relationship of the crash location to the intersection

Crash Totals: Collier compared to the state of Florida

As shown in the table below, compared with the State of Florida as a whole, from 2007 to 2011 Collier County experienced fewer pedestrians killed than the statewide average per 100,00 people, and had a lower pedestrian injury rate. During that same time frame, however, the bicyclist injury and fatality rate was higher than that of the state per 100,000 people.

Table 1: Collier County and state of Florida pedestrian and bicycle crash rate comparison

	State of Florida		Collier	
	Average (2007 - 2011)	Per 100k Population	Average (2007 - 2011)	Per 100k Population
Pedestrians killed	502	2.67	6	1.74
Pedestrians injured	7313.4	38.90	88	27.43
Bicycle riders killed	106.8	0.57	2	0.62
Bicycle riders injured	4458.2	23.71	94	29.24

* Most recent available statewide data is 2011
** rates based on 2010 census population

Crash totals: frequency and severity

The graphs below show the frequency and severity of Bicycle and Pedestrian crashes in Collier County from 2008 through 2012. Total pedestrian crashes have been high for the past 4 years when compared to 2008. Pedestrian injury-crashes appear to have held constant from 2011 to 2012, but have decreased since 2009. There have been 8 or less bicyclist/pedestrian fatalities in each of the 5 years in this study period. While bicycle crash totals have been relatively constant, bicyclist crashes with injuries appear to be decreasing.

Pedestrian crashes by year, 2008-2012

Bicycle crashes by year, 2008-2012
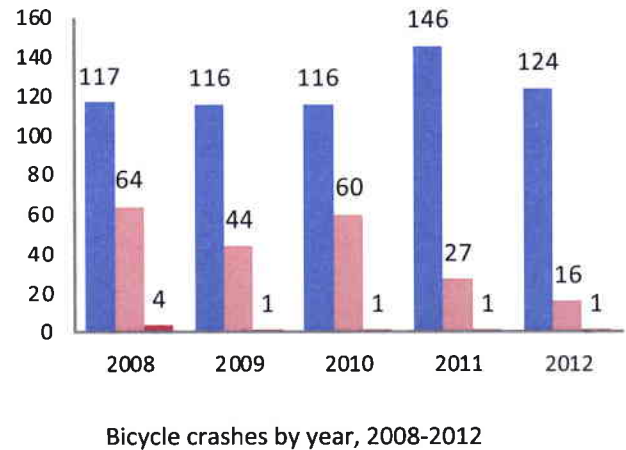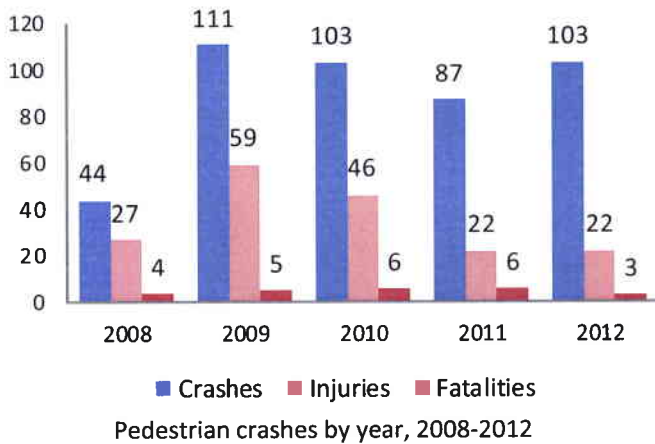
Pedestrian and bicycle crashes by month

Bicycle and pedestrian crash patterns in Florida tend to mirror the weather and the seasonal variation in population—which is an especially strong factor in Collier County. The charts below show the number of crashes by month.

The worst months for pedestrian crashes (shown in blue) have been January, March and December with 48 crashes each. September also ranks highly with 45 pedestrian crashes. The worst month for pedestrian fatalities was March, followed by December. Generally, there are fewer pedestrian injury crashes (shown in pink) in the summer. The increase in August may correlate with the start of school.

Bicycle crashes follow a different pattern, with 77 crashes occurring in November, followed by January with 64 and April with 57. Similar to pedestrian injury crashes, generally, there have been fewer bicycle injury crashes in the month of July. August has historically had the most bicycle fatalities.

Pedestrian Crashes by Month, 2008-2012

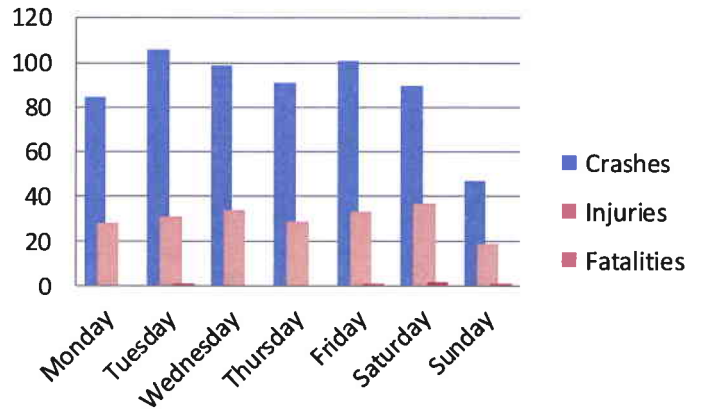Bicycle Crashes by Month, 2008-2012
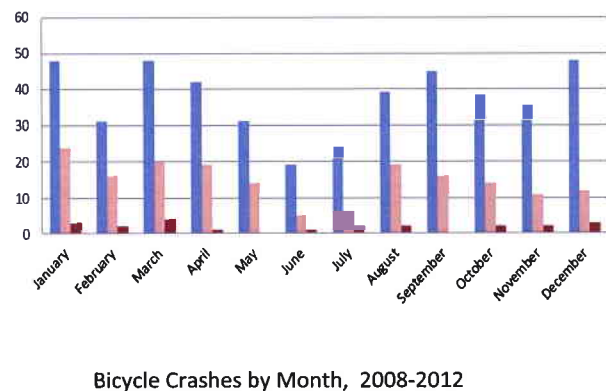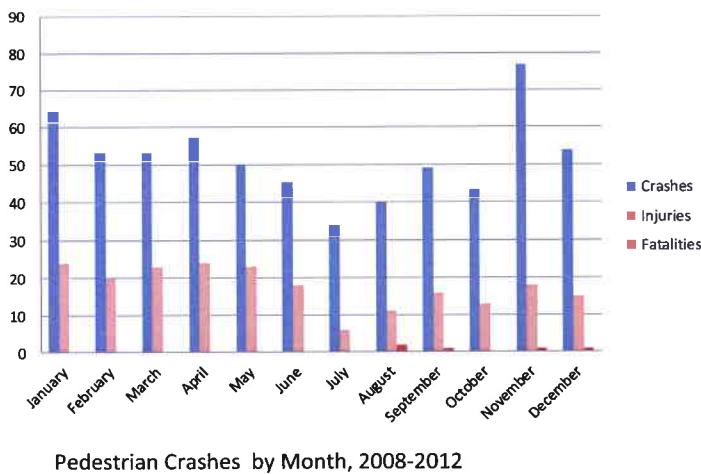
Pedestrian and bicycle crashes by day of the week

The charts below show the incidence of crashes by day of the week. Overall the highest numbers of pedestrian crashes have occurred on Tuesdays, Wednesdays and Saturdays. Saturdays also have the most fatal pedestrian crashes. The highest number of bicyclist crashes occurred on Tuesdays, but the crashes are more evenly spread out than pedestrian crashes. The highest number of fatal bicycle crashes happened on Saturdays.
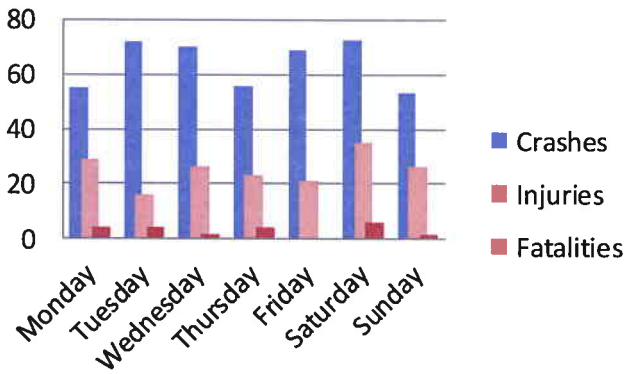

Pedestrian Crashes by day of the week, 2008-2012

Bicycle Crashes by day of the week, 2008-2012

Time of day

This chart shows the occurrences of crashes by hour. Crashes tend to occur in the afternoon and evening, with the greatest number of crashes happening between 8 and 9 pm. This also happens to be one of the hours with the highest number of fatal crashes. The hours between 7 and 9 pm account for almost 22% of fatal crashes.
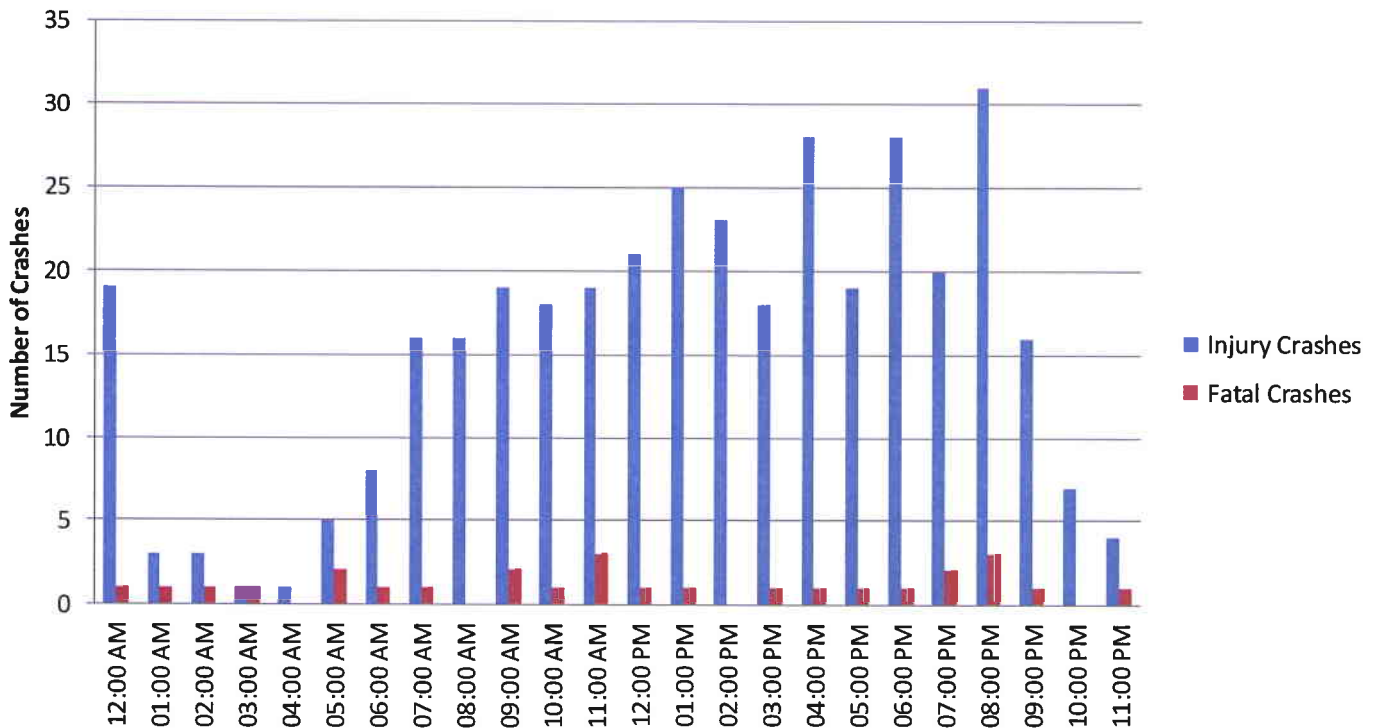
Bicyclist age

Bicyclist age at the time of the crash was analyzed and is graphed below. It should be noted that age is not always noted on the crash report, so the set of data from which this is developed is smaller than the other sets. Age of the bicyclist is an important factor when it comes to developing countermeasures because it assists in developing effective public information campaigns and training programs. In Collier County, age groups of 11-20 years and 41-50 are slightly higher than their counterparts, however, the age groups involved in bicycle crashes from ages 11-60 are almost equally represented.
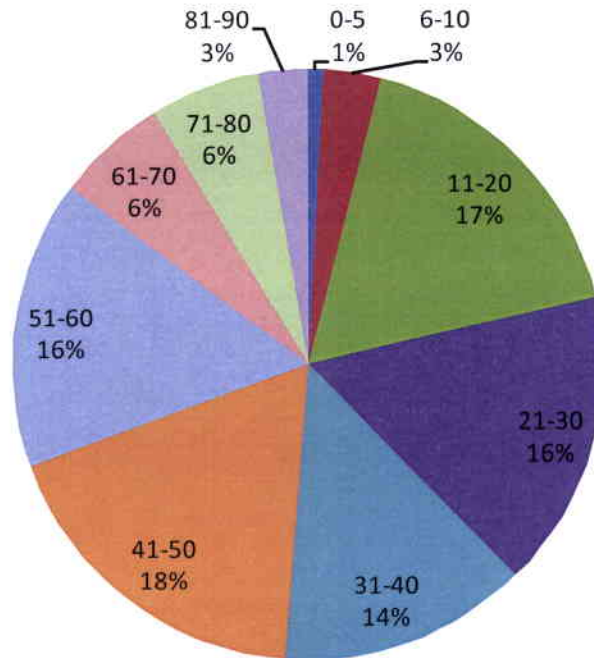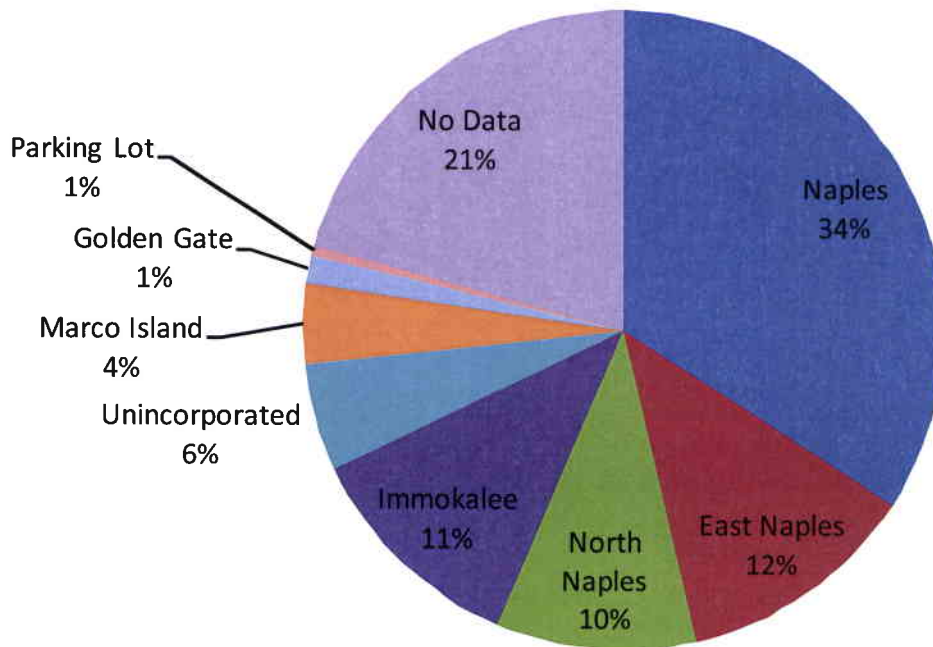

Pedestrian age

Pedestrian age at the time of the crash was also analyzed and is shown in the graph below. Targeting the groups that are involved in crashes can be an effective way to reduce crash occurrences.   However, similar to the bicycle crashes, the age groups involved in pedestrian crashes from ages 11-60 are almost equally represented.
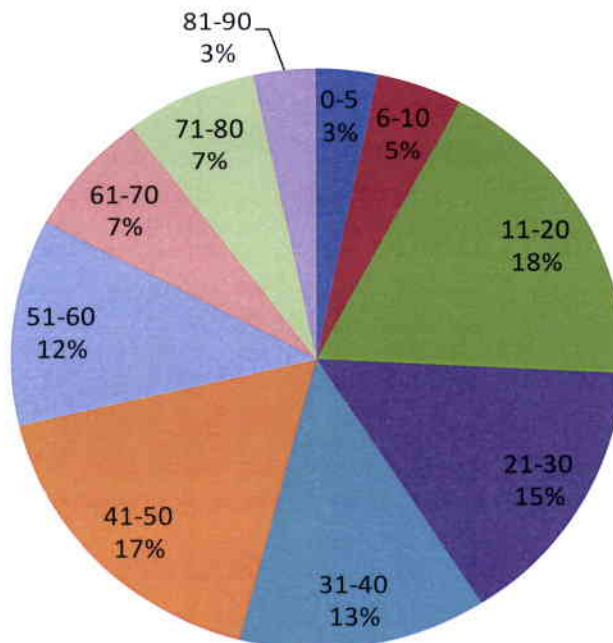
Pedestrian and bicycle crash locations

While pedestrian and bicycle crashes occur throughout Collier County, several areas stand out with a high number of reported crashes. The denser urban areas of Naples and the surrounding areas and Immokalee accounted for 67% of the crashes. In 21% of the cases no location was identified in the crash report.


Crash cause

Often many factors play a role in the cause of a pedestrian or bicycle crash. A crash report attempts to capture that cause in an analyzable way. These causes can vary by mode, but in Collier County the most frequently reported crash cause is the motor vehicle *Failure to Yield the Right-of-Way*. There were 144 (37%) reported instances of this cause for both pedestrian and bicycle crashes. Failure to yield can be on the part of the driver or the pedestrian or the bicyclist and when included in a crash report it is based on whoever was legally supposed to yield the right-of-way. There was a large number of crash reports reviewed that did not specify a cause.
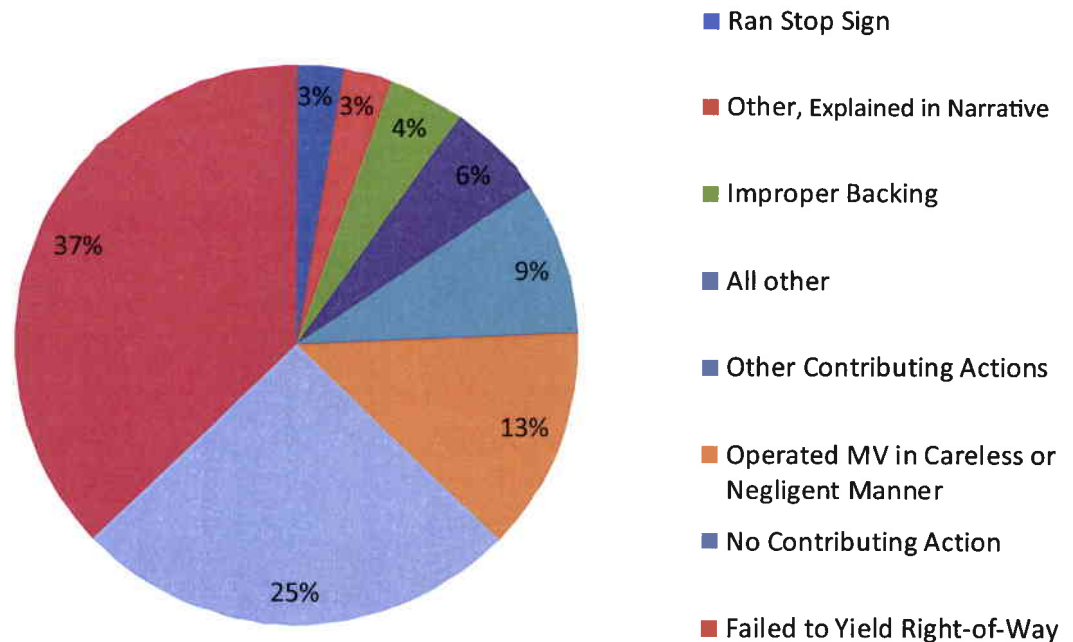
Vehicle movement

The direction of movement of both participants at the time a crash is noted in a crash report. The chart below shows movement of the first participant or vehicle. The vehicle participant believed to be at fault was moving straight ahead in 40% of crashes, and either turning right or turning left in 33% of crashes.

In the 9 percent of cases the movement was noted in the crash narrative, but not in the report. Reasons noted in the narrative included things like backing into a parking space or crossing a driveway.

Legend:
- All other
- Slowing
- Backing
- Other, Explained in Narrative
- Turning Left
- Turning Right
- Straight Ahead
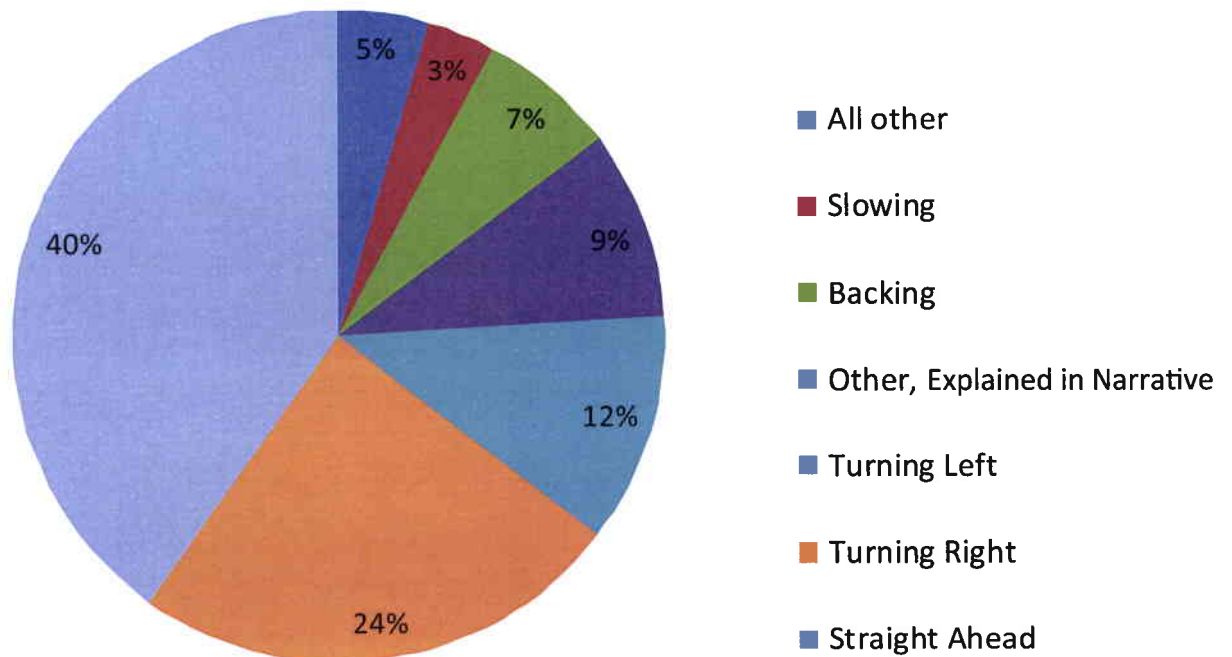
Weather conditions

The weather was noted as clear in the majority of pedestrian or bicycle crashes. This is likely because more people choose to walk or bicycle when the weather is clear.

Legend:
- Clear
- Cloudy
- Rain
- All other
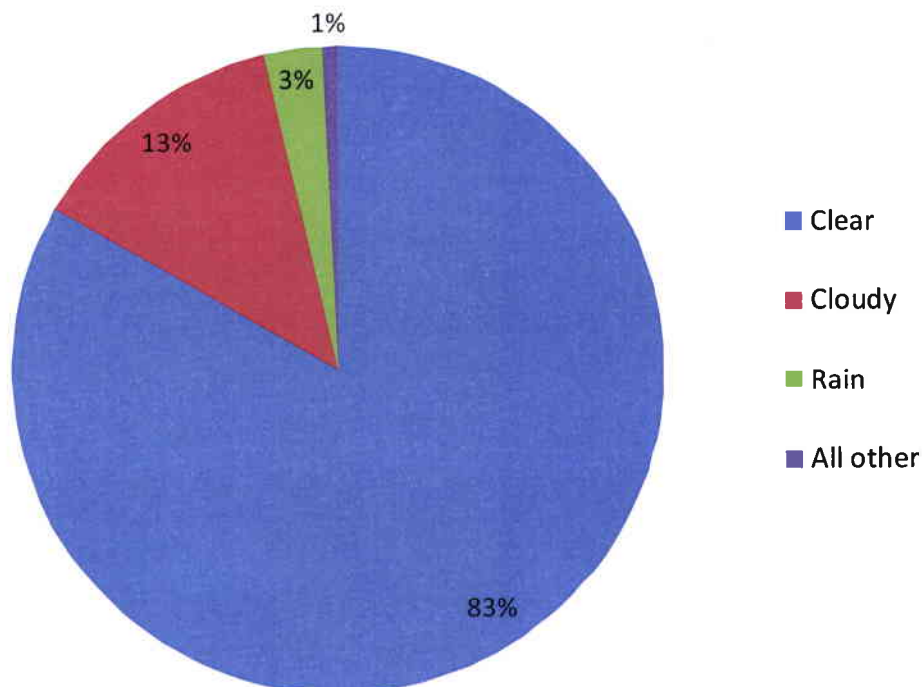
Lighting

The majority of recorded crashes, regardless of severity, occur in the daylight hours, which makes sense because that is when the majority of people walk or bicycle.

Legend:
- Daylight — 74%
- Dark-Lighted — 14%
- Dark-Not Lighted — 8%
- Dusk — 2%
- All other — 2%
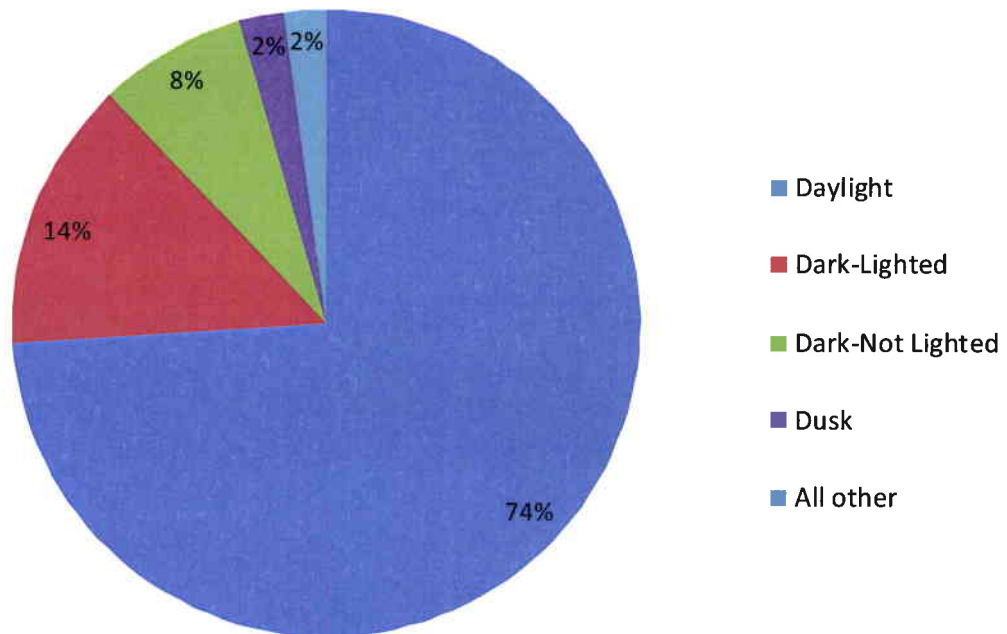
Location on the roadway

Most pedestrian or bicycle crashes happened on the roadway. For pedestrians, that typically means they were crossing the roadway at either a non-signalized (midblock) location or at a signalized intersection. In a number of cases, no location was noted on the crash report.

Legend:
- On Roadway — 80%
- Off Roadway — 10%
- Shoulder — 4%
- In Parking Lane or Zone — 4%
- All other — 2%