2011 TRAFFIC SAFETY SUMMARY

City of Fort Collins Traffic Operations

June 2011

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Introduction

This Traffic Safety Summary provides a description of traffic crashes that have occurred on public streets in Fort Collins. This document is intended to be used as a benchmarking tool to track progress on efforts to reduce the number of crashes and crash severity. In addition, the document is intended to serve as a tool to help determine strategies and countermeasures to achieve crash reduction goals. The document is divided into three sections: 1) a crash summary, 2) a detailed review of the most common types of crashes, and 3) the identification of high crash locations.

Explanation of Data

The source for crash information is the City of Fort Collins Traffic Operations Department traffic crash database. This database includes all crashes on public streets investigated and reported by Fort Collins Police Services plus those crash reports submitted after the fact to Police Services by involved parties. Traffic Operations staff reviews each crash report for accuracy and makes corrections as necessary prior to input into the database to ensure that data is as complete, accurate and consistent as possible. The numbers included in the report are conservative since some crashes go unreported. Also, only accidents involving motor vehicles are included so some accidents, like single vehicle bicycle accidents, are not included as no reports are created for those crashes.

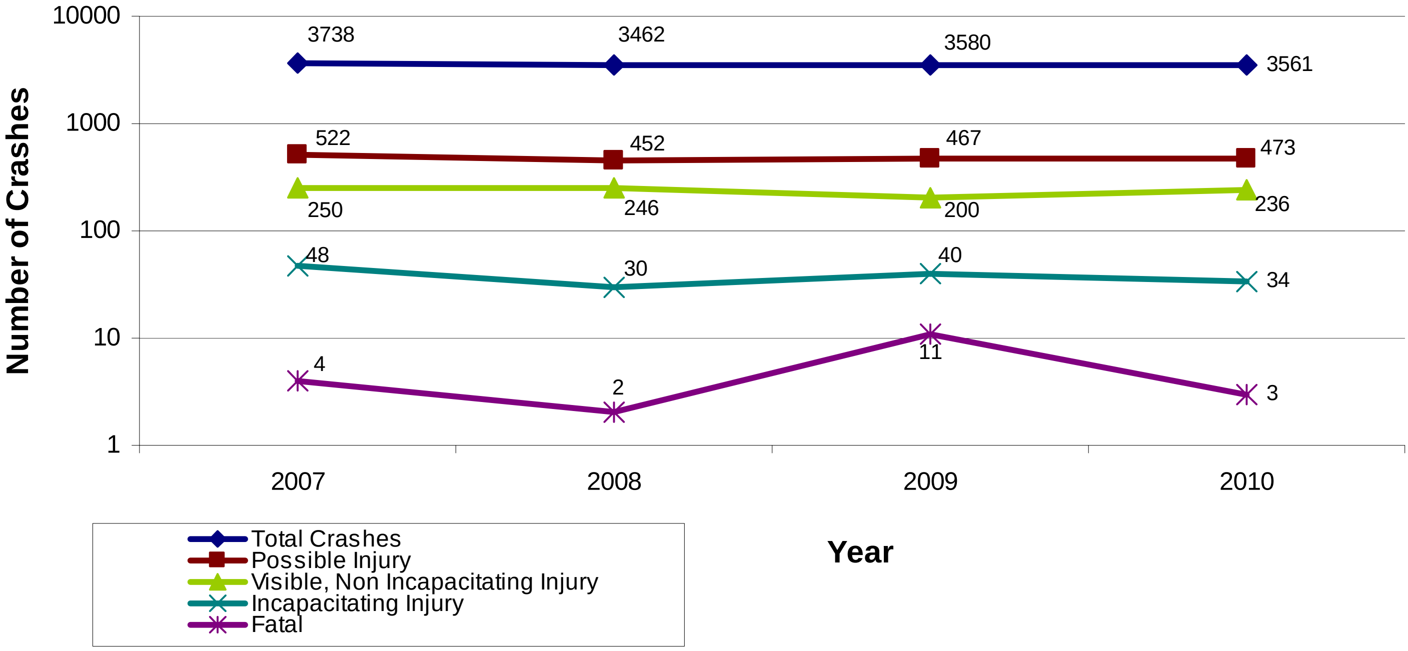
The City Advanced Planning Department provided demographic data used in this report. The Colorado Department of Revenue provided data showing the number of licensed drivers by age in Fort Collins.

Section 1 – General Crash Information

Number of Crashes

Figure 1 shows the total number of crashes in Fort Collins from 2007 – 2010. Crashes are broken out each year by the severity of injuries. Overall crash numbers have remained fairly consistent over the past four years with the exception of fatal crashes that were very high in 2009.

Figure 1 – Number of Crashes



Economic Impact of Traffic Crashes

Table 1 provides an estimate of economic costs associated with crashes in Fort Collins in 2010. The crash costs are based on figures determined by the Federal Highway Administration and published in the *Highway Safety Manual*[1]. The crash costs shown are adjusted to reflect 2010 values. Crash costs include monetary losses associated with medical care, emergency services, property damage, and lost productivity. They also include costs related to the reduction in the quality of life related to injuries. The estimated cost of crashes in Fort Collins in 2010 was nearly $94 million.

The National Highway Traffic Safety Administration (NHTSA) completed a study on the costs of crashes[2]. The NHTSA study not only concentrated on the costs of crashes, but also who pays the costs. The study found that society at large pays for about 75% of all costs incurred for each crash. Those costs are passed on to the general public through insurance premiums, taxes, direct out of pocket payments for goods/services, and increased medical costs. Using that information, it is estimated that traffic crashes cost the typical family of four in Fort Collins about $2,000 in 2010.

Table 1 – Economic Impact of Crashes, 2010

Crash Severity	Number of Crashes	Cost per Crash	Cost
Property Damage Only	2815	$9,000	$25,335,000
Possible Injury	473	$52,700	$24,927,100
Non-Incapacitating Injury	236	$91,400	$21,570,400
Incapacitating Injury	34	$249,500	$8,483,000
Fatal	3	$4,500,100	$13,500,300
Total			**$93,815,800**

Comparison with Other Cities

Table 2 compares the fatal crash rate from 2007 – 2009 in Fort Collins to other cities in Colorado with similar population (between 85,000 and 200,000) and also compared to other peer cities nationwide. The nationwide peer cities are participants in an annual benchmarking survey that Fort Collins Police Services participates in. Crash data for other communities was obtained from the National Highway Traffic Safety Administration's Fatal Accident Reporting System. Population estimates are for 2008 and are from the State Demography Office in Colorado and from individual communities for cities outside of Colorado.

Despite a record high number of fatalities in 2009, the fatal accident rate in Fort Collins is below the average compared to other comparable Colorado communities and also compared to peer cities nationwide.

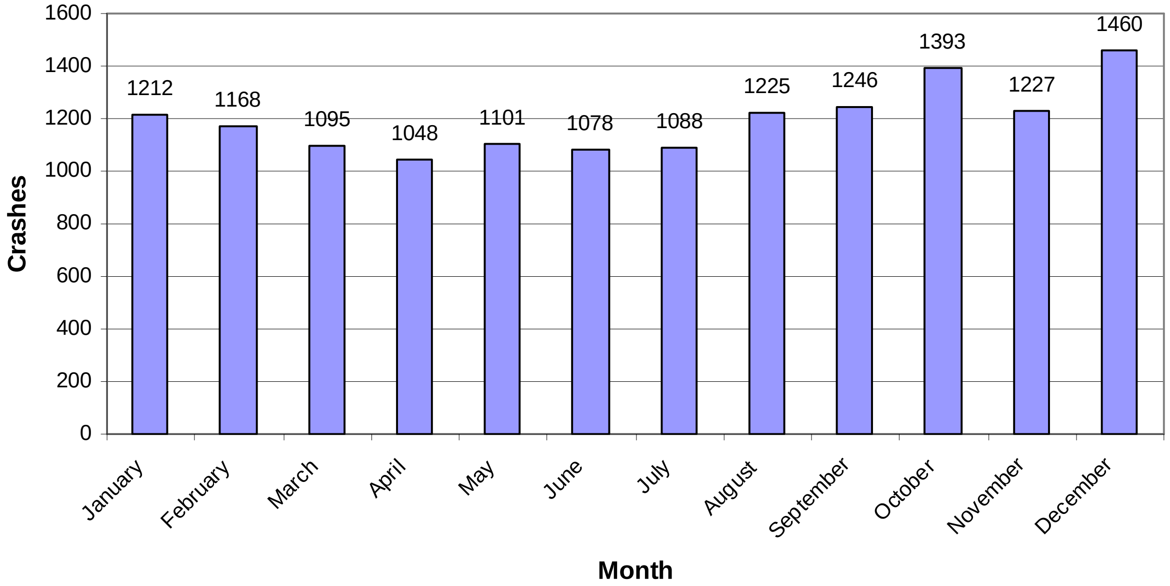
Table 2 – Comparison with Other Cities, Fatal Crashes, 2007 - 2009

City	Population	Fatal Crashes				Fatal Crash Rate *(Crashes/100,000 Population)*
		2007	2008	2009	Avg.	
Arvada	107,750	2	4	6	4.0	3.7
Boulder	101,100	2	2	5	3.0	3.0
Fort Collins	**137,700**	**4**	**2**	**11**	**5.7**	**4.1**
Greeley	91,400	4	3	0	2.3	2.5
Lakewood	144,600	11	9	6	8.7	6.0
Longmont	85,550	4	1	6	3.7	4.3
Pueblo	106,200	12	9	8	9.7	9.1
Thornton	115,600	3	7	2	4.0	3.5
Bellevue, WA	120,600	2	2	1	1.7	1.4
Boca Raton, FL	85,400	23	14	11	16.0	18.7
Broken Arrow, OK	101,000	4	3	4	3.7	3.7
Cedar Rapids, IA	128,050	5	4	7	5.3	4.1
Coral Springs, FL	127,200	8	9	14	10.3	8.1
Naperville, IL	145,550	1	1	1	1.0	0.7
Norman, OK	112,550	9	11	9	9.7	8.6
Olathe, KS	125,250	6	2	2	3.3	2.6
Overland Park, KS	173,250	6	9	4	6.3	3.6
Richardson, TX	99,700	10	15	3	9.3	9.3
San Angelo, TX	91,900	6	6	6	6.0	6.5
Springfield, MO	168,800	9	17	11	12.3	7.3
Colorado Cities	**889,900**	**42**	**37**	**44**	**41.0**	**4.6**
Overall	**2,369,150**	**131**	**130**	**117**	**126.0**	**5.3**

Crashes by Month

Figure 2 shows crashes by month in Fort Collins over the past four years. As shown, more crashes occur in the fall/winter than in the spring/summer. Inclement weather and a higher student population at those times likely contribute to the increase seen during the colder months.

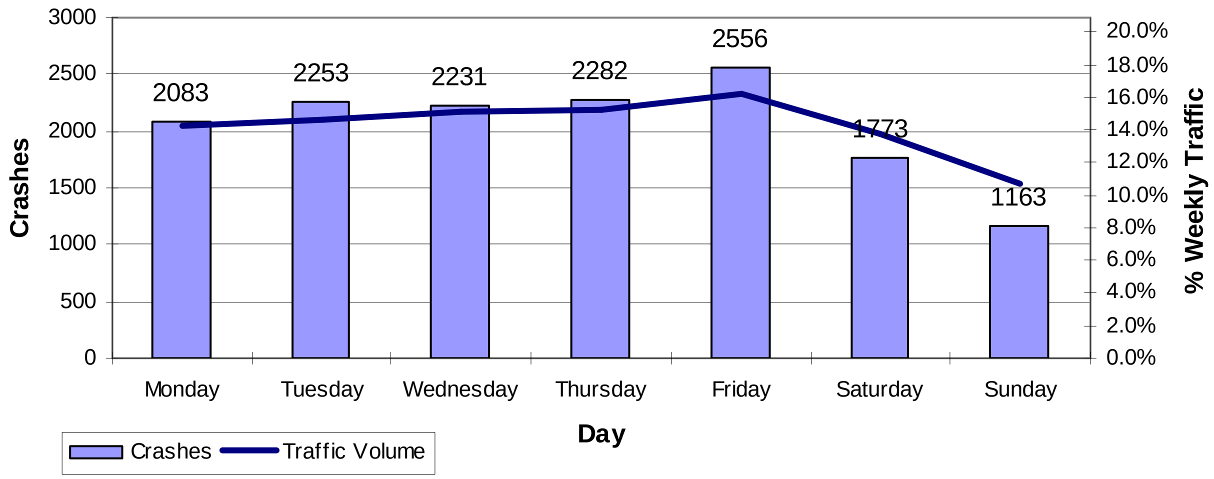
Figure 2 – Crashes by Month, 2007 - 2010



Crashes by Day of Week

Figure 3 shows crashes by day of the week over the past four years. More accidents occur on Fridays than on other days of the week. Daily variation in crashes tracks closely with daily variations in traffic volumes (blue line). Fridays tend to have both the highest traffic volumes and also the most accidents.

Figure 3 – Crashes by Day of Week, 2007 - 2010



Crashes by Time of Day

Figures 4, 5 and 6 show crashes by time of day for weekdays, Saturdays and Sundays respectively. The charts also show the percentage of daily traffic by hour (blue line).

On weekdays (Figure 4), crashes are overrepresented during the afternoon hours, particularly 12 p.m., 3 p.m. and 5 p.m. That is, there are more crashes than expected given the amount of traffic on the streets at those times. Crashes are also overrepresented from 12 a.m. to 2 a.m. on weekdays.

On weekends (Figures 5 and 6), early morning hours on Saturdays and Sundays are significantly overrepresented. At 1 a.m. on Saturdays and from 1 a.m. to 2 a.m. on Sundays, there are over 4 times as many crashes as would be expected given the traffic volumes at those times. Saturday evenings are also overrepresented. This data suggests that evening activities and alcohol use on weekends may contribute to a high number of crashes. See page 12 for more data on alcohol related crashes.

Figure 4 – Crashes by Time of Day, 2007- 2010
Monday - Friday

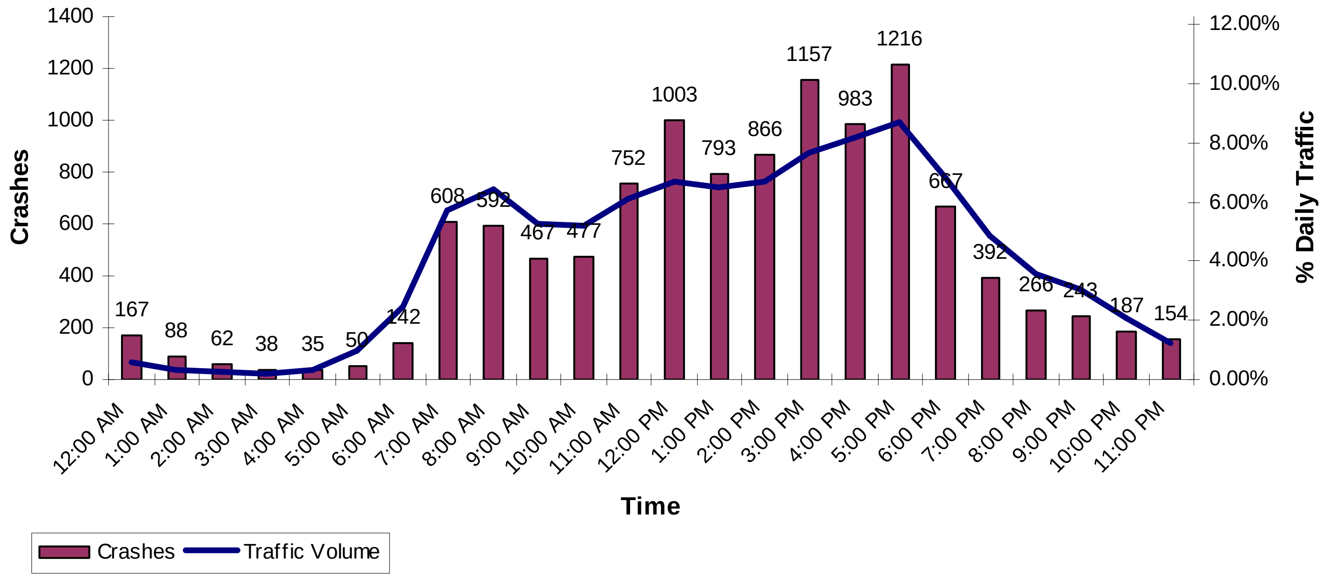


Figure 5 – Crashes by Time of Day, 2007 – 2010
Saturday

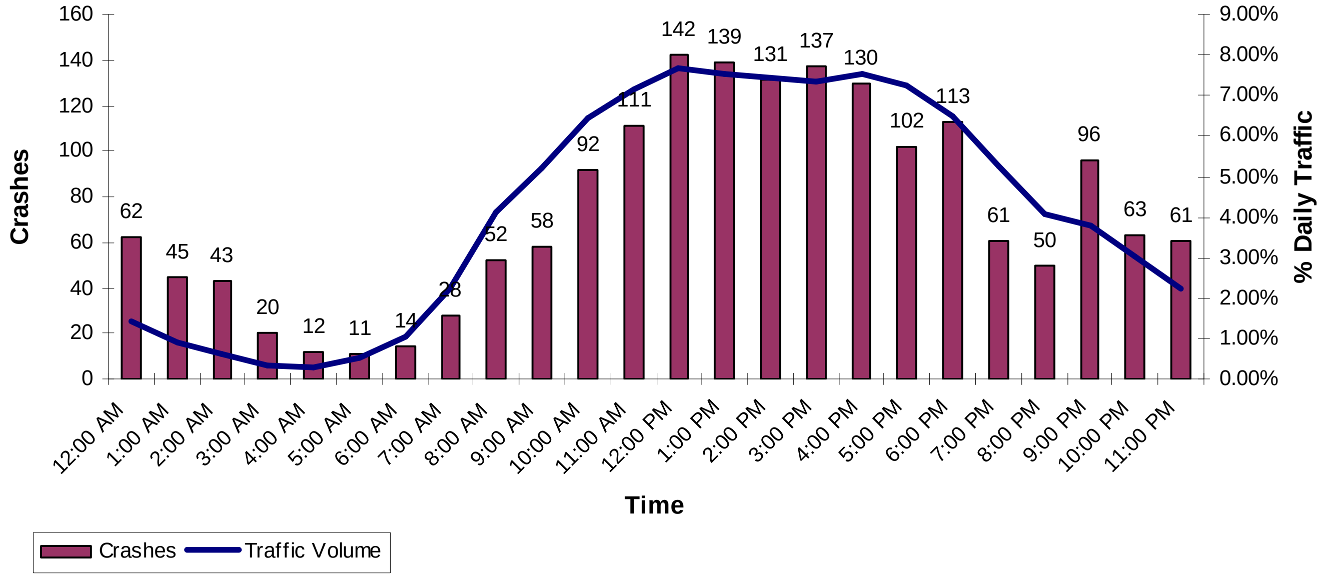
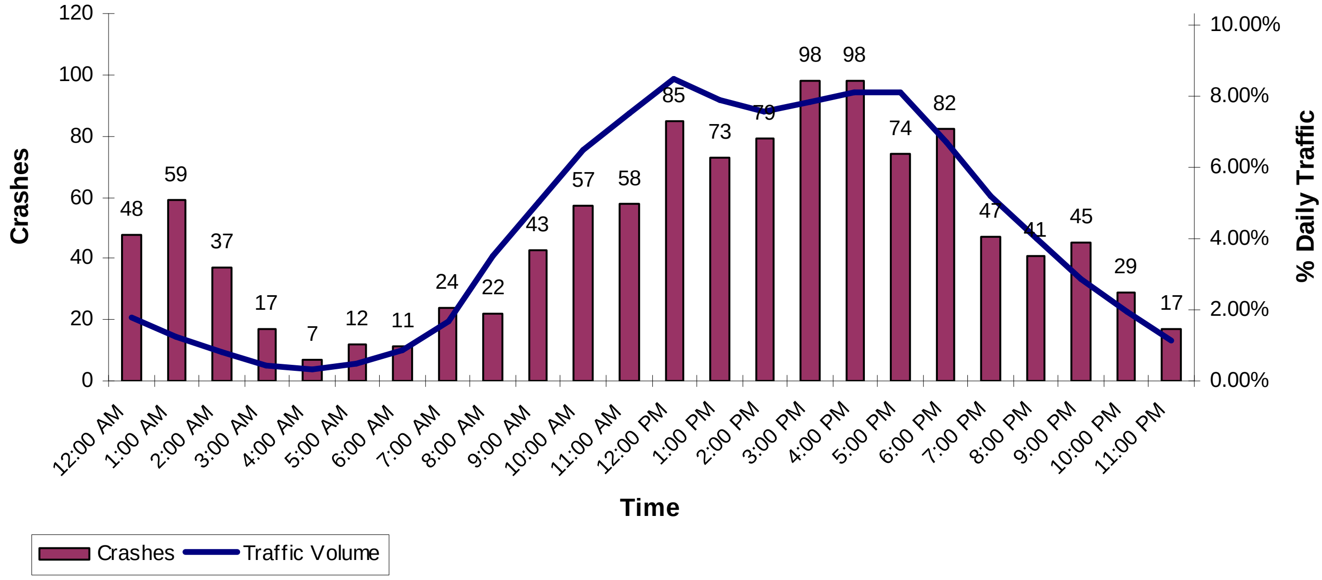


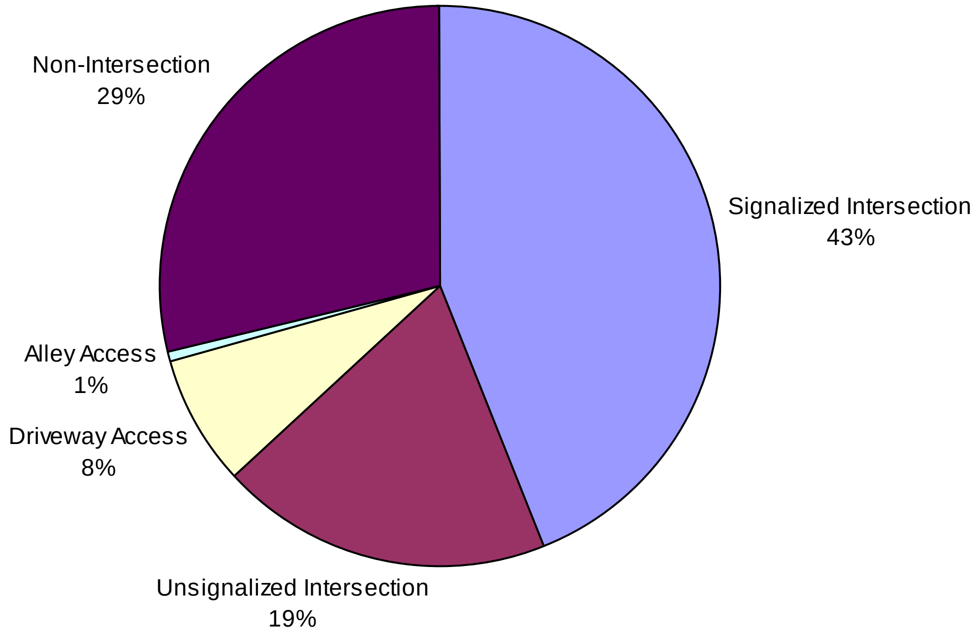
Figure 6 – Crashes by Time of Day, 2007 – 2010
Sunday



Location of Crashes

Figure 7 shows the location of crashes in Fort Collins for the years 2007 – 2010. Intersection crashes (including signalized intersections, unsignalized intersections, driveways and alleys) account for 71% of all crashes. This illustrates the importance of proper access control and access design as a component of a traffic safety program.

Figure 7 – Crashes by Location, 2007 - 2010



Driver Age

Figure 8 shows the number (and percentage) of at fault drivers involved in crashes in Fort Collins by age. The chart also shows the percentage of licensed drivers by age in Fort Collins. As can be seen, drivers 15 – 19 are more than five times as likely to be involved in a crash as would be expected given the number of licensed drivers in that age group. 20 – 24 year old drivers are over twice as likely to be in a crash as expected. All other age groups are underrepresented in crashes. While these statistics are not unique to Fort Collins, they do indicate that driver inexperience is likely a key factor in crashes here and countermeasures to deal with this problem would be appropriate at the local level.

Figure 8 – At Fault Drivers in Crashes, By Age, 2007 - 2010

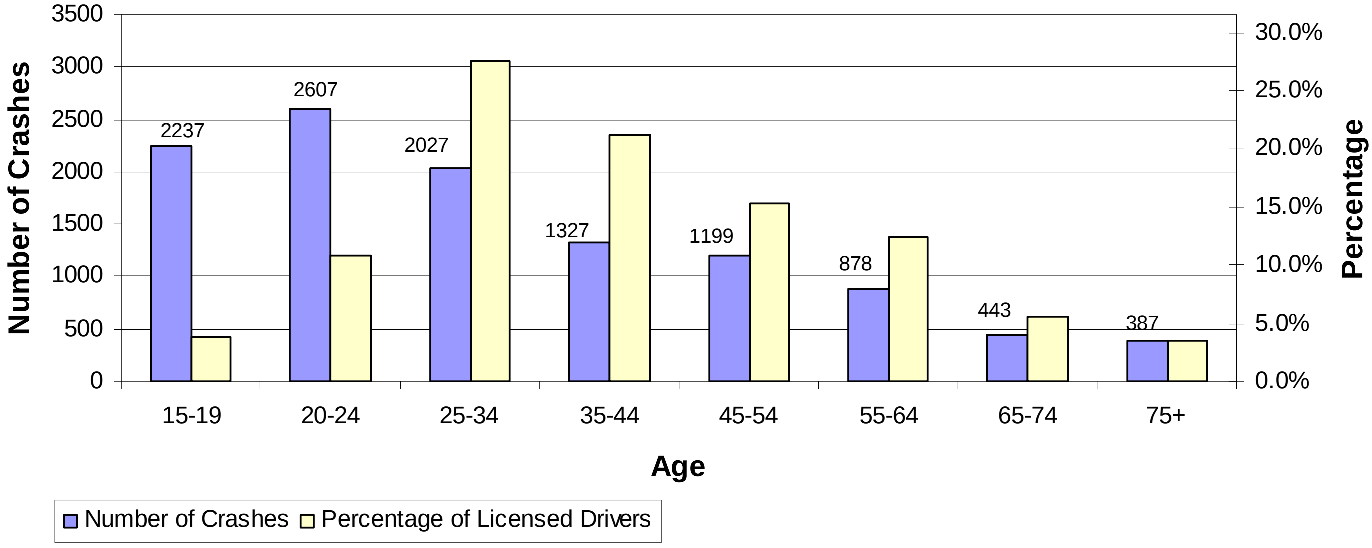
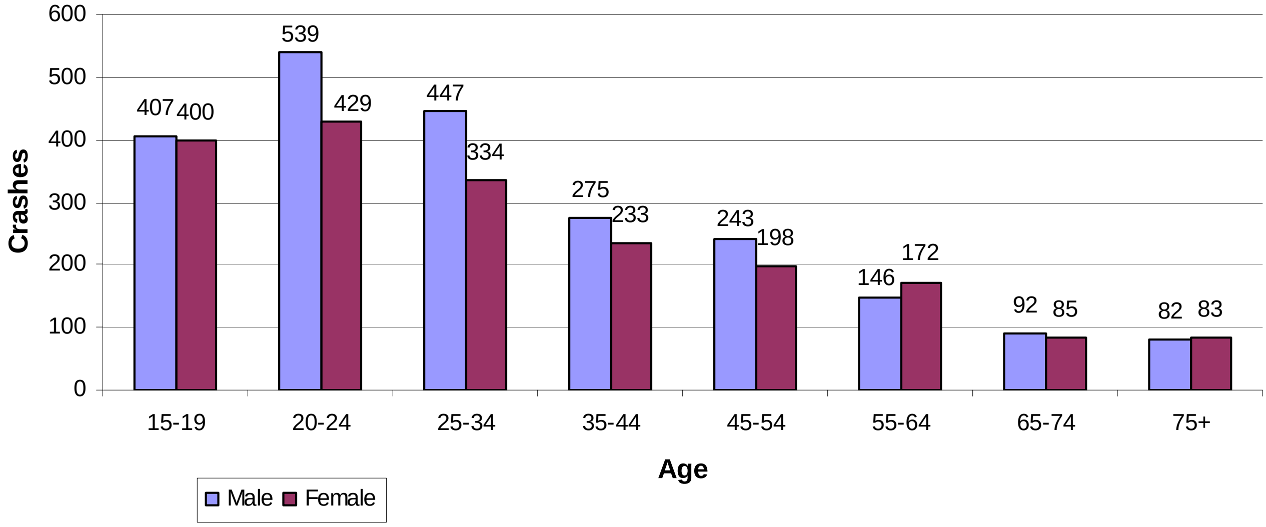


Figure 9 below shows crashes by age and gender. Only partial data by gender is available for 2007. So these numbers are somewhat lower than what is shown in Figure 8 above. Overall, male drivers are slightly more likely to be involved in accidents than female drivers. Younger male drivers (20 – 34) in particular are more likely to be involved in crashes.

Figure 9 – Crashes by Age and Gender



Driving Under the Influence

Figure 10 shows the number of DUI (driving under the influence) crashes over the past four years. The 567 DUI crashes represent about 4% of all crashes. However, the 29 incapacitating/fatal accidents represent about 17% of all serious injury accidents.

Figure 10 – Number of DUI Crashes, 2007 - 2010

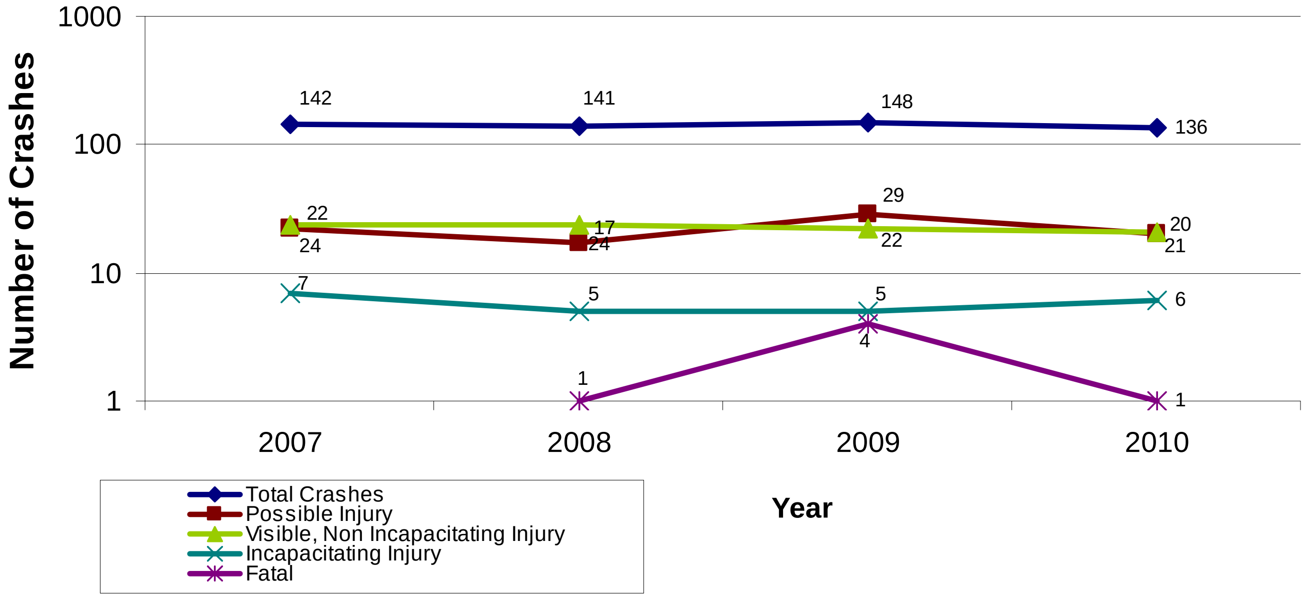
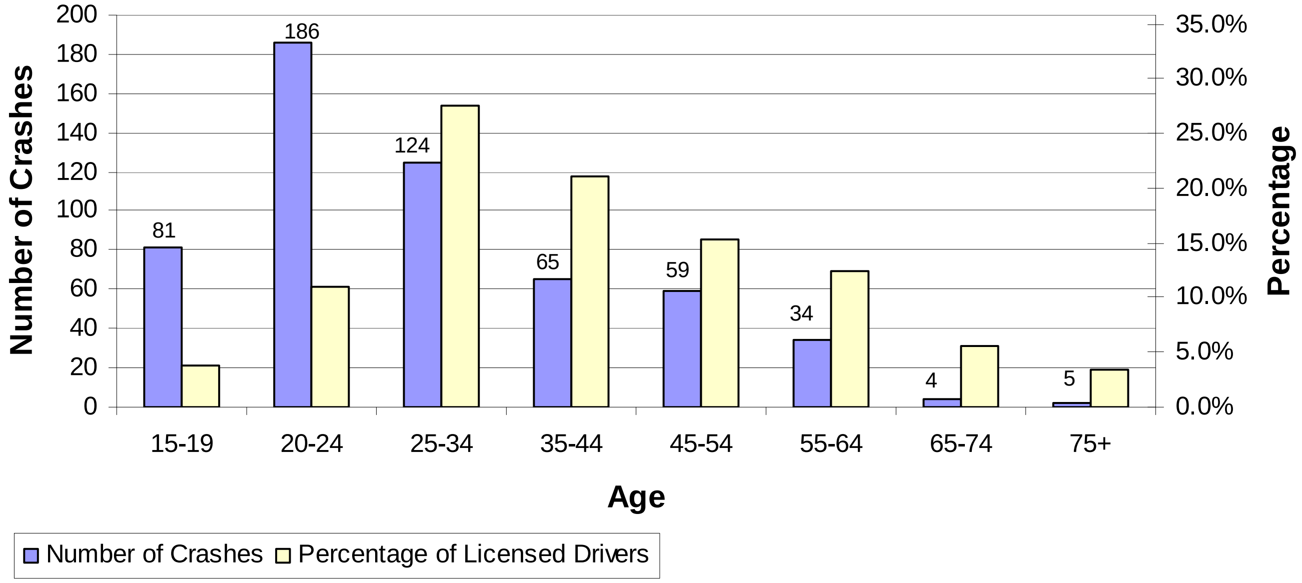


Figure 11 shows the ages of at fault drivers in DUI crashes over the past four years. 20 – 24 year old drivers are about three times more likely than expected to be in alcohol related crashes given the number of licensed drivers in that age group. Perhaps more surprisingly, 15 – 19 year old drivers are also overrepresented (nearly four times more likely than expected) despite the fact that they have not reached legal drinking age. The data showing DUI crashes combined with the data shown previously in Figures 4 and 5 that showed high accident rates on weekend evenings/early mornings suggests that driving under the influence continues to be an area of concern.

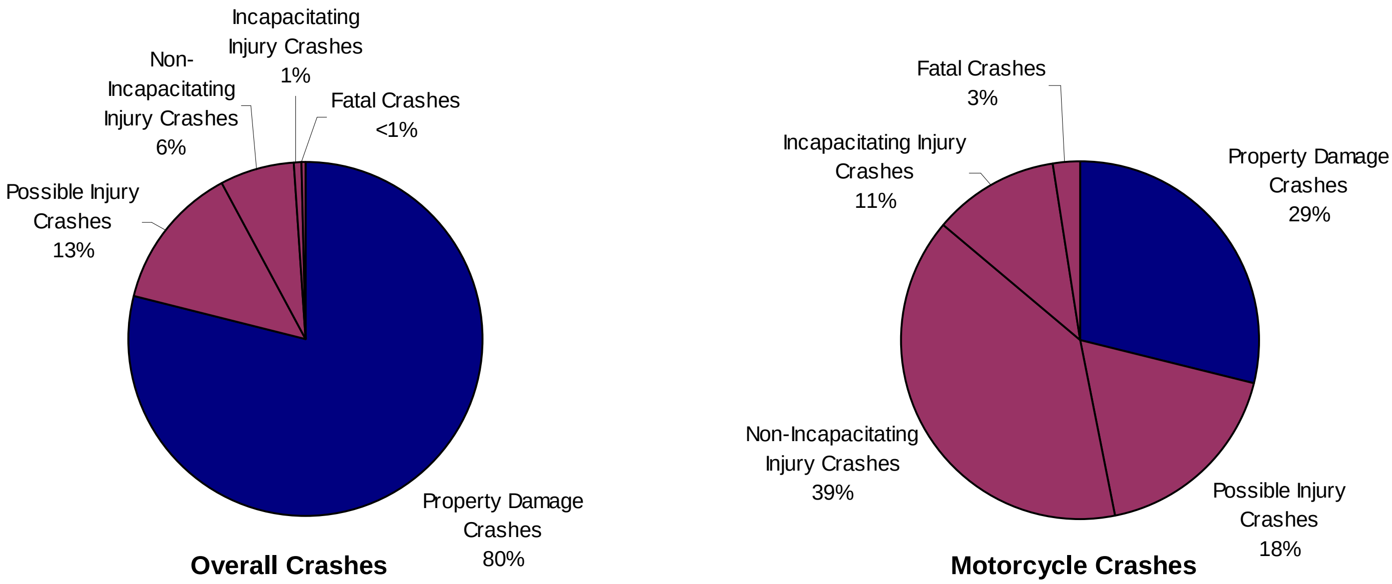
Figure 11 – At Fault Drivers in DUI Crashes -- By Age, 2007-2010



Motorcycle Crashes

From 2007 – 2010 there were a total of 267 reported motorcycle crashes. While motorcycle crashes tend to follow the same patterns as other crashes they tend to be more severe. Figure 12 shows a comparison of crash severity between overall crash data and motorcycle data. Overall, only 21% of crashes result in injury while 71% of motorcycle crashes result in injury.

Figure 12 – Crash Severity Comparison for Motorcycles



Section 2 - Types of Crashes

There are a variety of different types of crashes:

Approach Turn – Two vehicles traveling in opposite directions, one turns left (or attempts a U-turn) in front of the oncoming vehicle and is struck.

Bicycle – Any crash that involves a bicyclist.

Fixed Object – A single vehicle crash where a fixed object other than a parked vehicle is struck.

Head On – Two vehicles traveling in opposite directions hit head on.

Overtaking Turn – Two vehicles traveling in the same direction, the front vehicle turns right or left and is hit as the following vehicle tries to pass on the right or left.

Overturning Crash – A single vehicle crash where the vehicle flips over off its wheels.

Parking Related – Any crash involving a parked vehicle or a vehicle entering/leaving a parking space.

Pedestrian – Any crash that involves a pedestrian.

Rear End – Two vehicles traveling in the same direction, leading vehicle struck by following vehicle.

Right Angle – Two vehicles traveling on perpendicular streets one fails to yield or passes a traffic control device and strikes the other.

Sideswipe Opposite Direction – Two vehicles traveling in opposite directions, one veers into the wrong lane and strikes the side of the other car. This often occurs where a vehicle waiting at a STOP sign or traffic signal is struck by a vehicle turning right from a perpendicular road onto the road of the stopped car.

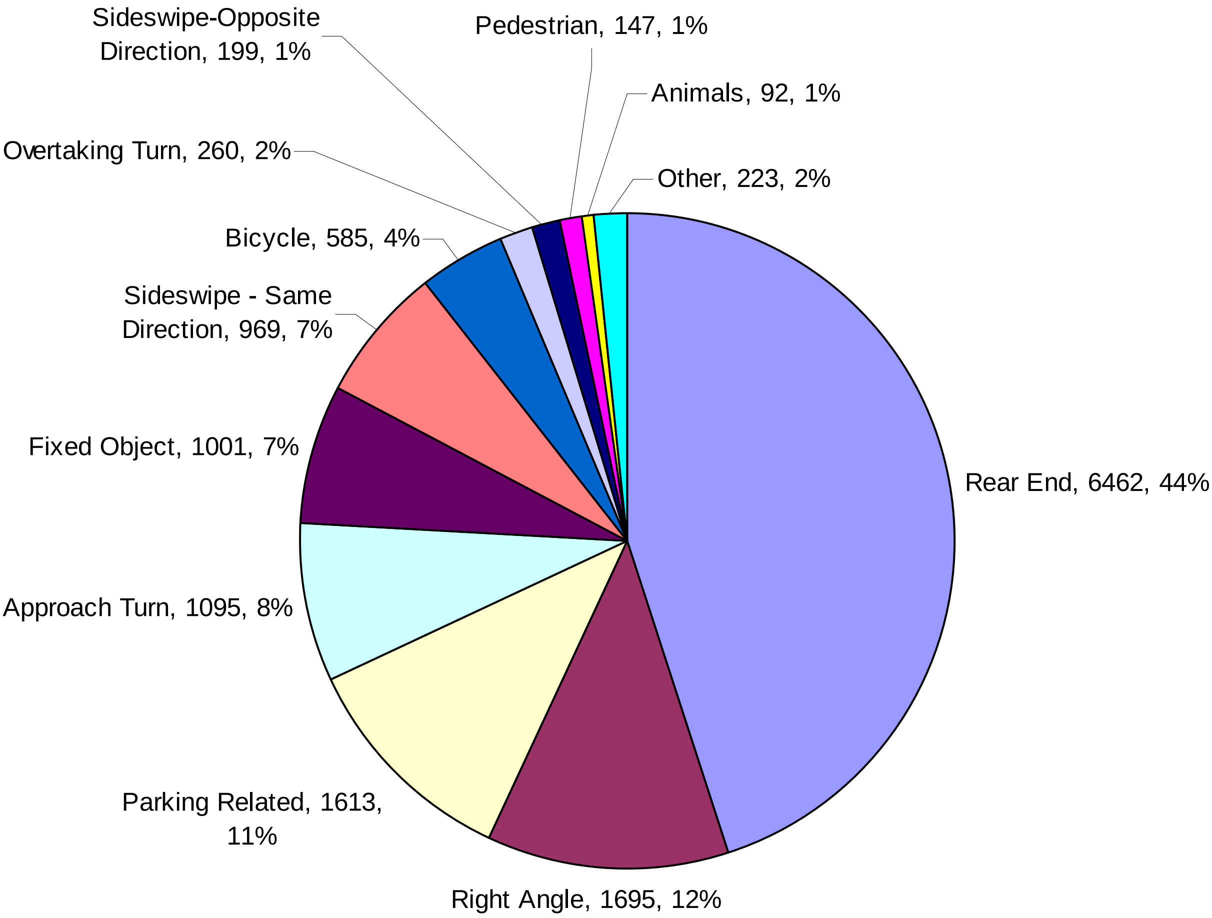
Sideswipe Same Direction – Two vehicles traveling the same direction, one vehicle veers into the other striking it in the side (usually due to improper lane changes).

Other Non-Collision Crash – Other single vehicle crashes that don't fit into any other category.

Other – Other crashes that do not fit into any category.

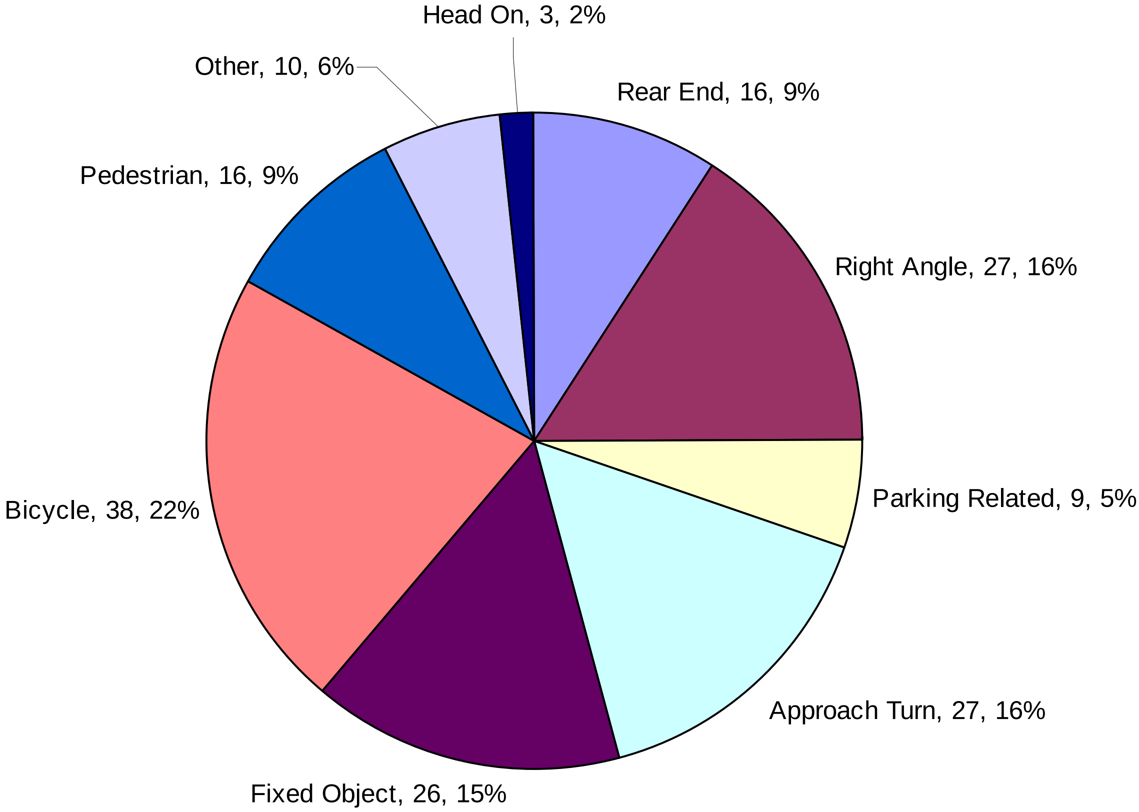
Figure 13 shows the number and percentage of crashes by type for the years 2007 - 2010. Rear end crashes make up nearly half of all crashes. Right angle, parking related, approach turn and fixed object crashes are the next most common types of crashes in Fort Collins.

Figure 13 – Crashes by Type, 2007 - 2010



While all traffic crashes are of concern, those that cause the most serious injuries are of special concern. Figure 14 shows the number of incapacitating injury and fatal crashes (the most severe crashes) by type from 2007 - 2010. Bicycle, Right Angle, Fixed Object, Approach Turn, Pedestrian and Rear End crashes account for about 85% of the serious injury/fatal crashes in Fort Collins. Note that while bicycle and pedestrian accidents make up only about 5% of total crashes they make up nearly a third (30%) of serious injury crashes.

Figure 14 – Severe Injury/Fatal Crashes by Type, 2007 - 2010



Analysis of Severe Injury Crash Types

The remainder of this section of the report examines Bicycle, Right Angle, Fixed Object, Approach Turn, Pedestrian and Rear End crashes in detail to help determine what countermeasures could be applied to reduce these types of crashes.

Bicycle Crashes

Figure 15 shows the number of bicycle crashes in Fort Collins from 2007 – 2010. The frequency of bike crashes has remained relatively constant over the past four years.

Figure 15 – NUMBER 0F BICYCLE CRASHES

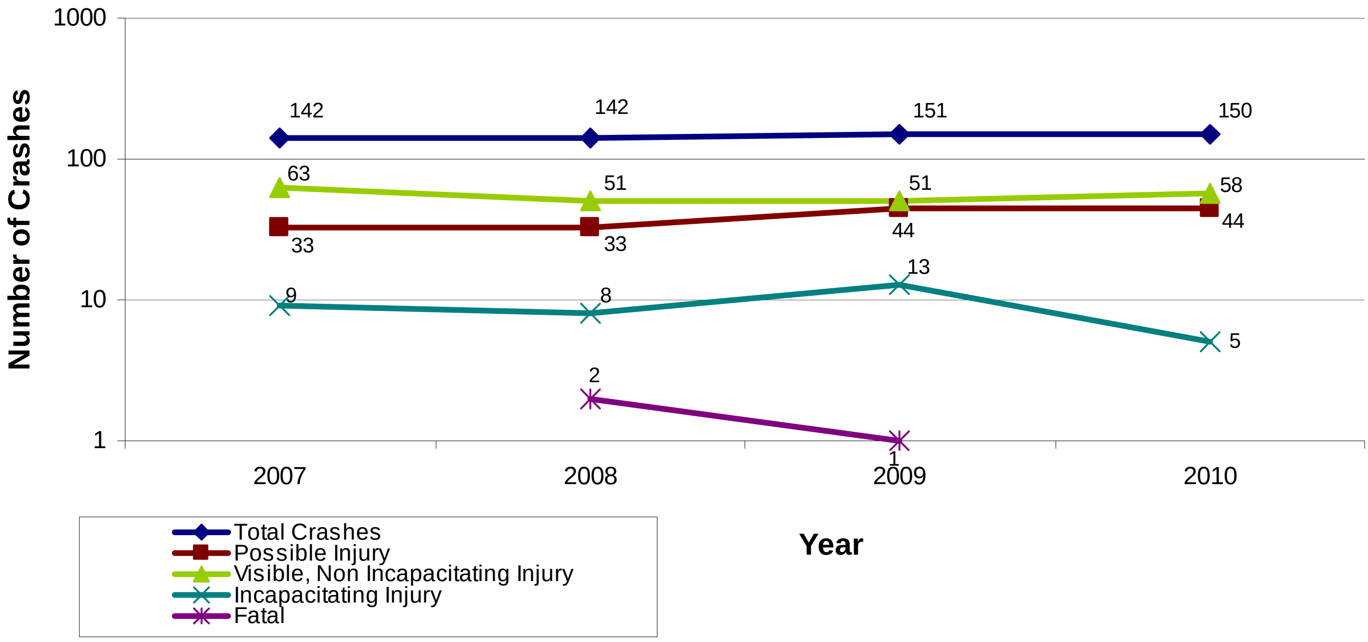
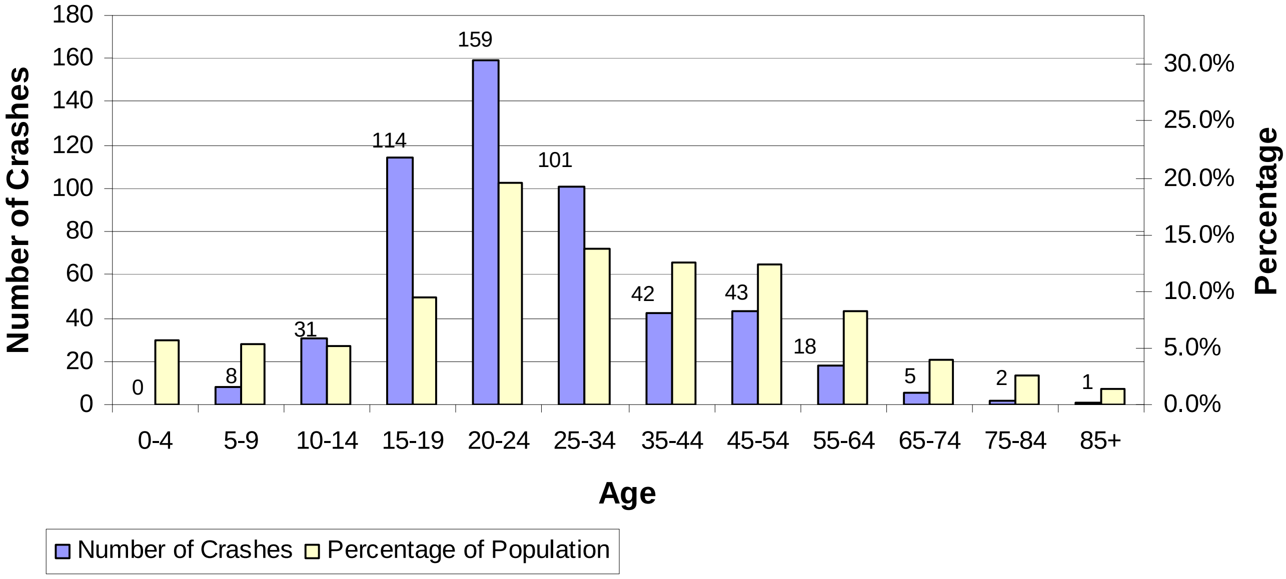


Figure 16 shows the age of bicyclists involved in crashes in Fort Collins as well as the percentage of population by age. 10 - 34 year old bicyclists are all overrepresented in crashes. 15 – 19 year older riders are most overrepresented. They are more than twice as likely as expected to be involved in a crash when compared to the population by age.

Figure 16 – Bicycle Crashes by Bicyclist Age, 2007 - 2001



Bicycle crashes can be further classified by type of collision. Table 3 shows bicycle accidents by type. Right angle crashes are by far the most common type of bike crash. Significant contributing circumstances in bike crashes include wrong way riding (37% of crashes) and sidewalk riding (34% of crashes). Note also that crashes at intersections account for about 85% of all bike crashes. This picture illustrates a typical right angle crash involving wrong way riding.

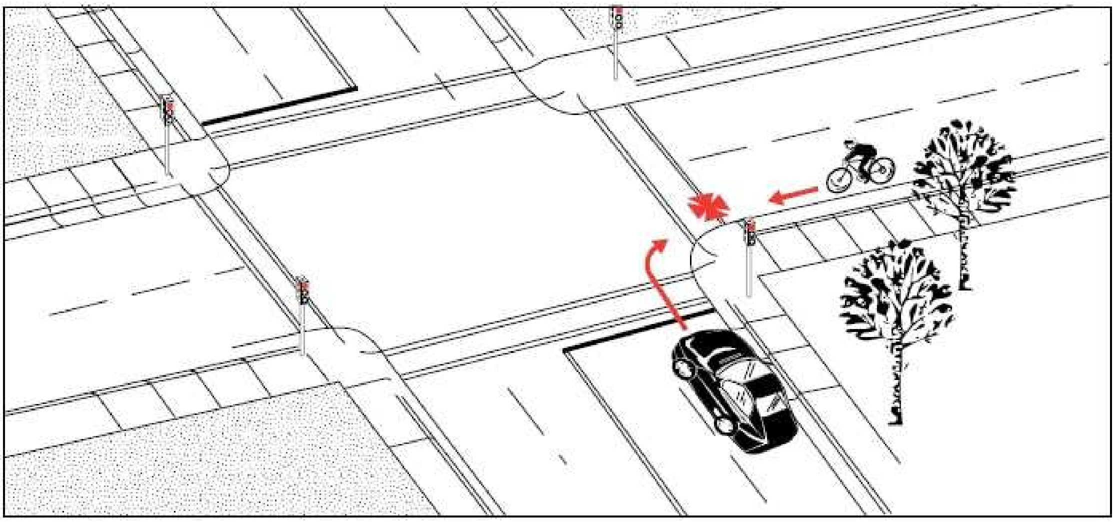


Table 3 – Types of Bicycle Crashes, 2007 - 2010

Type of Accident	Total	Serious Injury/Fatal
Right Angle		
Bike riding against traffic on sidewalk/crosswalk	126	2
Bike riding against traffic on street	71	5
Bike riding with traffic on sidewalk/crosswalk	41	5
Bike riding with traffic on street	74	5
Midblock Crossings	7	1
Unknown Location of Bike	44	2
Total Right Angle	**363**	**20**
Overtaking Turn		
Bike riding with traffic on sidewalk/crosswalk	9	1
Bike riding with traffic on street	62	2
Bike riding against traffic	5	0
Total Overtaking	**76**	**3**
Approach Turn		
Bike riding with traffic on sidewalk/crosswalk	7	2
Bike riding with traffic on street	44	2
Unknown Location	2	0
Total Approach Turn	**53**	**4**
Sideswipe		
Bike riding against traffic on street	8	3
Bike riding with traffic on street	31	2
Unknown Location of Bike	3	0
Total Sideswipe-Same Direction	**42**	**5**
Parked Related		
Bike riding with traffic on street or sidewalk/crosswalk	11	0
Bike riding against traffic on street or sidewalk/crosswalk	5	0
Unknown Location of Bike	2	1
Total Parked Motor Vehicle	**18**	**1**
Rear-End		
Bike riding with traffic on street	15	2
Unknown Location of Bike	2	
Total Rear End	**17**	**2**
Head-On		
Bike riding against traffic on street	2	1
Total Head-On	**2**	**1**
Total Objects, Non-Collision or No Information	**14**	**2**
Total	**585**	**38**

Right Angle Crashes

Right angle crashes occur at intersections when vehicles arrive on perpendicular roads and collide.

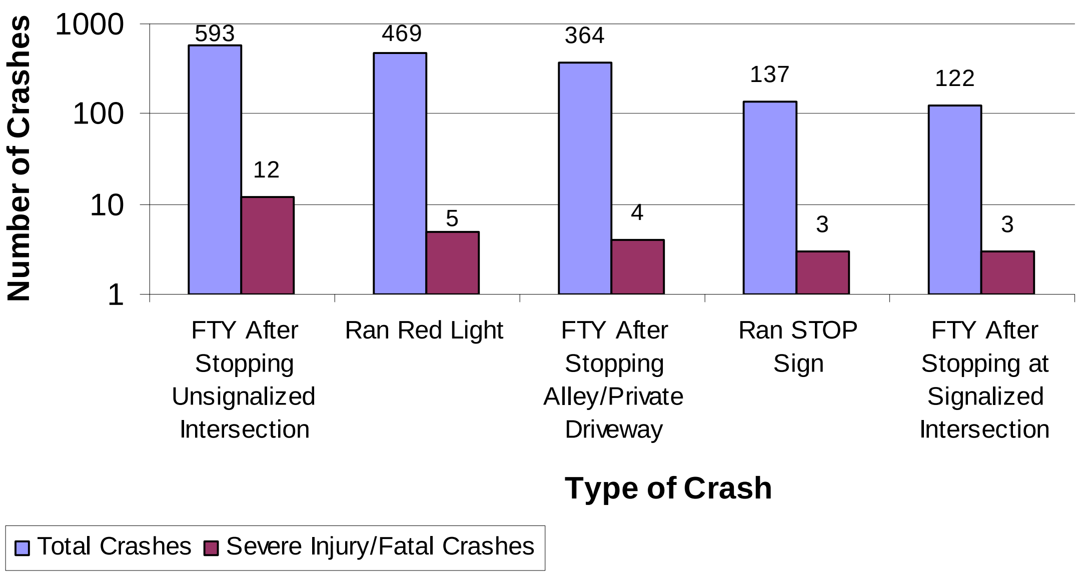
There are two main types of right angle crashes:

1) Failure to yield after stopping – These accidents can occur at STOP signs, traffic signals or before exiting a driveway. Typical contributing factors to these crashes include sight obstructions such as fences, trees, shrubs or parked cars that prevent the stopped driver from seeing oncoming traffic. They also occur where side street drivers encounter heavy traffic at intersections. The heavy traffic and difficulty entering or crossing the main road may encourage bad decisions or more risk taking.

2) Passing a signal/STOP sign without stopping - These may occur at a traffic signal or STOP sign controlled intersection. Typical contributing factors to these crashes include inattention, wide streets (that make STOP signs less visible), "busy" areas where numerous distractions tend to make traffic control devices blend in or become less obvious, and icy roads.

Figure 17 shows the breakdown of right angle crashes by type (failure to yield or passing a traffic control device) and by location (signalized or unsignalized intersections – including private driveway/public street intersections). As shown, most right angle crashes occur at unsignalized intersections where someone stops but then proceeds into oncoming traffic.

Figure 17 – Right Angle Crashes by Type and Location, 2007 – 2010

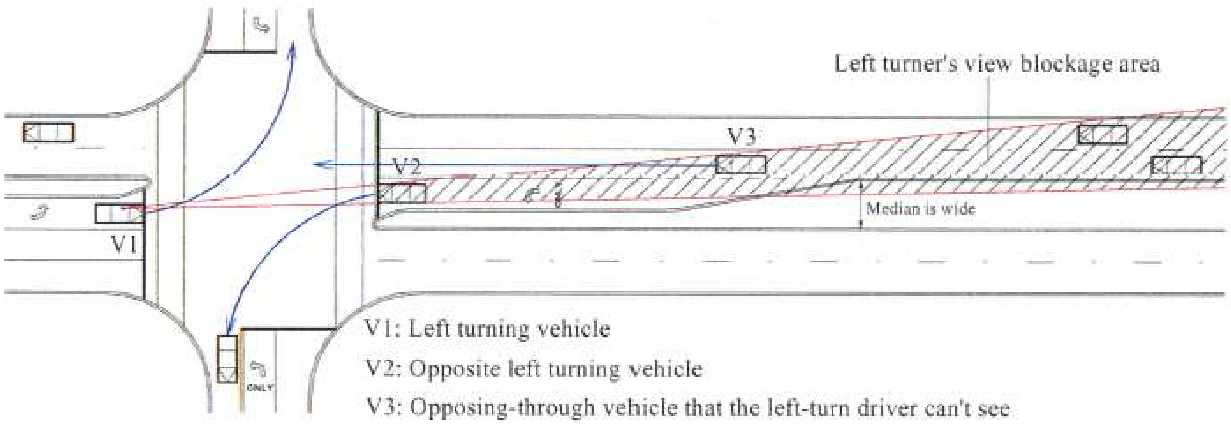


Approach Turn Crashes

Approach turn crashes occur at either signalized or unsignalized intersections. They occur when someone turns left in front of oncoming traffic without yielding the right of way.

There are two main causes of approach turn crashes:

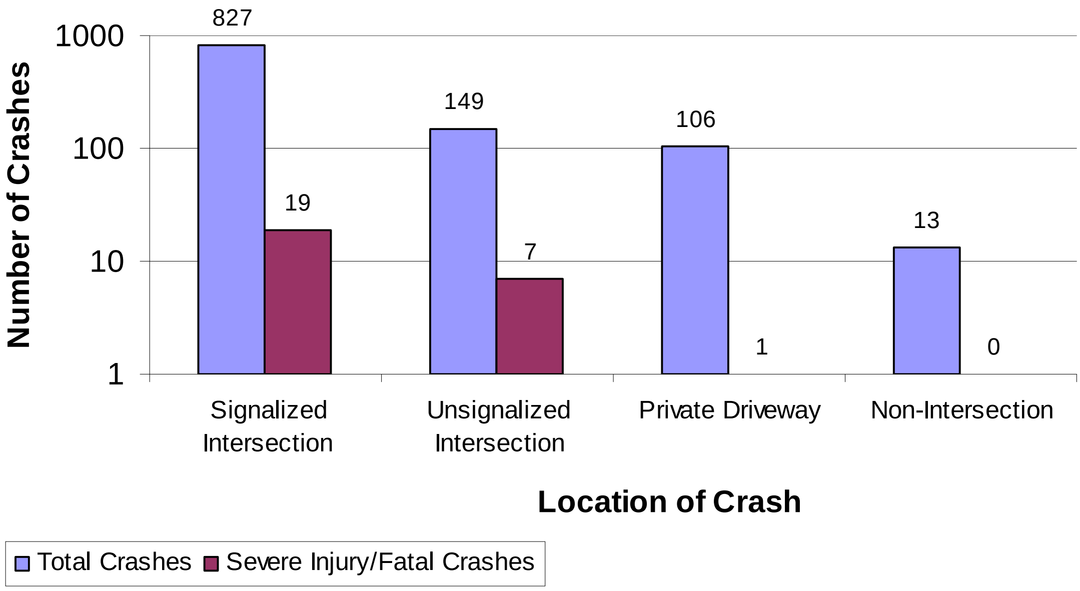
1) Poor estimation of distance and/or speed of approaching through traffic -- These accidents occur at both signalized and unsignalized intersections. Poor visibility can contribute to these accidents. Offset left turn lanes can result in vision obstructions as shown in the illustration below. Note that this offset created between opposing left turn lanes is a disadvantage of raised medians at intersections.



2) Inappropriate response to the onset of the yellow or red signal display – This situation can occur at signalized intersections where permissive left turns are allowed. A driver waiting to turn left on a green ball at a signalized intersection is required to yield the right-of-way to opposing through traffic. When the traffic signal turns yellow and/or red, some left turning drivers assume that oncoming traffic will stop. This causes them to turn in front of oncoming traffic that may not be able (or willing) to stop.

Figure 19 shows approach turn crashes by type of intersection. Note that unlike broadside crashes, the majority of approach turn crashes (75%) happen at signalized intersections. The combination of increased complexity and higher turning volumes along with the issue of turning on the yellow/red explain this trend.

Figure 19 – Approach Turn Crashes by Location, 2007 – 2010



Fixed Object Crashes

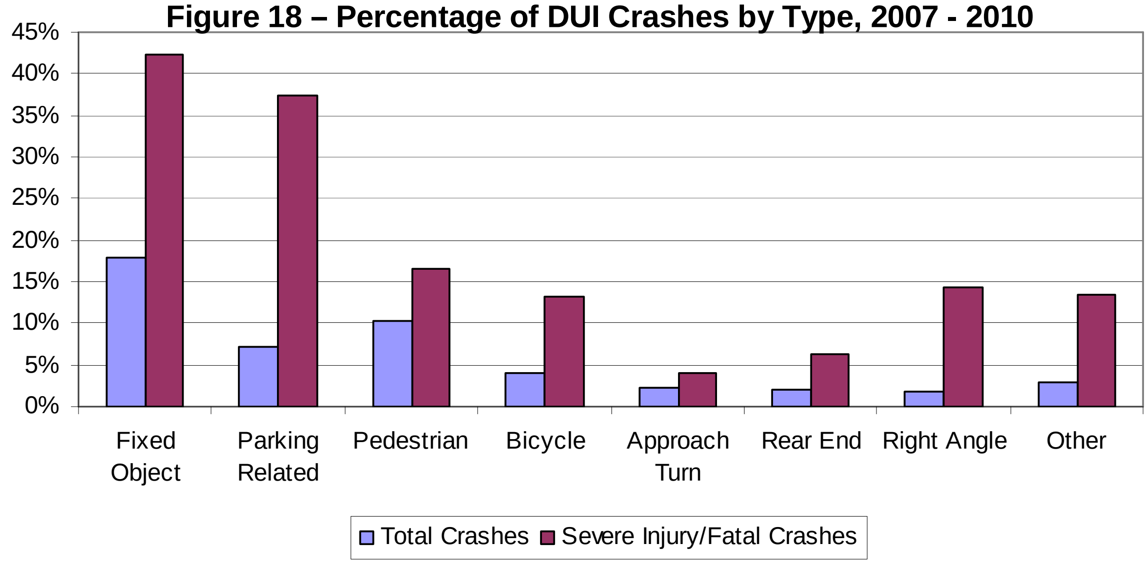
Fixed object crashes are single vehicle crashes where a driver collides with a fixed roadway feature such as a curb or a median or runs off the road and hits a roadside feature such as a tree or utility pole. Table 4 shows fixed object crashes by type of object struck.

Table 4 – Fixed Object Crashes by Type, 2007 – 2010

	All	Serious Inj./Fatal
Utility Pole	173	4
Curb or Median	167	3
Sign	156	2
Fence	124	4
Tree	120	4
Wall or Building	32	2
Embankment	30	2
Railroad Crossing Warning Device	17	1
Rocks	17	2
Bridge Structure	16	2
Other/Unknown	169	0
Total Fixed Object Crashes	1021	26

Alcohol plays a big part in fixed object crashes. Figure 18 shows that nearly 20% of all fixed object crashes and more than 40% of severe injury or fatal fixed object crashes involved alcohol. 38% of severe injury or fatal crashes involving parked cars (another type of fixed object) were alcohol related.

Figure 18 – Percentage of DUI Crashes by Type, 2007 - 2010



Pedestrian Crashes

Figure 20 shows the number of pedestrian crashes in Fort Collins from 2007 – 2010. There was a large increase in the number of pedestrian crashes in 2010 compared to previous years. No specific cause has been identified for the sudden increase.

Figure 20 – Pedestrian Crashes by Year, 2007 - 2010

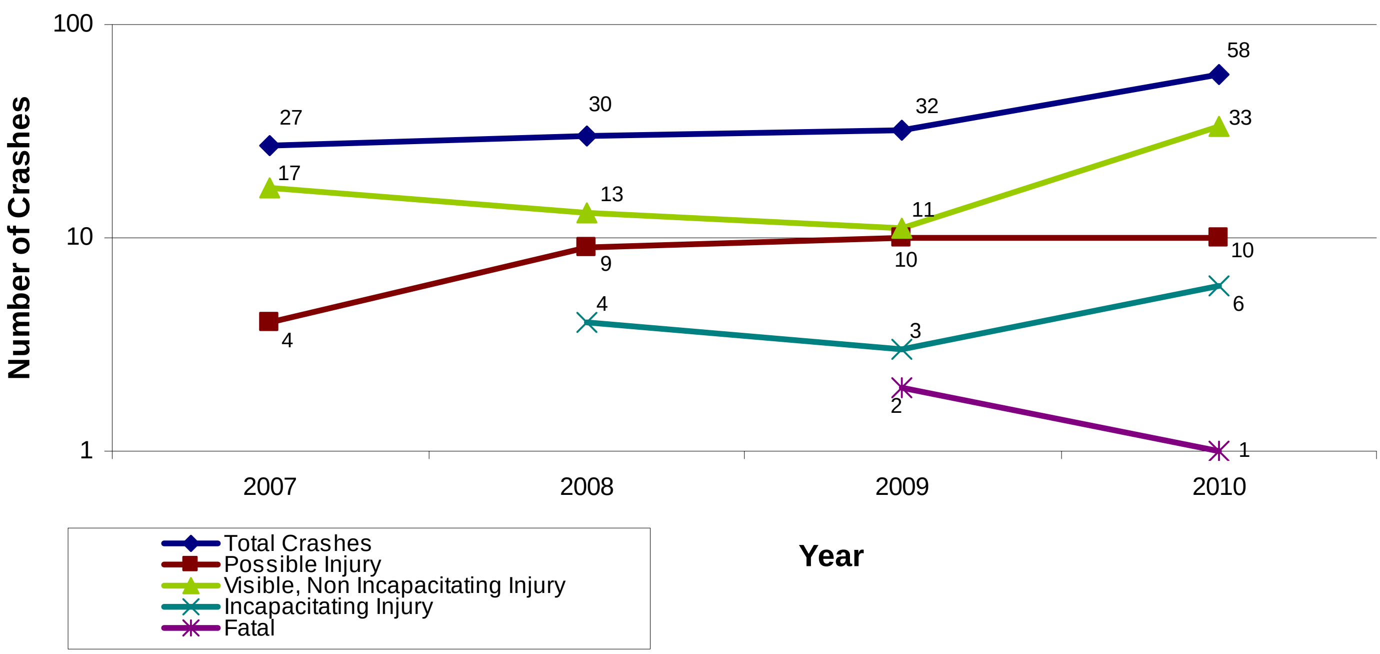
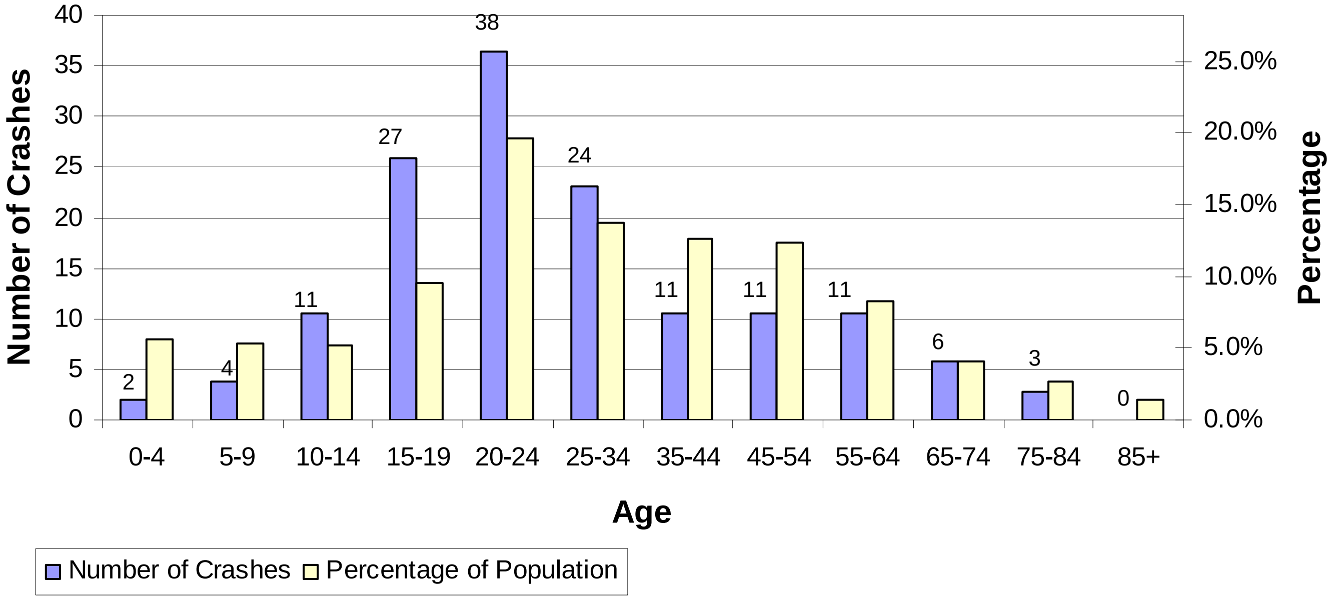


Figure 21 shows the age of pedestrians involved in crashes for the years 2007 - 2010. 10 – 34 year old pedestrians are overrepresented in crashes. 15 – 19 year old pedestrians in particular were about twice as likely as expected to be in a crash considering the population in this age range.

Figure 21 – Pedestrian Crashes by Pedestrian Age, 2007 - 2010



Pedestrian crashes can be further classified by type of collision. Some common types of pedestrian crashes are described below:

Motorist Fails to Yield at Signalized Intersection – Crashes at signalized intersections where a pedestrian legally crossing the street is hit by a motorist. These crashes typically involve a turning driver whose attention is diverted.

Motorist Fails to Yield at Unsignalized Intersection – Crashes where a pedestrian legally in the street is hit by a driver who does not yield the right of way. These crashes typically involve a turning driver whose attention is diverted.

Motorist Fails to Yield while Exiting a Driveway – Crashes that involve motorists crossing a sidewalk in the process of exiting a driveway to a public street and striking a pedestrian on the sidewalk crossing the driveway.

Dart Out - Crashes where a pedestrian enters the street in front of an approaching driver who is too close to avoid a collision. An example of this type of crash is a child chasing a ball into the street running out in front of a car.

Pedestrian Crosses Against Signal – Crashes at signalized intersections resulting from a pedestrian crossing against the signal indication.

Pedestrian Fails to Yield at Uncontrolled Locations - At non-crosswalk locations pedestrians must yield to motorists prior to crossing. These crashes involve pedestrians who attempted to cross without waiting for a safe break in traffic. Most of these crashes occur at night when pedestrians are less visible to motorists.

Pedestrian Standing/Walking in Road – Pedestrian walking on the road but not attempting to cross is struck by a motorist.

Crashes shown as "Other" include many different types of crashes including pedestrians hanging onto the outside of vehicles, pedestrians eluding the police, suicide attempts, pedestrians exiting parked vehicles and pedestrians who fell off the sidewalk into the street.

Table 5 shows pedestrian crashes by type and by age in Fort Collins for the years 2007-2010. Crashes involving cars that failed to yield at signalized intersections are the most common type of pedestrian crashes.

Table 5 – Pedestrian Crashes by Type, 2007-2010

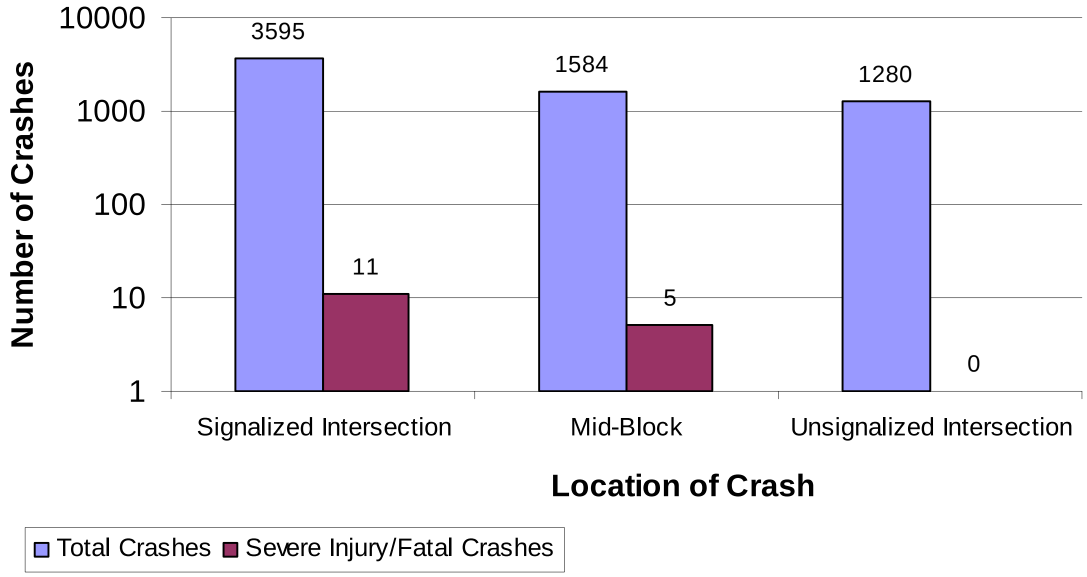
Type of Accident	Total	Serious Injury/Fatal
Motorist Fail to Yield at Signalized Intersection		
Motorist Turning Left on Green	18	1
Motorist Turning Right on Green	10	1
Motorist Turning Right on Red	17	1
Motorist Going Straight	3	0
Total Motorist Fail to Yield at Signalized Intersection	**48**	**3**
Motorist Fail to Yield at Unsignalized Intersection	**20**	**0**
Dart Out	**19**	**5**
Pedestrian Fail to Yield at Uncontrolled Location	**17**	**5**
Pedestrian Crosses Against Signal	**12**	**1**
Pedestrian Standing/Walking in Road	**10**	**1**
Motorist Fail to Yield Exiting Driveway	**6**	**0**
Other	**12**	**1**
		(fell off skateboard into the street)
Total	**147**	**16**

Rear End Crashes

Less than 1% of all rear end crashes result in a serious injury or fatality in Fort Collins. However, because of the sheer number of these types of crashes, there are a number of injuries related to them.

Rear end crashes are typically the result of motorist inattention often combined with unexpected stops in the traffic stream. Figure 22 shows the number of rear end crashes by location. As can be seen, the majority (56%) of rear end crashes occur at signalized intersections. Inattention along with the sudden onset of a yellow light combined with heavy traffic and/or high speeds can result in increased rear end accident potential.

Figure 22 – Rear End Crashes by Location, 2007 – 2010



Care must be taken to avoid increasing rear end crash potential by implementation of countermeasures intended to reduce other types of crashes. For example, installation of traffic signals, addition of protected only left turn signal phasing at traffic signals, and red light camera enforcement are all countermeasures that may be used to reduce right angle or left turn crashes. They also tend to increase the potential for rear end crashes. Since right angle and left turn crashes tend to be more severe it might make sense to implement these countermeasures at locations with a history of these types of crashes. However, it may not be appropriate to use these countermeasures at locations where there is not a history of these sorts of crashes because of the increased risk of rear end crashes.

Section 3 - High Crash Locations

Density Maps

Figures 23 – 28 are crash density maps which show crash concentrations by location. They are arranged as follows:

Figure 23 – All Crash Types Combined
Figure 24 – Bicycle Crashes
Figure 25 – Right Angle Crashes
Figure 26 – Approach Turn Crashes
Figure 27 – Pedestrian Crashes
Figure 28 – Rear End Crashes

Note that the bicycle and pedestrian maps include all bike/pedestrian crashes respectively. The other maps only show intersection related crashes since other mid-block crashes (except bikes/pedestrians) have not been geo-coded yet for use with the GIS system. Note also that there is not a map showing fixed object crashes since many of these crashes occur at mid-block locations.

Figure 23 - All Crash Types

1/1/2007 - 12/31/2010

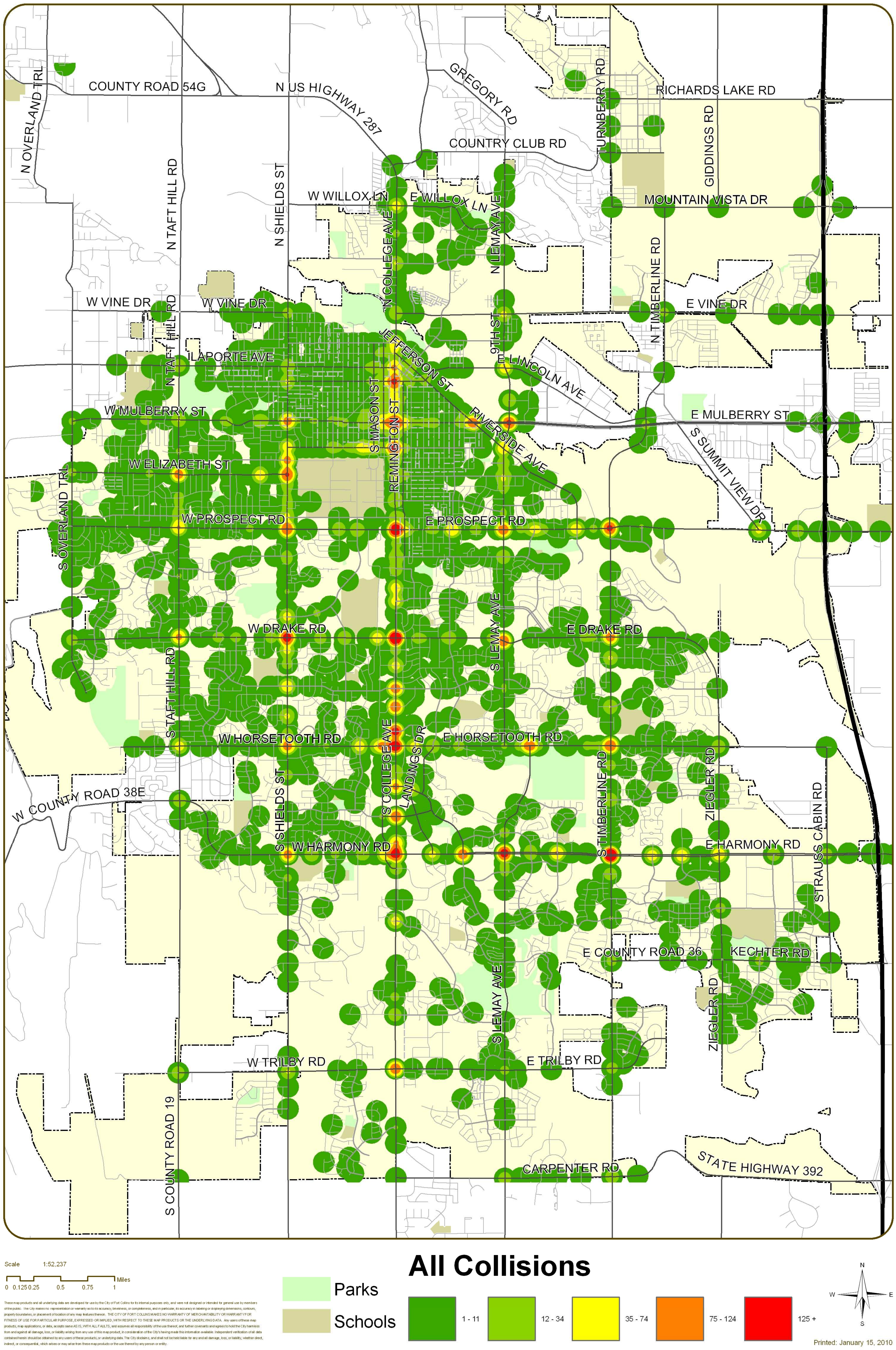


Figure 24 - Bicycle Crashes

1/1/2007 - 12/31/2010

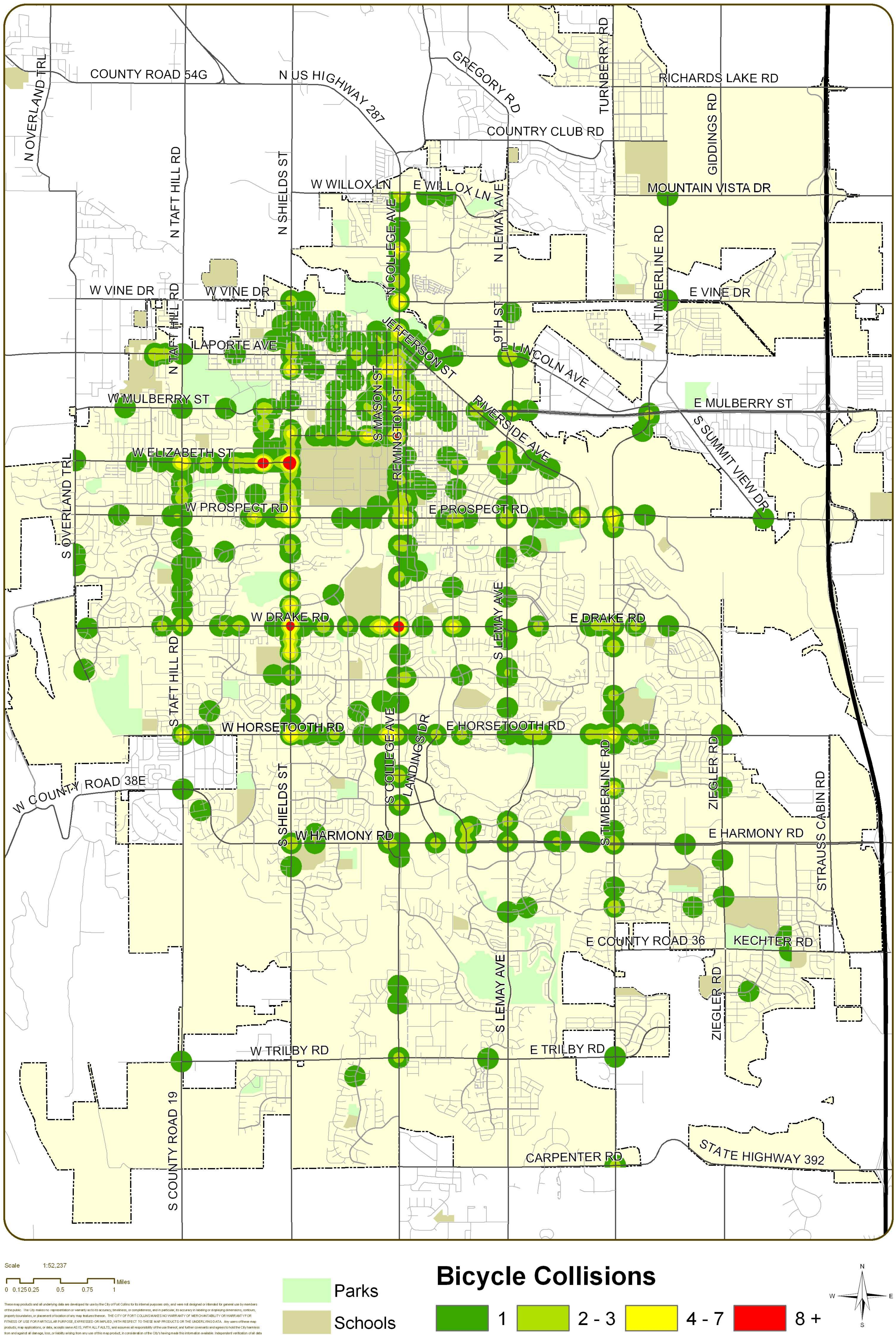
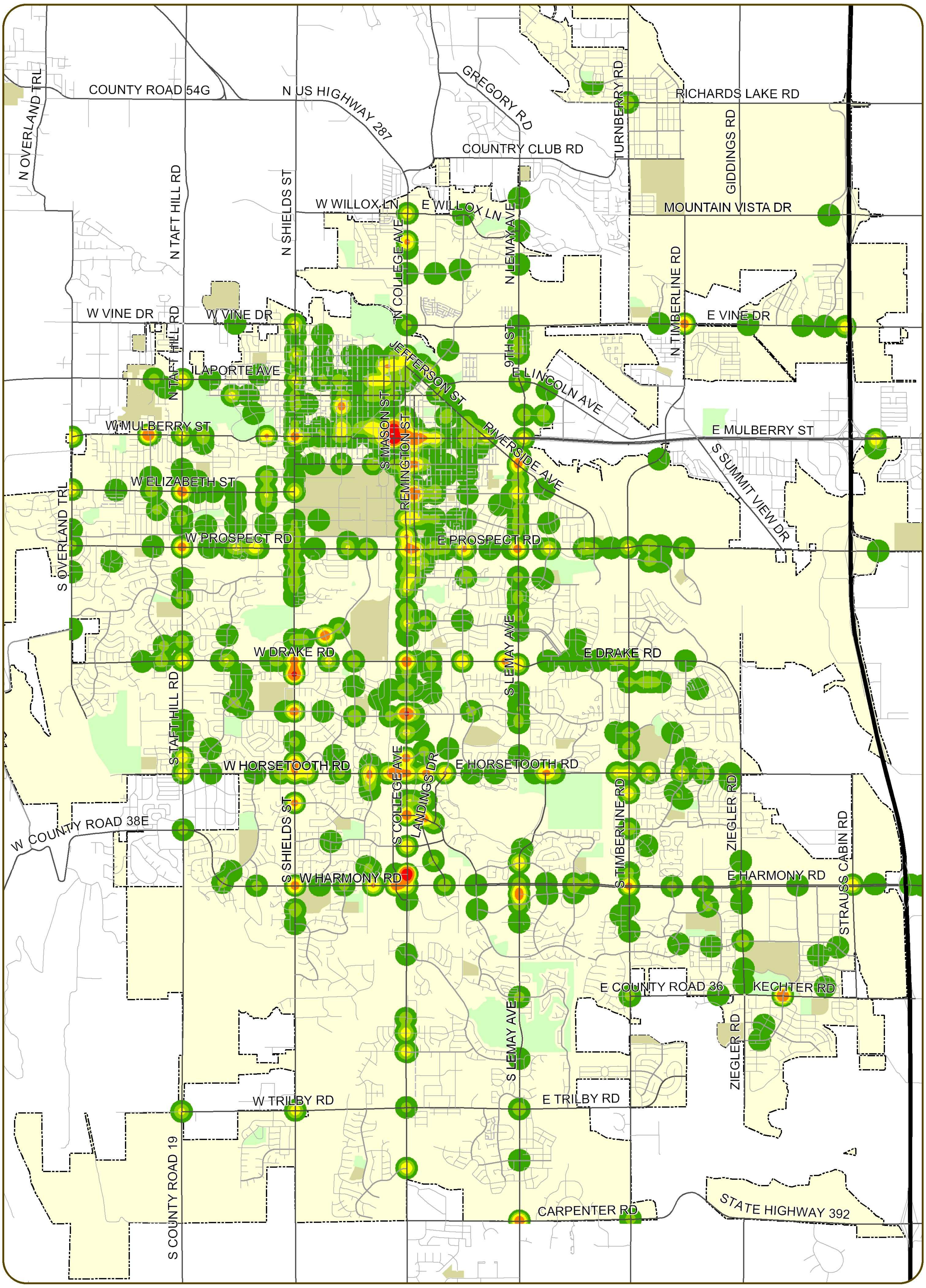


Figure 25 - Right Angle Crashes

1/1/2007 - 12/31/2010



Scale 1:52,237

0 0.125 0.25 0.5 0.75 1 Miles

Parks

Schools

Right Angle Accident Density

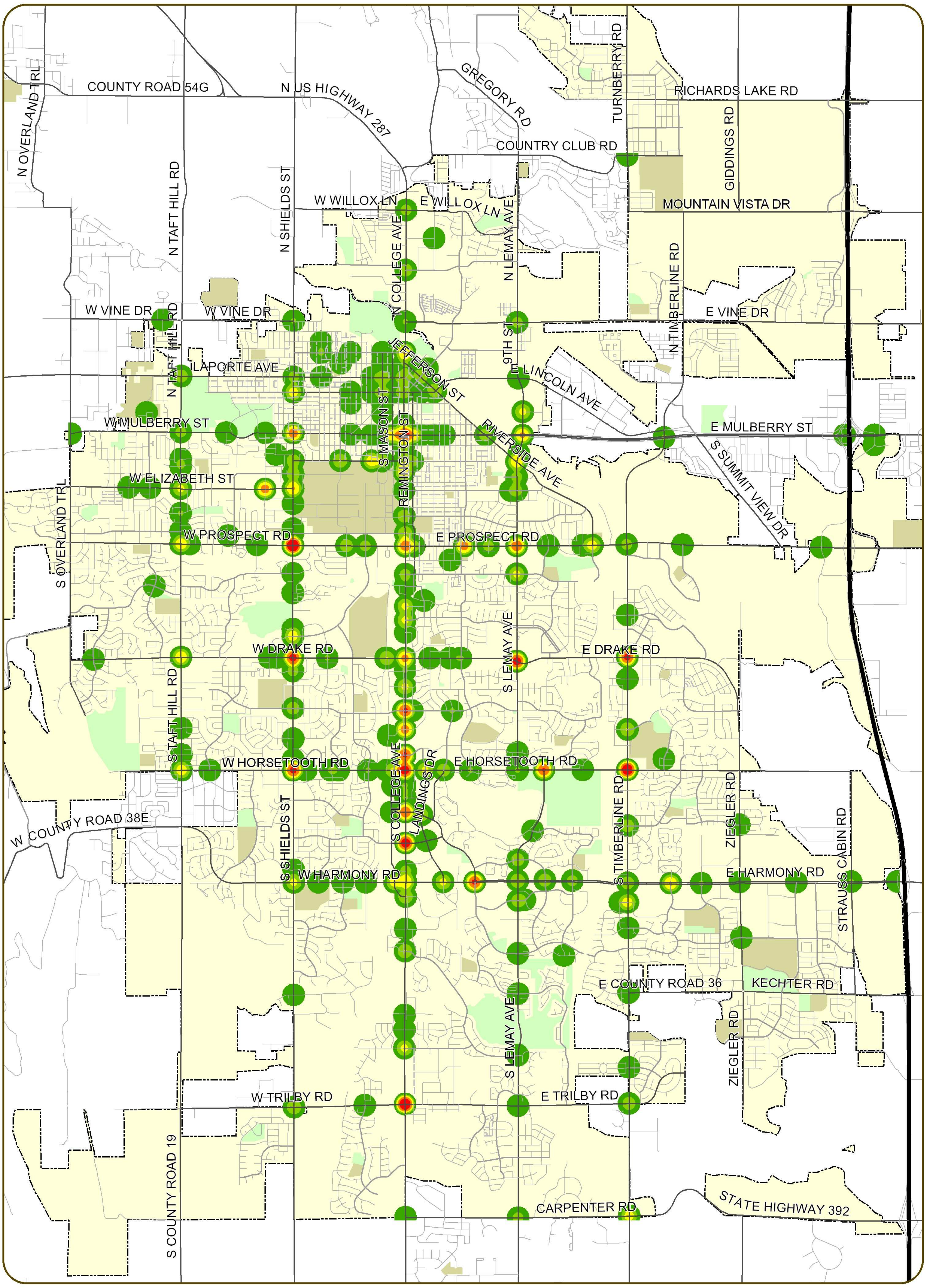
1 | 2-3 | 4-6 | 7-12 | More than 13

N W E S

Printed: January 15, 2010

Figure 26 - Approach Turn Crashes

1/1/2007 - 12/31/2010



Scale 1:52,237

0 0.125 0.25 0.5 0.75 1 Miles

Parks

Schools

Approach Turn Collisions

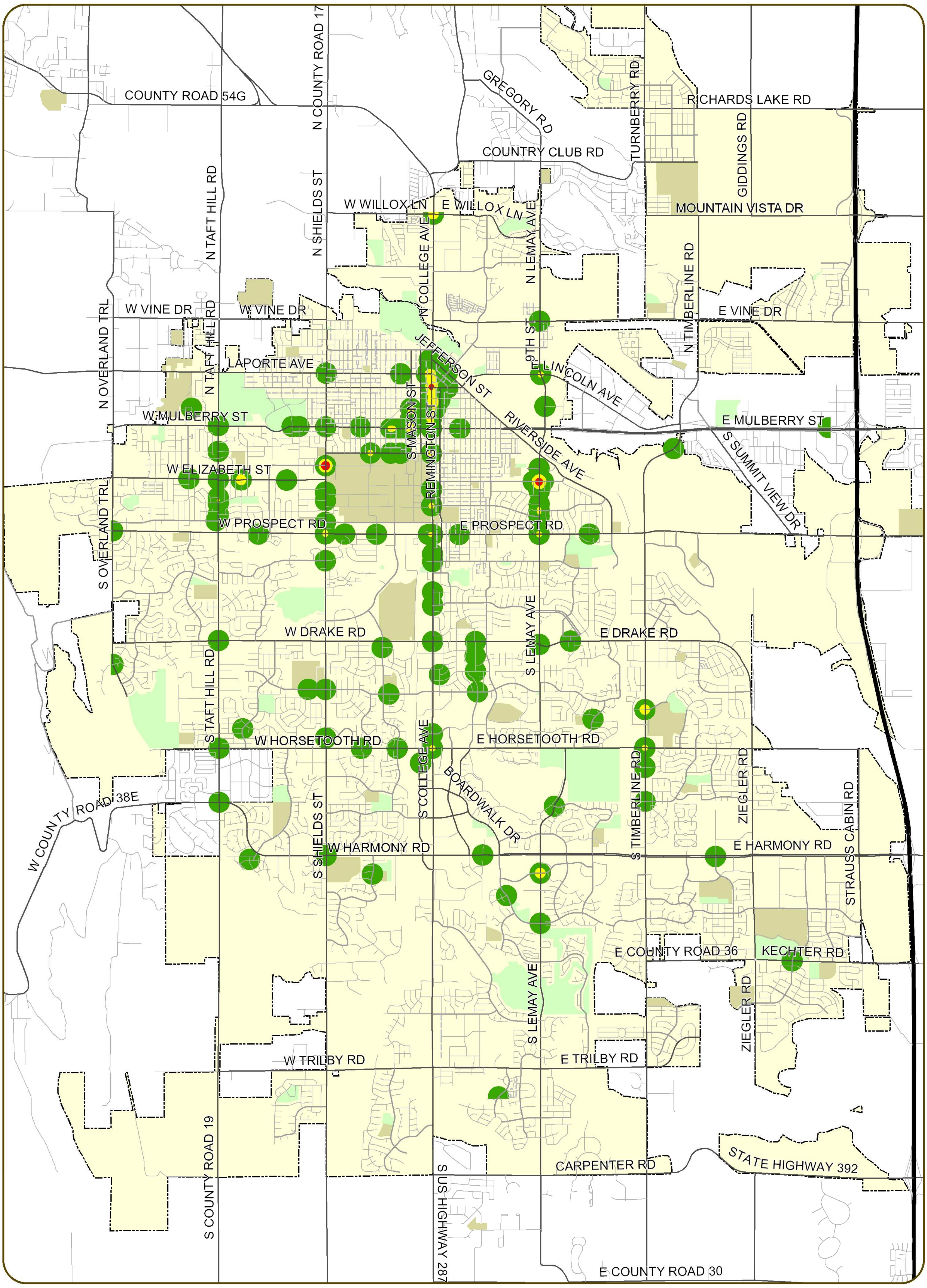
1 | 2-4 | 5-8 | 9-16 | More than 17

N W E S

Printed: January 15, 2010

Figure 27 - Pedestrian Crashes

1/1/2007 - 12/31/2010



Scale 1:54,671

0 0.125 0.25 0.5 0.75 1 Miles

Parks

Schools

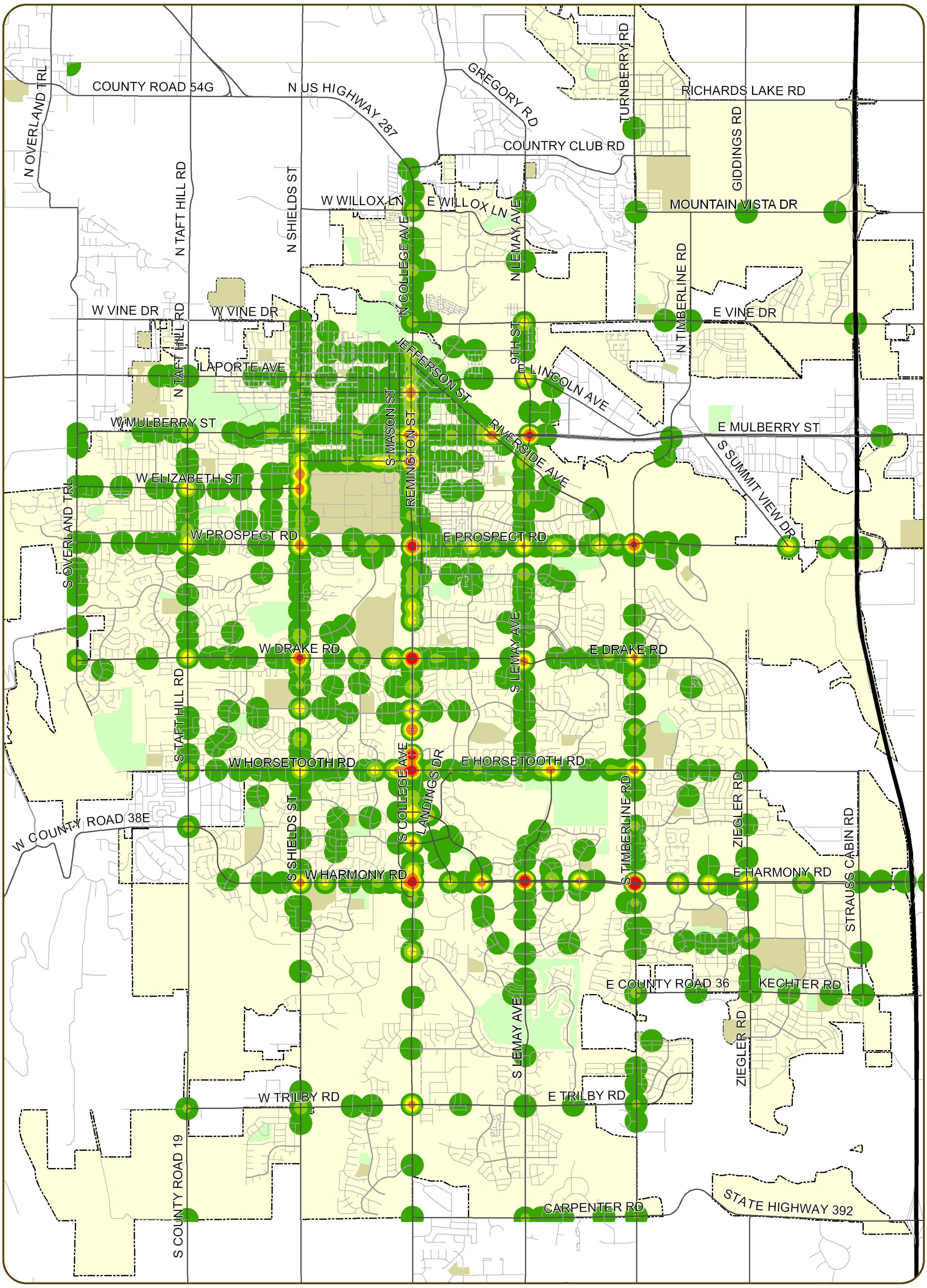
Pedestrian Collisions

1 | 2 - 3 | 4 +

Printed: January 15, 2010

Figure 28 - Rear-End Crashes

1/1/2007 - 12/31/2010



Scale 1:52,237

0 0.125 0.25 0.5 0.75 1 Miles

Parks

Schools

Rear-End Collisions

1-2 | 3-22 | 23-45 | 46-80 | More than 81

N W E S

Printed: January 15, 2010

Detailed Analysis

While density maps can be used to get a general idea of potential crash problem spots, staff also conducts more detailed analysis to identify intersections where there are more crashes than expected taking into account traffic volumes, roadway geometry, type of traffic control etc. These locations will likely be the best candidates to realize a reduction in crash frequency through implementation of specific countermeasures.

Traffic crashes are at least partially deterministic (i.e. factors affecting crash potential can be controlled). At the same time crashes are, to some extent, random events. When a period with a comparatively high crash frequency is observed at a location, it is statistically likely that the following period will have a comparatively low crash frequency and vice versa. This tendency is known as regression to the mean.

This random nature of crashes makes it difficult to determine if a location is truly a problem versus a location where natural variations lead to a high crash frequency during the observation period. In order to identify locations that truly warrant further investigation it is helpful to use a methodology that accounts for this phenomenon.

In 2010 the Transportation Research Board (TRB) and the American Association of State Highway and Transportation Officials (AASHTO) published the *Highway Safety Manual* (HSM). The HSM includes a statistical approach used to account for regression to the mean bias in order to identify locations that have a high crash frequency even after accounting for random variation. That approach was applied to intersections in Fort Collins.

The method applied uses a calibrated model (a regression equation) to predict the number of crashes at a location given the traffic volumes, the roadway geometry, and the type of intersection control. This prediction is then combined with the actual crash frequency using a statistical technique to determine an adjusted number of expected crashes that accounts for regression to the mean. The more the adjusted number of crashes exceeds the number of crashes predicted by the model the more likely it is that a location has an unusually high number of crashes or injury crashes.

Locations are ranked by excess crash costs. Since injury crashes tend to have higher crash costs associated with them, the ranking method gives more weight to locations with more injury crashes compared to locations with only “fender benders”. While locations are ranked by excess crash cost, any location with a positive excess crash cost could possibly benefit from the application of countermeasures. The cost of specific improvements also needs to be considered when determining where safety projects are best implemented. For low cost safety improvements it is possible to achieve a high benefit to cost ratio even at locations that are lower on the list (with an excess crash cost greater than zero.)

Table 6 shows the results of the statistical evaluation of intersections in Fort Collins using data for the years 2007 - 2010.

Table 6 – Intersection Excess Crash Costs, 2007 – 2010

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
TIMBERLINE RD	HARMONY RD	17.4	3.8	43.3	7.4	22.3	3.6	$470,696
LEMAY	HARMONY RD	15.8	3.5	32.0	6.7	13.0	3.2	$359,109
COLLEGE AV	HORSETOOTH RD	21.3	4.8	36.8	7.6	12.6	2.9	$328,736
SHIELDS ST	DRAKE RD	17.3	3.8	28.7	6.5	8.8	2.7	$278,913
COLLEGE AV	TRILBY RD	13.7	2.9	21.2	5.8	4.6	2.9	$255,318
LEMAY	MULBERRY ST	14.6	3.2	26.3	4.4	10.4	1.3	$187,781
COLLEGE AV	MONROE	17.8	3.9	28.7	5.2	9.7	1.2	$179,793
COLLEGE AV	LAUREL	11.2	2.6	20.9	4.0	8.3	1.4	$179,777
SHIELDS ST	PROSPECT RD	14.9	3.3	22.8	4.8	6.4	1.5	$170,312
COLLEGE AV	HARMONY RD	16.5	3.6	28.8	4.3	11.6	0.7	$159,605
COLLEGE AV	FOOTHILLS	12.5	2.8	21.7	3.9	8.1	1.1	$154,709
TIMBERLINE RD	HORSETOOTH RD	15.4	3.3	24.2	4.4	7.7	1.1	$152,600
COLLEGE AV	MULBERRY ST	13.5	3.0	24.2	3.8	10.0	0.7	$144,814
TIMBERLINE RD	DRAKE RD	9.7	2.1	17.0	3.3	6.2	1.2	$144,557
COLLEGE AV	DRAKE RD	23.9	5.4	37.8	5.5	13.7	0.1	$133,705
COLLEGE AV	PROSPECT RD	21.3	4.8	31.1	5.4	9.2	0.6	$129,240
COLLEGE AV	TROUTMAN	17.4	3.8	21.9	5.0	3.4	1.2	$116,759
MASON	MULBERRY	4.0	1.4	10.6	2.1	5.9	0.7	$108,114
LEMAY	DRAKE RD	14.0	3.0	19.5	3.8	4.7	0.8	$103,851
SHIELDS ST	MULBERRY ST	9.7	2.0	16.1	2.6	5.7	0.6	$99,211
TIMBERLINE RD	PROSPECT RD	12.8	2.8	22.8	2.9	9.9	0.1	$95,630
COLLEGE AV	KENSINGTON	13.1	2.9	16.7	3.8	2.7	1.0	$95,078
BOARDWALK DR	HARMONY RD	16.0	3.5	17.7	4.5	0.7	1.0	$81,846
SHIELDS ST	HORSETOOTH RD	14.9	3.2	18.1	4.0	2.4	0.8	$78,431
RIVERSIDE AV	MULBERRY ST	9.8	2.1	16.8	2.1	7.0	0.0	$65,682
LEMAY	PROSPECT RD	14.3	3.1	17.8	3.5	3.0	0.4	$60,924
MCMURRY	HARMONY RD	13.8	3.1	15.0	3.7	0.5	0.7	$53,981
CORBETT	HARMONY RD	8.1	1.8	12.3	2.0	4.0	0.2	$51,249
TAFT HILL RD	PROSPECT RD	9.7	2.0	12.1	2.4	2.0	0.4	$50,067
SNOW MESA	HARMONY RD	11.0	2.4	11.1	3.1	-0.6	0.7	$49,826
Shields	Davidson	3.9	1.0	6.1	1.4	1.9	0.4	$47,324
JFK	BOARDWALK	5.4	1.1	8.0	1.3	2.4	0.2	$40,459
MASON ST	HORSETOOTH RD	11.7	2.5	14.0	2.8	2.0	0.3	$39,250
TAFT HILL RD	DRAKE RD	9.0	1.9	13.6	1.8	4.7	-0.1	$36,933
SHIELDS ST	TRILBY RD	6.5	1.3	7.6	1.6	0.8	0.4	$34,416
LEMAY	LINCOLN	6.1	1.3	8.0	1.5	1.6	0.2	$32,651
LEMAY	CARPENTER	3.5	0.7	4.9	1.0	1.1	0.3	$30,494
TAFT HILL RD	HORSETOOTH RD	7.3	1.5	9.2	1.7	1.7	0.2	$29,402
COLLEGE AV	CHERRY	9.9	2.1	10.4	2.4	0.2	0.3	$25,183
Stover	Prospect	5.1	1.2	10.1	0.9	5.3	-0.3	$24,928
City Park	Mulberry	3.1	0.6	4.9	0.8	1.7	0.1	$23,513
Welch	Prospect	5.1	1.2	7.3	1.2	2.1	0.0	$22,016
TAFT HILL RD	ELIZABETH ST	9.2	2.0	12.2	1.9	3.1	-0.1	$21,274
Mason	Magnolia	2.0	0.4	3.3	0.5	1.2	0.1	$14,881

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
MELDRUM	LAUREL	9.1	2.1	9.2	2.3	-0.1	0.2	$13,478
COLLEGE AV	MOUNTAIN	11.8	2.8	16.2	2.4	4.8	-0.4	$12,548
Overland	Drake	2.3	0.4	3.6	0.5	1.3	0.0	$12,542
Taft Hill	Trilby	1.8	0.4	2.4	0.5	0.5	0.1	$11,836
ZIEGLER	ROCK CREEK	2.0	0.4	3.0	0.5	0.9	0.0	$10,842
Lady Moon	Kechter	0.7	0.1	1.3	0.2	0.5	0.1	$10,232
SHIELDS ST	ELIZABETH ST	12.6	2.9	17.3	2.4	5.2	-0.5	$9,100
SHIELDS ST	MOUNTAIN	6.6	1.4	6.5	1.5	-0.3	0.2	$8,675
LEMAY	RIVERSIDE	9.7	2.1	10.3	2.1	0.6	0.0	$8,656
SUMMITVIEW	PROPSECT	3.1	1.1	4.2	1.1	1.1	0.0	$8,297
Overland	Mulberry	1.8	0.4	2.5	0.4	0.7	0.0	$7,822
Shields	Wabash	2.3	0.5	2.7	0.6	0.4	0.1	$7,633
REMINGTON	LAUREL	1.6	0.4	2.3	0.4	0.7	0.0	$7,618
Worthington	Centre	1.1	0.2	1.6	0.3	0.4	0.0	$7,261
SHIELDS ST	SWALLOW	12.6	2.8	11.1	3.1	-1.8	0.3	$6,991
Robertson	Prospect	3.7	0.8	4.0	0.9	0.3	0.1	$6,774
Lemay	Whalers Way	3.7	0.8	3.9	0.9	0.1	0.1	$5,536
NW Frontage Road	Vine	0.6	0.1	0.9	0.2	0.3	0.0	$5,462
College	Plum	3.2	0.8	3.5	0.8	0.4	0.0	$5,000
DUNBAR	HORSETOOTH	1.9	0.7	2.0	0.8	0.0	0.1	$4,845
REMINGTON	ELIZABETH ST	1.3	0.3	1.7	0.3	0.4	0.0	$4,825
Impala/Ponderosa	Mulberry	2.0	0.4	2.8	0.3	0.9	-0.1	$4,252
Rolling Green	Horsetooth	2.3	0.6	3.3	0.6	1.1	-0.1	$4,071
La Plata	Prospect	1.0	0.3	1.4	0.3	0.3	0.0	$3,930
TAFT HILL RD	LAPORTE	3.5	0.8	4.1	0.8	0.6	0.0	$3,746
College	Oak	1.1	0.3	2.0	0.2	1.0	-0.1	$3,438
Taft Hill	Lake	4.7	1.1	5.1	1.1	0.5	0.0	$3,331
Strauss Cabin	Harmony	4.1	1.0	3.1	1.2	-1.1	0.2	$3,073
Tulane	Drake	3.5	0.8	3.8	0.8	0.3	0.0	$2,980
Overland	Elizabeth	1.3	0.3	1.6	0.3	0.3	0.0	$2,713
SENECA	HORSETOOTH	2.3	0.8	2.2	0.9	-0.1	0.0	$2,622
College	Mason/Palmer	3.2	0.8	3.9	0.7	0.8	-0.1	$2,583
Lemay	Haxton	2.0	0.5	2.2	0.5	0.1	0.0	$2,457
LEMAY	TRILBY RD	3.6	0.7	3.4	0.8	-0.3	0.1	$2,336
Edinburgh	Drake	2.1	0.5	2.2	0.5	0.1	0.0	$2,265
Shields	Maple (north int.)	1.1	0.3	1.3	0.3	0.2	0.0	$2,147
Howes	Maple	0.7	0.1	0.9	0.1	0.2	0.0	$2,120
REMINGTON	MULBERRY ST	9.7	2.1	9.7	2.1	0.0	0.0	$2,063
TIMBERLINE RD	TRILBY RD	5.1	1.0	4.8	1.1	-0.4	0.1	$1,943
Loomis	Oak	0.7	0.1	1.0	0.1	0.3	0.0	$1,764
SHIELDS ST	LAPORTE	5.1	1.1	5.6	1.0	0.5	0.0	$1,678
Century	Horsetooth	1.9	0.4	2.0	0.5	0.0	0.0	$1,524
Crestmore	Mulberry	0.9	0.2	0.9	0.3	0.0	0.0	$1,323
Meldrum	Mountain	1.3	0.2	1.5	0.2	0.2	0.0	$1,218
Impala	Laporte	0.8	0.2	1.0	0.1	0.3	0.0	$1,161
SHIELDS ST	VINE	2.6	0.5	2.9	0.5	0.3	0.0	$1,154
Lochwood	Horsetooth	2.2	0.5	2.6	0.5	0.5	0.0	$940

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
LEMAY	MAGNOLIA	3.7	1.2	4.0	1.2	0.3	0.0	$919
Strauss Cabin	Horsetooth	0.2	0.0	0.3	0.0	0.2	0.0	$596
Meldrum	Laporte	1.8	0.4	1.9	0.3	0.2	0.0	$379
Timberline	Vine	3.0	0.7	2.9	0.7	-0.2	0.0	$374
Meldrum	Magnolia	1.1	0.2	1.3	0.2	0.2	0.0	$341
Automation Way	Horsetooth	2.5	0.5	2.4	0.6	-0.1	0.0	-$61
12th	Magnolia	0.6	0.1	0.7	0.1	0.2	0.0	-$505
MCCLELLAND	DRAKE	5.7	1.9	6.3	1.8	0.7	-0.1	-$511
Lynnwood	Prospect	1.4	0.4	1.4	0.4	0.0	0.0	-$622
Arctic Fox	Horsetooth	1.8	0.4	1.5	0.4	-0.3	0.0	-$855
Loomis	Magnolia	1.0	0.2	1.2	0.1	0.2	0.0	-$1,111
College	Saturn	2.9	0.7	2.6	0.7	-0.3	0.0	-$1,155
Timberline	Fossil Creek	1.6	0.4	1.5	0.4	-0.1	0.0	-$1,483
REMINGTON	PITKIN	1.4	0.3	1.2	0.3	-0.2	0.0	-$1,507
Brookwood (west int.)	Drake	0.9	0.3	0.9	0.2	0.0	0.0	-$1,829
Kingsley	Horsetooth	1.1	0.2	1.2	0.2	0.1	0.0	-$2,345
Cook	Mulberry	1.1	0.3	1.0	0.3	0.0	0.0	-$2,560
12th	Lincoln	1.7	0.3	1.8	0.3	0.2	-0.1	-$2,597
Shields	Richmond	3.0	0.7	3.4	0.6	0.5	-0.1	-$2,945
Cowan	Mulberry	2.6	0.6	3.0	0.5	0.6	-0.1	-$3,011
TIMBERLINE RD	CARPENTER	4.4	0.9	4.8	0.7	0.5	-0.1	-$3,111
Sherwood	Laurel	2.3	0.5	2.3	0.5	0.1	0.0	-$3,169
Linden	Willow	2.0	0.4	2.1	0.3	0.1	-0.1	-$3,191
Raintree	Drake	2.7	0.6	2.9	0.6	0.2	-0.1	-$3,238
Shields	Birch	1.0	0.3	1.2	0.2	0.2	-0.1	-$3,264
Loomis	Mountain	1.3	0.2	1.3	0.2	0.0	0.0	-$3,343
Overland	CR 42 C	1.6	0.3	1.6	0.3	0.0	-0.1	-$3,705
Peterson	Mulberry	2.5	0.6	2.8	0.5	0.4	-0.1	-$3,934
Mathews	Mulberry	2.4	0.5	2.6	0.5	0.3	-0.1	-$4,015
Wood	Cherry	1.7	0.3	1.6	0.3	-0.1	0.0	-$4,033
College	Triangle	3.1	0.7	2.3	0.7	-0.8	0.0	-$4,056
Lemay	Mansfield	1.8	0.4	1.7	0.3	0.0	-0.1	-$4,149
Sharp Point	Prospect	1.7	0.4	1.6	0.4	-0.1	-0.1	-$4,471
College	Bristlecone	2.1	0.5	2.3	0.4	0.3	-0.1	-$4,640
Shields	Cherry	1.3	0.3	1.4	0.2	0.1	-0.1	-$4,793
Remington	Stuart	1.7	0.3	1.5	0.3	-0.2	0.0	-$4,925
MASON ST	HARMONY RD	13.1	2.8	12.9	2.7	-0.1	-0.1	-$5,015
Hanover	Drake	1.5	0.4	1.3	0.3	-0.1	-0.1	-$5,095
Larkbunting	Harmony	3.9	0.9	3.6	0.9	-0.3	0.0	-$5,157
MCCLELLAND	HORSETOOTH	6.3	2.1	7.7	1.8	1.7	-0.3	-$5,190
Mitchell	Horsetooth	1.7	0.4	1.7	0.4	0.0	-0.1	-$5,217
Lemay	Conifer	1.6	0.3	1.4	0.3	-0.2	0.0	-$5,515
City Park	Plum	1.7	0.3	1.6	0.3	0.0	-0.1	-$5,527
COLLEGE AV	WILLOX	8.3	1.7	7.3	1.8	-1.1	0.1	-$5,555
Fieldstone/Caribou	Horsetooth	1.7	0.4	1.7	0.3	0.1	-0.1	-$5,651
MEADOWLARK	SWALLOW	2.2	0.5	1.6	0.5	-0.5	0.0	-$5,971
Sherwood	Laporte	2.1	0.4	1.8	0.4	-0.2	-0.1	-$6,480

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
Academy	Prospect	3.1	0.7	2.6	0.7	-0.4	0.0	-$6,545
Shields	James	1.7	0.5	1.5	0.4	-0.1	-0.1	-$7,049
Hampshire	Drake	2.0	0.5	1.6	0.4	-0.3	-0.1	-$7,641
MANHATTAN	HORSETOOTH RD	10.6	2.3	9.3	2.4	-1.3	0.1	-$7,732
Taft Hill	Bronson	2.3	0.5	2.1	0.4	-0.2	-0.1	-$8,540
Ponderosa	Elizabeth	2.6	0.6	2.4	0.5	-0.1	-0.1	-$8,577
Emigh	Prospect	1.5	0.4	1.4	0.3	0.0	-0.1	-$8,951
COLLEGE AV	CONIFER	5.5	1.8	5.6	1.6	0.2	-0.2	-$9,086
Sagebrush	Drake	1.9	0.5	1.5	0.4	-0.3	-0.1	-$9,286
Lemay	Stoney Hill	2.0	0.5	1.7	0.4	-0.2	-0.1	-$9,328
Edora (west int.)	Prospect	2.3	0.6	2.2	0.5	0.0	-0.1	-$9,453
Washington	Mulberry	3.9	0.9	2.9	0.9	-0.9	0.0	-$9,833
MCCLELLAND	SWALLOW	2.2	0.5	1.3	0.4	-0.9	0.0	-$10,624
OVERLAND TRAIL	PROSPECT	3.4	0.7	2.6	0.6	-0.7	-0.1	-$10,663
Riverside	Magnolia	2.8	0.6	2.2	0.5	-0.5	-0.1	-$10,677
Bryan	Mulberry	1.9	0.4	1.6	0.3	-0.1	-0.1	-$11,063
Hinsdale	Harmony	2.6	0.6	2.3	0.4	-0.1	-0.1	-$11,170
College	Thunderbird	4.2	1.1	4.0	0.9	0.0	-0.1	-$11,524
Mason	Troutman	3.3	0.7	2.3	0.7	-0.9	0.0	-$11,593
Shields	Spring Creek	2.2	0.6	1.7	0.4	-0.4	-0.1	-$12,130
Stover	Mulberry	2.9	0.7	2.5	0.5	-0.2	-0.1	-$12,444
Timberline	Angelo/Timber Creek	2.5	0.6	1.9	0.5	-0.5	-0.1	-$12,522
Taft Hill	Springfield (north int.)	1.9	0.5	1.7	0.4	-0.1	-0.2	-$12,604
Wheaton	Harmony	3.7	1.0	3.7	0.8	0.2	-0.2	-$12,853
HOWES	LAUREL	8.5	1.9	8.6	1.7	0.3	-0.2	-$12,973
Timberline	Bighorn	3.1	0.8	2.9	0.6	0.0	-0.2	-$13,178
Shields	Oak	2.5	0.5	1.7	0.4	-0.7	-0.1	-$13,678
Mathews	Prospect	3.7	0.8	2.7	0.8	-0.9	-0.1	-$13,687
CONSTITUTION	DRAKE	3.4	1.2	3.1	1.0	-0.1	-0.2	-$13,779
STOVER	SWALLOW	3.1	0.6	1.9	0.6	-1.2	0.0	-$14,105
COLLEGE AV	SWALLOW	19.0	4.2	19.4	3.9	0.7	-0.3	-$14,168
JFK	TROUTMAN	3.3	0.7	2.0	0.6	-1.2	-0.1	-$14,561
COLLEGE AV	BOARDWALK	18.7	4.2	17.9	4.0	-0.7	-0.1	-$14,958
Whitcomb	Laurel	2.1	0.5	1.5	0.3	-0.4	-0.2	-$15,081
LEMAY	OAKRIDGE	5.6	1.2	3.9	1.2	-1.7	0.0	-$15,348
Stanford	Drake	3.8	0.9	2.7	0.8	-1.0	-0.1	-$15,396
College	Parker	1.9	0.6	1.6	0.4	-0.2	-0.2	-$15,580
Mason	Laurel	3.2	0.7	3.0	0.5	0.0	-0.2	-$16,301
TAFT HILL RD	HARMONY RD	6.2	1.3	5.1	1.2	-1.0	-0.1	-$16,900
SENECA	HARMONY RD	3.6	0.7	2.2	0.7	-1.3	-0.1	-$16,926
ZIEGLER	HARMONY RD	11.5	2.5	13.0	2.0	2.0	-0.5	-$17,058
CITY PARK	ELIZABETH ST	7.1	1.5	6.6	1.3	-0.3	-0.2	-$17,063
Taft Hill	Stuart n. or s.?	3.2	0.7	2.2	0.6	-0.9	-0.1	-$17,528
MATHEWS	MOUNTAIN	3.0	0.7	1.6	0.6	-1.4	-0.1	-$17,805
COLLEGE AV	FOSSIL CREEK	12.6	2.7	10.3	2.8	-2.4	0.1	-$17,925
LEMAY	VINE	8.2	1.6	7.5	1.5	-0.6	-0.2	-$18,007
LEMAY	SOUTHRIDGE	4.3	0.9	2.8	0.8	-1.5	-0.1	-$18,634

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
Heatheridge	Prospect	2.4	0.5	1.6	0.4	-0.6	-0.2	-$18,697
Taft Hill	Orchard/Glenmoor	3.7	0.8	2.6	0.7	-0.9	-0.1	-$18,819
COLLEGE AV	MAGNOLIA	9.6	2.1	7.8	2.1	-1.7	0.0	-$18,966
Taft Hill	Clearview	4.4	1.0	3.3	0.9	-0.9	-0.1	-$19,070
SHIELDS	CASA GRANDE	5.7	1.9	5.8	1.6	0.4	-0.3	-$20,184
College	Lake	4.8	1.2	4.8	0.9	0.3	-0.3	-$20,551
COLLEGE AV	VINE	5.2	1.7	4.5	1.5	-0.6	-0.2	-$21,898
YORKSHIRE	DRAKE	3.7	0.7	2.0	0.6	-1.6	-0.1	-$23,334
Timberline	Danfield/Lambkin	3.4	0.8	2.4	0.6	-0.9	-0.2	-$23,366
Whedbee	Prospect	4.9	1.1	3.7	1.0	-1.0	-0.2	-$23,513
9th (Lemay)	Buckingham	4.6	1.1	3.0	0.9	-1.4	-0.2	-$25,107
SHIELDS ST	PLUM	14.9	3.3	14.7	2.9	0.2	-0.4	-$25,305
REMINGTON	PROSPECT	8.5	1.8	7.5	1.6	-0.8	-0.2	-$25,337
LEMAY	FOSSIL CREEK	4.7	1.0	2.7	0.8	-1.8	-0.1	-$26,676
TAFT HILL RD	MULBERRY ST	7.3	1.5	6.1	1.3	-0.9	-0.3	-$26,758
Whitcomb/Canyon	Mulberry	4.8	1.1	3.9	0.9	-0.7	-0.3	-$26,954
RIVERSIDE AV	PROSPECT RD	10.2	2.1	10.1	1.7	0.3	-0.4	-$27,447
SHIELDS	LAUREL	6.9	2.2	8.1	1.6	1.8	-0.6	-$27,603
STANFORD	HORSETOOTH RD	9.8	2.1	6.7	2.1	-3.1	0.0	-$27,777
Shields	Westward	2.8	0.7	1.5	0.4	-1.0	-0.3	-$28,801
Innovation	Harmony	3.5	0.9	2.1	0.6	-1.1	-0.3	-$29,555
STOVER	DRAKE	8.6	1.8	5.9	1.7	-2.5	-0.1	-$33,576
MELDRUM	MULBERRY ST	6.6	1.5	3.4	1.4	-3.1	-0.1	-$34,491
Shields	Pitkin	4.7	1.0	2.6	0.7	-1.9	-0.2	-$35,561
STOVER	HORSETOOTH	4.8	1.7	3.5	1.3	-0.9	-0.4	-$36,327
WORTHINGTON	DRAKE	7.6	1.6	5.5	1.4	-1.9	-0.3	-$36,866
Lemay	Pitkin n or s?	3.7	0.9	2.2	0.5	-1.1	-0.4	-$37,508
College	Myrtle	6.2	1.5	5.6	1.0	-0.2	-0.5	-$37,597
COLLEGE AV	MAPLE/JEFFERSON	8.8	1.9	6.3	1.7	-2.2	-0.3	-$38,928
LEMAY	BOARDWALK	6.1	1.3	2.8	1.1	-3.1	-0.2	-$40,946
COLLEGE AV	LAPORTE	8.3	2.0	6.9	1.6	-1.0	-0.4	-$42,146
TIMBERLINE RD	NANCY GRAY	6.2	1.4	3.3	1.1	-2.7	-0.2	-$42,394
CONSTITUTION	ELIZABETH ST	5.8	1.2	2.6	1.0	-3.0	-0.2	-$43,875
SHIELDS ST	RAINTREE	13.3	2.9	9.0	2.8	-4.2	-0.1	-$44,729
SHIELDS	LAKE	6.5	2.2	5.1	1.7	-0.9	-0.5	-$46,618
COLLEGE AV	ELIZABETH	7.3	2.5	6.4	1.9	-0.3	-0.6	-$46,619
TIMBERLINE RD	BATTLE CREEK	5.9	1.2	3.0	0.9	-2.7	-0.3	-$46,999
TAFT HILL RD	VALLEY FORGE	7.1	1.5	3.1	1.3	-3.8	-0.2	-$48,954
LEMAY	SWALLOW	4.9	1.7	3.2	1.1	-1.2	-0.5	-$49,439
SHIELDS	STUART	5.5	1.9	3.3	1.4	-1.7	-0.5	-$50,969
RIVERSIDE AV	MOUNTAIN	7.1	1.5	3.7	1.1	-3.0	-0.3	-$51,442
WHITCOMB	PROSPECT	10.0	2.2	6.3	1.9	-3.4	-0.3	-$52,049
TIMBERLINE RD	KECHTER	9.0	1.8	5.0	1.6	-3.7	-0.3	-$52,710
TIMBERLINE RD	TIMBERWOOD	8.8	1.9	6.1	1.4	-2.2	-0.4	-$52,846
TIMBERLINE RD	CARIBOU	9.9	2.1	6.8	1.7	-2.7	-0.4	-$54,279
RESEARCH/MEADOW LARK	DRAKE	9.7	2.1	6.3	1.7	-3.0	-0.4	-$54,591

STREET1	STREET2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
WHEDBEE	MULBERRY ST	8.1	1.7	4.9	1.3	-2.8	-0.4	-$54,917
LADY MOON	HARMONY RD	9.9	2.2	6.8	1.7	-2.6	-0.4	-$55,420
Mason	Cherry	5.5	1.3	2.7	0.9	-2.4	-0.5	-$56,115
LEMAY	ELIZABETH ST	10.7	2.3	5.5	2.2	-5.0	-0.2	-$56,217
LINDEN	JEFFERSON	6.6	1.5	3.0	1.1	-3.3	-0.4	-$56,720
JFK	HORSETOOTH RD	12.2	2.6	10.5	2.0	-1.1	-0.6	-$57,024
Timberline	Milestone	5.1	1.1	1.8	0.7	-2.9	-0.4	-$57,173
LEMAY	STUART	10.7	2.3	7.1	1.9	-3.2	-0.4	-$57,309
JFK	HARMONY RD	13.5	2.9	10.0	2.4	-3.0	-0.5	-$64,084
LEMAY	PENNOCK	9.4	2.0	5.5	1.6	-3.6	-0.4	-$64,294
SHIELDS ST	ROLLAND MOORE	7.3	1.6	3.1	1.2	-3.7	-0.4	-$65,881
PROSPECT PKWY	PROSPECT	7.7	1.6	3.4	1.2	-3.9	-0.4	-$66,861
LOOMIS	LAUREL	10.2	2.2	5.7	1.7	-4.0	-0.4	-$69,456
LEMAY	DOCTORS LN	9.7	2.1	5.0	1.6	-4.2	-0.5	-$72,776
CENTRE	PROSPECT	10.3	2.3	6.1	1.8	-3.7	-0.5	-$73,095
TRADITION	HORSETOOTH RD	8.0	1.7	3.2	1.2	-4.2	-0.5	-$73,097
LOOMIS	MULBERRY ST	8.5	1.8	3.5	1.3	-4.4	-0.5	-$77,806
SHIELDS ST	ROCKY MOUNTAIN	8.7	1.9	4.1	1.3	-4.0	-0.6	-$80,338
COLLEGE AV	OLIVE	11.0	2.5	6.6	1.8	-3.6	-0.7	-$84,751
COLLEGE AV	SKYWAY	11.3	2.4	6.4	1.7	-4.2	-0.7	-$88,987
TIMBERLINE RD	VERMONT	13.2	2.9	7.3	2.2	-5.2	-0.7	-$99,737
LEMAY	ROBERTSON	9.2	2.0	3.3	1.3	-5.1	-0.7	-$102,110
COLLEGE AV	HARVARD	14.0	3.1	8.4	2.2	-4.7	-0.9	-$108,309
ZIEGLER	COUNCIL TREE	10.4	2.3	3.5	1.4	-6.1	-0.8	-$118,425
COLLEGE AV	COLUMBIA	17.3	3.8	10.5	2.9	-5.9	-0.9	-$121,387
COLLEGE AV	PITKIN	14.3	3.2	7.1	2.3	-6.3	-0.9	-$122,171
TIMBERLINE RD	CUSTER	12.9	2.8	7.4	1.7	-4.3	-1.1	-$123,437
COLLEGE AV	SPRING PARK	13.9	3.1	6.9	2.0	-5.9	-1.1	-$138,145
COLLEGE AV	RUTGERS	16.3	3.6	8.8	2.5	-6.3	-1.2	-$145,113
COLLEGE AV	BOCKMAN	18.4	4.1	7.9	2.7	-9.1	-1.4	-$187,247
COLLEGE AV	STUART	18.8	4.2	4.9	2.0	-11.8	-2.2	-$266,902

* FI = Fatal/Injury Crashes

** PDO = Property Damage Only Crashes

[1] American Association of State Highway and Transportation Officials, *Highway Safety Manual*, 1st Edition, Volume 1, Page 4-84.

[2] Blincoe, L.J., et al, *The Economic Cost of Motor Vehicle Crashes, 2000*, May 2002. Washington, DC: U.S. Department of Transportation, National Highway Traffic Safety Administration, DOT HS 809 446. Online at http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.131.9418