

PEDESTRIAN/BICYCLE CRASH STUDY

This report summarizes an analysis of pedestrian and bicycle crashes that has been conducted by the CRCOG staff. In 2004, CRCOG completed a study of pedestrian crash data in the region for a three year span from 1999 – 2001. With the Connecticut Crash Data Query Tool (currently in beta testing at www.ctcrash.uconn.edu), we are now able to examine both bicycle and pedestrian crashes occurring between January 1995 and January 2010. This richer source of data was analyzed to refine and supplement our earlier findings. Similarly to the earlier study, we have examined regional statistics and also focused a more in depth analysis on the four towns with the highest rates of pedestrian and bicycle crashes.

We conducted this analysis for several purposes:

- to gain an understanding of pedestrian / bicycle crash experience in the region
- to specifically learn if data that appeared to be an anomaly in the 3 year analysis changed with more years of statistics.
- To learn if there are locations in the region that are more problematic than others.
- To inform our planning process.
- To enable us to direct resources in a way that has the potential to improve bicycle and pedestrian safety.
- To develop a strategy for the future use of the CT Crash data Query tool.

The following pages present our analysis, including the findings from the previous study and the updated analysis of the more extensive data source.

Findings:

The examination of pedestrian and bicycle crash data is important to determine how we can improve safety going forward. Over the past 15 years, bicycle and pedestrian crashes and fatalities have declined in the region, but for pedestrian crashes in particular, the region has more pedestrian fatalities per total traffic fatalities than is found in both the state and the nation. And given the large number of bicycle fatalities that have occurred over the past 2 years (which are not yet contained in the CT Crash data base) we have some concern that bicycle fatality rates are also trending higher than in the nation. Bicyclists and pedestrians do not fare well in crashes, while bicyclists and pedestrian crashes represented under 3% of all crashes in the region in the 15 year analysis period, bicycle and pedestrian fatalities represented 17.3% of all traffic fatalities.

We found the CT Crash Data Query Tool to be a useful tool for evaluating bicycle and pedestrian crash experience in the region. This tool will become more useful in the future when the crash locations are geocoded. Going forward, we believe that it will be sufficient to examine pedestrian crashes over a 3 year period, and bicycle crashes over a 5 year period, and still get a fairly accurate picture of crash trends.

Conclusions

Pedestrian Crash Data Findings:

The longer set of data reinforces our earlier findings and enriches our understanding of high crash locations. After evaluating data throughout the region as well as our in depth study of the four towns with the highest pedestrian crash rates we come to the following conclusions:

While the 15 year data resulted in some differences in our understanding of when pedestrian crashes occur, contributing factors for pedestrian crashes, and pedestrian maneuver at the time of the crash, the differences were small and this indicates to us that analyses of the three most recent years of data to assess pedestrian crash characteristics in the region is probably valid. However, for evaluation of fatal crashes, a longer period of time for analysis is desirable because fatalities are much less frequent. As the CT Crash Data Base tool is updated with gis capability, it will become a more valuable tool.

Our findings are as follows:

- A tendency for crashes to occur on Friday (18%) as opposed to other days of the week
- A slightly higher occurrence of pedestrian crashes in November and December (10%) as compared to other months.
- 29% of all crashes occurring between 3 and 6 PM, and 20 % between 6 and 9 PM.
- Approximately 50% of crashes attributed to unsafe use of highway by pedestrian, 18% to driver failed to grant right of way, and 17% to driver behavior. For children 14 and under, the percent of crashes attributed to unsafe use of highway by pedestrian rises to 76%.
- Of those crashes occurring when the driver failed to grant the right of way, 8% involve vehicles turning right on red.
- Approximately 70% of all pedestrian crashes occur when the pedestrian is crossing the street.
- Approximately 70% of pedestrian crashes occur on local roads, 18% on state routes, 11% on US routes, and 1% on interstates. Fatal crashes occur 50% on local roads, 31% on state roads, 11 % on US Routes, and 7% on Interstates.
- The towns with the highest per capita pedestrian crash rates were Hartford, East Hartford, Manchester and West Hartford. High crash rate seems to be correlated with high population and population density.
- The towns with the highest volume of pedestrian crashes over the 15 year period were Hartford, West Hartford, East Hartford, Manchester, and Enfield.
- We concluded that the high crash rate in East Windsor in the earlier 3 year study was an anomaly, however, with 15 years of data, East Windsor has a higher rate of pedestrian crashes than expected based upon population or population density.
- We looked more closely at crashes in the 4 towns with high crash rates and the highest absolute number of crashes – Hartford, West Hartford, East Hartford, and Manchester. Conclusions regarding these four towns are summarized below:
 - 76% of pedestrian crashes involving children in the 4 towns are attributed to unsafe use of highway by pedestrian, much higher than the percent for this factor for all crashes.
 - 24% of all pedestrian crashes involve children, but children represent only 9% of fatal crashes.
 - 75% of the pedestrian crashes in these towns occur when the pedestrian is crossing the street, which is higher than the regional total. Of these, 66% are attributed to unsafe use of highway by pedestrian and 34 % to motorist failed to grant right of way.

- In those crashes where the pedestrian was crossing the street and the driver failed to grant right of way, 25% occurred at signalized intersections 30% at unsignalized intersections, and 45% between intersections.
- In those crashes where the pedestrian was crossing the street and the contributing factor was determined to be unsafe use of the highway by pedestrian, 21% were at unsignalized intersections, 20% at signalized intersections, and 59% between intersections.
- In large part the crashes occur on local roads, more so than for the region as a whole (80% for local roads, 7% for state routes, and 12% for US routes). We were unable to evaluate crash location by functional classification of roads as we had done in the earlier study.
- Most of the pedestrian crashes occur between 3 and 6 PM (29%), with a secondary peak from 6 to 9 PM (21%) and some additional peaking between noon and 3 PM (11%).
- The roadways with the highest levels of pedestrian crashes are US Route 44 in Hartford, East Hartford and Manchester; Park Street in Hartford, and Farmington avenue in Hartford and West Hartford.

Based upon these findings, we recommend the following be pursued to improve pedestrian safety in the region:

- Educate Pedestrians:
 - How to legally cross the street, why crossing at an intersection is safer
 - How to cross at unsignalized intersections
 - Focus education on school age children
- Educate Motorists:
 - Duty to yield to pedestrians at unsignalized intersections
 - Duty to yield to pedestrians when turning and when turning right on red
 - Need to watch for pedestrians
 - Insure that drivers license exams include at least 1 question on pedestrian rights
- Enforcement of traffic laws: both pedestrians and motorists
- Need for a physical environment that enhances pedestrian safety and visibility, particularly, these locations should be the subject of a followup study which will look at more recent pedestrian crash data for these roads to evaluate specific locations, contributing factor, pedestrian action and driver behavior in order to identify potential safety interventions:
 - U.S. Route 44 in Hartford, East Hartford, and Manchester
 - Park Street in Hartford
 - Farmington Avenue in Hartford and West Hartford

Bicycle Crash Data Findings:

This evaluation provided our first analysis of regional bicycle crashes. We do not have an earlier study to compare results to, in the future, and analysis could be made of 3 and 5 years of data to determine what length of analysis period yields the most useful statistics.

It will be very important to monitor bicycle crash experience in the region because there has been a large number of fatal bicycle crashes in the past 2 years (which are not yet reported in the CT Crash data Base.)

Our findings are as follows:

- A slight tendency for crashes to occur on Thursday (16%) as opposed to other days of the week
- A higher occurrence of bicycle crashes in the summer months of June, July and August, with August the peak (15%).
- 36% of all crashes occurring between 3 and 6 PM, and 20% between 6 and 9 PM and 19% between noon and 3 PM.
- Approximately 64% of crashes attributed to bicyclist at fault and 34% to motorist at fault.
- Of the bike at fault crashes, 20% were due to wrong way riding, 37% bicyclist behavior, and 37% bicyclist failed to grant right of way. One half of the bicyclist behavior category were due to violation of traffic control.
- Of those crashes where the motorist was at fault, 63% were attributed to motorist failed to grant right of way, and 26% to motorist behavior.
- Approximately 58% of bicycle crashes occur on local roads, 29% on state routes, and 11% on US routes. This differs from the pedestrian crash statistics, where 70% of crashes occur on local roads.
- 50% of bicycle fatalities occur on US Routes, 25% on State routes, and 25% on local roads. (For pedestrian crashes 50% of fatalities occur on local routes).
- Bicyclists without helmets are over represented in fatal bicycle crashes as compared to their representation in all bicycle crashes. And children bicyclists without helmets are overrepresented in the bicycle crash statistics as compared to all bicycle crashes.
- The towns with the highest per capita bicycle crash rates were Hartford, East Hartford, Manchester and Enfield.
- The towns with the highest volume of bicycle crashes over the 4 year period were Hartford, Manchester, East Hartford, West Hartford, and Enfield.
- We looked more closely at crash rates in the 4 towns with high crash rates – Hartford, West Hartford, East Hartford, and Enfield to investigate where the crashes were occurring. The roadways with the highest levels of bicycle crashes are US Route 44 in Hartford and East Hartford, Route 83 in Manchester, and US Route 5 in Enfield and east Hartford.

Based upon these findings, we recommend the following be pursued to improve pedestrian safety in the region:

- Educate Cyclists
 - Ride with Traffic
 - How to operate on the road, obeying traffic control, positioning in the safest manner.
 - Watch for potential hazards
 - Educate Elementary and Middle School age children about bike safety
 - Effectiveness of helmets

- Educate Motorists:
 - Reduce speed when passing bicyclists and give at least 3 feet of passing space
 - Do not pass bicyclists if you will be making a right turn immediately afterward
 - Need collaboration with the Department of Motor Vehicles to educate new drivers about bicycle riders rights, including insuring that every drivers license exams include at least 1 question on bicycle rights
- Traffic enforcement: both bicyclist and motorists
- Need for physical environment that accommodates and enhances bicyclist safety and visibility, particularly, these locations should be the subject of a followup study which will look at more recent pedestrian crash data for these roads to evaluate specific locations, contributing factor, and driver (bicyclist and motorist) behavior in order to identify potential safety interventions::
 - U.S. Route 44 in Hartford and East Hartford
 - CT Route 83 in Manchester
 - U.S. Route 005 in Enfield and East Hartford

Overview:

Before delving into the details of pedestrian and bicycle crash experience in the region and its towns, it is instructive to compare crash statistics for the region with national and state statistics. Table 1 shows the total number of traffic fatalities in the nation, state, and region from 1995 to 2010 (or 2009, for the region, since this is the last full year for which the CT Crash Data is available). Table 1 also lists the number of pedestrian and bicyclist fatalities each of those years, at those geographies.

While it is interesting to look at crash statistics on an annual basis, it is best to consider 3 year averages rather than focusing upon a single year's information. This is a better indicator of overall trends, as it lessens the impact of individual years that might be outliers, masking the general trends.

Looking at the three year averages in Table 1 it is clear that consistently across all three geographies, nation, state and region, total traffic fatalities, pedestrian fatalities and bicycle fatalities have declined. Additionally, the pedestrian and bicycle fatalities as a percent of total traffic fatalities have also declined for each geography.

In Connecticut over the study period, pedestrian fatalities as a percent of total traffic fatalities has been higher than the national average, although the percentage has decreased over the study period. On the other hand, bicycle fatalities as a percent of total traffic fatalities has consistently been lower than the national average.

On the regional level, pedestrian fatalities as a percent of total traffic fatalities have been higher than the national and state percentages in most years. This indicates a need to focus on pedestrian safety in the region.

Bicycle fatalities as a percent of total traffic fatalities in the region were higher than the national and state experience in the early years of the analysis period, but seem to have dropped to below the national average and the state average more recently. While bicycle fatalities have dropped in the analysis period, we know that there have been several bicycle fatalities in the past 2 years

(which are not part of the analysis period) which may negate the apparent improvement in bicycle fatal crash experience.

Table 2 takes a look at regional bicycle and pedestrian crashes as a percent of total crashes. As the table shows, while bicycle and pedestrian crashes represented less than 3% of all crashes in the region from 1995 to 2009, bicycle and pedestrian fatalities have represented 17.3% of all traffic fatalities. This is logical, given that in any crash between a motor vehicle and a bicycle or pedestrian, the motor vehicle has a large steel enclosure protecting the driver and occupants, while the bicyclist and pedestrian are virtually unprotected. Because of this disparity and the overrepresentation of bicyclists and pedestrians in traffic fatalities, it is important that we analyze the bike and pedestrian crash data so we can understand how we can improve safety for these vulnerable road users.

TABLE 2: REGIONAL CRASH STATISTICS

REGIONAL STATISTICS						
Year	Total Crashes			Bike/Pedestrian		
	Total Crashes	Total Fatalities	Total B/P Crashes	B/P Crashes as % of Total Crashes	Total B/P Fatalities	B/P Fatalities as % of Total Fatalities
1995	15,247	67	540	3.5%	14	20.9%
1996	16,654	64	512	3.1%	11	17.2%
1997	15,440	61	473	3.1%	22	36.1%
1998	15,226	65	462	3.0%	12	18.5%
1999	17,884	43	508	2.8%	13	30.2%
2000	18,164	64	451	2.5%	13	20.3%
2001	17,209	66	381	2.2%	8	12.1%
2002	14,487	65	361	2.5%	9	13.8%
2003	14,714	53	319	2.2%	6	11.3%
2004	17,096	47	331	1.9%	6	12.8%
2005	17,270	50	371	2.1%	9	18.0%
2006	14,246	60	330	2.3%	6	10.0%
2007	22,732	54	426	1.9%	2	3.7%
2008	22,486	51	420	1.9%	11	21.6%
2009	23,198	36	396	1.7%	4	11.1%
TOTAL	262,053	846	6,281	2.4%	146	17.3%

Pedestrian Crash Analysis

Earlier Study

The 1999 to 2001 data on pedestrian crashes indicated the following:

- A tendency for crashes to occur on Friday (18%) as opposed to other days of the week
- A slightly higher occurrence of pedestrian crashes in November (11%) as compared to other months.
- 25% of all crashes occurring between 3 and 6 PM, and 21 % between noon and 3.
- Slightly more than 50% of crashes attributed to unsafe use of highway by pedestrian, 19% to driver behavior, and 18% to driver failed to grant right of way.
- The towns with the highest per capita pedestrian crash rate were Hartford, East Windsor, East Hartford, Manchester and West Hartford.
- The towns with the highest volume of pedestrian crashes over the 4 year period were Hartford, West Hartford, East Hartford, Manchester, and Windsor.

- We concluded that the high crash rate in East Windsor might be an anomaly with just 3 years of data (over the three year period, East Windsor had only 14 pedestrian crashes, and 50% of these occurred in one of the three years.)
- We looked more closely at crash rates in the 4 towns with high crash rates and the highest absolute number of crashes – Hartford, West Hartford, East Hartford, and Manchester by obtaining more detailed information on these crashes from the CTDOT. Conclusions regarding these four towns are summarized below:
 - In large part the accidents are found on principal and minor arterials in the four towns, particularly in locations with retail and commercial land uses
 - The pedestrian crash experience in each of the towns is similar, with the exception that East Hartford and Manchester have fewer crashes (on a percentage basis) occurring when a pedestrian is crossing a road than the other towns (70% vs 80%).
 - Of those crashes which occur when a pedestrian is crossing the road, about 50% of the pedestrians cross between intersections, about 25% at signalized intersections and about 25% at unsignalized intersections.
 - Most of the pedestrian crashes occur between 3 and 6 PM, with a secondary peak from 6 to 9 PM and some additional peaking between noon and 3 PM.
 - About 50% of pedestrian accidents in the four towns are attributed to “unsafe use of the highway by a pedestrian” and about 25 % are attributed to “driver failed to grant right of way” and 18% to “driver behavior.” This is similar to the regional experience.
 - Of those crashes occurring when the driver failed to grant the right of way, 6% involve vehicles turning right on red.

Evaluation of 1995 to 2009 Data

With the availability of the CT Crash Database, we were able to access complete records of all crashes in the Capitol region from January 1995 to January 2010. This enabled us to summarize the characteristics of all pedestrian (and bicycle) crashes over that time period. Because pedestrian crashes are relatively infrequent, we were concerned that our earlier analysis of three years of crashes might not have given a true picture of pedestrian crash experience in the region. Additionally, for the earlier study, we were only able to dig deeper into the characteristics of pedestrian crashes in 4 municipalities in the region. That analysis required re-entering crash statistics from printout records supplied by the CTDOT. These records were then geocoded so that we could examine the crash statistics spatially with our gis tools.

With data available from a longer time period we sought a better understanding of pedestrian crashes in the region, and we also wanted to learn if the use of 3 years worth of data yielded vastly different results than the longer study period. One shortcoming of our evaluation is that by looking at the entire period of data for most of our analysis, we are unable to identify improvements that have occurred over time. Additionally, the crash data base does not include any geocoding, though this will be added to the database at some point. In the future, we believe it will be sufficient to evaluate the most recent 3 to 5 years of data to understand current characteristics of pedestrian crashes.

Following is a discussion of the 15 year data analysis, and a comparison of the findings to our earlier work.

When Do Pedestrian Crashes Occur?

Looking at the pedestrian crashes that occurred throughout the Capitol Region from 1995 to 2010, we can see that there are not very strong trends when analyzing the data over a Day of the Week or Month of Occurrence scale. As Figure 1 shows, more pedestrian crashes occur on Fridays than the other days of the week, being about 3 percent higher than other weekdays. On the other hand, Sundays have the lowest crash rate of 7.65 percent. This could be attributed to the lower number of commuters and pedestrians traveling to work on Sundays as well as the absence of school on the weekend. These results are complementary to our earlier findings from the 1999 – 2001 study; however, with 15 years of data the peak of Friday stands out slightly more with Tuesday through Thursday clustered more closely. When we looked at individual town data we found that the day of week variation can differ at the local level, so towns may want to examine the crash data base to understand their own experience.

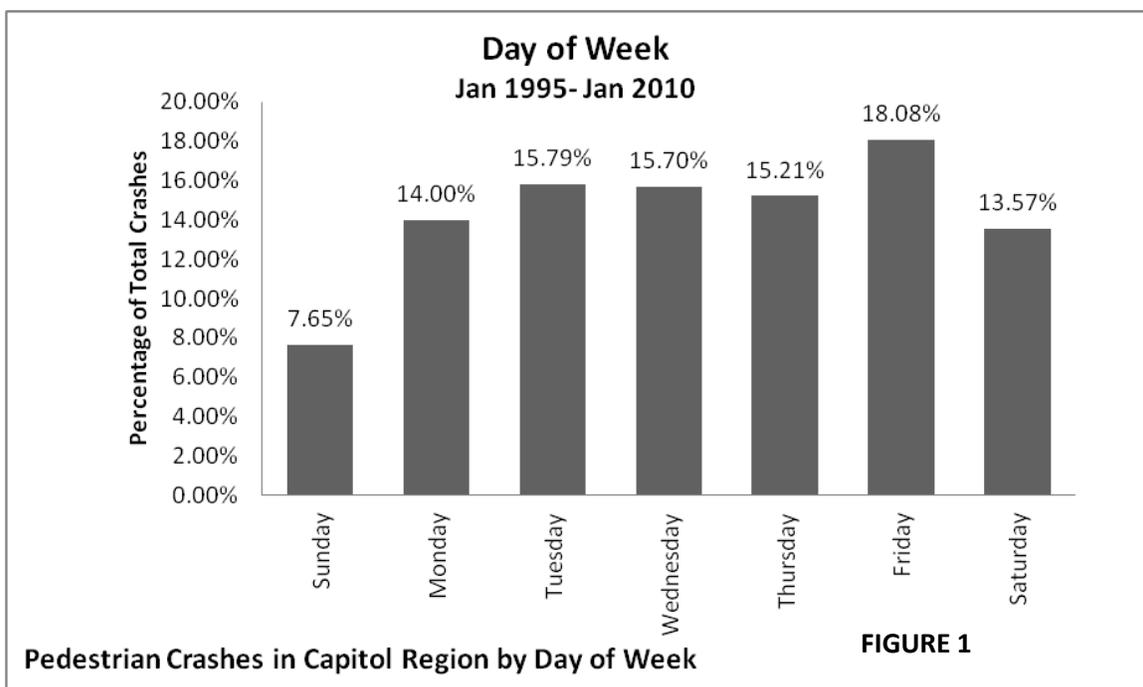


Figure 2 shows pedestrian crashes by month of the year. These results are similar to our findings from the 1999 to 2001 data, except that the months of October, November and December are more clearly identified as the high pedestrian crash months with the longer analysis period. However, with the three year analysis, November pedestrian crash occurrence was even more peaked, accounting for almost 11% of the total. We surmise that this higher occurrence of pedestrian crashes in October, November, December may be due to fewer hours of sunlight coupled with the holiday season causing more people to be out walking.

Looking at individual town crash records, again there are interesting variations, most notably with Hartford having a much less defined peak (December with the highest incidence of pedestrian crashes at only 9.5% of the total.)

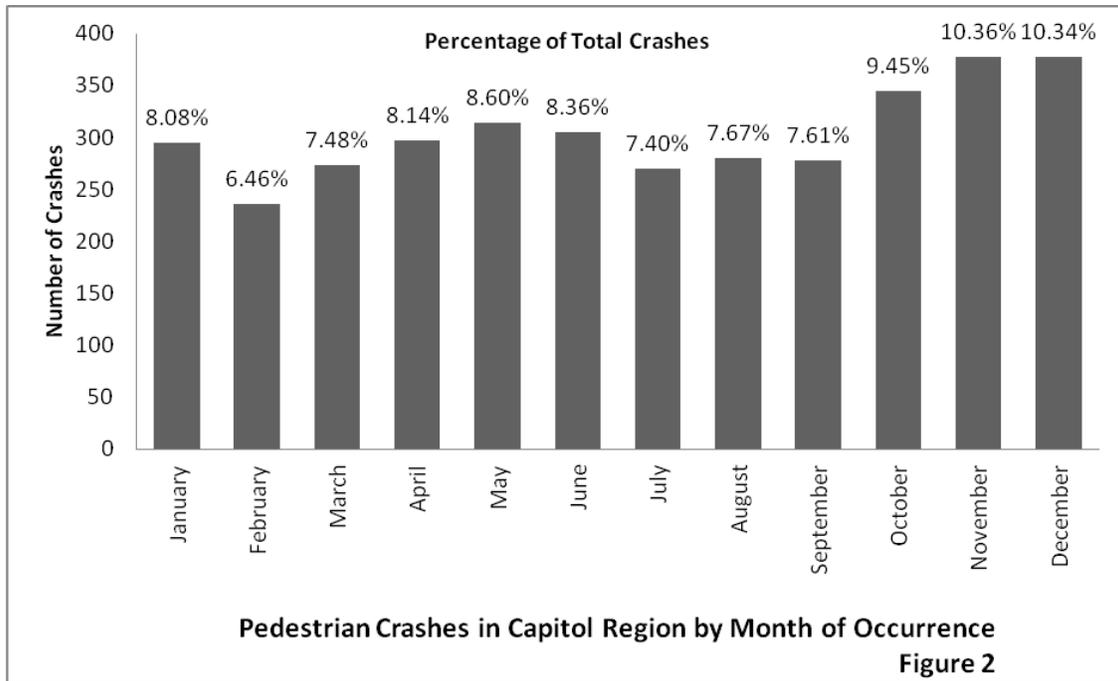
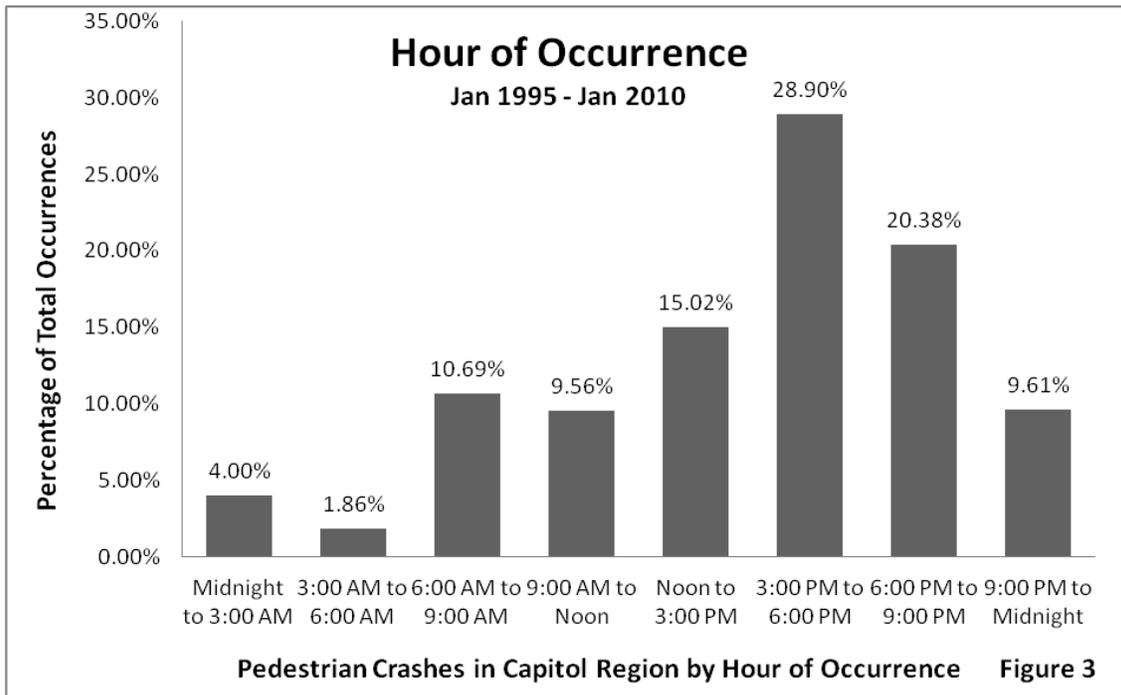
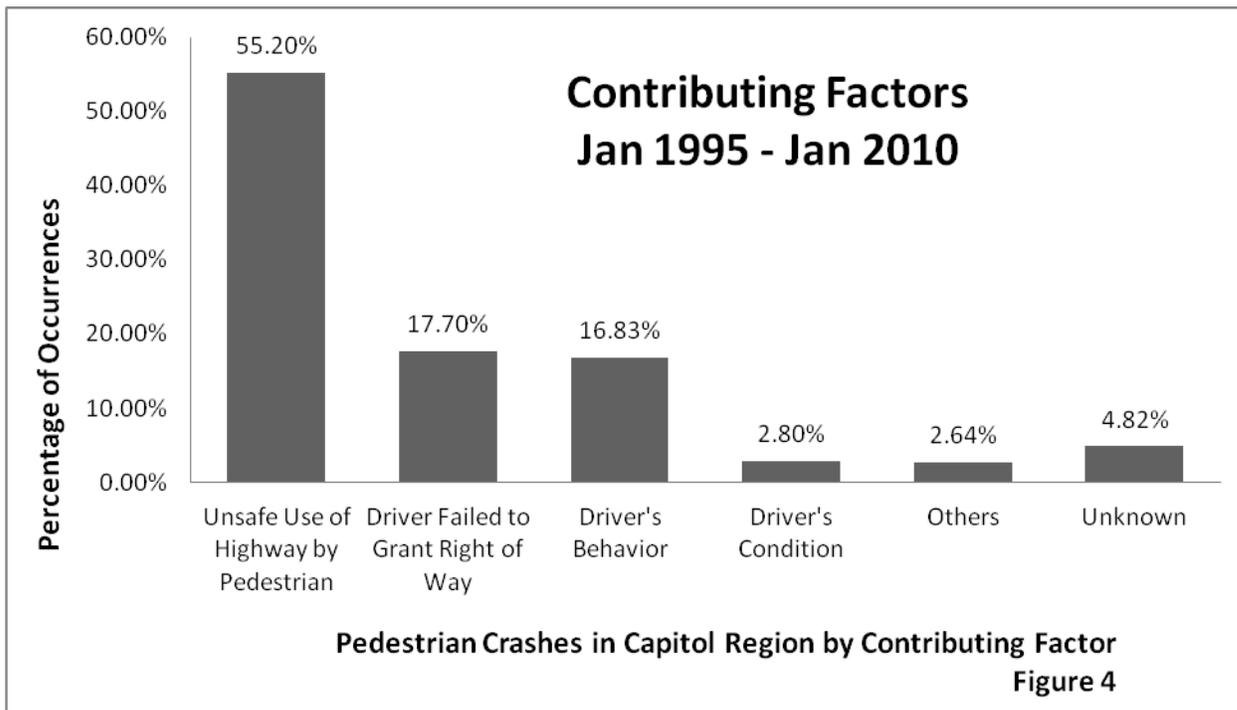


Figure 3 illustrates pedestrian crashes by time of day. As in the 3 year study, the 3 to 6 PM period accounts for the majority of pedestrian crashes, however, with the longer study period, the peak in this time period is even more pronounced (28% vs. 25%). The secondary peak for the longer study is 6 to 9 PM, with approximately 20% of all pedestrian crashes occurring in this timeframe, while in the shorter study, the secondary peak was from noon to 3 PM. The longer study period aligns our findings more closely with national statistics. There are variations in this peaking at the town level with West Hartford having the secondary peak from noon to 3 followed by 9 to noon as the third peak. Individual towns may want to examine this more closely



Contributing Factors for Pedestrian Crashes

Looking at the factor that is defined as the contributing factor to the crash, we find that in the Capitol Region, approximately 55% of all pedestrian accidents are caused by “Unsafe use of the highway by the pedestrian” (see Figure 4). Approximately 18% of the pedestrian crashes are caused by the “driver failed to grant right of way” and about 17 % are caused by “driver’s behavior”. This is similar to the findings from the 3 year study, where the percentages were 52, 18 and 19 respectively.



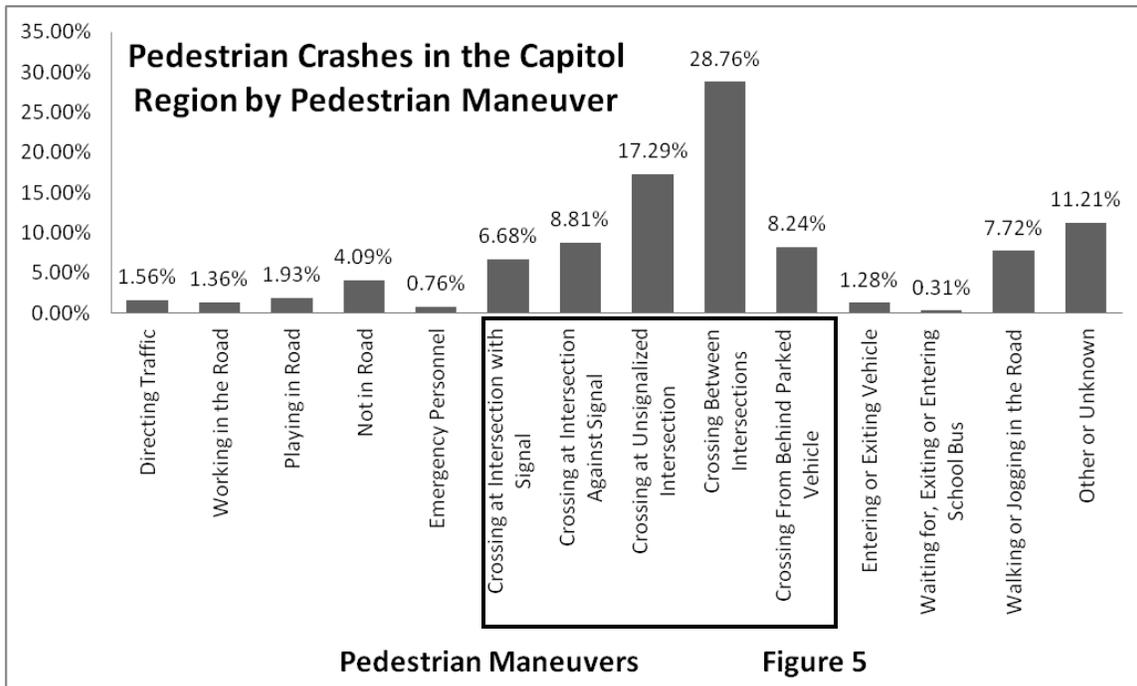
It is important to note in any discussion of the “contributing factor” for a crash, that this is not the legal assignment of responsibility for the crash. Contributing factor is determined by the Connecticut Department of Transportation’s Accident Records section and is used by the Department in its ongoing engineering evaluation of Connecticut’s roads and highways. The factors are determined subjectively, and therefore should be used with caution. In our earlier work, when we looked closely at individual crash records, we discovered an apparent tendency to designate unsafe use of the highway by a pedestrian in instances where the contributing factor might as credibly be determined to be driver failed to grant right of way. However, we expect that even with a correction on this basis, unsafe use of highway by pedestrian would likely still represent over 50% of all pedestrian crashes.

With the 15 year data, we were able to take a deeper look at sub categories of contributing factors, and were also able to evaluate the pedestrian action at the time of the crash. In the earlier study, this more indepth look was only possible on the 4 town basis.

As Table 3 shows, within the category of Driver failed to grant the right of way, approximately 8% of the crashes were attributed to an unsafe right turn on red (this compares with 6% in the earlier study.) Within the category of Driver’s behavior, the most common behaviors listed as contributing factor were driver lost control and driver violated traffic control, followed by unsafe backing and speed too fast for conditions. The predominant factor categorized as drivers condition was driving under the influence.

Table 3		Jan 1995 - Jan 2010	
Regional Crash Data By			
Contributing Factor	Totals	Percentage	
Unsafe Use of Highway by Pedestrian	2,014	55.20%	
<u>Driver Failed to Grant Right of Way</u>	646	17.70%	
Driver Failed to grant Right of way	592	16.22%	
Unsafe Right Turn on Red	54	1.48%	
<u>Driver's Behavior</u>	614	16.84%	
Driver Lost Control	153	4.19%	
Violated Traffic Control	150	4.12%	
Unsafe Backing	130	3.56%	
Speed too Fast for Conditions	121	3.32%	
Improper Turning Maneuver	36	0.99%	
Improper Passing Maneuver	9	0.25%	
Driving on the Wrong Side of the Road	6	0.16%	
Entered Roadway in Wrong Direction	5	0.14%	
Improper Lane Change	3	0.08%	
Following Too Closely	1	0.03%	
<u>Driver's Condition</u>	102	2.80%	
Under the Influence	100	2.74%	
Driver Illness	1	0.03%	
Driver Fell Asleep	1	0.03%	
<u>Unknown</u>	176	4.82%	
<u>Other</u>	97	2.64%	
Driver's View Obstructed	32	0.87%	
Driverless Vehicle	25	0.68%	
Defective Equipment	11	0.30%	
Slippery Surface	10	0.27%	
Roadway Width Restricted	10	0.27%	
Vehicle Without Lights	4	0.11%	
Vehicle Involved in Emergency	3	0.08%	
Disabled or Illegally Parked Vehicle	1	0.03%	
Animal or Foreign Object in Road	1	0.03%	
<u>Total:</u>	<u>3,649</u>	<u>100.00%</u>	
<i>Source: Connecticut Crash Data Query Tool, Capitol Region, Contributing Factors, Jan 1995 to Jan 2010</i>			

Looking next at what the pedestrian was doing at the time of the crash, we find that approximately 70% of the crashes occur when the pedestrian is crossing the road. (see Figure 5) Crossing between intersections is noticeably higher than the other categories at about 29 percent. Crossing at unsignalized intersections has the second highest occurrence rate at 17 percent, with the pedestrian crossing the street at a signalized intersection in 15 percent of the crashes.



In our earlier study, we were only able to evaluate pedestrian action for the 4 towns for which we received detailed crash data. For those 4 towns, over the 3 year period of analysis, pedestrians were crossing the street in 80% of the crashes, with crossing between intersections accounting for about half of the crossing crashes, and crossing at signalized intersections and at unsignalized intersections both representing about ¼ of the crossing crashes. Figure 6 shows this same breakdown for the 1995 to 2009 data for the entire region, where 53% of all crossing crashes occurred when the pedestrian was crossing someplace other than the intersection, 25 % occur when the pedestrian is crossing at a signalized intersection, and 22% at a signalized intersection. This data may indicate a need for more education of pedestrians regarding safety issues with crossing between intersections.

Pedestrian Crashes in Capitol Region When Pedestrian was Crossing The Street

Figure 6

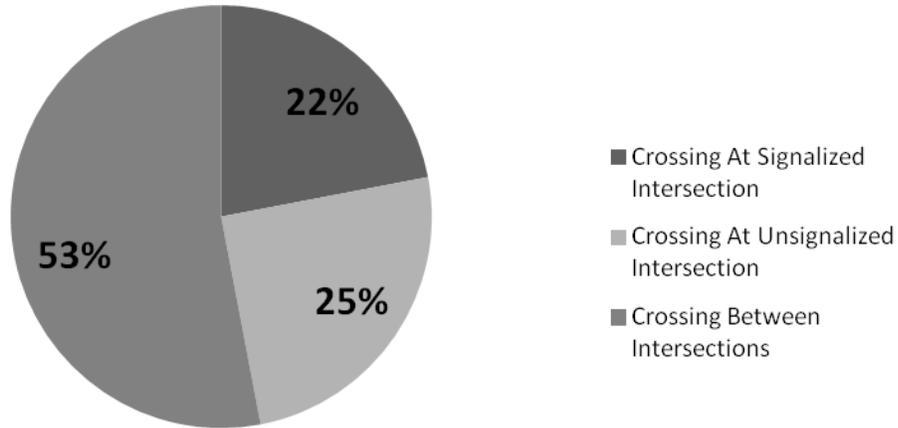
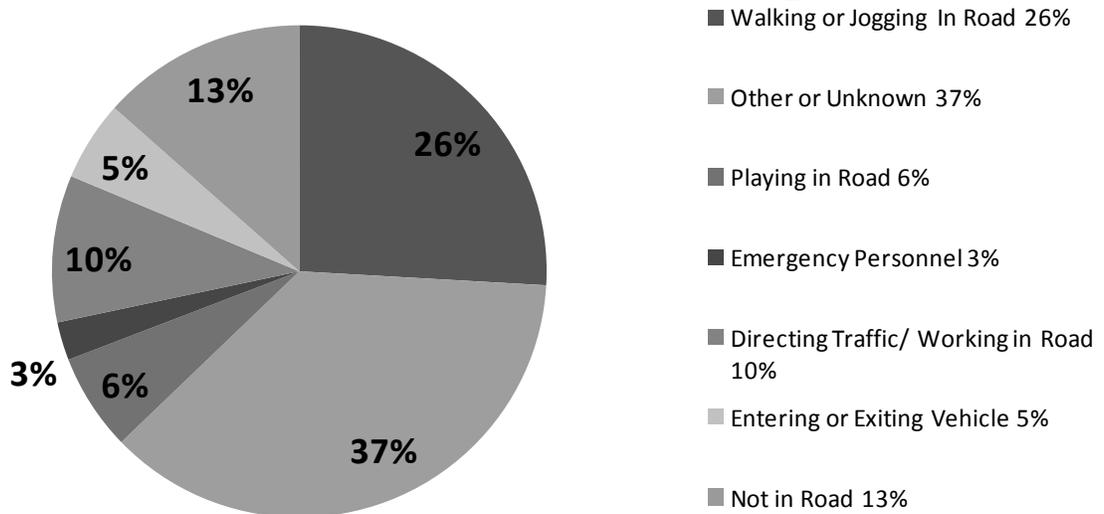


Figure 7 shows pedestrian action for all the crashes (only 30% of the total) that occurred when the pedestrian was NOT crossing the street at the time of the crash. It is unfortunate that the category for other or Unknown Maneuver is the highest at around 37 percent because this does not give us a clear picture of the pedestrian action involved. Walking or Jogging in the road has the second highest occurrence rate at 26 percent. This makes sense as pedestrians are exposed to traffic when they are walking in the road as opposed to up on the sidewalk. The category for Waiting, Exiting, or Entering the School Bus is included with entering or exiting vehicle.

Pedestrian Action for regional crashes where Pedestrian was NOT Crossing Street

Figure 7



Where Do Pedestrian Crashes Occur?

Table 4 examines the pedestrian crash data on a town by town basis and finds that four of the Region's towns have pedestrian crash rates of more than 4 per 1000 population for the entire 15 year study period: Hartford, East Hartford, West Hartford, and Manchester. These are also the highest population towns. In the 3 year study the finding was similar except that East Windsor was also in the highest tier for pedestrian crash rate. During that earlier study period, East Windsor had an anomaly that occurred in 2000, when the Town had more than double the number of pedestrian crashes that occurred in 1999 and 2001 combined. We expected that an examination of more years of data might show a lower pedestrian crash rate for East Windsor. This did happen, but East Windsor still appears very high in the pedestrian crash rate ranking, and East Windsor, along with Windsor Locks and Bloomfield, have higher crash rates than we would expect if crash rates varied according to overall population (as it does with the 4 towns with the highest crash rates.)

We examined a number of other factors (see Tables 4 and 5): population density, poverty rate, median household income, unemployment rate and walk to work rate to see if we could correlate high pedestrian crashes with any other factors. We were unable to find such a link, there are probably a combination of factors at play, including road characteristics, that cause higher crash rates in some towns.

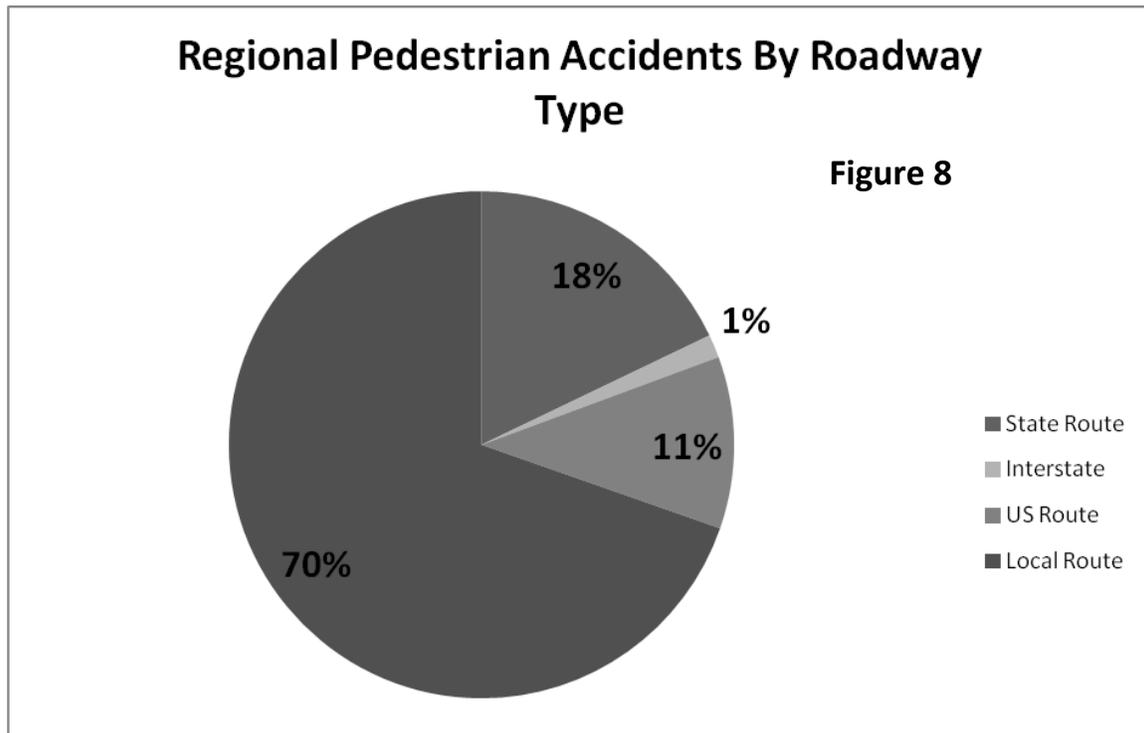
Table 4 Jan 1995 - Jan 2010
Average Pedestrian Crash Rate per 1,000 Population

Town	Population	Density	Crashes	Rate P/1,000
Hartford	124,775	7,029	1,974	15.82
East Hartford	51,252	2,710	277	5.4
West Hartford	63,268	2,921	280	4.4
Manchester	58,241	2,125	250	4.29
Windsor Locks	12,498	1,376	42	3.36
East Windsor	11,162	399	37	3.3
Bloomfield	20,486	801	67	3.27
Windsor	29,044	983	85	2.92
Wethersfield	26,668	2,118	75	2.8
Vernon	29,179	1,698	81	2.77
Enfield	44,654	1,362	120	2.69
Newington	30,562	2,274	77	2.52
Stafford	12,087	210	23	1.9
Bolton	4,980	368	8	1.6
Farmington	25,340	901	40	1.57
Canton	10,292	393	16	1.55
East Granby	5,148	302	7	1.34
Rocky Hill	19,709	1,449	25	1.27
Marlborough	6,404	267	8	1.25
South Windsor	25,709	926	30	1.16
Glastonbury	34,427	650	36	1.04
Simsbury	23,511	685	23	0.97
Avon	18,098	763	17	0.94
Tolland	15,052	379	12	0.8
Hebron	9,686	246	7	0.72
Granby	11,282	272	8	0.71
Ellington	15,602	434	11	0.7
Suffield	15,735	341	11	0.7
Somers	11,444	399	7	0.61
Andover	3,303	212	1	0.3

Source: 2010 Census & Connecticut Crash Database Town Level
Accidents from Jan 1995 - Jan 2010

Table 5			Median	Unemployment	Walk to
Town	Population	Poverty Rate	Household Income	Rate	Work Rate Per 1,000
Hartford	124,775	31.60%	\$26,055.00	16.90%	81.41
East Hartford	51,252	14.00%	\$46,634.00	12.50%	16.18
West Hartford	63,268	5.90%	\$76,835.00	8.50%	25.86
Manchester	58,241	7.70%	\$57,570.00	9.10%	14.84
Windsor Locks	12,498	6.4%	\$57,769.00	9.7%	10.02
East Windsor	11,162	4.00%	\$58,810.00	9.20%	10.29
Bloomfield	20,486	5.20%	\$67,325.00	10.60%	2.92
Windsor	29,044	3.40%	\$75,116.00	9.00%	5.25
Wethersfield	26,668	3.40%	\$64,405.00	9.10%	10.87
Vernon	29,179	7.90%	\$54,393.00	8.20%	29.46
Enfield	44,654	6.30%	\$59,614.00	9.50%	19.1
Newington	30,562	5.10%	\$67,857.00	8.00%	4.61
Stafford	12,087	4.50%	\$62,969.00	9.90%	21.33
Bolton	4,980	2.90%	\$87,503.00	7.30%	3.57
Farmington	25,340	5.30%	\$90,456.00	7.20%	13.22
Canton	10,292	3.50%	\$79,499.00	7.40%	22.21
East					
Granby	5,148	0.90%	\$82,245.00	7.20%	4.99
Rocky Hill	19,709	4.80%	\$71,296.00	7.50%	15.95
Marlborough	6,404	2.50%	\$96,318.00	7.90%	0
South Windsor	25,709	1.90%	\$87,762.00	7.40%	4.1
Glastonbury	34,427	3.10%	\$103,105.00	6.60%	10.41
Simsbury	23,511	1.80%	\$108,554.00	6.30%	24.97
Avon	18,098	3.20%	\$121,137.00	6.00%	19.76
Tolland	15,052	2.30%	\$100,636.00	6.90%	8.65
Hebron	9,686	1.90%	\$99,250.00	7.00%	2.83
Granby	11,282	1.40%	\$101,048.00	7.10%	11.01
Ellington	15,602	3.40%	\$78,252.00	7.40%	9.55
Suffield	15,735	2.50%	\$81,367.00	8.10%	20.46
Somers	11,444	6.50%	\$85,914.00	9.40%	5.84
Andover	3,303	2.50%	\$80,803.00	7.20%	16.08

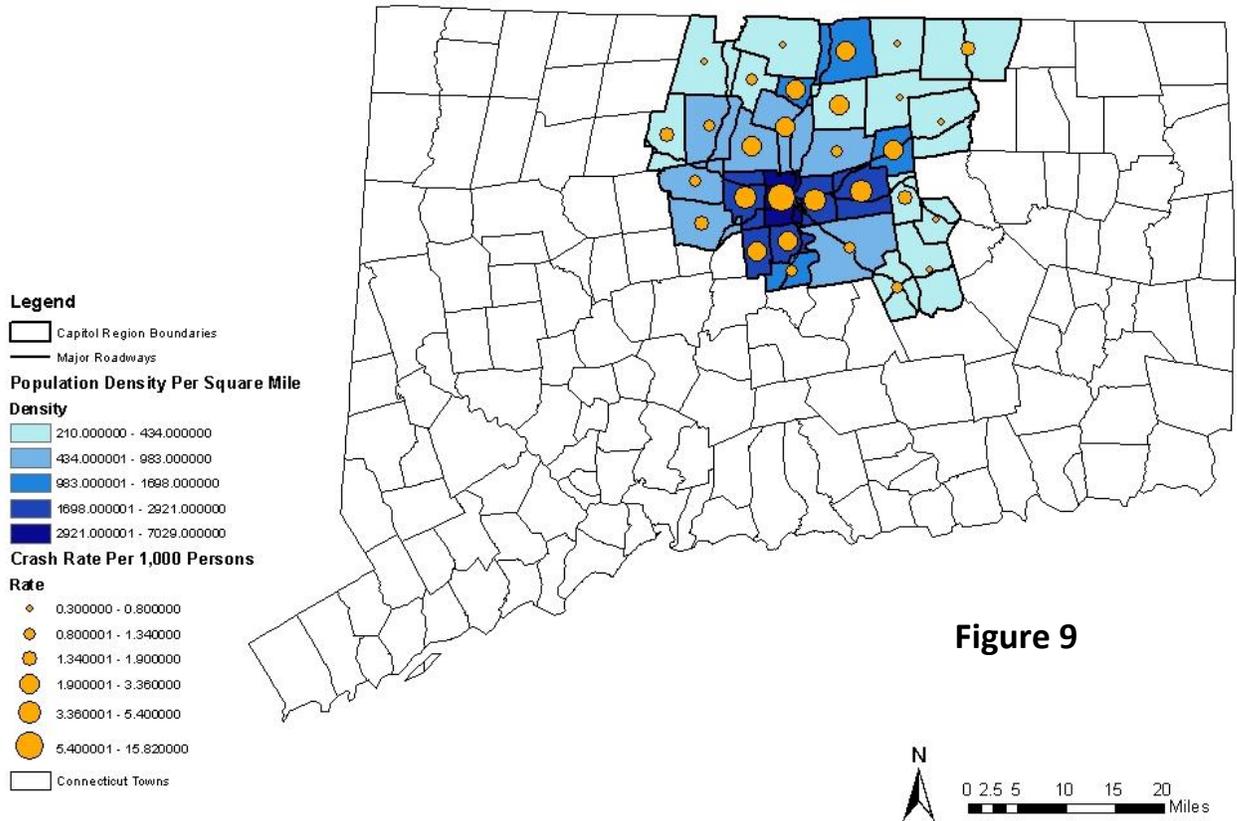
Figure 8 shows the occurrence of pedestrian crashes by roadway type. Local roads account for 70% of crashes, with 18% occurring on state roads, 1% on interstates and 11 % on US routes.



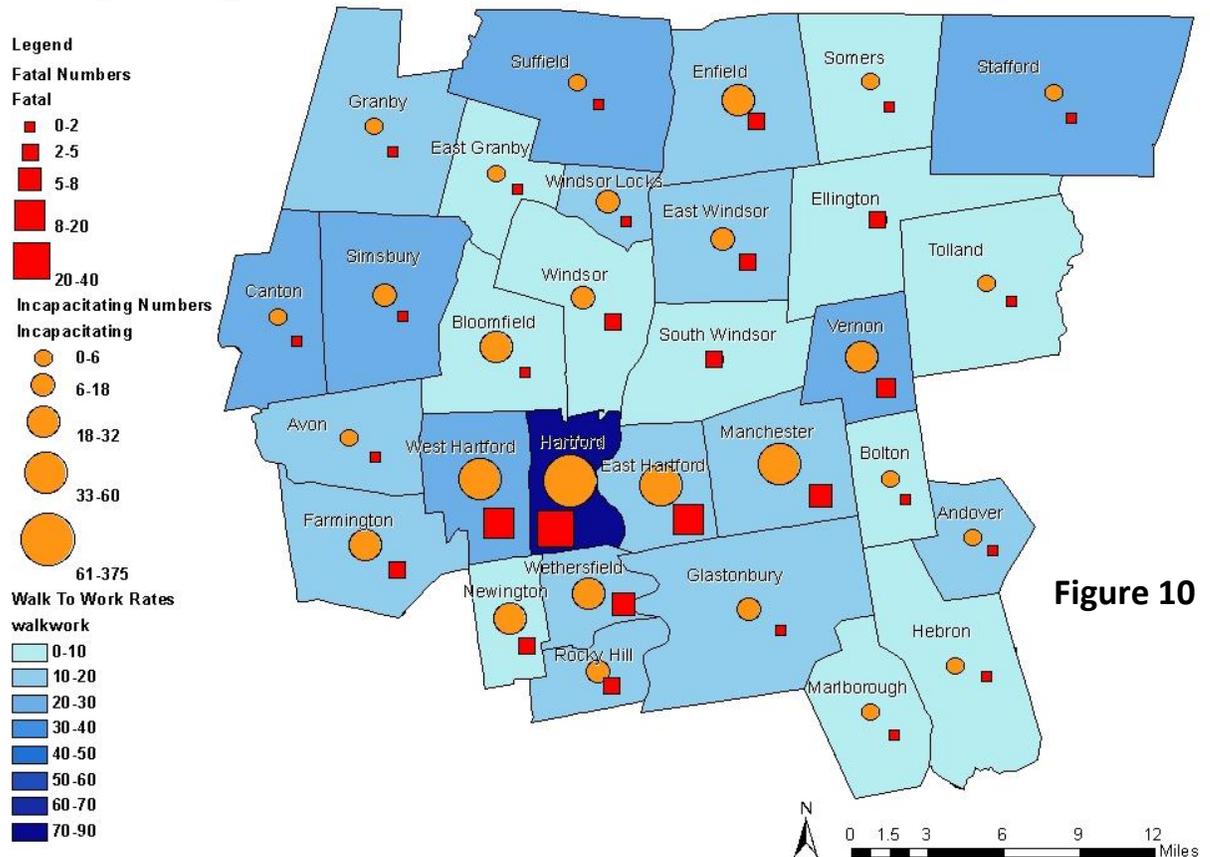
During the development of this study, we were able to utilize work that a staff intern produced as part of a geographic information systems graduate level course. This project developed displays of pedestrian crash statistics in map format, which helps to illuminate our understanding of the crash statistics. Those maps are displayed on the following pages.

Figure 9 shows population density of each town and crash rate per 1000 population. This map shows that generally crash rate per capita increases with population density, but that some towns have higher crash rates than would be expected solely based upon population density. Figure 10 graphically displays walk to work rates and the number of fatal pedestrian crashes and incapacitating injuries in each town. Outside of the City of Hartford, these do not seem to be closely correlated. Figure 11 displays pedestrian crash locations and roadway type.

Capitol Region Town Densities and Crash Rates



Capitol Region Walk to Work Rates and Crash Severities



Capitol Region Fatal Pedestrian Crash Locations

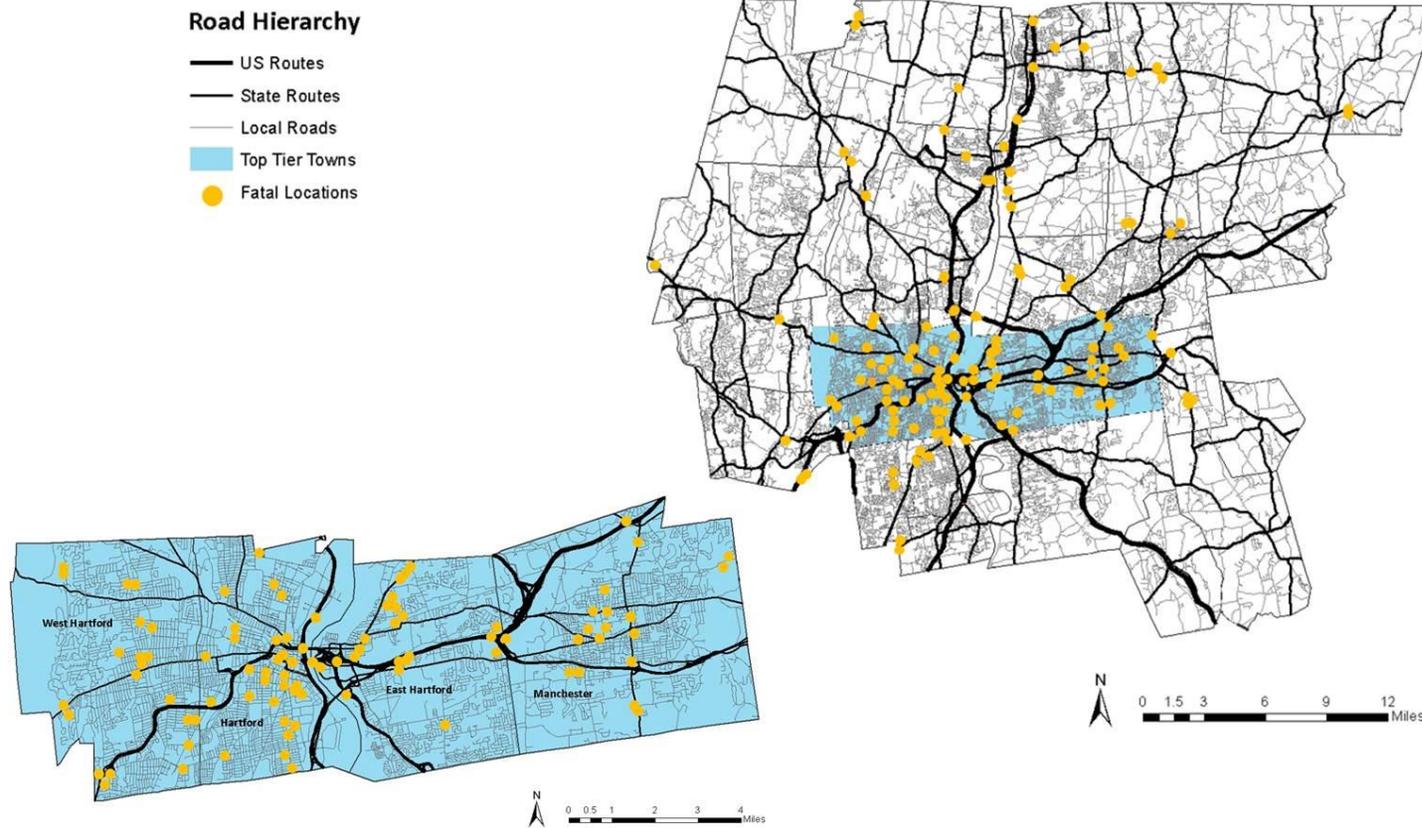


Figure 11

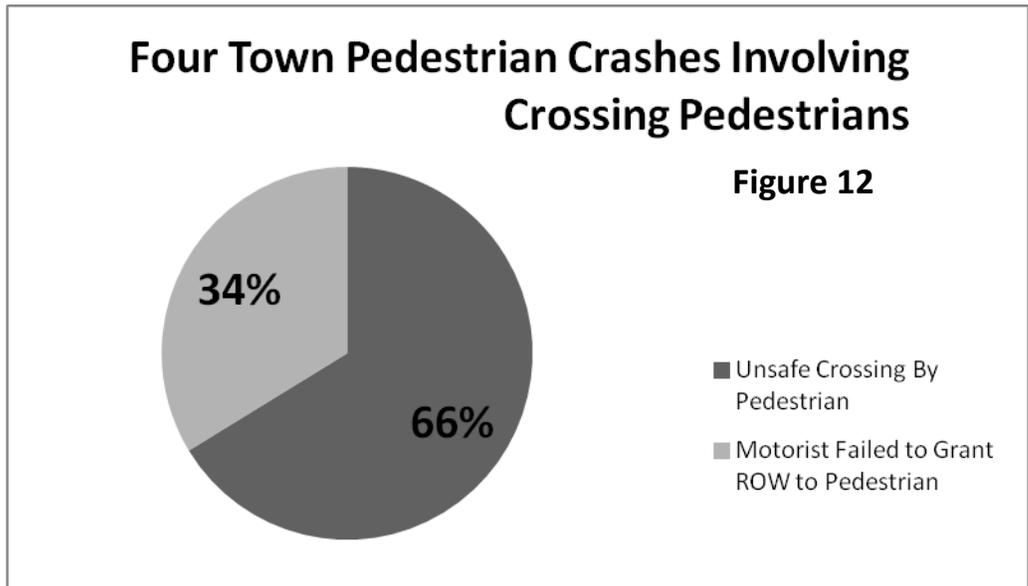
Four Town Pedestrian Crashes

As we had done with the earlier study, we examined the crashes in the four towns with the highest pedestrian crash rates more closely, to determine if the crashes in those towns differ notably from those in the region as a whole. These four towns are Hartford, East Hartford, West Hartford and Manchester. We found that the variations are very slight. One notable variation is that for the 4 towns with the highest rates of pedestrian crashes, a slightly larger percentage (75% vs 70%) occur when the pedestrian is crossing the street. This is likely attributable to the fact that the higher population towns are more likely to have sidewalks on the majority of roads. There is an interesting difference between the four towns, with West Hartford having the most pedestrian crashes occurring when the pedestrian was crossing the street(81%), followed by Hartford with 76%, East Hartford with 68% and Manchester with 67%. It is likely that smaller towns in the region have rates of pedestrian crossing crashes under the 70% average for the region.

Additionally, the Pedestrian crashes in the 4 towns have a different distribution by roadway type, 80% on local roads, 7% on state roads, and 12% on US routes, as compared to 70%, 18% and 11%, respectively for the region as a whole.. This difference is probably attributable to the much lower percentage of roadways in the larger towns that are state roads or US routes.

On all other measures, the crash data for the four towns is remarkably similar to the data for the region as a whole. Given the similarity between the regional and four town statistics, we believe that the below more in depth study of certain crash characteristics for the four towns are likely to have applicability to the region.

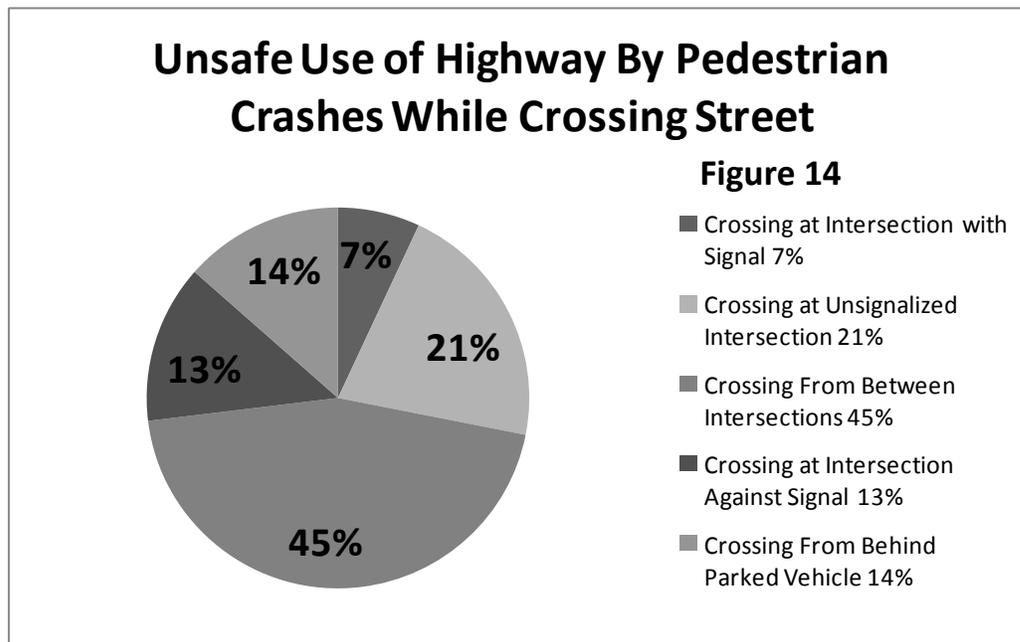
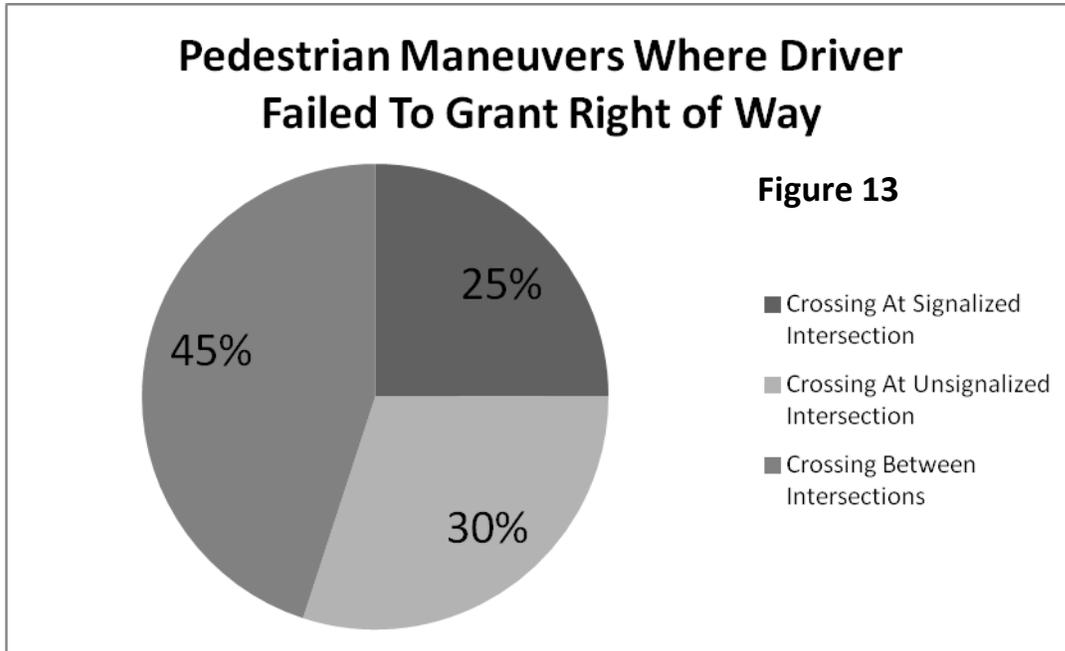
Looking first at crashes where the pedestrian was crossing the street (Figure 12), we see that for 66% of these crashes the contributing factor was determined to be unsafe use of highway by pedestrian and 34% to motorist failed to grant right of way.



Looking then at the pedestrian maneuver in these two instances (Figures 13 and 14), we find that in the case of driver failed to grant right of way, 55% of the crashes occurred at intersections,

while 45% occurred between intersections. For the unsafe use of highway by pedestrian, the patterns is almost reversed, with 41% occurring at intersections and 59% not at intersections.

This is an important finding as it indicates a possible need to educate drivers that they have a duty to yield to pedestrians at both marked and unmarked crosswalks.



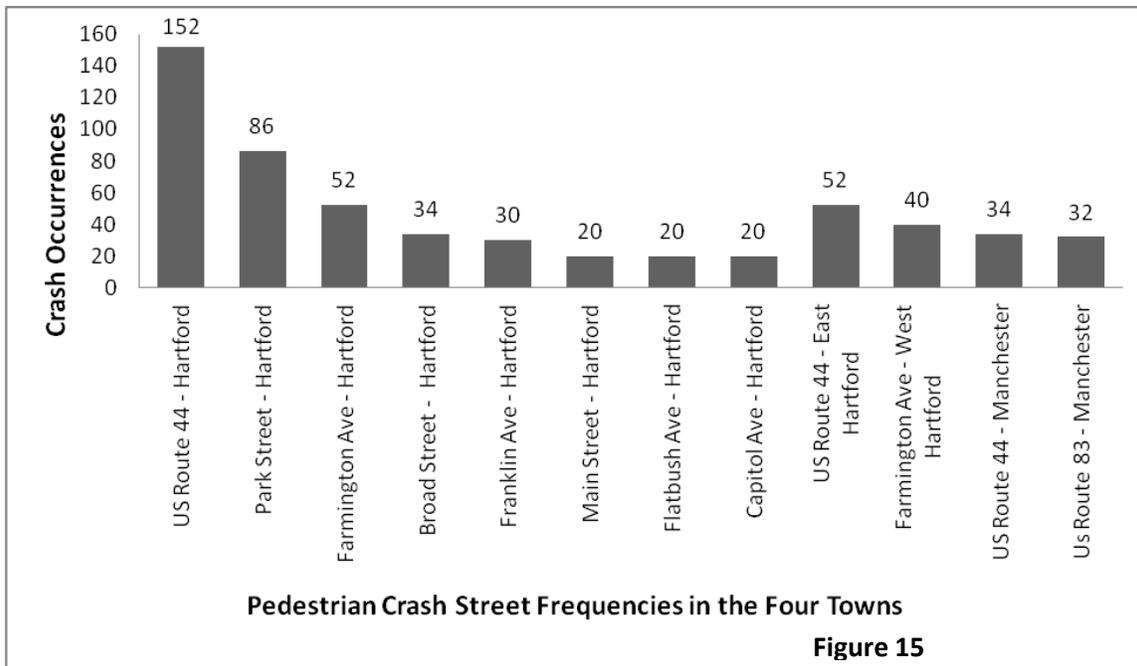
With a deeper look at the four towns with the highest pedestrian crash rates, it is possible to begin to identify the roadways that have the highest incidents of pedestrian crashes. The roadways with the highest incidence of pedestrian crashes are:

- US Route 44 in Hartford, East Hartford, and Manchester
- Farmington Avenue in Hartford and West Hartford
- Park Street in Hartford
- CT Route 83 in Manchester

These are the roads with the highest incidence of crashes over the 15 years of analysis, but it is important to understand what is happening today. In more recent years, there has been an increase in pedestrian crashes on Flatbush Avenue and Capitol Avenue in Hartford. Although across the board in the 15 year study they show only 20 crashes, in recent years these locations have seen a substantial increase in crashes, with incidents occurring more frequently than earlier years throughout the study. Table 6 and Figure 15 show the highest frequency pedestrian crash locations over the 15 year analysis period.

Street	Town	# of Crashes
US Route 44	Hartford	152
Park Street	Hartford	86
Farmington Ave	Hartford	52
US Route 44	East Hartford	52
Farmington Ave	West Hartford	40
Broad Street	Hartford	34
US Route 44	Manchester	34
Us Route 83	Manchester	32
Franklin Ave	Hartford	30
Main Street	Hartford	20
Flatbush Ave	Hartford	20
Capitol Ave	Hartford	20

Source: Connecticut Crash Data Query Tool, Pedestrian Crash Data



It should be noted that we use the 15 year analysis period because it assists us in seeing trends for pedestrian crashes which are infrequent events. However, it is unfair to draw broad conclusions on the relative safety of the roads where crashes occur since the characteristics of the roads may have changed drastically over the years. This data does provide direction for future analysis of crash experience on these roads. A follow up study could examine more recent pedestrian crash data for these roads to evaluate specific locations, contributing factor, pedestrian action and driver behavior in order to identify potential safety interventions.

We also looked into street frequencies for East Windsor and Windsor Locks, the towns with the next highest pedestrian crash rates. Because they have low populations and density, but high crash rates, we thought we might identify a particular roadway that accounts for many of the crashes. US Route 5 had the highest crash occurrence in East Windsor, so this roadway may explain why crash rates are high in East Windsor. No similar high crash location was found in Windsor Locks so this does not explain why the crash rates are higher than expected based upon population in Windsor Locks.

Crash Severity

Pedestrian crash severity for the four towns (Fig. 16) was very similar to the findings for the entire Capitol Region. Non-incapacitating but evident accident severity had the highest occurrences for the four towns and the entire region, followed closely by possible injury, not visible. Fatal injuries had the lowest percentages, and the four towns had a slightly lower percentage than the region with 2.6 percent compared to the regional 3.67 percent of total pedestrian crashes.

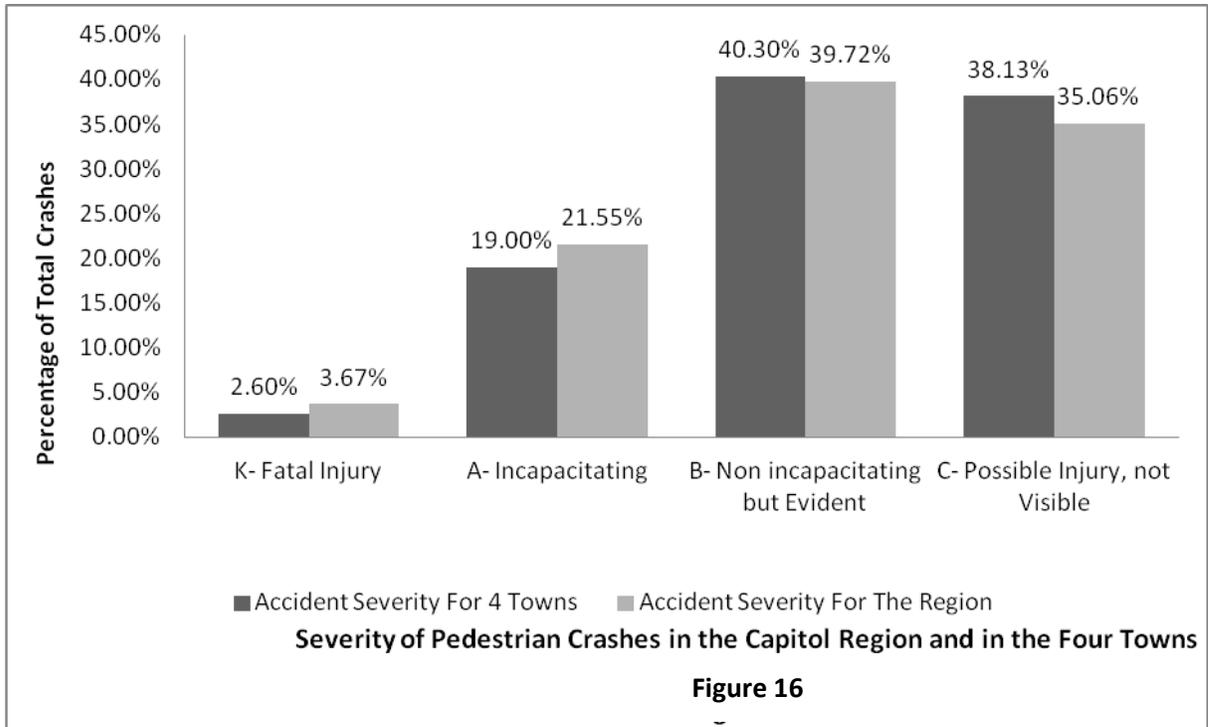
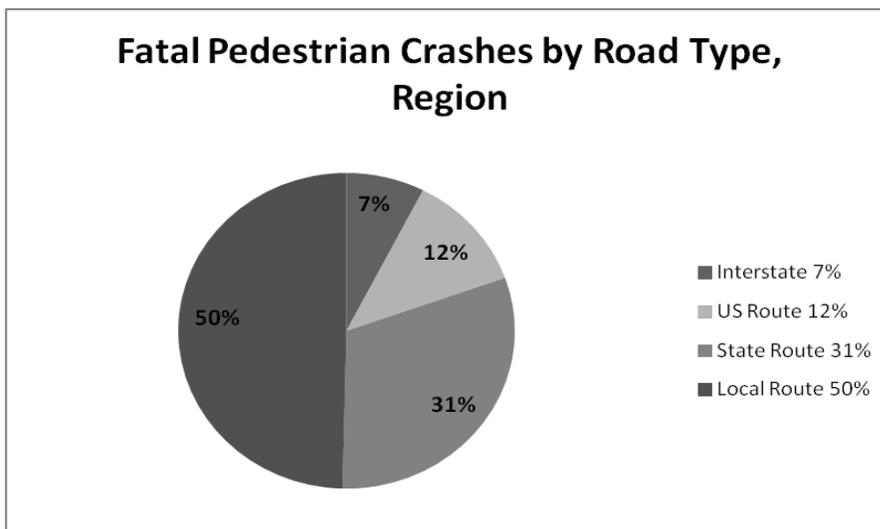


Table 7 shows pedestrian fatalities as the percent of total pedestrian crashes per year and per 3 year period. This shows a general decline in both pedestrian crashes and pedestrian fatalities as a percent of crashes over the 15 years.

Table 8 compares the contributing factor for all pedestrian crashes in the four towns compared to contributing factor for fatal pedestrian crashes. As the table shows, the contributing factors of unsafe use of highway by pedestrian (53%), driver under the influence (29%) and driver lost control (6%) are the contributing factors in the majority of fatal pedestrian crashes. This is different than the contributing factor for all pedestrian crashes.

Fatal pedestrian crashes occur more frequently on state routes, US routes and interstates, than do all pedestrian crashes, which occur predominantly on local roads (see Figure 8 for comparison):



all pedestrian crashes, which occur predominantly on local roads (see Figure 8 for comparison):

Year	Total Crashes	Fatalities	% of Years Crashes
1995	318	13	4.09%
1996	299	10	3.34%
1997	268	18	6.72%
95-97	885	41	4.63%
1998	276	10	3.62%
1999	290	11	3.79%
2000	262	13	4.96%
98-00	828	34	4.11%
2001	209	7	3.35%
2002	210	9	4.29%
2003	200	6	3.00%
01-03	619	22	3.55%
2004	188	6	3.19%
2005	220	9	4.09%
2006	193	5	2.59%
04-06	601	20	3.33%
2007	248	2	0.81%
2008	245	10	4.08%
2009	223	4	1.79%
06-09	716	16	2.23%
Totals	3,649	133	3.64%

Four Town Contributing Factors For Fatal Crashes	Total Crashes	Fatal Crashes
Unsafe Use of Highway by Pedestrian	56.6%	53.4%
Driver failed to grant ROW		
Driver Failed to Grant Right of Way	16.5%	2.7%
Unsafe Right Turn on Red	1.2%	0%
Unknown	4.9%	1.3%
Drivers Behavior		
Violated Traffic Control	4.4%	0%
Unsafe Backing	3.8%	1.3%
Driver Lost Control	3.8%	6.9%
Speed too Fast for Conditions	3.2%	4.1%
Improper Turning Maneuver	1.0%	0%
Entered Roadway in Wrong Direction	0.2%	0%
Improper Passing Maneuver	0.2%	1.3%
Driving on the Wrong Side of the Road	0.1%	0%
Improper Lane Change	0.04%	0%
Drivers Condition		
Under the Influence	2.0%	29.0%
Other		
Driver's View Obstructed	0.7%	0%
Driverless Vehicle	0.4%	0%
Defective Equipment	0.4%	0%
Slippery Surface	0.3%	0%
Roadway Width Restricted	0.2%	0%
Vehicle Without Lights	0.1%	0%
Vehicle Involved in Emergency	0.1%	0%
Disabled or Illegally Parked Vehicle	0.04%	0%

Pedestrian Crash Statistics – Children

Using the four towns with the highest pedestrian crash rates, we took a look at the characteristics of the crashes affecting pedestrians 14 years of age and under. Figure 17 shows the contributing factor for crashes involving children. As this graph shows, unsafe use of the roadway was determined to be the contributing factor in the majority of pedestrian crashes involving children, but at 76%, this is much higher than the similar statistic for all pedestrian crashes (55%).

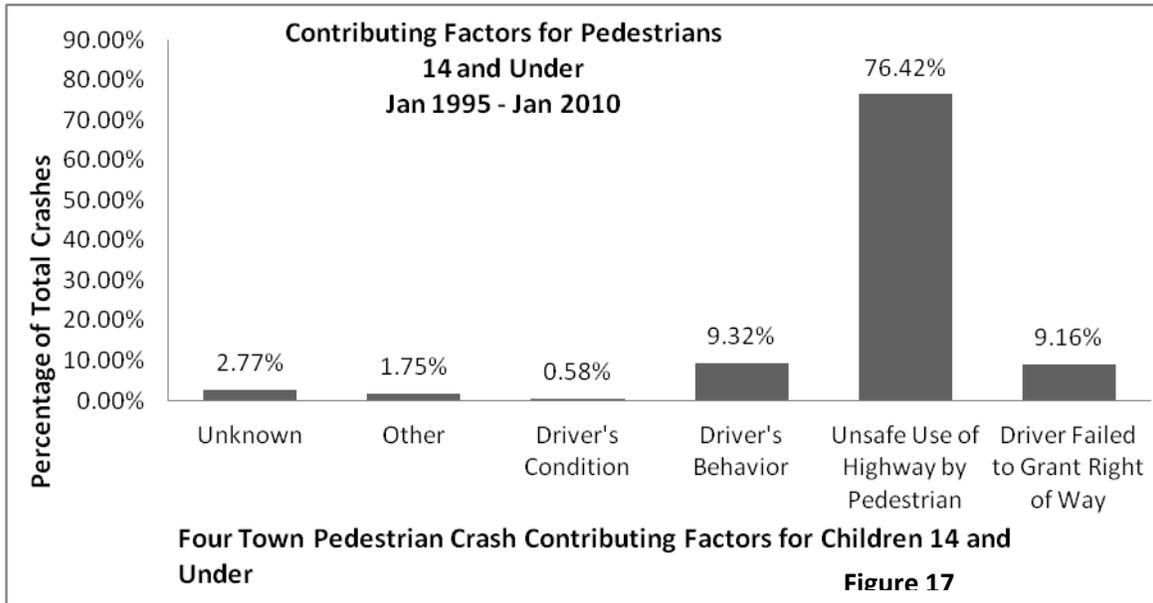


Table 9 displays the yearly totals for pedestrian crashes and fatalities in which the pedestrian was 14 years old or younger. The total number of pedestrian crashes for the Capitol Region was 3,649 as shown in Table 3. Of these 3,649 crashes, we see in Table 12 that 856 crashes (about 24 percent) involved pedestrians 14 years old and under. So therefore, roughly one quarter of pedestrian crashes involve children 14 and under. There were a total of 12 fatalities involving pedestrians 14 years old and under (this is 9 percent of the total 121 fatal crashes). So it does not appear that children are overrepresented in fatal pedestrian crashes. However, children 14 years of age and under appear to be overrepresented in pedestrian crashes overall. We also see a trend over the study period of crash occurrences decreasing. In 1995 there were 94 crashes involving children 14 and under, in 2009 there were 40 crashes involving children 14 and under.

Year	Crashes	Fatalities
1995	94	2
1996	88	3
1997	70	2
1998	75	0
1999	71	0
2000	58	3
2001	58	1
2002	59	1
2003	41	0
2004	38	0
2005	49	0
2006	37	0
2007	38	0
2008	40	0
2009	40	0
<i>Totals</i>	856	12

Bicycle Crash Analysis

Evaluation of 1995 to 2009 Data

Our earlier study did not evaluate bicycle crashes, given their infrequent occurrence over the three year study period. Having 15 years of data greatly enhances our ability to assess the characteristics of bicycle crashes in the region.

When do Bicycle Crashes Occur?

Figure 18 shows bicycle crashes by day of week. This shows a relatively even distribution of crashes across the days of the week with a decrease over the weekend. This is somewhat surprising as we might expect that there is a larger volume of bicycling taking place on weekends, with a commensurate increased rates of crashes.

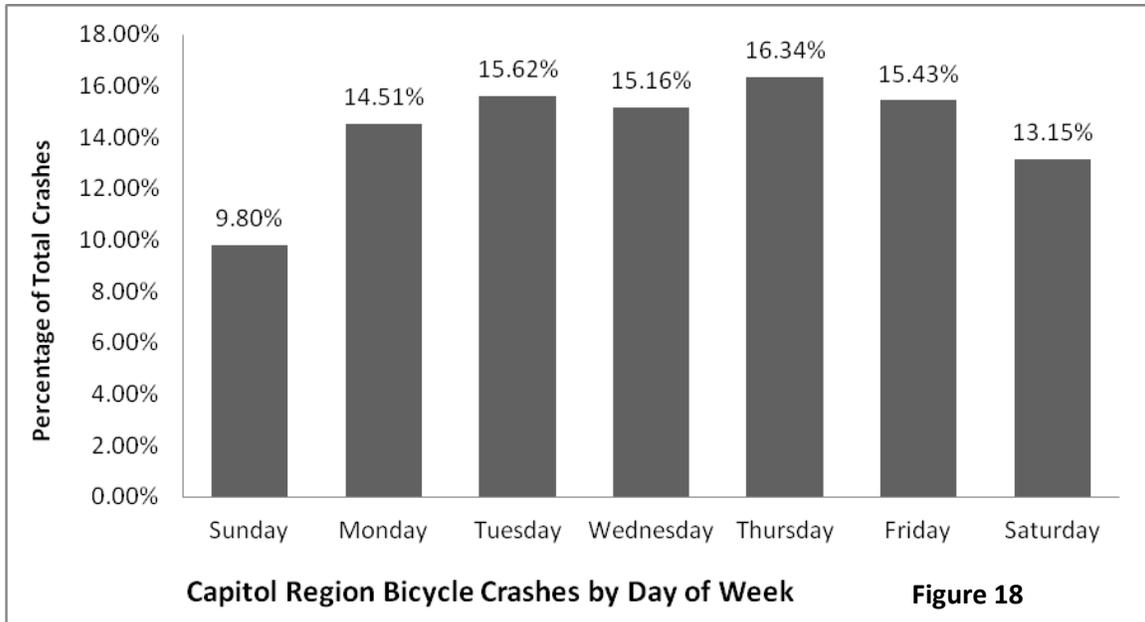


Figure 19 shows bicycle crashes by month of occurrence. Here we see a different pattern than we found with pedestrian crashes, where the highest number of crashes occurred over the months of October, November and December. With bicycle crashes, most crashes occur in the summer months of June, July and August, with the highest month being August. Additionally, the months with the fewest bicycle crashes are the winter months of December, January and February. This seems reasonable given that more individuals choose to bicycle in the warm months of the year.

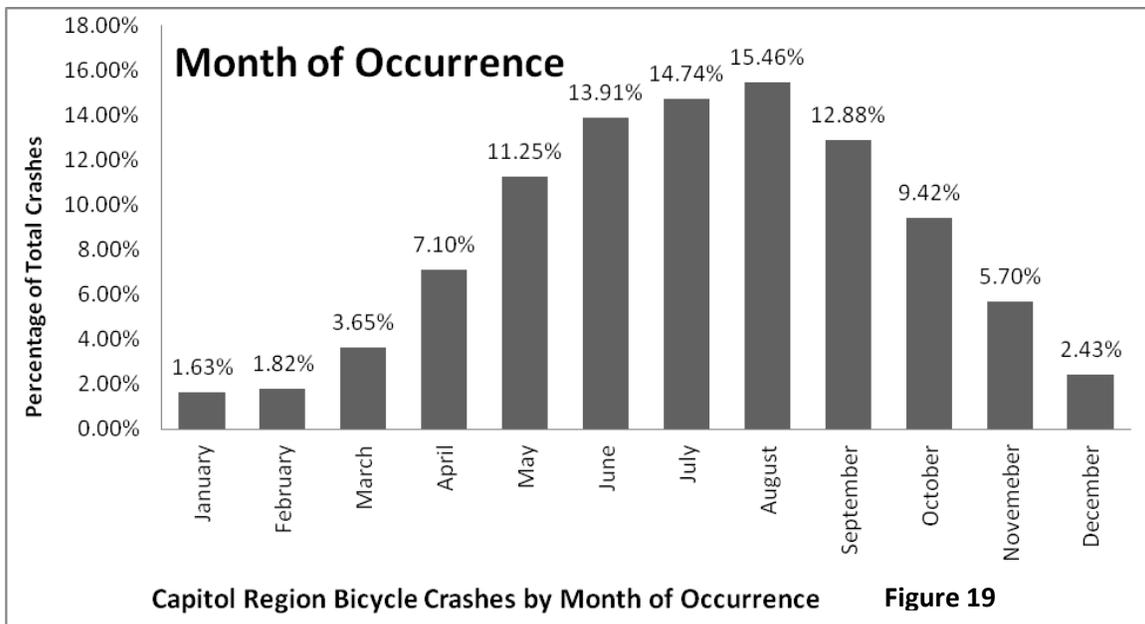
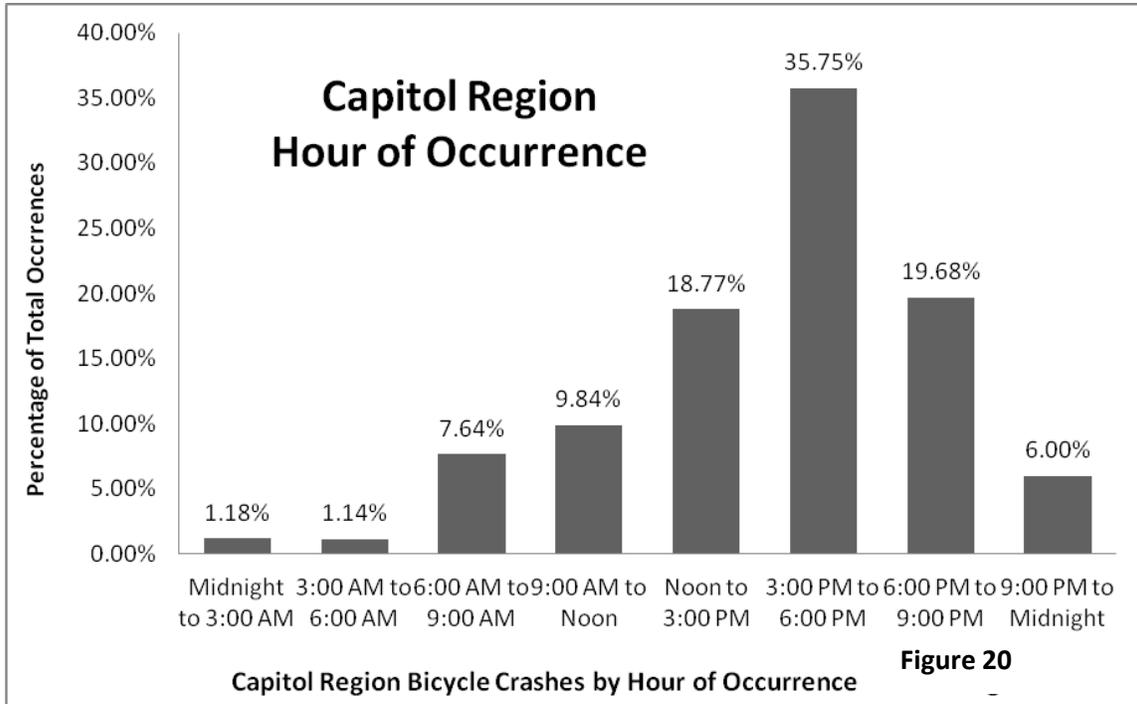


Figure 20 shows Bicycle Crashes by time of day. This shows a similar trend to pedestrian crash frequency, with 3 to 6 PM accounting for most bicycle crashes, and 6 to 9 PM the next highest. However, with the bicycle crashes, the peak in the 3 to 6 PM time period is much higher, and the noon to 3 PM period accounts for almost the same number of crashes as does the 6 to 9 PM period.



Contributing Factors for Bicycle Crashes

Analyzing the contributing factor for bicycle crashes is much more difficult than assessing the same measure for pedestrian crashes. Table 10 lists the contributing factor for the bicycle crashes, but because bicyclists are considered vehicle operators, this summary of contributing factors does not tell us if contributing factor was determined to apply to the bicyclist or motorist. Therefore, we needed to assess contributing factor for those crashes where the bicyclist was determined to be at fault and those for which the motorist was determined to be at fault.

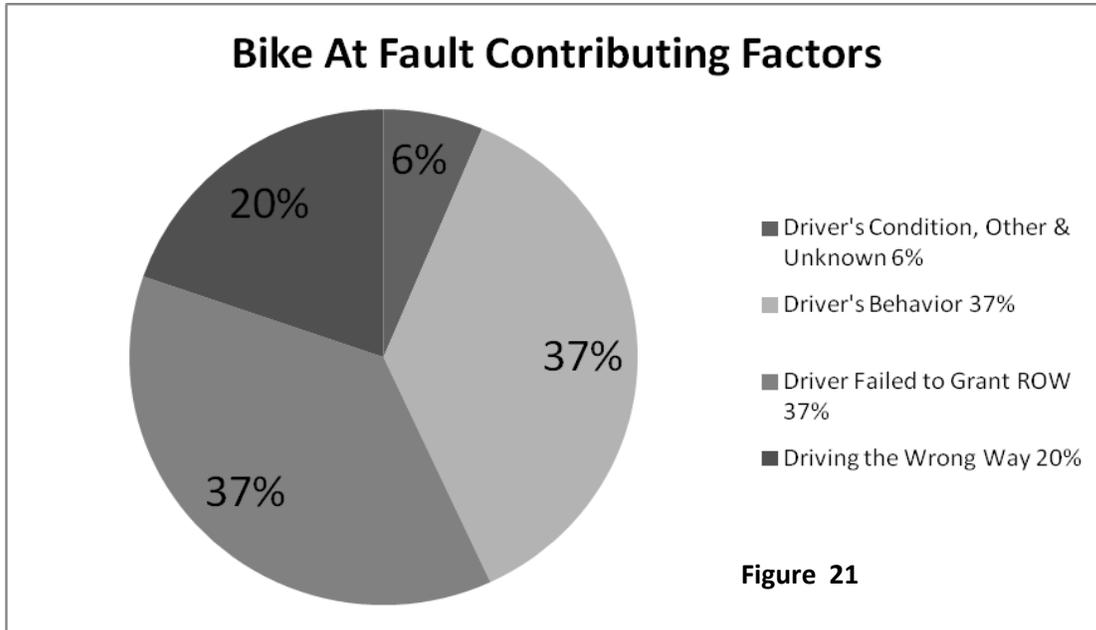
Table 10 Capitol Region Bicycle Accidents Contributing Factors	Jan 1995 - Jan 2010	
	Totals	Percentage
<u>Driver's Condition (Could be bicyclist or motor vehicle driver)</u>	25	0.95%
Driver Illness	1	0.04%
Driver Fell Asleep	1	0.04%
Under the Influence	23	0.87%
<u>Driver's Behavior(Could be bicyclist or motor vehicle driver)</u>	873	33.17%
Violated Traffic Control	383	14.55%
Entered Roadway in Wrong Direction	18	0.68%
Speed too Fast for Conditions	35	1.33%
Following Too Closely	34	1.29%
Driver Lost Control	115	4.37%
Improper Passing Maneuver	80	3.04%
Improper Lane Change	28	1.06%
Improper Turning Maneuver	152	5.78%
Unsafe Backing	28	1.06%
<u>Driver Failed to Grant Right of Way (Could be bicyclist or motor vehicle driver)</u>	1,204	45.74%
Driver Failed to Grant Right of Way	1,165	44.26%
Unsafe Right Turn on Red	39	1.48%
<u>Wrong Side of the Road (We assume this is the cyclist)</u>	342	12.99%
<u>Other</u>	107	4.07%
Driverless Vehicle	0	0.00%
Roadway Width Restricted	0	0.00%
Animal or Foreign Object in Road	0	0.00%
Driver's View Obstructed	37	1.41%
Slippery Surface	6	0.23%
Defective Equipment	25	0.95%
Vehicle Without Lights - Likely this is a cyclist	35	1.33%
Vehicle Involved in Emergency	0	0.00%
Abnormal Road Condition	2	0.08%
Disabled or Illegally Parked Vehicle	2	0.08%
<u>Unknown</u>	81	3.08%
<i>Totals</i>	2632	100.00%

Source: Connecticut Crash Data Query Tool, Capitol Region, Contributing Factors, Jan 1995 to Jan 2010

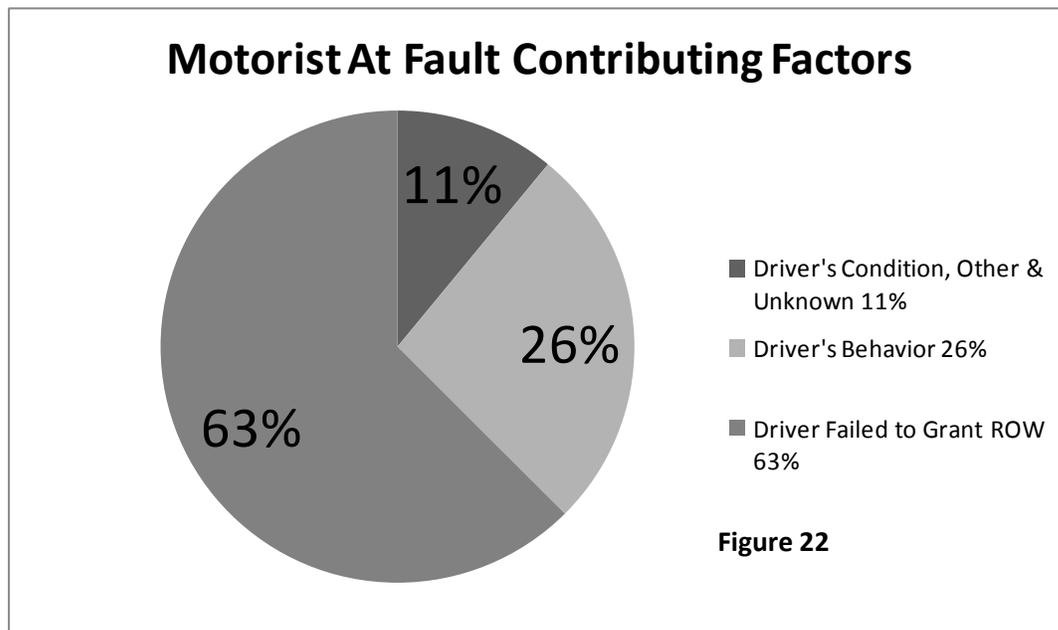
Table 11 categorizes the bicycle crashes by at fault unit. 64% of the crashes are attributed to the fault of the bicyclist, 36% to the motorist. Figure 21 and 22 show the contributing factor determined for the bicyclist at fault and the motorist at fault crashes.

TABLE 11			
Capitol Region Bike Crashes by At Fault Unit for Contributing Factors			
Contributing Factor	At Fault Unit		
	Bicyclist	Motorist	Unknown
Driver's Condition	0.66%	0.31%	0.00%
Driver Illness	0.00%	0.04%	
Fell Asleep	0.00%	0.04%	
Under the Influence	0.66%	0.23%	
Driver's Behavior	24.47%	9.41%	0.20%
Violated Traffic Control	12.10%	2.85%	
Entered Roadway in Wrong Direction	0.70%	0.00%	
Speed Too Fast For Conditions	0.78%	0.59%	
Following Too Closely	0.51%	0.66%	0.16%
Driver Lost Control	3.43%	1.01%	0.04%
Improper Passing Maneuver	1.95%	1.17%	
Improper Lane Change	1.01%	0.08%	
Improper Turning Maneuver	3.98%	1.95%	
Unsafe Backing	0.00%	1.09%	
Driver Failed to Grant Right of Way	24.75%	22.21%	0.00%
Failed to Grant Right Of Way	24.67%	20.77%	
Unsafe Right Turn on Red	0.08%	1.44%	
Driving on the Wrong Side of the Road	13.11%	0.27%	0.00%
Other	2.58%	1.44%	0.00%
Driver's View Obstructed	0.20%	1.25%	
Slippery Surface	0.16%	0.08%	
Defective Equipment	0.90%	0.08%	
Vehicle Without Lights	1.33%	0.04%	
Unknown	0.98%	2.15%	0.04%
Totals	63.97%	35.79%	0.23%

Looking only at the bicyclist at fault crashes, we see that 37% are due to the bicyclist failing to grant right of way, 37% are due to bicyclist behavior (of which approximately 50% violated traffic control), and 20% are due to wrong way riding. These statistics point up the need to educate bicyclists on how to properly operate in traffic. There may also be a need for better enforcement of traffic law for bicyclists.



Looking at the motorists, the largest contributing factor for bicycle crashes where the motorist is determined to be at fault is driver failed to grant right of way. In fact, according to Table , both motorists and bicyclists were determined to be almost equally at fault for failure to grant right of way (22% and 25% of all bicycle crashes respectively). This points up the need for education targeted to motorists on sharing the road.



Where Do Bicycle Crashes Occur?

Table 12 and Table 13 summarize the location of bicycle crashes in the capitol region towns over the 15 year period. Table 12 shows the bicycle crash rate for each town and also includes pedestrian crash rates and bike to work and walk to work rates. The 4 towns with the highest rates of bicycle crashes differ from those with the highest pedestrian crash rates, with Enfield replacing West Hartford, so the 4 towns with the highest bicycle crash rates are Hartford, Manchester, East Hartford, and Enfield. There appears to be some correlation between the bike to work rate in each town and the bicycle crash rate. Table 13 shows the actual number of crashes in each town, and here we have another difference between bicycle crashes and pedestrian crashes. The towns with the highest pedestrian crash rates also had the highest volume of pedestrian crashes. For bicycle crashes, the towns with the highest crash rates are not the towns with the highest number of crashes, with Enfield having a higher bicycle crash rate, but West Hartford a higher volume of bicycle crashes than Enfield. Table 13 highlights which towns have a higher volume of bicycle crashes than pedestrian crashes. Of note is that while Hartford has more bicycle crashes than any other town, the degree to which Hartford crashes exceed those of other towns is much less marked for bicycle crashes than pedestrian crashes.

The towns with 100% or higher difference in bicycle crashes over pedestrian crashes in the 15 year study period are Glastonbury (150%), Simsbury (125%), Somers (100%.) This may be because these communities offer bicycle routes and rides that are attractive to bicyclists.

Table 12 Crash Rate Comparisons	Bike Crash Rate Per 1000 Pop.	Bike To Work Rate Per 1000 Pop.	Pedestrian Crash Rates Per 1000 Pop.	Walk to Work Rate Per 1000 Pop.
Hartford	6.67	10.29	15.82	81.41
Manchester	5.34	4.45	4.29	14.84
East Hartford	4.47	1.89	5.4	16.18
Enfield	4	5.99	2.69	19.1
Windsor	3.47	3.72	2.92	5.25
West Hartford	3.19	1.82	4.4	25.86
Windsor Locks	3.12	4.4	3.36	10.02
Bloomfield	3	0.49	3.27	2.92
Newington	2.94	0	2.52	4.61
Vernon	2.77	0.87	2.77	29.46
Farmington	2.68	1.02	1.57	13.22
Glastonbury	2.61	1.29	1.04	10.41
Stafford	2.32	4.57	1.9	21.33
Simsbury	2.21	1.75	0.97	24.97
East Windsor	2.06	0	3.3	10.29
Wethersfield	2.02	2.66	2.8	10.87
Canton	2	8.69	1.55	22.21
Rocky Hill	1.62	1.01	1.27	15.95
Bolton	1.4	0	1.6	3.57
East Granby	1.34	0	1.34	4.99
South Windsor	1.28	0	1.16	4.1
Somers	1.22	0	0.61	5.84
Suffield	0.89	1.19	0.7	20.46
Marlborough	0.78	0	1.25	0
Ellington	0.77	0	0.7	9.55
Granby	0.71	1.64	0.71	11.01
Avon	0.66	3.95	0.94	19.76
Hebron	0.62	0	0.72	2.83
Andover	0.6	0	0.3	16.08
Tolland	0.33	0	0.8	8.65

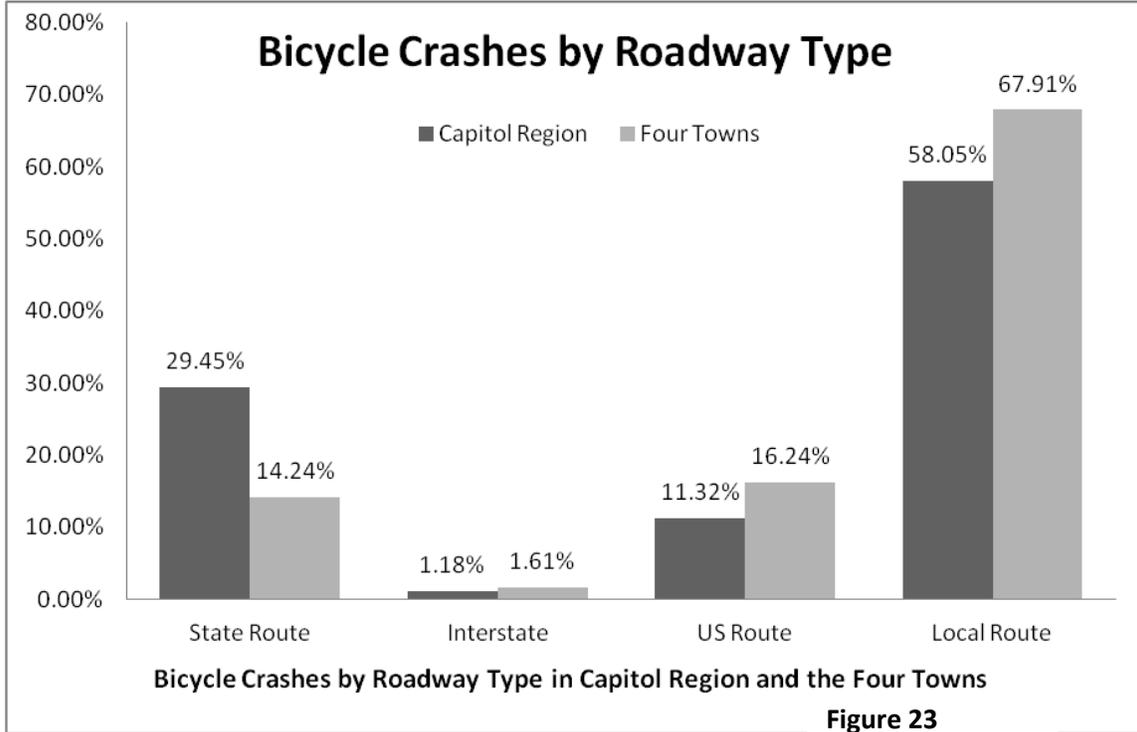
*Bicycle and Pedestrian Crashes, Jan 1995 - Jan 2010
Source:U.S. Census Bureau, 2010 American Community Survey 5 year Estimates, Means of Transportation to Work, County Subdivision Level*

Table 13	Bike Crashes	Pedestrian Crashes
Hartford	833	1,974
Manchester	311	250
East Hartford	229	277
Enfield	179	120
Windsor	101	85
West Hartford	202	280
Windsor Locks	39	42
Bloomfield	62	67
Newington	90	77
Vernon	81	81
Farmington	68	40
Glastonbury	90	36
Stafford	28	23
Simsbury	52	23
East Windsor	23	37
Wethersfield	54	75
Canton	21	16
Rocky Hill	32	25
Bolton	7	8
East Granby	7	7
South Windsor	33	30
Somers	14	7
Suffield	14	11
Marlborough	5	8
Ellington	12	11
Granby	8	8
Avon	12	17
Hebron	6	7
Andover	2	1
Tolland	5	12

**The shaded columns display the instances where the Bicycle Crash numbers exceeded the numbers of Pedestrian Crashes*
Source:U.S. Census Bureau, 2010 American Community Survey 5 year Estimates, Means of Transportation to work, County Subdivision Level

Bicycle and Pedestrian Crashes, Jan 1995 - Jan 2010

Figure 23 shows bicycle crashes by roadway type. Here we see differences between the 4 towns with the highest bicycle crash rates and the regional crashes. The four town bicycle crashes are predominantly on local roads, at 68% vs. 58% for the region. The four town bicycle crashes are then about evenly split between state routes and US routes, at about 15% each. Whereas looking at the region as a whole, there are 29% of all bicycle crashes occurring on State routes, followed by 11% on US routes. This differs somewhat from the pedestrian experience where the prevalence of crashes on local roads is even more pronounced.



Four Town Bicycle Crashes

We examined more closely the bicycle crashes in the four towns with the highest bicycle crash rates: Hartford, Manchester, East Hartford and Enfield. Table 14 lists the locations in the four towns with the highest incidence of bicycle crashes.

Street	Town	Crashes
US Route 44, Albany Avenue	Hartford	74
CT Route 83	Manchester	57
US Route 44, Burnside Avenue	East Hartford	56
US Route 005	Enfield	50
Park Street	Hartford	41
US Route 005	East Hartford	31
Farmington Ave	Hartford	23
US Route 44, Middle Turnpike	Manchester	17

The streets with the highest incidence of crashes reveal similarities to the pedestrian crash analysis. US Route 44 had similarly high crash occurrences in Hartford, East Hartford, and Manchester. Again, much like in the pedestrian study, Route 44 in Hartford had the highest crash occurrence. This road is very heavily traveled and runs through the downtown which has many shops, businesses, and an overall high level of activity which may contribute to the crash rate. Additionally US Routes tend to have higher speed limits which also correlate to the overall number and outcome of crashes. Farmington Avenue and Park Street had high occurrences for bicycle accidents which was also true with the pedestrian data set. Additionally, CT Route 83 in Manchester had high bicycle crash occurrences once more at 57 instances, even higher than the 32 occurrences that were recorded in the pedestrian portion of this study. US Route 005 in Enfield as well as East Hartford had high crash numbers too. These 50 occurrences along Route 005 in Enfield are probably what have elevated Enfield into our top tier group for bicycle crash rate.

Crash Severity

Bicycle crash severity for the four towns is very similar to that of the entire Capitol Region (Figure 24). The severity of bike crashes over the analysis period is similar to severity of pedestrian crashes. Non incapacitating but evident injury occurrence is the highest for both bike and pedestrian crashes followed then by Possible Injury, not visible. The fatal injury percentages for bicycle crashes were around 2 percent lower than the fatal injury percentages for pedestrian crashes. Data for Not Injured classification crashes was also available for the bicycle data; this returned no data in the pedestrian data set.

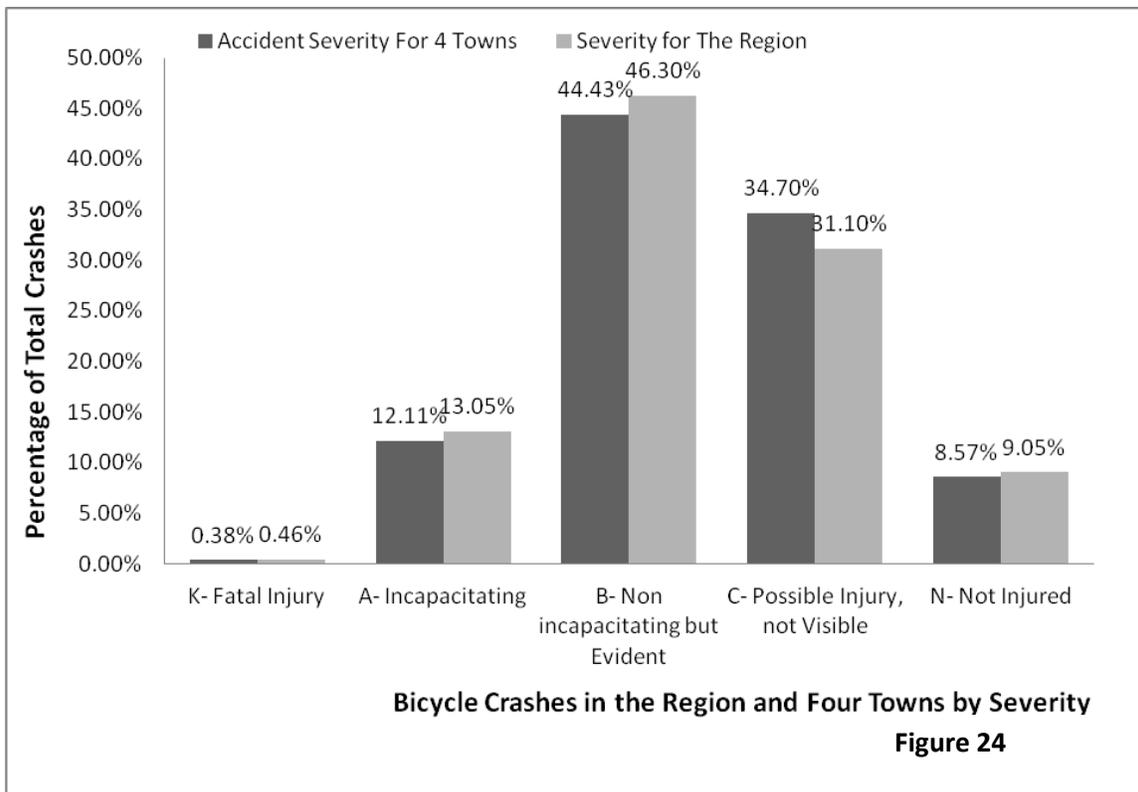


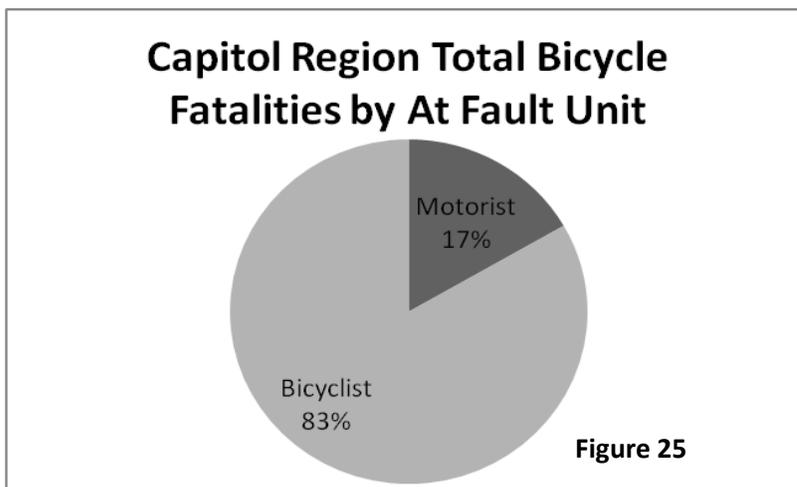
Table 15 shows the location of fatal bicycle crashes in the region and the year of occurrence. 1997 recorded the highest number of fatalities of any year in our study. Fatal crash occurrences seemed to slow down in the early 2000's, but note that recently there have been 3 fatal bicyclist accidents on Burnside Avenue (US Route 44) in East Hartford that occurred too recently to make it into the database. Additionally, it is striking to note that during this entire 15 year study window, we have seen 12 bicycle fatalities. In the past 18 months, there have been an additional 4 fatalities.

Table 15		
Regional Bike Fatalities		Jan 1995 - Jan 2010
Town	Year	Route
Enfield	1995	CT Route 190
Enfield	1997	US Route 005
East Hartford	1997	Tolland Street
Simsbury	1997	CT Route 309
Newington	1997	CT Route 173
Hartford	1998	Garden Street
Vernon	1998	CT Route 83
Vernon	1999	CT Route 30
Hartford	1999	US Route 44
Granby	2001	CT Route 10
Hartford	2006	Main Street
East Windsor	2008	US Route 005

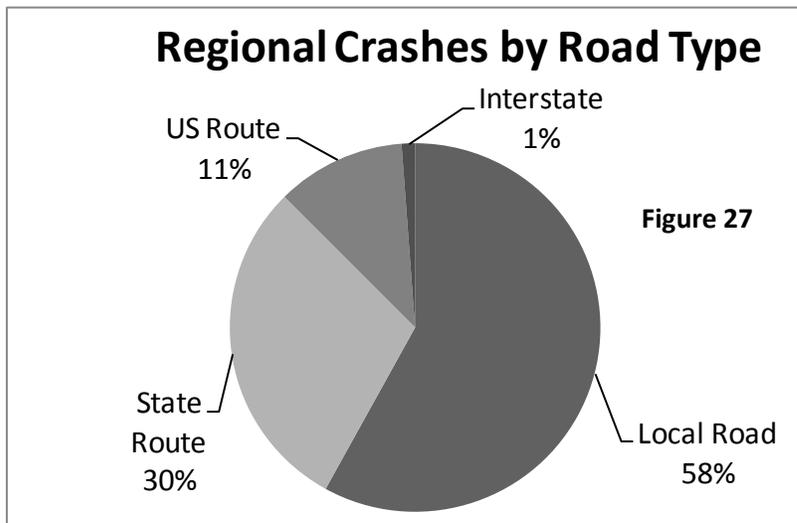
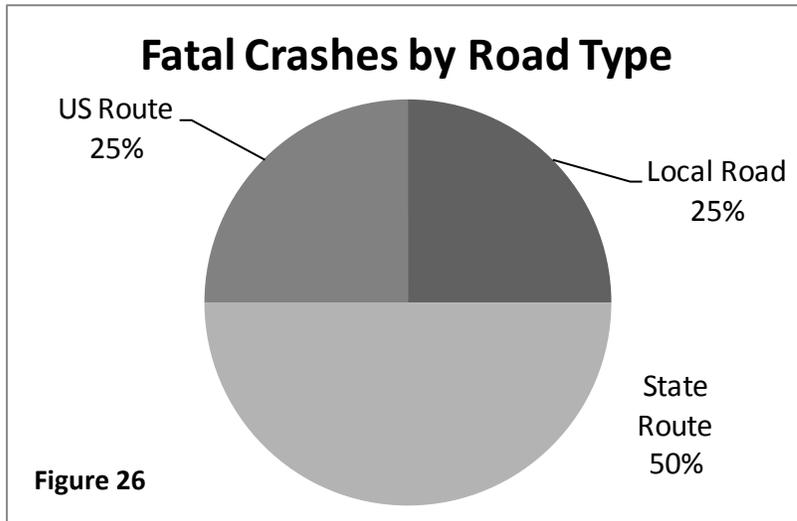
Table 16 is a comparison of Pedestrian and Bicycle crashes by year. It displays the total crashes per each year as well as the fatalities for the year. From this data it is appears that both bicycle and pedestrian crashes were trending downward, but our knowledge of crashes that have not yet been recorded in the crash data base cause concern that bicycle crashes and fatalities may currently be on an upward trend.

Year	Pedestrian Crashes	Pedestrian Fatalities	Bike Crashes	Bike Fatalities
1995	318	13	222	1
1996	299	10	213	1
1997	268	18	205	4
1998	276	10	186	2
1999	290	11	218	2
2000	262	13	189	0
2001	209	7	172	1
2002	210	9	151	0
2003	200	6	119	0
2004	188	6	143	0
2005	220	9	151	0
2006	193	5	137	1
2007	248	2	178	0
2008	245	10	175	1
2009	223	4	173	0
TOTAL	3649	133	2632	13

The determinant of at fault unit differs between bicycle crashes and fatal crashes, with 83% of bicyclists at fault for fatal crashes, vs 64 % for all bicycle crashes. However, this finding may be skewed by the small number of fatal crashes over the study period.

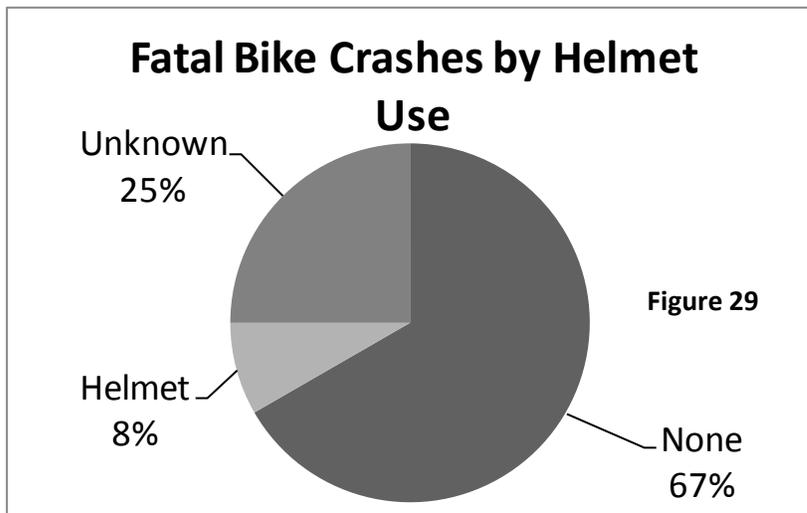
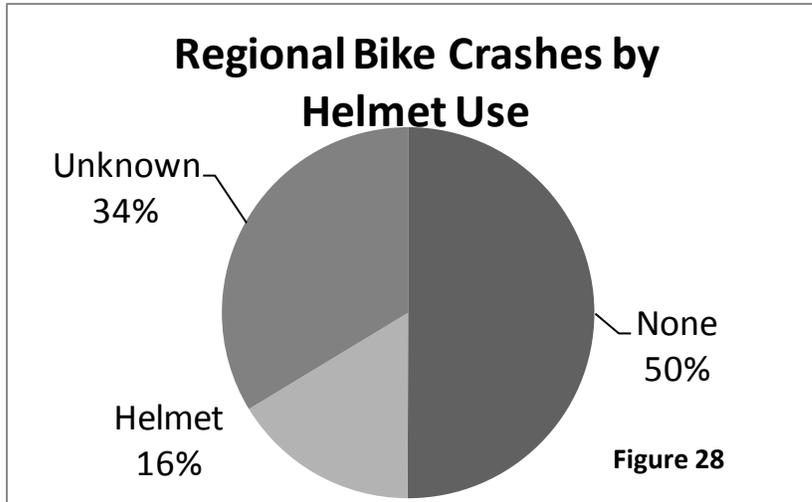


The location of fatal bicycle crashes differs from the location of all bicycle crashes with more fatal crashes occurring on state and US routes, rather than local roads.



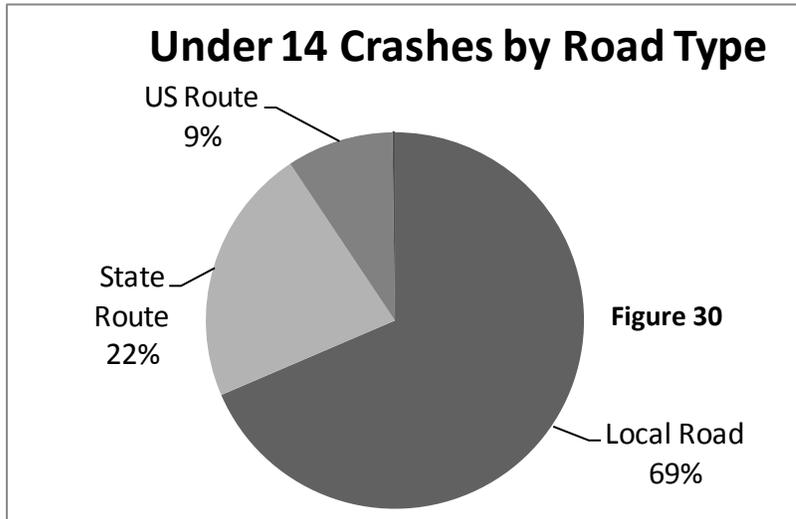
Helmet Use and Bicycle Crashes

We evaluated helmet use for fatal crashes and for all crashes as shown below. While we cannot determine cause and effect from this data, more bicyclists in fatal crashes are not wearing helmets than those involved in all crashes.

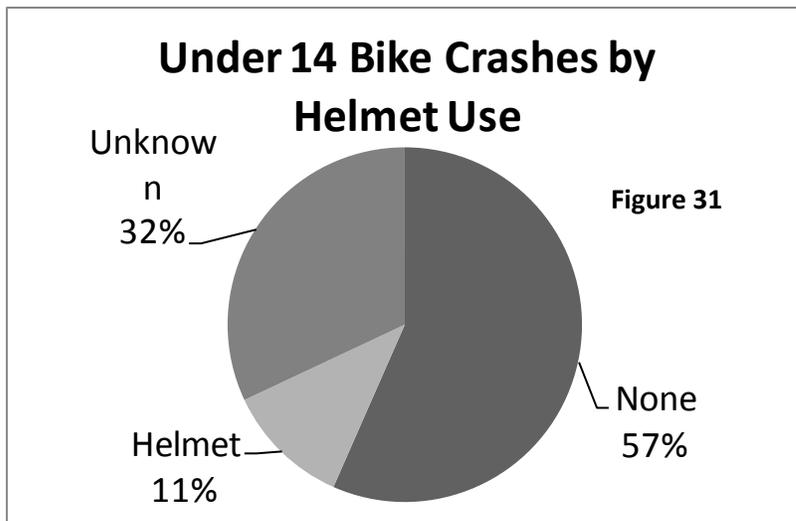


Bicycle Crash Statistics – Children

Bicycle crashes for children 14 and younger are more likely to occur on local roads - 70% vs 58% for all bicycle crashes. (Figure 30)



57% of children under 14 involved in bicycle crashes are not wearing a helmet (Figure 31).



Helmet usage by children involved in bicycle crashes seems to decline as children get older (see Figure 32).

Table 17 shows that children under 14 are overrrpresented in bicycle crashes (59% of the total), but a lower percentage of total fatalities are for children 14 and under.

Under 14 Crashes with No Helmet by Age

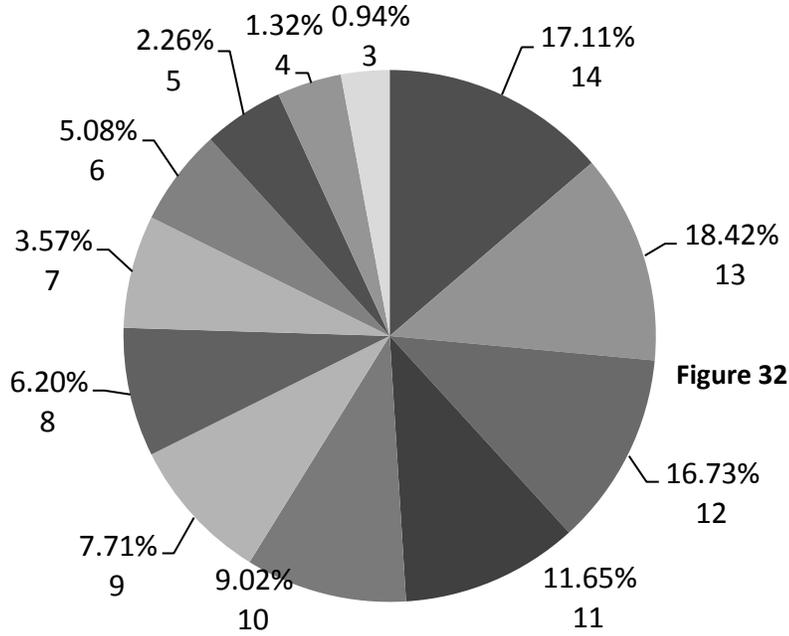


Table 17

Bicycle Fatalities by Year for 14 years and Under

Year	Crashes	Fatalities
1995	90	0
1996	87	0
1997	77	2
1998	76	0
1999	94	1
2000	71	0
2001	56	0
2002	49	0
2003	41	0
2004	52	0
2005	53	0
2006	37	0
2007	51	0
2008	53	1
2009	36	0
Totals	923 – 59%	4 – 33%