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Analysis of Fatal Motor Vehicle Traffic Crashes and Fatalities at Intersections, 1997 to 2004

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Acknowledgement:

The work in this report builds upon the pioneering work of Barry Eisemann in creating geocoded FARS data, and the work of Majka, Blatt, and Flanigan, researchers at the Center for Transportation Injury Research (CenTIR) on analyzing Geocoded FARS data (see Majka et. al., 2006). An outgrowth of their work was that the need and feasibility became clear for a more comprehensive analysis of fatal intersection crashes.

As a result, NCSA began to work on the intersection safety problem. Rajesh Subramanian created the Geocoded Intersection Safety Analysis Tool (GISAT) that provided aerial images (where available from Google Earth and Local Live) for each of ~30,000 geocoded fatal crash locations for the years 2001-2004. This is a subset of the Highway Infrastructure Safety Analysis Tool (HISAT) that adds the aerial images of all roadway locations, as available, for all ~130,000 geocoded fatal crash locations in FARS since 2001. These tools permit a wide variety of safety analyses to be performed by safety researchers in the future. Illustrative examples are shown in Appendix 4. Aerial Images have not been presented due to copyright restrictions. However, web links to the images have been provided.

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16. Abstract

This report aims to characterize the drivers, infrastructure, and environment associated with fatal motor vehicle traffic crashes that occur at roadway intersections in the United States. Trends of these characteristics have been presented for the eight-year period from 1997 to 2004, the latest year for which such data was available at the time of this analysis. Of particular interest are the type and condition of traffic control devices present at the intersection, potential driver and environment-related contributing factors, as well as violations that were charged to the drivers involved in the crashes.

Although fatal crashes represent a small proportion of all motor vehicle traffic crashes, they cause considerable emotional and economic trauma to surviving family members and economic losses to society. In 2004, about 9,400 people were fatally injured in motor vehicle traffic crashes that occurred at intersections or were intersection-related. This represents slightly more than 20 percent of all fatalities that occurred in motor vehicle traffic crashes in the United States.

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Executive Summary

This technical report provides an analysis of fatal motor vehicle traffic crashes at intersections. The research in this report is intended to support the U.S. Department of Transportation Cooperative Intersection Collision Avoidance Systems (CICAS) program with a descriptive analysis of infrastructure-, driver-, and vehicle-related factors in fatal motor vehicle crashes at intersections. The scope of the analysis in this report is to present univariate distributions of crash attributes. Multivariate analyses of crash attributes are beyond the scope of this report and will be taken up in future research activities.

Intelligent intersection systems offer a significant opportunity to improve safety by enhancing driver decision-making at intersections that will help drivers avoid crashes. Intersection collision avoidance systems use both vehicle-based and infrastructure-based technologies to help drivers approaching an intersection understand the state of activities within that intersection. Cooperative intersection collision avoidance systems (CICAS) have the potential to warn drivers about likely violations of traffic control devices and to help them maneuver through cross traffic. Eventually, CICAS technologies may also be used to inform other drivers (i.e., potential victims) about impending violations as well as identify pedestrians and cyclists within an intersection.

There are three major program areas currently being implemented under CICAS, namely, CICAS-Violation (CICAS-V) for violations of traffic signals and stop signs, CICAS-Signalized Left Turn Assist (CICAS-SLTA) for assisting left turns at signalized intersections, and CICAS-Stop Sign Assist (CICAS-SSA) for providing vehicle gap assessment assistance at stop-sign-controlled intersections. One of the objectives of this report is to identify fatal crash populations under each of these scenarios and vehicle-, driver-, and infrastructure-related factors in these crashes. It should be noted that the CICAS program is not just about preventing fatal crashes. CICAS is also investigating the crash population and characteristics of non-fatal intersection crashes.

Fatalities in crashes occurring at intersections account for slightly more than 20 percent of all motor vehicle traffic fatalities in the United States every year. Of particular interest in this report were crashes that involved at least one driver who violated a traffic control device or failed to yield properly at a traffic control device *(Figure 3, Page 11)*.

Two-vehicle crashes that comprise a majority of the multiple-vehicle crashes thought to be applicable under CICAS countermeasures were analyzed in this report. In the period between 1997 and 2004, there were 800 fatalities on average each year in two-vehicle crashes that involved at least one driver who ran a red light. Correspondingly, there were 1,336 fatalities on average each year in two-vehicle crashes at stop signs that involved at least one driver who ran a stop sign *(Table 16, Page 34)*.

Older drivers (65 and older) were involved more in fatal crashes occurring at intersections as compared to those that occurred at non-intersection areas. In fact, 31 percent of all fatal crashes occurring at intersections involved at least one older driver as compared to 13 percent of all crashes occurring at non-intersection areas *(Figure 18, Page 72)*. Also, older drivers were shown to

have a higher involvement in fatal, two-vehicle intersection crashes as compared to drivers of all other ages (*Table 49, Page 73*). In particular, the older drivers were more involved in failure-to-yield crashes at both traffic signals and stop signs. The failure-to-yield scenarios imply that after these drivers properly obeyed the traffic control device, i.e., they stopped at a traffic signal or a stop sign, they did not yield to another vehicle that had the right-of-way. The vehicles driven by the older drivers were predominantly turning left at traffic signals and were struck by an oncoming vehicle on the passenger side. At stop signs, the vehicles driven by the older drivers were either proceeding straight or turning left at the intersection when an approaching vehicle on the driver side struck them. A majority of the occupant fatalities in these two vehicle crashes occurred to the older people (drivers and passengers). A large proportion of the crashes involving the older drivers occur during non-rush, daytime hours (9 a.m. to 3 p.m.) (*Table 55, Page 80*).

On an average each year about 2,982 fatalities, about 31 percent, occur in crashes at intersections controlled by traffic signals; 3,643 fatalities, about 38 percent, occur at intersections controlled by stop signs and 2,593 fatalities, or about 27 percent, occur at intersections with no traffic control devices (*Table 2, Page 12*).

About 7,964 fatalities on an average each year, or 84 percent, occurred within the limits of the intersection while the remaining 1,557 fatalities were intersection-related, i.e., they occurred on the approach to or an exit from an intersection and the actions of the vehicles were related to the movement through the intersection (*Table 2, Page 12*).

About 84 percent of the fatalities in intersections controlled by traffic signals occurred in urban areas as compared with 37 percent of the fatalities in intersections controlled by stop signs that occurred in urban areas (*Table 4, page 15*).

In the period between 1997 through 2004, the highest number of fatal crashes at intersections controlled by traffic signals in a State was 2,521 crashes in California, followed by 2,483 crashes in Florida. The highest number of fatal crashes occurring at intersections controlled by stop signs in a State was 2,137 crashes in Texas followed by Florida with 2,112 crashes (*Table 5, Page 17*).

Fatal crashes at signal-controlled intersections accounted for about 25 percent of all fatal crashes in the District of Columbia followed by New York (16%), Delaware (15%), Arizona, Florida, and Nevada each at 11 percent. Arkansas, Mississippi, Montana, and Vermont had the lowest percentage (1%) represented by such crashes. Fatal crashes at stop-sign-controlled intersections accounted for 14 percent of all fatal crashes in Minnesota and Wisconsin – the highest percentage among the States. In Alaska, New Hampshire, and Wyoming, only 3 percent of all fatal crashes occurred at intersections controlled by stop signs – the lowest such percentage among the States (*Table 5, Page 17*).

At traffic signals, on an average, each year, about 2,126 fatalities, or about 78 percent of the fatalities, occurred to vehicle occupants while the remaining occurred to nonoccupants (pedestrians, pedalcyclists, etc.). At stop signs 3,463 fatalities, or about 95 percent of the fatalities, occurred to occupants of vehicles (*Table 7, Page 23*).

On an average each year, there were 5,589 fatalities to occupants of vehicles and 794 fatalities to nonoccupants in intersections controlled by traffic signals and stop signs (*Table 7, Page 23*).

Of the 794 fatalities to nonoccupants at intersections controlled by stop signs and traffic signals, 613, or about 77 percent, occurred in intersections controlled by traffic signals (*Table 7, Page 23*).

Single-vehicle crashes either involve a nonoccupant fatality or a fatality to an occupant of a vehicle that hit a fixed object at the intersection like a tree, embankment, curb, etc. CICAS technology may be effective in addressing only a portion of single-vehicle crashes such as those swerving to avoid a pedestrian, etc. While CICAS may have an effect on these crashes, CICAS primarily targets multiple-vehicle crossing-path crashes. Multiple-vehicle crashes, especially two-vehicle crashes, were hence analyzed in greater detail. In fact, close to 90 percent of all multiple-vehicle crashes were two-vehicle crashes.

Two-vehicle crashes were organized into failure-to-obey crashes and failure-to-yield crashes for both traffic signals and stop signs. Failure-to-yield violations are less egregious violations than failure-to-obey violations, in that these scenarios result after obeying a traffic control but not yielding the right-of-way. Failure-to-obey crashes at traffic signals represent a running-the-red-light scenario that are addressed by CICAS-V. Failure-to-yield crashes at traffic signals are usually left-turn-into-oncoming-vehicle scenarios that will be addressed by CICAS-SLTA. Failure-to-obey crashes at stop signs are violations of stop sign rules intended to be covered under CICAS-V. Failure-to-yield crashes at stop signs are addressed by CICAS-SSA.

On average each year, there are 1,578 fatalities in two-vehicle crashes in intersections controlled by traffic signals. About 800, or 51 percent, had a coded failure-to-obey violation, i.e., these crashes involved a driver who ran a red light. About 460, or 29 percent, were failure-to-yield crashes, i.e., one of the involved drivers failed to yield the right-of-way at a traffic signal (*Table 16, Page 34*).

In intersections controlled by stop signs, an average of 2,967 fatalities occurred each year with 1,336, or about 45 percent, in failure-to-obey crashes and 1,430, or about 48 percent occurring in failure-to-yield crashes (*Table 16, Page 34*).

In intersections controlled by traffic signals, 43 percent of the crashes were Straight Crossing Path (SCP) crashes while 31 percent were Left Turn Across Path/Opposite Direction (LTAP/OD) crashes. In failure-to-obey crashes, about 65 percent were SCP crashes. In failure-to-yield crashes about 69 percent were LTAP/OD crashes (*Table 18, Page 37*).

For stop signs, 70 percent of the crashes were Straight Crossing Path crashes while 18 percent were Left Turn Across Path/Lateral Direction (LTAP/LD) crashes. In failure-to-obey crashes, about 84 percent were SCP crashes. In failure-to-yield crashes about 61 percent were SCP crashes while 26 percent were Left Turn Across Path/Lateral Direction crashes (*Table 18, Page 37*).

About 93 percent of the fatal two-vehicle crashes at traffic signals occurred within the intersection and about 97 percent of the traffic crashes at stop signs occurred within the intersection (*Table 19, Page 38*).

About 44 percent of the failure-to-obey crashes in rural traffic signals occurred on principal arterial roads and 24 percent occurred on minor arterial roads. In contrast, about 32 percent of the failure-to-obey crashes at rural stop signs occurred on major collector roads. Also, 28 percent of the failure-to-yield crashes at rural stop signs occurred on principal arterial roads (*Table 22, Page 41*).

In urban intersections controlled by traffic signals, about 59 percent of the failure-to-obey and 59 percent of the failure-to-yield crashes occurred on principal arterial roads. At urban stop signs, 34 percent of the failure-to-obey crashes occurred on local roads while 44 percent of the failure-to-yield crashes occurred on principal arterial roads (*Table 23, Page 42*).

Fatal failure-to-obey crashes at traffic signals are more likely to occur on two-lane roads, followed by four-lane roads. This was also true of failure-to-yield crashes at traffic signals. Among these two- and four-lane roads, roads that had a median without a barrier recorded more crashes than undivided roads (*Table 25, Page 44*). However, in the case of stop-sign controlled intersections, undivided two-lane roads accounted for a major proportion of both failure-to-yield and failure-to-obey crash (*Table 26, Page 45*).

Slightly less than half of all failure-to-yield and failure-to-obey crashes at traffic signals occurred on roadways with posted speed limits between 40-50 mph . However, among crashes at stop-sign controlled intersections, slightly more than half of the both failure-to-yield and failure-to-obey crashes occurred at roads with a posted speed limit of 55 mph or greater (*Pages 46-47*).

The intersection crashes in rural areas occur on roads with posted speed limits higher than those roads on which urban intersection crashes occur. This disparity is greater for crashes at stop signs as compared to those at traffic signals (*Pages 46-47*).

More than 90 percent of the crashes at both traffic signals and stop signs occur under normal weather conditions. About 7 percent have occurred under rainy conditions (*Table 29, Page 48*).

About 87 percent of the crashes occur under dry roadway surface conditions at both traffic signals and stop signs. About 12 percent of the two-vehicle crashes occurred when the roadway surface was wet (*Table 30, Page 49*).

About 85 percent of the crashes at traffic signals occurred on level roadways while 11 percent occurred on roadways that were at a grade. While 15 percent of the failure-to-obey stop-sign crashes occurred on a graded roadway, 18 percent of the failure-to-yield crashes occurred on a graded roadway (*Table 31, Page 50*).

A large majority of failure-to-yield and failure-to-obey two-vehicle crashes at both traffic signals and stop signs occurred on straight sections of the roadway (*Table 32, Page 51*).

At traffic signals, about 70 percent of the failure-to-obey crashes occurred on roadways that were not part of the National Highway System (NHS), while 74 percent of the failure-to-yield crashes were not part of the NHS. At stop signs, about 83 percent of the failure-to-obey crashes occurred

on roadways that were not part of the NHS while 73 percent of the failure-to-yield crashes were on roadways that were not part of the NHS (*Table 34, Page 53*).

At traffic signals, the highest number of failure-to-obey crashes occurred in the morning time periods, especially between 9 a.m. and noon, while the highest number of failure-to-yield crashes occurred in the early evening time period, between 3 p.m. and 6 p.m. At stop signs, the number of both the failure-to-obey and failure-to-yield crashes peaked in the early evening hours between 3 p.m. and 6 p.m. (*Table 36, Page 55*).

Both newer and older model vehicles were involved in fatal, two-vehicle failure-to-obey and failure-to-yield crashes at both traffic signals and stop signs. In fact, 30 percent of the vehicles involved in fatal, two-vehicle failure-to-obey crashes at traffic signals were 10 years old or older (*Table 39, Page 58*).

In failure-to-obey crashes at traffic signals, 56 percent of the vehicles involved were passenger cars while 70 percent of the occupant fatalities occurred to occupants of passenger cars. In such crashes, while 4 percent of the vehicles involved were motorcycles, 7 percent of the occupant fatalities were motorcyclists. While 16 percent of the vehicles involved were pickup trucks, 10 percent of the occupant fatalities were pickup truck occupants. In failure-to-yield crashes at traffic signals, 71 percent of the vehicles involved were passenger cars while 83 percent of the occupant fatalities occurred to occupants of passenger cars. While 9 percent of the vehicles involved were pickup trucks, 6 percent of the occupant fatalities were occupants of pickup trucks (*Table 40, Page 60*).

In failure-to-obey crashes at stop signs, 61 percent of the vehicles involved were passenger cars while 68 percent of the occupant fatalities occurred to occupants of passenger cars. While 7 percent of the vehicles involved were SUVs, 5 percent of the occupant fatalities were SUV occupants. While 19 percent of the vehicles involved were pickup trucks, 15 percent of the occupant fatalities were pickup truck occupants. In failure-to-yield crashes at stop signs, 71 percent of the vehicles involved were passenger cars while 79 percent of the occupant fatalities occurred to occupants of passenger cars. While 13 percent of the vehicles involved were pickup trucks, 10 percent of the occupant fatalities were occupants of pickup trucks (*Table 40, Page 60*).

In vehicles that failed-to-obey at traffic signals, 55 percent of the occupant fatalities were in the struck vehicle while 82 percent of the occupant fatalities in vehicles that failed-to-yield were in struck vehicles. At stop signs, 72 percent of the occupant fatalities in failure-to-obey vehicles were in struck vehicles as compared to 89 percent of the occupants in failure-to-yield vehicles (*Table 41, Page 61*).

In traffic signals, for about 66 percent of the vehicles that failed-to-obey, the initial point of impact was the front while for about 50 percent of the failure-to-yield vehicles, the initial point of impact was on the right (passenger) side. At stop signs, for about 43 percent of the vehicles that failed-to-obey, the initial point of impact was the front while for about 55 percent of the failure-to-yield vehicles, the initial point of impact was on the left (driver) side (*Table 42, Page 63*).

A large proportion of the occupant fatalities in two-vehicle crashes occurred to occupants of passenger cars who were struck by other passenger cars, pickup trucks, and large trucks (*Table 43, Page 65*).

At traffic signals, about 9 percent of the occupant fatalities in failure-to-obey vehicles occurred when the vehicles rolled over subsequent to the impact as compared to 4 percent of the failure-to-yield vehicle occupant fatalities. At stop signs, about 13 percent of the occupant fatalities in failure-to-obey vehicles occurred when the vehicles rolled over subsequent to the impact as compared to 6 percent of the failure-to-yield vehicle occupant fatalities (*Table 46, Page 69*).

A greater proportion of failure-to-yield vehicles, as compared to failure-to-obey vehicles, had two or more occupants in the vehicles at both traffic signals and stop signs (*Table 47, Page 70*).

More than 90 percent of the crashes had no vehicle-related factors such as brake-system failures and tires at traffic signals (*Table 48, Page 71*).

A key finding in this analysis related to the older driver's involvement in fatal two-vehicle intersection crashes. Among drivers of all ages involved in fatal two-vehicle crashes, about 14 percent were in crashes at intersections controlled by traffic signals and stop signs. However, among the older drivers, about 24 percent were involved in two-vehicle crashes at intersections controlled by traffic signals and stop signs. This proportion ranged from 12 percent to 14 percent for all the other age groups. This clearly indicates that when older drivers are involved in fatal crashes, they are more likely to be involved in fatal, two-vehicle crashes at intersections as compared to drivers of other age groups (*Page 72*).

About 18 percent of all drivers who ran a red light were older (65 or older) drivers. However, among drivers who failed to yield at traffic signals, 34 percent were older drivers. In crashes that occurred at intersections controlled by stop signs, 23 percent of those charged with failure-to-obey violations were older drivers as compared to 40 percent of all drivers charged with a failure-to-yield violation (*Table 50, Page 75*).

At traffic signals, while 75 percent of the failure-to-obey older drivers were going straight, 86 percent of the failure-to-yield older drivers were turning left. At stop signs, 79 percent of the failure-to-obey older drivers were going straight while 45 percent of the failure-to-yield drivers were going straight and 35 percent were turning left (*Table 52, Page77*).

At traffic signals, about 55 percent of the failure-to-obey older drivers were struck as compared to 80 percent of the older failure-to-yield drivers. At stop signs, about 75 percent of the failure-to-obey older drivers were struck as compared to 88 percent of the older failure-to-yield drivers (*Table 53, Page 78*).

At traffic signals, about 28 percent of the failure-to-obey drivers were females as compared to 39 percent of the failure-to-yield drivers. At stop signs, about 32 percent of the failure-to-obey drivers were females as compared to 42 percent of the failure-to-yield drivers (*Table 58, Page 83*).

At traffic signals, about 20 percent of the failure-to-obey drivers were legally intoxicated (blood alcohol concentration [BAC] = .08+ grams per deciliter) as compared to 11 percent of the failure-to-yield drivers. At stop signs, about 16 percent of the failure-to-obey drivers were legally intoxicated as compared to 8 percent of the failure-to-yield drivers (*Table 59, Page 84*).

At traffic signals, about 16 percent of the failure-to-obey drivers were cited for speeding as compared to 3 percent of the failure-to-yield drivers. At stop signs, about 10 percent of the failure-to-obey drivers were cited for speeding as compared to 2 percent of the failure-to-yield drivers (*Table 60, Page 85*).

At traffic signals, about 17 percent of the failure-to-obey drivers were driving with an invalid license as compared to 10 percent of the failure-to-yield drivers. At stop signs, about 15 percent of the failure-to-obey drivers were driving with an invalid license as compared to 8 percent of the failure-to-yield drivers (*Table 61, Page 86*).

Driver inattention/distraction/drowsiness was cited as a factor for 12 percent of the failure-to-obey drivers at traffic signals as compared to 10 percent of the failure-to-yield drivers at traffic signals. At stop signs, for about 11 percent of the failure-to-obey drivers, inattention/distraction/drowsiness was coded as a factor as compared to 10 percent of the failure-to-yield drivers (*Table 62, Page 88*).

The percentage of unrestrained fatally injured occupants is higher in crashes at stop signs as compared to traffic signals (*Table 63, Page 89*).

About 70 percent of the crashes that occurred on intersections with no traffic control device were on undivided, two-lane roads. About 60 percent of such crashes in rural areas were on high-speed roads (55+ mph) while about 51 percent of such crashes in urban areas were on low-speed roads (under 35 mph) (*Table 68, Page93*) (*Table 70, Page 95*).

1. Introduction

The Cooperative Intersection Collision Avoidance Systems initiative of the U.S. Department of Transportation states the following objective:

Intelligent intersection systems offer a significant opportunity to improve safety by enhancing driver decision-making at intersections that will help drivers avoid crashes. Intersection collision avoidance systems use both vehicle-based and infrastructure-based technologies to help drivers approaching an intersection understand the state of activities within that intersection. Cooperative intersection collision avoidance systems (CICAS) have the potential to warn drivers about likely violations of traffic control devices and to help them maneuver through cross traffic. Eventually, CICAS may also inform other drivers (i.e., potential victims) about impending violations as well as identify pedestrians and cyclists within an intersection.

The CICAS-V countermeasures use vehicle and infrastructure-based communication technologies to alert drivers of conditions at the intersection to avoid potential violations.

This report describes the characteristics of fatal motor vehicle traffic crashes that occur at roadway intersections in the United States, specifically describing in greater detail those that involved violations where a driver was coded with a failure-to-obey or failure-to-yield violation of a properly functioning traffic control device at the intersection. Intersections are usually controlled by a traffic light or a stop sign while there are others that are not controlled by any traffic control device. This report will analyze driver, vehicle, and environmental factors that are associated with fatal crashes that resulted from a violation of a traffic control device.

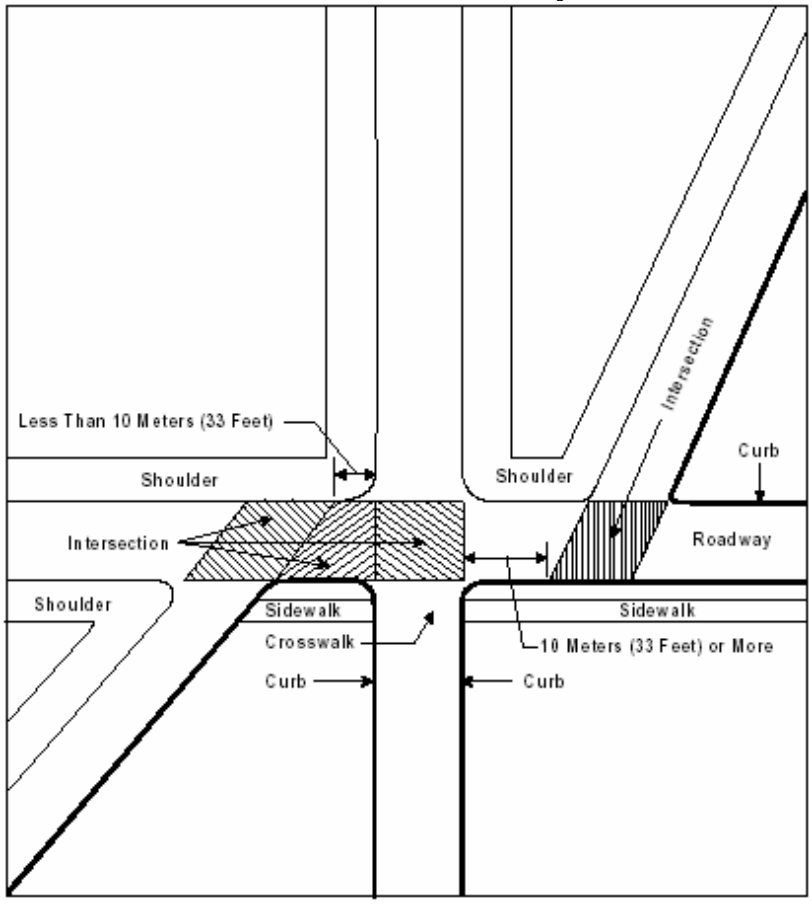
The data presented in this report are from NHTSA's Fatality Analysis Reporting System. The data are from the final FARS files from 1997 to 2003 and the Annual Report File (ARF) for 2004. FARS identifies crashes that occur at intersections and codes them as within-intersection crashes or intersection-related crashes.

The American National Standards Institute (ANSI) D-16 Manual on the classification of motor vehicle traffic crashes, in its article 2.5.10, defines an intersection as an area which

- Contains a crossing or connection of two or more roadways not classified as driveway access, and
- Is embraced within the prolongation of the lateral curb lines or, if none, the lateral boundary lines of the roadways. Where the distance along a roadway between two areas meeting these criteria is less than 10 meters (33 feet), the two areas and the roadway connecting them are considered to be parts of a single intersection.

Figure 1 (overleaf) depicts the schematic of intersections as defined by ANSI D-16.

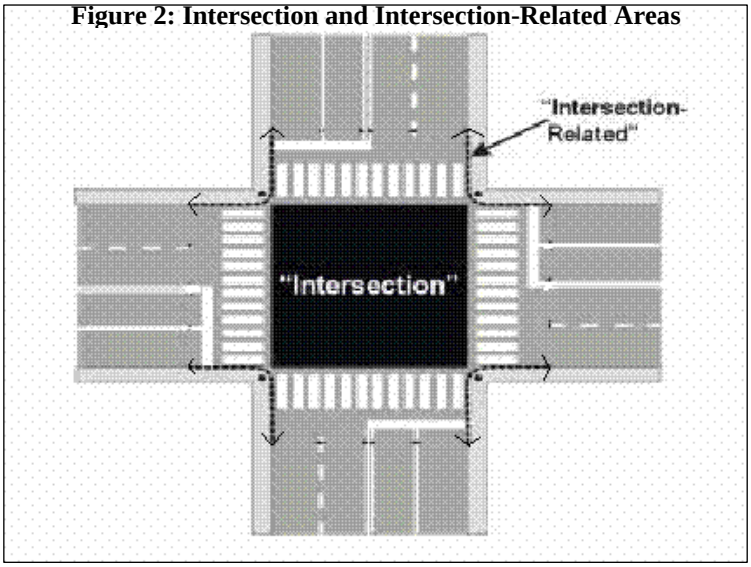
Figure 1: Schematic of Intersections as defined by ANSI D-16 Article 2.5.10



Source: ANSI D-16, Article 2.5.10, Figure 5

ANSI defines a traffic crash as a within-intersection crash if the first harmful event occurred within the limits of an intersection. A traffic crash is considered to be intersection-related if the first harmful event occurs on an approach to or exit from an intersection and results from an activity, behavior or control related to the movement of traffic units through the intersection, as shown in Figure 2 (1). Junctions between driveways and trafficways are considered driveway accesses and are <u>not</u> counted as intersections.

Figure 2: Intersection and Intersection-Related Areas



In the period from 1997 to 2004, a total of 69,198 fatal crashes occurred at intersections. About 83 percent, or 57,535 crashes, were within-intersection crashes and the remaining 11,663 crashes were coded as being intersection-related. This resulted in a total of 76,162 fatalities. About 83 percent, or

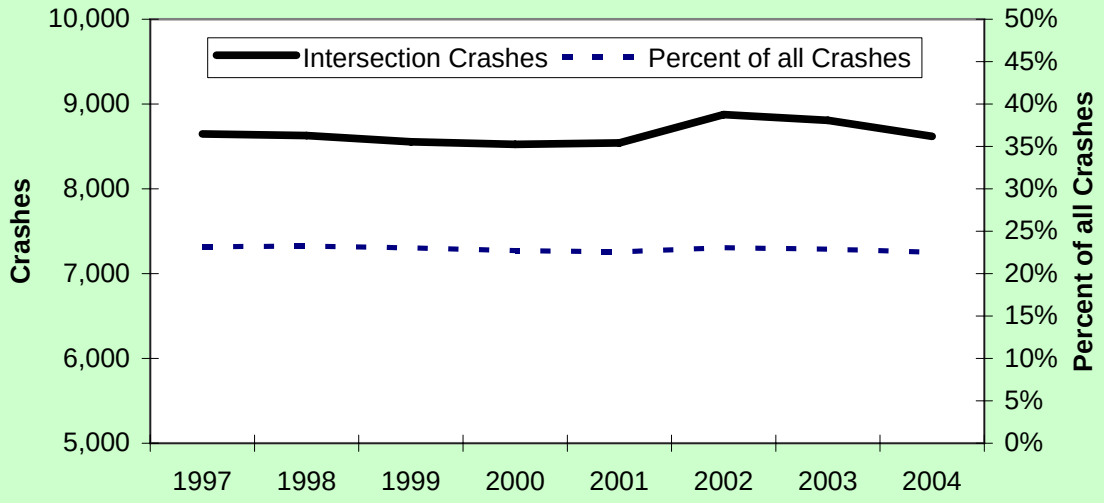
63,509 fatalities, occurred in within-intersection crashes and 12,453 occurred in intersection-related crashes.

For the remainder of this report, "occurring <u>at</u> intersections" implies both within-intersection crashes and intersection-related crashes.

2. Overview of Fatal Intersection Crashes, 1997-2004

Figure 3 depicts the trend of fatal crashes that occur at intersections from 1997 to 2004 and the percentage that such comprise of all motor vehicle traffic crashes during the year. The number and proportion of all crashes that occur at intersections has remained relatively constant (around 22 percent) over the years.

Figure 3: Fatal Crashes that Occured at Intersections as Number and Percent of all Fatal Crashes, 1997-2004



Source: NCSA FARS 1997-2003 Final and 2004 ARF Files

Table 1 depicts the number of fatal intersection crashes and fatalities from 1997 to 2004.

Table 1: Fatal Crashes and Fatalities in Intersection Crashes by Relation to Intersection, 1997-2004

Year	Crashes			Fatalities		
	Within-intersection	Intersection-related	Total	Within-intersection	Intersection-related	Total
1997	7,406	1,241	8,647	8,235	1,336	9,571
1998	7,280	1,349	8,629	8,176	1,423	9,599
1999	7,286	1,268	8,554	8,083	1,362	9,445
2000	7,205	1,319	8,524	7,982	1,406	9,388
2001	7,042	1,499	8,541	7,769	1,603	9,372
2002	7,182	1,694	8,876	7,910	1,820	9,730
2003	7,023	1,785	8,808	7,755	1,914	9,669
2004	7,111	1,508	8,619	7,799	1,589	9,388
Total	57,535	11,663	69,198	63,709	12,453	76,162
Avg.	*7,192*	*1,458*	*8,650*	*7,964*	*1,557*	*9,520*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

As seen in Table 1, on average, about 83 percent of the fatal intersection crashes were within-intersection crashes. Table 2 presents summary data of crashes and fatalities from 1997 to 2004 by the type of traffic control device within the intersection, i.e., if the intersection was controlled by a traffic signal, stop sign, etc. Highway traffic signals include on-color traffic lights (green-amber-red) with or without pedestrian signals, flashing traffic control signals, as well flashing beacons. The other/unknown devices include regulatory signs such as "Yield" signs, school zone signs, and warning signs. The highlighted cells in Table 2 indicate the crashes and fatalities of interest in this report. They are crashes and fatalities that occur either at a properly functioning on-colors traffic signal or at a stop-sign-controlled intersection. Traffic control devices are coded in FARS based on the coding analyst's judgment on the proximity of the device to the crash. Stop sign information at intersections is coded based on the applicability of the sign to the movement of the vehicles just prior to the crash. The type of stop signs, i.e., if the intersection was controlled by two-way or four-way stop signs, while of great safety analysis interest, is not currently available in FARS.

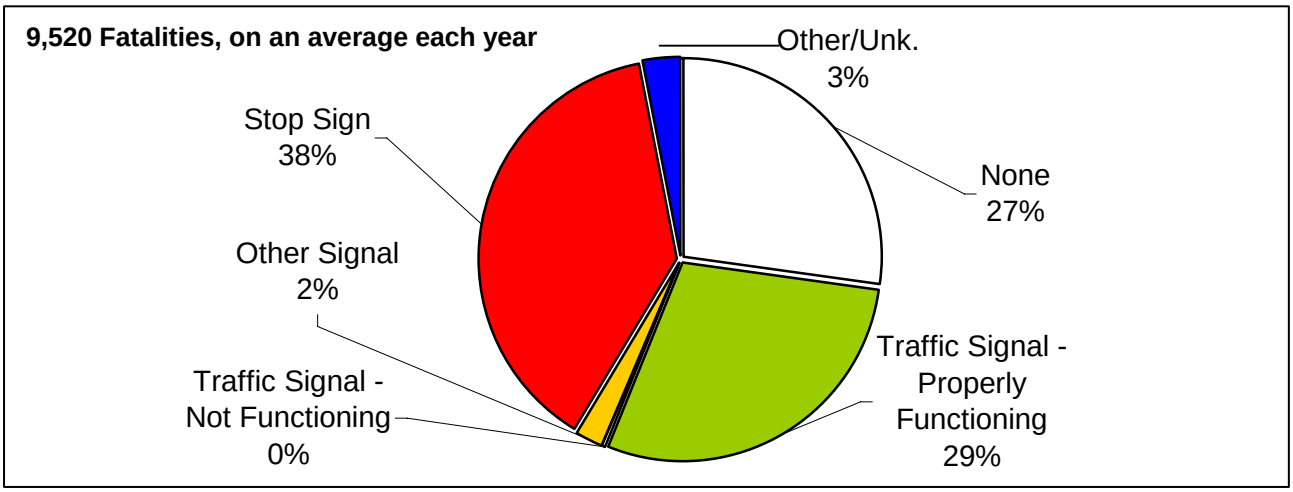
Table 2: Fatal Crashes and Fatalities in Intersection Crashes by Type of Traffic Control Device and Relation to Intersection, 1997-2004

Traffic Control Device	Crashes			Fatalities		
	Within-intersection	Intersection-related	Total	Within-intersection	Intersection-related	Total
None	14,012	5,166	19,178	15,206	5,540	20,746
Traffic Signal	18,262	3,908	22,170	19,746	4,109	23,855
Properly Functioning On-Colors Signal	16,695	3,728	20,423	18,001	3,913	21,914
Not Properly Functioning On-Colors Signal	272	46	318	286	47	333
Other Signal	1,295	134	1,429	1,459	149	1,608
Stop Sign	23,634	2,054	25,688	26,918	2,227	29,145
Other/Unknown	1,627	535	2,162	1,839	577	2,416
Total	57,535	11,663	69,198	63,709	12,453	76,162
Average Per Year						
None	*1,752*	*646*	*2,397*	*1,901*	*693*	*2,593*
Traffic Signal	*2,283*	*489*	*2,771*	*2,468*	*514*	*2,982*
Properly Functioning On-Colors Signal	*2,087*	*466*	*2,553*	*2,250*	*489*	*2,739*
Not Properly Functioning On-Colors Signal	*34*	*6*	*40*	*36*	*6*	*42*
Other Signal	*162*	*17*	*179*	*182*	*19*	*201*
Stop Sign	*2,954*	*257*	*3,211*	*3,365*	*278*	*3,643*
Other/Unknown	*203*	*67*	*270*	*230*	*72*	*302*
Total	*7,192*	*1,458*	*8,650*	*7,964*	*1,557*	*9,520*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Figure 4 depicts the relative proportion of fatalities that occurred at intersections by the type of traffic control device at the intersection. In the eight-year period between 1997 and 2004, there were a total of 20,423 fatal traffic crashes at intersections controlled by properly functioning traffic signals, resulting in 21,914 fatalities. In intersections that were controlled by stop signs, there were 25,688 fatal crashes in the eight-year period between 1997 and 2004, resulting in 29,145 fatalities.

Figure 4: Fatalities in Crashes at Intersections by Traffic Control Device



About 18 percent (3,728/20,423) of fatal crashes occurring at intersections controlled by traffic signals were intersection-related crashes as compared to 8 percent (2,054/25,688) of crashes that occurred at intersections controlled by stop signs. Also, as shown in Figure 4, 38 percent of the fatalities at intersections occur at stop-sign-controlled intersections, 29 percent at traffic signal controlled intersections and 27 percent at intersections that had "none" coded as the traffic control device.

For crashes that had "none" coded as the traffic control device, there were 19,178 fatal crashes resulting in 20,746 fatalities. As compared to fatal crashes occurring at intersections controlled by signals or stop signs, a greater proportion (about 27%) of crashes at intersection controlled by signals or stop signs were coded as being intersection-related. Crashes at intersections controlled by signals or stop signs will be discussed throughout the report. A brief note on when FARS coded traffic control devices as "none" and how the variable is coded in general is shown below.

A Note on Intersections Where Traffic Control Devices Are Coded as "None" (excerpted from NHTSA's FARS Coding and Validation Manual):

"…If there is a question as to which type a sign is, consult the Manual of Uniform Traffic Control Devices (MUTCD). Generally, the appropriate code should be used if a party to the accident failed to heed the sign, was in a position to be controlled by the sign, or the sign has some relationship to the accident. For example, code "20 - Stop Sign" for an accident at a four-legged, two-way stop intersection where a driver fails to stop at the stop sign and collides with another vehicle. Conversely, at the same intersection, a driver on an approach not controlled by a stop sign loses control and strikes a utility pole. In this case, code "20" would not be appropriate. Code "40 - Warning Sign" would be appropriate for a vehicle that fails to negotiate a curve that is posted with a warning sign. Also use code "40" for the flashing lights on an approaching train. Another set of questions arises from the issue of proximity of the device to the accident. Analysts' judgment must be applied in these situations. Typical signs which create such problems are speed limit signs where a party to the accident may be speeding; "Do Not Pass" signs where a no passing zone extends for miles but is only marked at the beginning of

the zone; pedestrians-prohibited signs at entrances to freeways but a pedestrian accident occurs on the freeway between interchanges; and other such signs which may pertain to a significant length of road. In these instances, if the accident occurs within reasonably close proximity of the sign and the sign type is relevant to the accident then it may be appropriate to code the sign."

A scenario where the traffic control device would be coded as none could be at an intersection of a minor roadway controlled by a two-way stop sign, intersecting a major roadway without any device. A crash between two vehicles on the major roadway at this intersection would be coded as having no traffic control devices as the two-way stop sign on the minor road did not control the vehicles.

Table 3 depicts the trend of these crashes and fatalities from 1997 to 2004. As shown in Table 3, on an average, every year, about 2,553 fatal crashes occur at intersections controlled by traffic signals as compared to an average of about 3,211 fatal crashes at intersections controlled by stop signs. On average, these crashes result, in about 2,739 fatalities at signal-controlled intersections and 3,643 fatalities at stop-sign-controlled intersections every year in the U.S.

Table 3: Fatal Crashes and Fatalities in Intersection Crashes by Type of Traffic Control Device and Relation to Intersection, 1997-2004

Year	Crashes			Fatalities		
	Within-intersection	Intersection-related	Total	Within-intersection	Intersection-related	Total
Traffic Signal						
1997	2,139	404	2,543	2,304	426	2,730
1998	2,063	462	2,525	2,230	482	2,712
1999	2,083	410	2,493	2,256	424	2,680
2000	2,076	437	2,513	2,240	463	2,703
2001	2,108	502	2,610	2,290	528	2,818
2002	2,085	503	2,588	2,232	526	2,758
2003	2,021	521	2,542	2,186	561	2,747
2004	2,120	489	2,609	2,263	503	2,766
Total	16,695	3,728	20,423	18,001	3,913	21,914
Average	*2,087*	*466*	*2,553*	*2,250*	*489*	*2,739*
Stop Sign						
1997	2,913	197	3,110	3,346	220	3,566
1998	3,079	198	3,277	3,572	220	3,792
1999	3,170	202	3,372	3,605	216	3,821
2000	2,942	231	3,173	3,361	249	3,610
2001	2,843	286	3,129	3,199	308	3,507
2002	2,938	328	3,266	3,336	353	3,689
2003	2,847	354	3,201	3,219	385	3,604
2004	2,902	258	3,160	3,280	276	3,556
Total	23,634	2,054	25,688	26,918	2,227	29,145
Average	*2,954*	*257*	*3,211*	*3,365*	*278*	*3,643*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

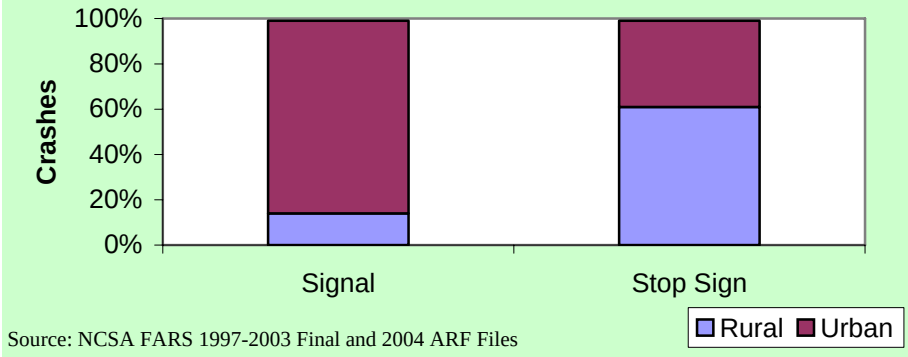
Of particular interest in this report is the location of the crashes that occur at signal-controlled and stop-sign-controlled intersections. Table 4 and Figure 5 depict the distribution of the crashes by the roadway function class and the type of traffic control device. A majority of the crashes at signal-controlled intersections (about 84%) occur in urban areas. Of the crashes that occur at stop-sign-controlled intersections, 61 percent occur in rural areas. In FARS, the roadway function class is coded using the Federal Highway Administration classification obtained from the State Highway Department.

Table 4: Fatal Crashes and Fatalities That Occurred at Intersections by Roadway Function Class and Type of Traffic Control Device, 1997-2004

Year	Roadway Function Class	Crashes		Fatalities	
		Num	%	Num	%
Traffic Signal					
1997 to 2004	Rural	3,037	15%	3,344	15%
	Urban	17,246	84%	18,416	84%
	Unknown	140	1%	154	1%
	Total	20,423	100%	21,914	100%
Avg. per Year	*Rural*	*380*	*15%*	*418*	*15%*
	Urban	*2,156*	*84%*	*2,302*	*84%*
	Unknown	*18*	*1%*	*19*	*1%*
	Total	*2,553*	*100%*	*2,739*	*100%*
Stop Sign					
1997 to 2004	Rural	15,640	61%	18,248	63%
	Urban	9,879	38%	10,709	37%
	Unknown	169	1%	188	1%
	Total	25,688	100%	29,145	100%
Avg. per Year	*Rural*	*1,955*	*15%*	*2,281*	*63%*
	Urban	*1,235*	*84%*	*1,339*	*37%*
	Unknown	*21*	*1%*	*24*	*1%*
	Total	*3,211*	*100%*	*3,643*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Figure 5: Fatal Intersection Crashes by Type of Traffic Control Device and Roadway Function Class, 1997-2004



Source: NCSA FARS 1997-2003 Final and 2004 ARF Files

3. Intersection Crashes by State at Signal/Stop-Sign Controlled Intersections

This section will present a brief analysis of intersection crashes by State and also present county-level maps along rural/urban classification lines.

Table 5 depicts the number of fatal crashes and fatalities in the period from 1997 to 2004 by State. Also shown are the proportion of all crashes that constitute crashes at intersections controlled by signals and stop signs. In this period, the highest number of fatal crashes at intersections controlled by traffic signals was 2,521 crashes in California, followed by 2,483 crashes in Florida. Among crashes occurring at intersections controlled by stop signs, Texas recorded 2,137 crashes followed by Florida with 2,112 crashes.

Fatal crashes at signal-controlled intersections accounted for about 25 percent of all fatal crashes in the District of Columbia followed by New York (16%), Delaware (15%), Arizona, Florida, and Nevada at 11 percent. Arkansas, Mississippi, Montana, and Vermont had the lowest percentage (1%) represented by such crashes. Fatal crashes at stop-sign-controlled intersections accounted for 14 percent of all fatal crashes in Minnesota and Wisconsin – the highest percentage among the States. In Alaska, New Hampshire, and Wyoming, only 3 percent of all fatal crashes occurred at intersections controlled by stop signs – the lowest such percentage among the States.

Table 5: Fatal Crashes and Fatalities at Intersections by type of Traffic Control Device and State, 1997-2004												
State	Fatal Crashes						Fatalities					
	Total		Traffic Signals		Stop Signs		Total		Traffic Signals		Stop Signs	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Alabama	7,675	100%	373	5%	579	8%	8,584	100%	410	5%	638	7%
Alaska	638	100%	44	7%	19	3%	709	100%	45	6%	21	3%
Arizona	7,386	100%	798	11%	485	7%	8,442	100%	867	10%	563	7%
Arkansas	4,489	100%	66	1%	294	7%	5,136	100%	69	1%	339	7%
California	27,542	100%	2,521	9%	1,999	7%	30,882	100%	2,677	9%	2,312	7%
Colorado	4,744	100%	451	10%	344	7%	5,339	100%	465	9%	388	7%
Connecticut	2,353	100%	176	7%	102	4%	2,542	100%	184	7%	107	4%
Delaware	922	100%	142	15%	66	7%	1,017	100%	149	15%	73	7%
Dist of Columbia	397	100%	101	25%	26	7%	428	100%	112	26%	28	7%
Florida	21,763	100%	2,483	11%	2,112	10%	24,090	100%	2,682	11%	2,303	10%
Georgia	11,272	100%	629	6%	1,043	9%	12,602	100%	679	5%	1,184	9%
Hawaii	926	100%	87	9%	41	4%	1,015	100%	91	9%	44	4%
Idaho	1,886	100%	38	2%	194	10%	2,154	100%	39	2%	232	11%
Illinois	10,151	100%	921	9%	1,025	10%	11,308	100%	1,007	9%	1,166	10%
Indiana	6,564	100%	459	7%	810	12%	7,304	100%	494	7%	925	13%
Iowa	3,114	100%	115	4%	443	14%	3,536	100%	120	3%	505	14%
Kansas	3,410	100%	95	3%	316	9%	3,906	100%	104	3%	371	9%
Kentucky	6,256	100%	294	5%	477	8%	7,001	100%	323	5%	531	8%
Louisiana	6,620	100%	287	4%	469	7%	7,436	100%	316	4%	525	7%
Maine	1,393	100%	24	2%	106	8%	1,543	100%	28	2%	117	8%
Maryland	4,587	100%	467	10%	203	4%	5,008	100%	496	10%	228	5%
Massachusetts	3,348	100%	201	6%	166	5%	3,568	100%	206	6%	176	5%
Michigan	9,605	100%	750	8%	1,237	13%	10,623	100%	816	8%	1,419	13%
Minnesota	4,428	100%	259	6%	639	14%	4,948	100%	277	6%	747	15%
Mississippi	6,306	100%	66	1%	615	10%	7,126	100%	66	1%	727	10%
Missouri	8,157	100%	330	4%	566	7%	9,280	100%	357	4%	666	7%
Montana	1,709	100%	18	1%	72	4%	1,949	100%	20	1%	80	4%
Nebraska	2,002	100%	115	6%	267	13%	2,288	100%	123	5%	330	14%
Nevada	2,520	100%	286	11%	207	8%	2,839	100%	310	11%	227	8%
New Hampshire	997	100%	15	2%	29	3%	1,086	100%	15	1%	30	3%
New Jersey	5,429	100%	547	10%	205	4%	5,953	100%	580	10%	225	4%
New Mexico	3,167	100%	123	4%	155	5%	3,673	100%	130	4%	168	5%
New York	11,346	100%	1,820	16%	851	8%	12,305	100%	1,918	16%	936	8%
North Carolina	11,066	100%	461	4%	1,219	11%	12,357	100%	504	4%	1,375	11%
North Dakota	710	100%	17	2%	93	13%	809	100%	17	2%	112	14%
Ohio	9,957	100%	576	6%	1,158	12%	11,015	100%	632	6%	1,317	12%
Oklahoma	5,047	100%	136	3%	515	10%	5,850	100%	146	2%	629	11%
Oregon	3,354	100%	117	3%	215	6%	3,819	100%	126	3%	239	6%
Pennsylvania	11,179	100%	780	7%	1,101	10%	12,320	100%	829	7%	1,221	10%
Rhode Island	627	100%	38	6%	44	7%	669	100%	38	6%	47	7%
South Carolina	7,364	100%	311	4%	618	8%	8,163	100%	336	4%	687	8%
South Dakota	1,215	100%	23	2%	94	8%	1,387	100%	23	2%	105	8%
Tennessee	8,979	100%	363	4%	585	7%	9,959	100%	398	4%	639	6%
Texas	25,803	100%	1,539	6%	2,137	8%	29,363	100%	1,669	6%	2,456	8%
Utah	2,307	100%	144	6%	115	5%	2,673	100%	156	6%	130	5%
Vermont	631	100%	8	1%	27	4%	703	100%	8	1%	30	4%
Virginia	6,765	100%	308	5%	279	4%	7,443	100%	324	4%	305	4%
Washington	4,521	100%	204	5%	376	8%	5,074	100%	213	4%	426	8%
West Virginia	2,879	100%	60	2%	131	5%	3,161	100%	66	2%	149	5%
Wisconsin	5,545	100%	219	4%	783	14%	6,189	100%	236	4%	905	15%
Wyoming	1,129	100%	18	2%	36	3%	1,323	100%	18	1%	42	3%
U.S.	302,180	100%	20,423	7%	25,688	9%	337,897	100%	21,914	6%	29,145	9%
Puerto Rico	495	2.65	235	1.26	157	0.84	494	2.53	248	1.27	173	0.89

Source: NHTSA's NCSA FARS 2003 (Final), 2004 (ARF) Files, FHWA

The counties in a State may be predominantly urban or predominantly rural in nature. This affects the type of traffic control devices present in such locations as rural areas have more stop-sign-controlled intersections and urban areas have more signal controlled intersections. Also, counties vary significantly by their population and hence any comparison across counties will have to be performed by normalizing the fatalities for population, i.e., compute population based rates for fatalities occurring at intersections. For simplicity, in this section of the report, counties with a population below 50,000 will be considered rural counties while those above 50,000 will be considered urban counties.

Two rates are computed for each county for fatalities in intersection crashes controlled by signals and stop signs on the basis of (1).

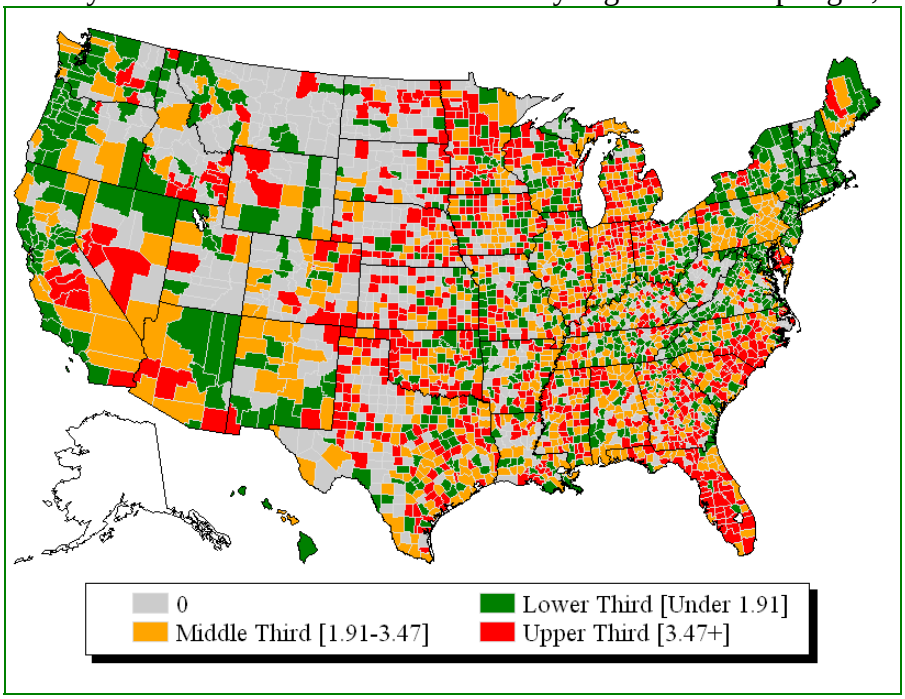
$$FatalityRate_{County,Device}^{1997-2004} = \frac{Average\ Fatalities_{County,Device}^{1997-2004}}{Average\ Population_{County}^{1997-2004}} \qquad (1)$$

The maps depict the rate for a county in four levels:

- Rate = 0 (there were no fatalities in county for the type of traffic control device)
- Lower Third (Rate of fatal crashes at intersections controlled by the type of device is below the 33.333 percentile, or lower third, among all counties nationwide)
- Middle Third (Rate of fatal crashes at intersections controlled by the type of device is between the 33.333 percentile and 66.666 percentile, or middle third, among all counties nationwide)
- Upper Third (Rate of fatal crashes at intersections controlled by the type of device is above the 66.666 percentile, or upper third, among all counties nationwide)

Figure 6 depicts the rate of fatalities in intersections controlled by both stop signs and traffic signals per 100,000 population by county.

Figure 6: Fatality Rates at Intersections Controlled by Signals and Stop Signs, 2000-2004



The following set of U.S. Maps compare fatality rates in intersection crashes by the type of traffic control device (signal or stop-sign) and the type of county (rural or urban). Figures 7 through 10 are maps that depict the population-based rate of fatalities at signal-controlled and stop-sign-controlled intersections in rural and urban counties.

Figure 7: Fatality Rates at Signal-Controlled Intersections in Urban Counties, 2000-2004

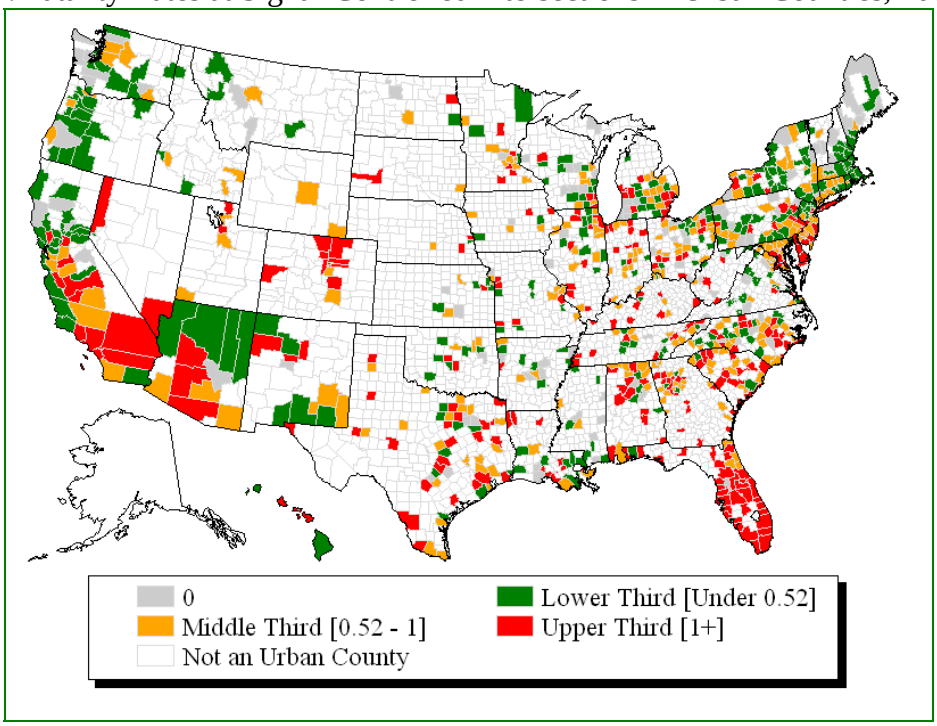


Figure 8: Fatality Rates in Stop-Sign Controlled Intersections in Urban Areas, 2000-2004

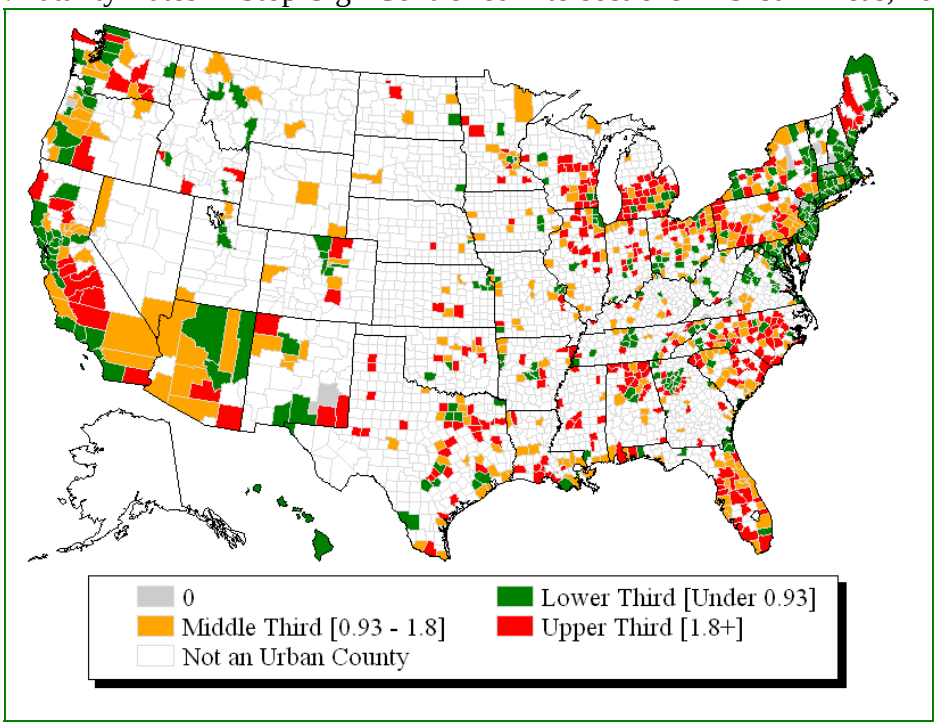


Figure 9: Fatality Rates in Signal-controlled intersections in Rural Areas, 2000-2004

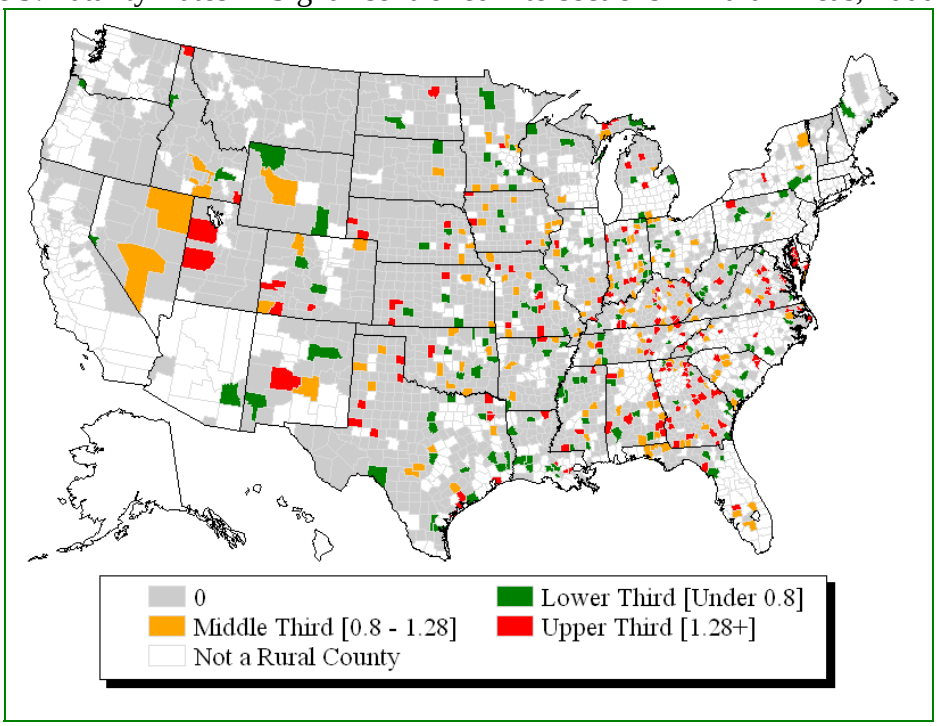


Figure 10: Fatality Rates in Stop-Sign-Controlled Intersections in Rural Areas, 2000-2004

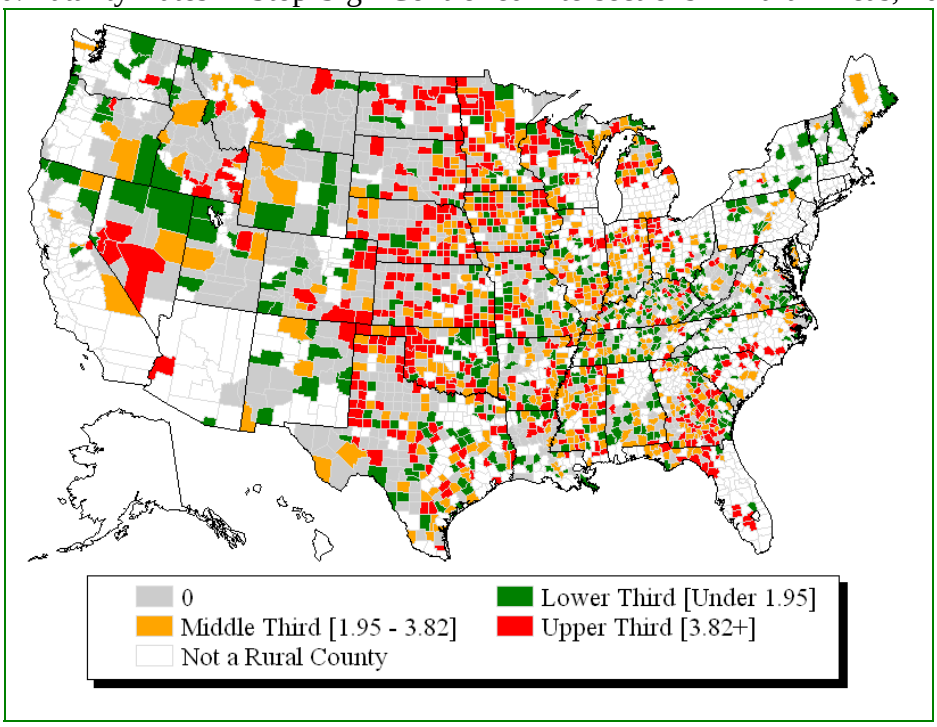
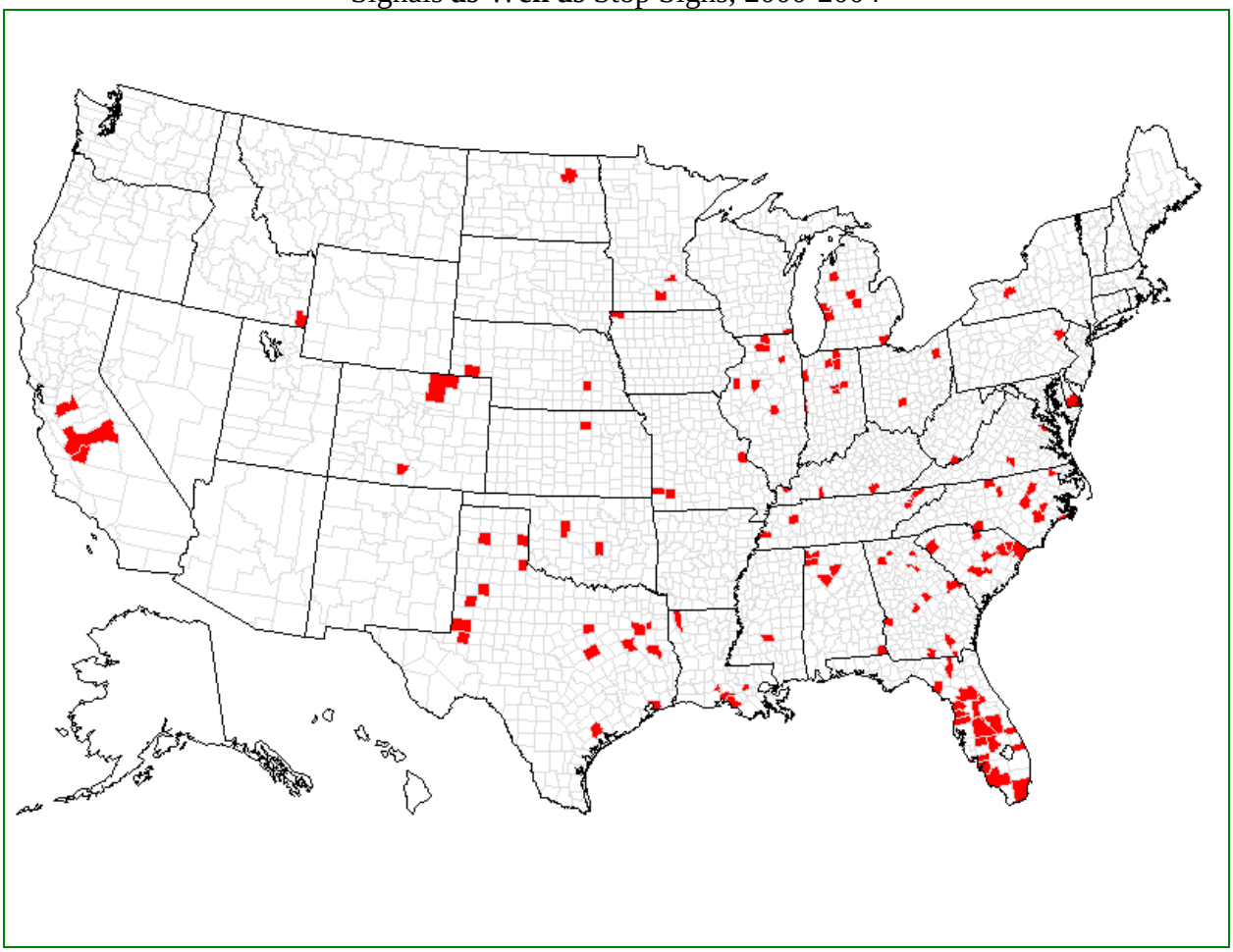


Figure 11 combines the data presented in Figures 5 through 9 and depicts the counties that have a high fatality rate in crashes in both signal-controlled intersections and stop-sign-controlled intersections.

Figure 11: Counties With High Fatality Rates for Crashes in Intersections Controlled by Traffic Signals **as Well as** Stop Signs, 2000-2004



There were a total of 125 counties, both rural and urban, that had a high fatality rate per 100,000 resident population for crashes that occur in stop-sign controlled intersections as well as signal-controlled intersections.

The remainder of the report will analyze intersection crashes at a national level highlighting crash, driver, and vehicle characteristics.

4. Characteristics of Crashes at Signal/Stop-Sign-Controlled Intersections

This section presents analysis on a national level of the crashes that occur in intersections controlled by traffic signals and stop signs.

Table 6 summarizes fatal crashes and fatalities from 1997 to 2004 occurring in intersections by the type of the crash, i.e., if it was a single- or multiple-vehicle crash. On an average, about 700 single-vehicle and 1,850 fatal multiple-vehicle crashes occur each year in intersections controlled by traffic signals. On an average, about 715 fatalities in single-vehicle crashes and 2,020 fatalities in multiple-vehicle crashes occur each year.

At intersections controlled by stop signs, there were, on an average each year, 383 single-vehicle and 2,828 multiple-vehicle crashes, resulting in 402 and 3,241 fatalities, respectively.

Table 6: Fatal Crashes and Fatalities in Intersections Controlled by Traffic Signals by Crash Type, 1997-2004

Year	Crashes			Fatalities		
	Single-Vehicle	Multiple-Vehicle	Total	Single-Vehicle	Multiple-Vehicle	Total
Traffic Signal						
1997	695	1,848	2,543	716	2,014	2,730
1998	715	1,810	2,525	726	1,986	2,712
1999	681	1,812	2,493	695	1,985	2,680
2000	672	1,841	2,513	682	2,021	2,703
2001	702	1,908	2,610	715	2,103	2,818
2002	725	1,863	2,588	739	2,019	2,758
2003	697	1,845	2,542	720	2,027	2,747
2004	714	1,895	2,609	729	2,037	2,766
Total	5,601	14,822	20,423	5,722	16,192	21,914
Avg.	*700*	*1,853*	*2,553*	*715*	*2,024*	*2,739*
Stop Sign						
1997	332	2,778	3,110	355	3,211	3,566
1998	341	2,936	3,277	356	3,436	3,792
1999	359	3,013	3,372	378	3,443	3,821
2000	397	2,776	3,173	415	3,195	3,610
2001	354	2,775	3,129	369	3,138	3,507
2002	431	2,835	3,266	452	3,237	3,689
2003	407	2,794	3,201	432	3,172	3,604
2004	440	2,720	3,160	457	3,099	3,556
Total	3,061	22,627	25,688	3,214	25,931	29,145
Avg.	*383*	*2,828*	*3,211*	*402*	*3,241*	*3,643*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

One of the primary determinations that needs to be made is to identify the role of the fatally injured people, i.e., if they are vehicle occupants or nonoccupants (pedestrians, pedalcyclists, etc.). Table 7 depicts this data from 1997 to 2004.

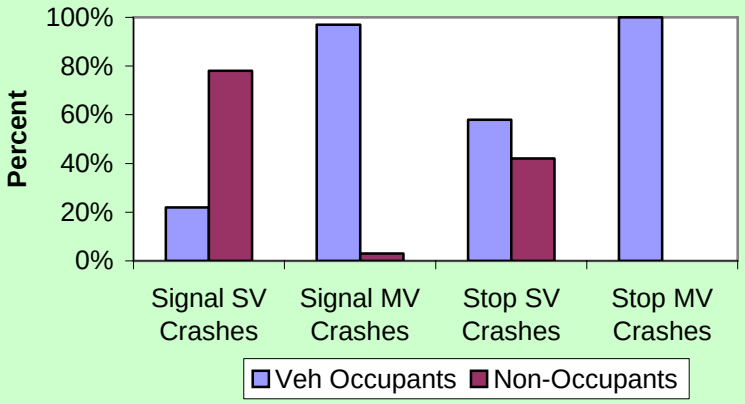
Table 7: Fatalities in Crashes Occurring at Intersections Controlled by Traffic Signals, by Person Role, and Crash Type, 1997-2004

Year	Single-Vehicle Crash					Multiple-Vehicle Crash					Total		
	Vehicle Occupants		Nonoccupants		Total	Vehicle Occupants		Nonoccupants		Total	Vehicle Occupants	Non-Occs	Total
	Num	%	Num	%		Num	%	Num	%		Num	Num	Num
Traffic Signal													
1997	138	19%	578	81%	716	1,952	97%	62	3%	2,014	2,090	640	2,730
1998	158	22%	568	78%	726	1,951	98%	35	2%	1,986	2,109	603	2,712
1999	129	19%	566	81%	695	1,927	97%	58	3%	1,985	2,056	624	2,680
2000	140	21%	542	79%	682	1,968	97%	53	3%	2,021	2,108	595	2,703
2001	145	20%	570	80%	715	2,050	97%	53	3%	2,103	2,195	623	2,818
2002	163	22%	576	78%	739	1,966	97%	53	3%	2,019	2,129	629	2,758
2003	185	26%	535	74%	720	1,960	97%	67	3%	2,027	2,145	602	2,747
2004	195	27%	534	73%	729	1,983	97%	54	3%	2,037	2,178	588	2,766
Total	1,253	22%	4,469	78%	5,722	15,757	97%	435	3%	16,192	17,010	4,904	21,914
Avg.	*157*	*22%*	*559*	*78%*	*715*	*1,970*	*97%*	*54*	*3%*	*2,024*	*2,126*	*613*	*2,739*
Stop Sign													
1997	192	54%	163	46%	355	3,198	100%	13	0%	3,211	3,390	176	3,566
1998	209	59%	147	41%	356	3,421	100%	15	0%	3,436	3,630	162	3,792
1999	212	56%	166	44%	378	3,431	100%	12	0%	3,443	3,643	178	3,821
2000	225	54%	190	46%	415	3,183	100%	12	0%	3,195	3,408	202	3,610
2001	207	56%	162	44%	369	3,128	100%	10	0%	3,138	3,335	172	3,507
2002	294	65%	158	35%	452	3,228	100%	9	0%	3,237	3,522	167	3,689
2003	266	62%	166	38%	432	3,154	99%	18	1%	3,172	3,420	184	3,604
2004	267	58%	190	42%	457	3,085	100%	14	0%	3,099	3,352	204	3,556
Total	1,872	58%	1,342	42%	3,214	25,828	100%	103	0%	25,931	27,700	1,445	29,145
Avg.	*234*	*58%*	*168*	*42%*	*402*	*3,229*	*100*	*13*	*0%*	*3,241*	*3,463*	*181*	*3,643*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Seventy-eight percent of fatalities in single-vehicle crashes at intersections controlled by traffic signals occur to nonoccupants. However, in multiple-vehicle crashes at intersections controlled by traffic signals, 97% of the fatalities occur to occupants of vehicles. When the intersection is controlled by a stop sign, 58 percent of the fatalities in single-vehicle crashes are vehicle occupants.

Figure 12: Proportion of Vehicle Occupant and Nonoccupant Fatalities by Single Vehicle (SV) or Multiple Vehicle (MV) Intersection Crashes, 1997-2004



Source: NCSA FARS 1997-2003 Final and 2004 ARF Files

Table 8 breaks down the 20,423 fatal crashes that occurred at traffic-signal-controlled intersections from 1997 to 2004 by who was fatally injured in the crash.

As seen in Table 8 below, almost all crashes result in a fatality to either a vehicle occupant or a nonoccupant. Crashes that result in a fatality to both a vehicle occupant and a nonoccupant are few in number. About 76 percent of the crashes occurring at traffic signals resulted in a fatality to one or more occupants of the vehicles involved in the crash while the remaining crashes resulted in a fatality to one or more of the nonoccupants involved in the crash. Similarly, about 94 percent of the crashes occurring at intersections controlled by stop signs resulted in a fatality to a vehicle occupant while 6 percent of the crashes resulted in a fatality to a nonoccupant involved in the crash.

Table 8: Fatal Crashes Occurring at Intersections Controlled by Traffic Signals, by Who Were Fatally Injured in a Crash, 1997-2004

Year	Vehicle Occupants Only were Fatally Injured		Nonoccupants Only were Fatally Injured		Vehicle Occupants and Nonoccupants were Fatally Injured		Total
	Num	%	Num	%	Num	%	
Traffic Signal							
1997	1,918	75%	625	25%	0	0%	2,543
1998	1,927	76%	597	24%	1	0%	2,525
1999	1,877	75%	616	25%	0	0%	2,493
2000	1,921	76%	592	24%	0	0%	2,513
2001	2,000	77%	610	23%	0	0%	2,610
2002	1,962	76%	626	24%	0	0%	2,588
2003	1,953	77%	589	23%	0	0%	2,542
2004	2,026	78%	581	22%	2	0%	2,609
Total	15,584	76%	4,836	24%	3	0%	20,423
Avg.	*1,948*	*76%*	*605*	*24%*	*0*	*0%*	*2,553*
Stop Sign							
1997	2,935	94%	175	6%	0	0%	3,110
1998	3,117	95%	159	5%	1	0%	3,277
1999	3,194	95%	177	5%	1	0%	3,372
2000	2,971	94%	202	6%	0	0%	3,173
2001	2,958	95%	171	6%	0	0%	3,129
2002	3,099	95%	167	5%	0	0%	3,266
2003	3,022	94%	179	6%	0	0%	3,201
2004	2,956	94%	204	7%	0	0%	3,160
Total	24,252	94%	1,434	6%	2	0%	25,688
Avg.	*3,032*	*94%*	*179*	*6%*	*0*	*0%*	*3,211*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Table 9 summarizes the crashes in Table 8 further subdivided by the type of the crash, i.e., if it was a single-vehicle or a multiple-vehicle crash.

Table 9: Fatal Crashes Occurring at Intersections Controlled by Traffic Signals, by Type of Crash, 1997-2004			
Type of Crash	Single-Vehicle	Multiple-Vehicle	Total
Traffic Signal			
Vehicle Occupants Only were Fatally Injured	1,165 (5.7%)	14,419 (70.6%)	15,584 (76.3%)
Nonoccupants Only were Fatally Injured	4,435 (21.7%)	401 (2.0%)	4,836 (23.7%)
Total*	5,601 (27.4%)	14,822 (72.6%)	20,423 (100%)
Stop Sign			
Vehicle Occupants Only were Fatally Injured	1,725 (6.7%)	22,527 (87.7%)	24,252 (94.4%)
Nonoccupants Only were Fatally Injured	1,335 (5.2%)	99 (0%)	1,434 (5.6%)
Total*	3,061 (11.9%)	22,627 [(88.1%)	25,688 (100%)
Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).* Components do not add up to total due to few crashes that resulted in a fatality to both a vehicle occupant as well as a nonoccupant.			

As seen in Table 9, 76 percent of the crashes at signal-controlled intersections resulted in the fatality to one or more vehicle occupants. The remaining 24 percent resulted in a fatality to a nonoccupant. Also, about 93 percent (14,419/15,584) of the crashes that resulted in a vehicle occupant fatality were multiple-vehicle crashes. Conversely, 92 percent (4,435/4,836) of the crashes that resulted in a nonoccupant fatality were single-vehicle crashes. Also, 97 percent of multiple-vehicle crashes resulted in the fatality to one or more vehicle occupants only, i.e., no nonoccupant was fatally injured in the crash. In the period from 1997 to 2004, there were 14,822 fatal, multiple-vehicle crashes at traffic signal-controlled intersections in the U.S. A majority of these crashes resulted in one or more vehicle occupants being fatally injured.

In these crashes, the event that produced the first damage to property or injury is of interest to determine the first harmful event in the crash. This is recorded in FARS in the First Harmful Event variable. Table 10 depicts the first harmful event in single- and multiple-vehicle crashes occurring at intersections controlled by stop signs and traffic signals. For a majority of the multiple-vehicle crashes the first harmful event was a motor vehicle in transport. Pedestrians are the predominant first harmful event in single-vehicle crashes.

Table 10: First Harmful Event in Crashes That Occurred at Intersections by Traffic Control Device, 1997-2004

First Harmful Event	Traffic Signal						Stop Sign					
	Single-vehicle		Multiple-vehicle		Total		Single-vehicle		Multiple-vehicle		Total	
Overturn	72	1%	50	0%	122	1%	211	7%	80	0%	291	1%
Immersion	5	0%	0	0%	5	0%	18	1%	0	0%	18	0%
Fell From Veh	21	0%	6	0%	27	0%	29	1%	6	0%	35	0%
Injured in Veh	9	0%	0	0%	9	0%	2	0%	0	0%	2	0%
Other non-Coll	9	0%	1	0%	10	0%	10	0%	4	0%	14	0%
Pedestrian	3,671	66%	169	1%	3,840	19%	712	23%	22	0%	734	3%
Pedalcycle	653	12%	27	0%	680	3%	549	18%	13	0%	562	2%
Animal	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%
Veh in Transp	0	0%	14,470	98%	14,470	71%	0	0%	22,464	99%	22,464	87%
Veh in Trans Oth	0	0%	12	0%	12	0%	0	0%	1	0%	1	0%
Park/Stop Mot Veh	15	0%	4	0%	19	0%	32	1%	2	0%	34	0%
Non-Mot Conveync	79	1%	4	0%	83	0%	52	2%	0	0%	52	0%
Obj Thrown/Fall	0	0%	1	0%	1	0%	1	0%	0	0%	1	0%
Boulder	0	0%	0	0%	0	0%	8	0%	0	0%	8	0%
Oth Non-Fix Obj	18	0%	3	0%	21	0%	21	1%	2	0%	23	0%
Building	28	0%	0	0%	28	0%	40	1%	0	0%	40	0%
Impact Attenuatr	1	0%	0	0%	1	0%	1	0%	0	0%	1	0%
Bridge Pier	13	0%	0	0%	13	0%	9	0%	0	0%	9	0%
Bridge Parapet	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
Bridge Rail	5	0%	0	0%	5	0%	2	0%	0	0%	2	0%
Guardrail Face	22	0%	3	0%	25	0%	58	2%	0	0%	58	0%
Concrete Barrier	19	0%	5	0%	24	0%	14	0%	1	0%	15	0%
Other L-Barrier	3	0%	0	0%	3	0%	3	0%	0	0%	3	0%
Hwy Sign Post	62	1%	7	0%	69	0%	120	4%	6	0%	126	0%
Overhead Sign	6	0%	0	0%	6	0%	1	0%	0	0%	1	0%
Light Support	61	1%	5	0%	66	0%	9	0%	0	0%	9	0%
Utility Pole	161	3%	9	0%	170	1%	93	3%	3	0%	96	0%
Other Post/Pole	33	1%	2	0%	35	0%	29	1%	0	0%	29	0%
Culvert	6	0%	0	0%	6	0%	17	1%	0	0%	17	0%
Curb	257	5%	29	0%	286	1%	119	4%	11	0%	130	1%
Ditch	8	0%	0	0%	8	0%	127	4%	1	0%	128	0%
Embank-Earth	10	0%	0	0%	10	0%	133	4%	1	0%	134	1%
Embank-Rock	6	0%	0	0%	6	0%	14	0%	0	0%	14	0%
Embank-Unk	7	0%	0	0%	7	0%	108	4%	1	0%	109	0%
Fence	17	0%	0	0%	17	0%	80	3%	3	0%	83	0%
Wall	23	0%	0	0%	23	0%	45	1%	0	0%	45	0%
Fire Hydrant	4	0%	0	0%	4	0%	3	0%	1	0%	4	0%
Shrubbery	1	0%	0	0%	1	0%	6	0%	0	0%	6	0%
Tree	71	1%	2	0%	73	0%	304	10%	2	0%	306	1%
Other Fixed Obj	37	1%	3	0%	40	0%	65	2%	1	0%	66	0%
Pavemt Irregular	2	0%	1	0%	3	0%	0	0%	0	0%	0	0%
Working Vehicles	3	0%	1	0%	4	0%	2	0%	0	0%	2	0%
Traf Sig Support	179	3%	6	0%	185	1%	0	0%	0	0%	0	0%
Own Veh Strk occ	0	0%	1	0%	1	0%	2	0%	0	0%	2	0%
Snowbank	2	0%	0	0%	2	0%	4	0%	0	0%	4	0%
Animal in Transp	0	0%	0	0%	0	0%	6	0%	1	0%	7	0%
Guardrail End	1	0%	0	0%	1	0%	0	0%	0	0%	0	0%
Mail Box	0	0%	1	0%	1	0%	1	0%	0	0%	1	0%
Unknown	1	0%	0	0%	1	0%	0	0%	0	0%	0	0%
Total	5,601	100%	14,822	100%	20,423	100%	3,061	100%	22,627	100%	25,688	100%

4.1 Violations Overview

Of particular interest in this report are intersection crashes that involved a violation on the part of at least one of the drivers. In FARS, there are two data sources to identify if a violation occurred on the part of a driver who was involved in an intersection crash.

- Police-reported violations as recorded by the *Violations Charged* variable, and
- Factors related to the driver as coded in the *Related Factors – Driver Level* variable.

Using both data sources, drivers who are involved in fatal crashes may be coded as *failure-to-obey* or *failure-to-yield* drivers. The failure-to-obey crashes are the more egregious violation in that they represent a definite violation of the traffic control device. This usually is a driver who failed to stop at a traffic control device and was involved in a crash after entering the intersection. The failure-to-yield drivers are those who stopped at the traffic control device and then proceeded into the intersection into the path of crossing traffic. The failure-to-yield is not necessarily a violation in most cases but are used synonymously with failure-to-obey in most PARs. The police may often cite the failure-to-yield drivers as being a factor in the crash. So for the scope of this report, the failure-to-yield coded will be treated as a type of violation for the driver. Table 11 depicts the codes used in identifying the two different types of violations as coded in FARS. FARS fidelity about violations charged was expanded in 1997 which is why data from 1997 up to 2004 have been used in this report.

Important: Violations may be under-reported in FARS. The extent of any potential under-reporting is unknown.

Table 11: FARS Codes Used to Identify Failure-to-Obey and Failure-to-Yield Crashes

	Traffic Signals		Stop Signs	
Codes	Failure-to-Obey Crashes	Failure-to-Yield Crashes	Failure-to-Obey Crashes	Failure-to-Yield Crashes
Violations Charged	31 - Fail to Stop for Red Signal 35 - Fail to Obey Signal, Generally 39 - Fail to Obey Traffic Control Dev. 41 – Turn in Violation of Traffic Control (Turn Arrow)	33 – Turn on Red (Fail to Stop and Yield) 46 – Failure to Yield Generally	37 – Fail to Obey Stop Signs 39 – Fail to Obey Traffic Control Device	46 – Failure to Yield Generally
Related Factors – Driver Level	39 – Failure to Obey Actual Traffic Control Device	38 – Failure to Yield Right-of-Way	39 – Failure to Obey Actual Traffic Sign, Traffic Control Devices	38-Failure to yield right-of-way

The Cooperative Intersection Collision Avoidance System initiative has three major focus areas. The *CICAS-Violation* targets drivers who might potentially violate (run) a traffic signal or a stop sign. The *CICAS-Signal Left Turn Assist* targets drivers of vehicles at signal-controlled intersections making an unprotected left turn and thereby running a risk of colliding with oncoming traffic. The *CICAS-Stop Sign Assist* is targeted at drivers at intersections with stop signs, especially where minor roads intersect with higher speed highways. Table 12 depicts the population of crashes as described in the following sections of the report and their relevance to the three major CICAS program areas.

Table 12: Relationship Between Failure-to-Obey and Failure-to-Yield Crashes and CICAS Focus Areas

Traffic Control Device	Failure-to-Obey Crashes	Failure-to-Yield Crashes
Traffic Signal	CICAS-V	CICAS-SLTA (*Left Turn*)
Stop Sign	CICAS-V	CICAS-SSA

Note: This table offers a general view of the crash populations to be addressed under the three current CICAS programs. For a more accurate classification, based on pre-crash scenarios, please refer to Appendix 3.

In failure-to-obey crashes at intersections controlled by properly functioning traffic signals, it can be assumed that one of the drivers was involved in a red-light-running violation. The failure-to-yield crashes at signal-controlled intersections usually involve a left-turning vehicle colliding with an oncoming vehicle. Figure 13 depicts the proportion, on an average, of fatal intersection crashes that involved at least one driver who failed to obey or failed to yield at a stop-sign- or signal-controlled intersection. About 38 percent of all fatal two-vehicle crashes at intersections controlled by traffic signals were failure-to-obey crashes as compared to 42 percent of all two-vehicle crashes at stop signs. In addition, 24 percent of all two-vehicle crashes at intersections controlled by traffic signals were failure-to-yield crashes as compared to 45 percent of all two-vehicle crashes at stop-sign controlled intersections.

Figure 13: Proportion of All Fatal Intersection Crashes That Involved at Least One Driver With a Failure-to-Yield or Failure-to-Obey Violation, 1997-2004

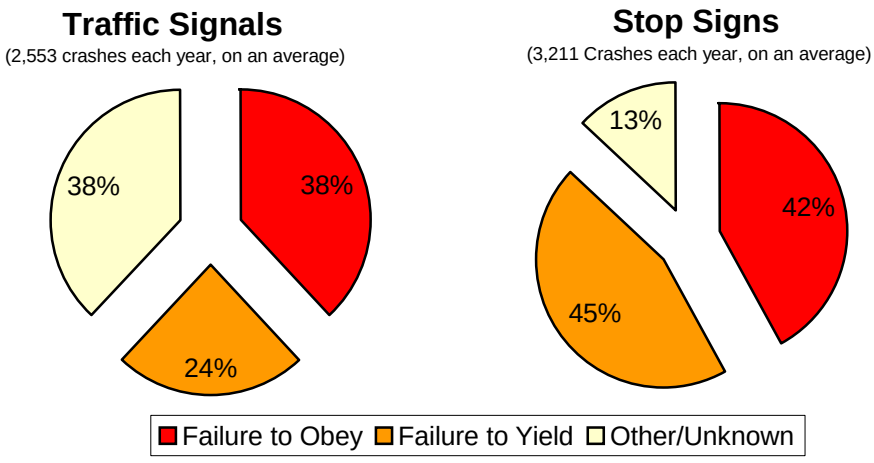


Table 13 depicts the trend of failure-to-obey and failure-to-yield crashes at traffic signals and stop signs from 1997 to 2004. On an average, about 38 percent of all fatal crashes at signal-controlled intersections involved at least one driver who ran a red light. In addition, 24 percent of the fatal crashes, on an average, involved at least one driver who failed to yield.

Among fatal intersection crashes that occurred at stop signs, 42 percent of the crashes, on an average, involved at least one driver who was charged with a failure-to-obey violation. About 45 percent of the drivers were charged with a failure-to-yield violation.

Table 13: Fatal Crashes and Fatalities That Occurred at Intersections by Major Violations and the Number of Fatalities, 1997-2004

Traffic Signal

Year	Crashes					Fatalities				
	Total	Red-Light Running (Failure to Obey)		Failure to Yield		Total	Red-Light Running (Failure to Obey)		Failure to Yield	
		Num	%	Num	%		Num	%	Num	%
1997	2,543	998	39%	617	24%	2,730	1,100	40%	654	24%
1998	2,525	931	37%	641	25%	2,712	1,011	37%	702	26%
1999	2,493	916	37%	629	25%	2,680	1,011	38%	659	25%
2000	2,513	971	39%	594	24%	2,703	1,075	40%	627	23%
2001	2,610	1,036	40%	584	22%	2,818	1,142	41%	616	22%
2002	2,588	966	37%	628	24%	2,758	1,061	38%	662	24%
2003	2,542	977	38%	563	22%	2,747	1,072	39%	610	22%
2004	2,609	938	36%	649	25%	2,766	1,017	37%	687	25%
Total	20,423	7,733	38%	4,905	24%	21,914	8,489	39%	5,217	24%
Avg.	*2,553*	*967*	*38%*	*613*	*24%*	*2,739*	*1,061*	*39%*	*652*	*24%*

Stop Sign

Year	Total	Failure to Obey		Failure to Yield		Total	Failure to Obey		Failure to Yield	
1997	3,110	1,352	43%	1,409	45%	3,566	1,618	45%	1,566	44%
1998	3,277	1,414	43%	1,486	45%	3,792	1,684	44%	1,700	45%
1999	3,372	1,379	41%	1,529	45%	3,821	1,601	42%	1,727	45%
2000	3,173	1,302	41%	1,424	45%	3,610	1,552	43%	1,583	44%
2001	3,129	1,333	43%	1,393	45%	3,507	1,542	44%	1,535	44%
2002	3,266	1,448	44%	1,339	41%	3,689	1,689	46%	1,483	40%
2003	3,201	1,296	40%	1,435	45%	3,604	1,512	42%	1,585	44%
2004	3,160	1,191	38%	1,454	46%	3,556	1,397	39%	1,614	45%
Total	25,688	10,715	42%	11,469	45%	29,145	12,595	43%	12,793	44%
Avg.	*3,211*	*1,339*	*42%*	*1,434*	*45%*	*3,643*	*1,574*	*43%*	*1,599*	*44%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Table 14 depicts the type of the crash occurring at signal-controlled and stop-sign-controlled intersections, i.e., if the crashes were single-vehicle or multiple-vehicle crashes.

Table 14: Fatal Crashes That Occurred at Signal-Controlled Intersections by the Number of Vehicles Involved and the Number of Fatalities, 1997-2004

Number of Vehicles	Crashes		Fatalities	
	Crashes	% of Total	Fatalities	% of Total
Traffic Signal				
Single-Vehicle	**5,601**	**27%**	**5,722**	**26%**
Multiple-Vehicle	**14,470**	**73%**	**16,192**	**74%**
2	11,878	58%	12,951	59%
3	2,217	11%	2,426	11%
4	514	2%	561	3%
5 or More	213	1%	254	1%
Total	**20,423**	**100%**	**21,914**	**100%**
Stop Sign				
Single-Vehicle	**3,061**	**12%**	**3,214**	**11%**
Multiple-vehicle	**22,464**	**88%**	**25,931**	**89%**
2	20,920	81%	23,934	82%
3	1,560	6%	1,823	6%
4	127	0%	148	1%
5 or More	20	0%	26	0%
Total	**25,688**	**100%**	**29,145**	**100%**

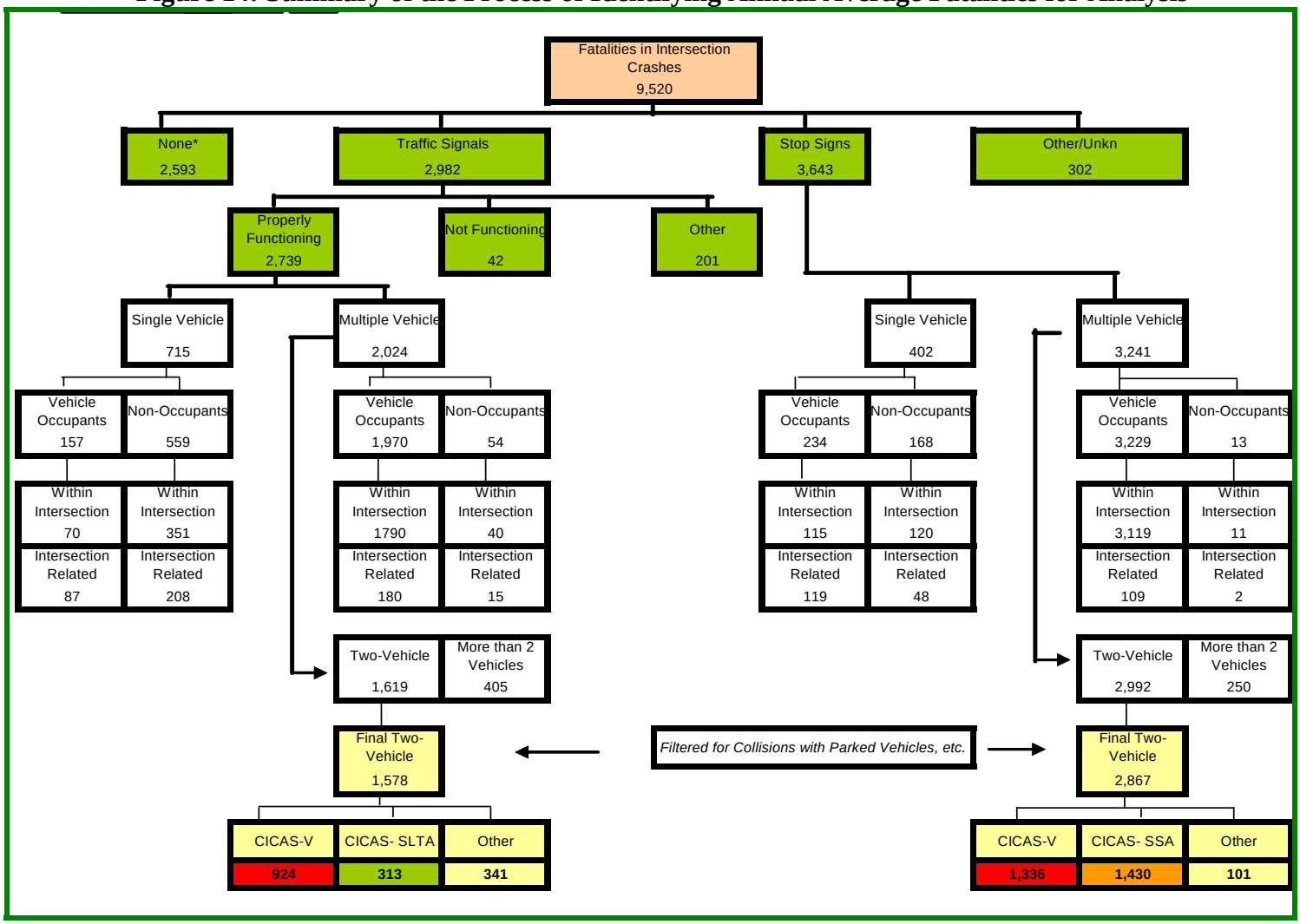
Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

A large proportion, about 81 percent, of the fatal crashes at intersections controlled by stop signs are two-vehicle crashes. About 60 percent of the crashes that occur at signal-controlled intersections are two-vehicle crashes. However, most of the single-vehicle crashes that occur at signal-controlled intersections result in the fatality to a pedestrian or a pedalcyclist, as shown in Table 9. Also, for a large majority of the multi-vehicle crashes, the first harmful event in the crash is a motor vehicle in transport. Hence, the following sections of the report will analyze two-vehicle crashes at intersections. Nonoccupant fatalities (pedestrian, pedalcyclists, etc.) will be discussed in a forthcoming publication.

Figure 14 summarizes the process of identifying the crash population that will be analyzed in detail in the following sections of this report. As seen in Figure 14, a large proportion of the fatalities in single-vehicle crashes occur to pedestrians. Fatally injured vehicle occupants in single-vehicle crashes are usually in vehicles that hit a fixed object in the intersection such as a tree, embankment, signal fixture, curb, or the vehicle had rolled over. These are scenarios on which a CICAS system may not be as effective. Among nonoccupants killed in single-vehicle crashes, CICAS might be effective in a portion of the crashes. These might involve nonoccupants who are struck due to a vehicle whose driver either failed to obey or failed to yield to a traffic control device prior to hitting the nonoccupant.

Among multiple-vehicle crashes, a majority are two-vehicle crashes. Crashes involving more than two vehicles are more complex to analyze and the number of vehicles involved also varies. Two-vehicle crashes will be the type of crash analyzed in the remainder of this report. Figure 14 as well as Table 18 (*Table 18, Page 37*) show the fatality categories primarily addressed by the three current CICAS (V, SLTA and SSA) programs.

Figure 14: Summary of the Process of Identifying Annual Average Fatalities for Analysis



*A Vehicle Safety Communications Application (VSC-A) Program is being designed to address crashes in this category as well as the other categories.

As seen in Figure 14, about 42 percent [(924+313+1,336+1,430)/9,520] of the fatalities occurring at intersections each year could potentially be affected by CICAS technology.

5. Two-Vehicle Fatal Crashes at Intersections Controlled by Signals/Stop Signs

This section will analyze the characteristics of fatal, two-vehicle crashes at intersections controlled by signals and stop signs. Most of the fatal, single-vehicle crashes at intersections result in the fatality to a nonoccupant. Also, a large proportion of the multiple-vehicle crashes, which are generally more serious in nature, are crashes that involved two vehicles.

Of the 11,878 two-vehicle crashes at signal-controlled intersections, 11,587 had a first harmful event coded as a motor vehicle in transport. Similarly, of the 20,920 two-vehicle crashes at stop-sign controlled intersections, 20,764 had a first harmful event coded as a motor vehicle in transport. These crashes will constitute the population of crashes to be analyzed in the following sections.

Table 15 (overleaf) depicts the Most Harmful Event (MHE) for the vehicles involved in fatal, two-vehicle crashes at intersections controlled by signals and stop signs. The MHE is coded at the vehicle level while the First Harmful Event (FHE) detailed earlier is coded at the crash level. This element is used when the FHE is minor, for a particular vehicle, compared to some subsequent event. Otherwise, MHE and FHE are coded the same for a given vehicle. As seen in Table 15, close to 92 percent [10,701/11,571] of all two-vehicle crashes at signal-controlled intersections had a *motor vehicle in transport* coded as the MHE for both the vehicles. This proportion was similar for vehicles involved in two-vehicle crashes at stop-sign controlled intersections.

Also, fatal, two-vehicle intersection crashes that involve a parked vehicle will be removed from the crash population to be analyzed. Thus, the rest of this section will detail the 11,571 two-vehicle crashes at signal-controlled intersections resulting in 12,621 fatalities. Similarly, the 20,732 fatal two-vehicle crashes resulting in 23,733 fatalities at stop signs will be detailed.

Table 15: Most Harmful Events of Vehicles Involved in Fatal Two-Vehicle Crashes at Intersections and Role of People Killed, 1997 to 2004

Most Harmful Event for 1st Vehicle	Most Harmful Event for 2nd Vehicle	Crashes	Occupants Killed in 1st Vehicle	Occupants Killed in 2nd Vehicle	Total Vehicle Occupants Killed	Nonoccupants Killed	Total
Traffic Signal							
Motor Vehicle in Transport	Motor Vehicle in Transport	10,701	5,967	5,656	11,623	14	11,637
Motor Vehicle in Transport	Overturn	332	189	186	375	3	378
Motor Vehicle in Transport	Collision with Fixed Object	300	181	146	327	3	330
Motor Vehicle in Transport	Nonoccupants	143	1	3	4	152	156
Motor Vehicle in Transport	Non-Collision	46	25	32	57	0	57
Collision with Fixed Object	Collision with Fixed Object	17	7	13	20	0	20
Collision with Fixed Object	Overturn	13	13	3	16	0	16
Other		19	9	9	18	9	27
Subtotal		**11,571**	**6,392**	**6,048**	**12,440**	**181**	**12,621**
Involving a Parked Motor Vehicle		16	11	8	19	0	19
Total		11,587	6,403	6,056	12,459	181	12,640
Stop Sign							
Motor Vehicle in Transport	Motor Vehicle in Transport	19,264	13,371	8,546	21,917	3	21,920
Motor Vehicle in Transport	Overturn	855	549	504	1,053	0	1,053
Motor Vehicle in Transport	Collision with Fixed Object	354	215	197	412	0	412
Motor Vehicle in Transport	Nonoccupants	55	1	1	2	56	58
Motor Vehicle in Transport	Non-Collision	78	72	42	114	0	114
Collision with Fixed Object	Collision with Fixed Object	24	20	10	30	0	30
Collision with Fixed Object	Overturn	17	5	15	20	0	20
Other		82	55	66	121	2	123
Subtotal		**20,732**	**14,290**	**9,382**	**23,672**	**61**	**23,733**
Involving a Parked Motor Vehicle		32	22	15	37	1	38
Total		20,764	14,312	9,397	23,709	62	23,771

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Table 16 depicts the trend of the two-vehicle crash population and the resulting fatalities that will be analyzed in greater detail in the following sections of the report. On an average, every year, there are 1,446 fatal two-vehicle crashes at traffic signals resulting in 1,578 fatalities. About 50 percent of these crashes involved at least one driver who was charged with a failure-to-obey violation, i.e., ran a red light. At stop-sign-controlled intersections, on an average, there are 2,592 fatal two-vehicle crashes resulting in 2,967 fatalities. About 44 percent of these crashes involved at least one driver who was charged with a failure-to-obey violation, i.e., the driver failed to stop at the stop sign.

Table 16: Fatal Two-Vehicle Crashes and Fatalities That Occurred at Intersections by Major Violations Charged and the Number of Fatalities, 1997-2004

Traffic Signal

Year	Crashes					Fatalities				
	Total Crashes	Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities	Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%		Num	%	Num	%
1997	1,461	761	52%	428	29%	1,591	836	53%	460	29%
1998	1,410	692	49%	440	31%	1,542	750	49%	490	32%
1999	1,422	691	49%	442	31%	1,549	761	49%	464	30%
2000	1,410	730	52%	403	29%	1,551	809	52%	433	28%
2001	1,520	791	52%	434	29%	1,667	877	53%	463	28%
2002	1,431	719	50%	428	30%	1,548	788	51%	458	30%
2003	1,437	741	52%	392	27%	1,582	815	52%	437	28%
2004	1,480	710	48%	445	30%	1,591	767	48%	478	30%
Total	11,571	5,835	50%	3,412	29%	12,621	6,403	51%	3,683	29%
Avg.	*1,446*	*729*	*50%*	*427*	*29%*	*1,578*	*800*	*51%*	*460*	*29%*

Stop Sign

Year	Crashes					Fatalities				
	Total Crashes	Failure-to-obey Crashes		Failure-to-Yield Crashes		Total Fatalities	Failure-to-obey Crashes		Failure-to-Yield Crashes	
1997	2,564	1,151	45%	1,260	49%	2,961	1,382	47%	1,406	47%
1998	2,699	1,199	44%	1,337	50%	3,172	1,450	46%	1,539	49%
1999	2,772	1,202	43%	1,370	49%	3,170	1,408	44%	1,550	49%
2000	2,550	1,116	44%	1,267	50%	2,931	1,339	46%	1,410	48%
2001	2,527	1,118	44%	1,241	49%	2,841	1,291	45%	1,365	48%
2002	2,583	1,187	46%	1,189	46%	2,946	1,399	47%	1,316	45%
2003	2,565	1,095	43%	1,279	50%	2,893	1,273	44%	1,411	49%
2004	2,472	963	39%	1,295	52%	2,819	1,142	41%	1,440	51%
Total	20,732	9,031	44%	10,238	49%	23,733	10,684	45%	11,437	48%
Avg.	*2,592*	*1,129*	*44%*	*1,280*	*49%*	*2,967*	*1,336*	*45%*	*1,430*	*48%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

The following sections will describe in detail the crash, vehicle, and driver characteristics in fatal two-vehicle crashes identified in the table above.

5.1 Crash Characteristics of Fatal, Two-Vehicle Intersection Crashes

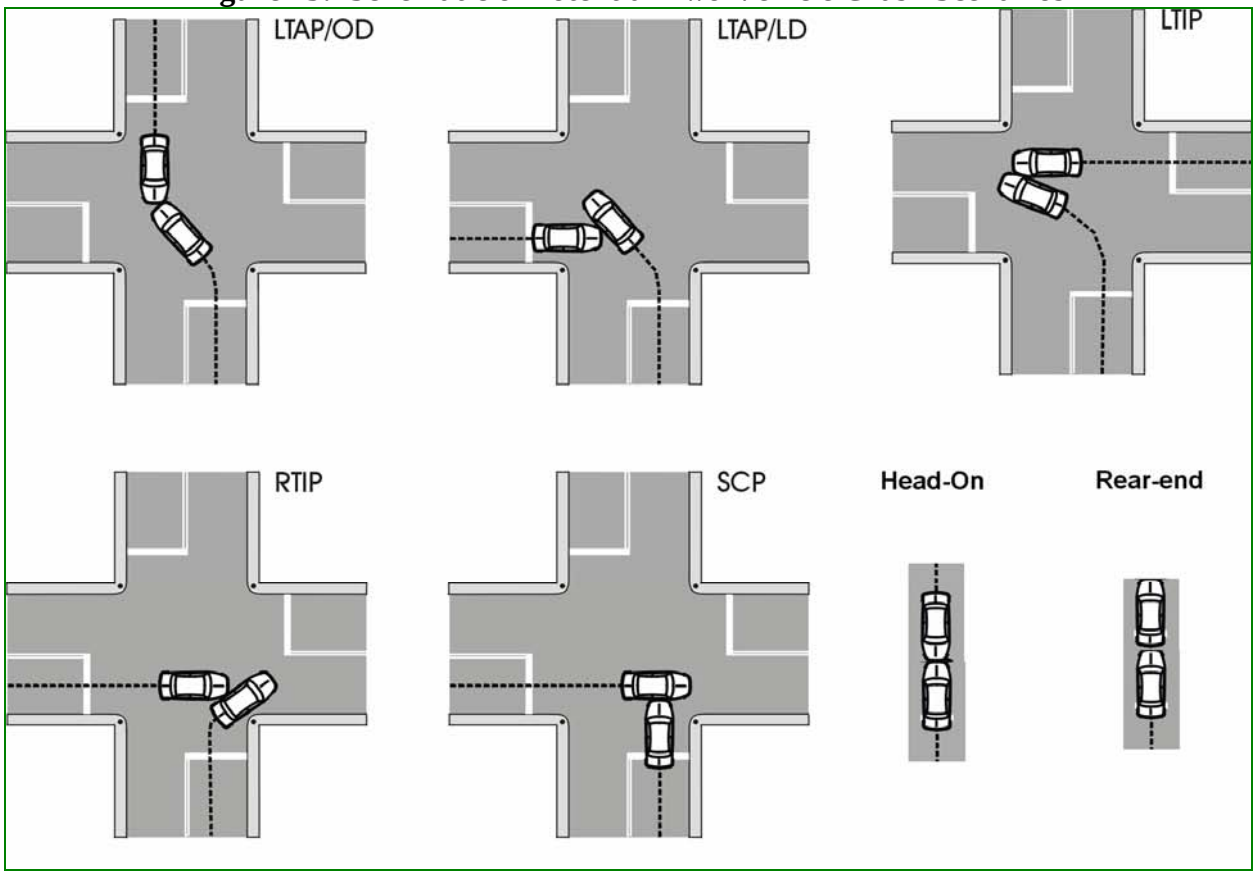
5.1.1. Crash Scenarios

The major types of crashes involving two vehicles at an intersection are crossing-path crashes, head-on collisions, and rear-end collisions. Crossing-path crashes have been defined in prior research as those that involve the type of traffic conflict where one moving vehicle cuts across the path of another, when they were initially approaching from either lateral or opposite directions, in such a way that they collided at or near a junction (Najm et. al., 2001).

Figure 15 depicts the potential scenarios that might lead to a two-vehicle crash. The relevant crash scenarios are:

- Crossing-Path Crashes
  - Left Turn Across Path - Opposite Direction Conflict (LTAP/OD)
  - Left Turn Across Path - Lateral Direction Conflict (LTAP/LD)
  - Left Turn Into Path - Merge Conflict (LTIP)
  - Right Turn Into Path - Merge Conflict (RTIP)
  - Straight Crossing Paths (SCP)
- Head-On Collisions, not classifiable as Crossing-Path Crashes
- Rear-End Collisions, not classifiable as Crossing-Path Crashes

Figure 15: Schematic of Potential Two-Vehicle Crash Scenarios



While the taxonomy of two-vehicle crashes is currently not coded in FARS, this study has classified fatal two-vehicle crashes along the lines of Figure 15 by using available FARS variables and descriptions. The crash schematics depicted in Figure 15 are just one representation of the many possible impact scenarios between the two vehicles. The variables used and the algorithm employed in the classification of two-vehicle crash scenarios are documented in Appendix 1. Figure 16 depicts the distribution of crash scenarios in two-vehicle crashes occurring at intersections controlled by traffic signals and stop signs. About 43 percent of fatal, two-vehicle crashes at intersections controlled by traffic signals were SCP crashes followed by 31 percent that were LTAP/OD crashes. However, in the case of fatal, two-vehicle crashes at intersections controlled by stop signs, 70 percent of the crashes were SCP crashes followed by 17 percent that were LTAP/LD crashes.

Figure 16: Crash Scenarios in Fatal Two-Vehicle Intersection Crashes, 1997-2004

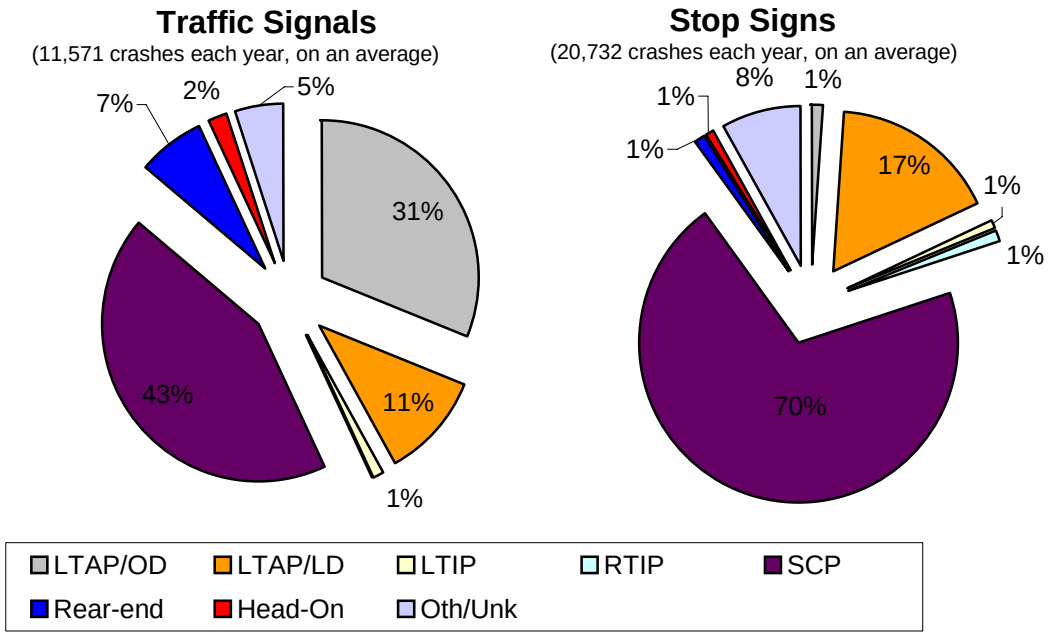


Table 18 depicts the data for the crash scenarios by the type of violations. About 65 percent of the failure-to-obey crashes at traffic signals and 84 percent of the failure-to-obey crashes at stop signs were SCP crashes. Also, 69 percent of the failure-to-yield crashes at traffic signals were LTAP/OD crashes and 61 percent of the failure-to-yield crashes at stop signs were SCP crashes.

Table 18: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Roadway Crash Scenario, 1997-2004

Year	Crash Scenario	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	LTAP/OD	3,602	31%	844	14%	2,340	69%	3,876	31%	913	14%	2,507	68%
	LTAP/LD	1,288	11%	722	12%	389	11%	1,370	11%	777	12%	407	11%
	LTIP	92	1%	31	1%	49	1%	97	1%	32	0%	53	1%
	RTIP	49	0%	28	0%	16	0%	51	0%	29	0%	16	0%
	SCP	4,919	43%	3,820	65%	464	14%	5,470	43%	4,234	66%	524	14%
	Rear-end	780	7%	80	1%	22	1%	850	7%	85	1%	35	1%
	Head-On	231	2%	87	1%	22	1%	258	2%	94	1%	23	1%
	Oth/Unk	610	5%	223	4%	110	3%	649	5%	239	4%	118	3%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*LTAP/OD*	*450*	*31%*	*106*	*14%*	*293*	*69%*	*485*	*31%*	*114*	*14%*	*313*	*68%*
	LTAP/LD	*161*	*11%*	*90*	*12%*	*49*	*11%*	*171*	*11%*	*97*	*12%*	*51*	*11%*
	LTIP	*12*	*1%*	*4*	*1%*	*6*	*1%*	*12*	*1%*	*4*	*0%*	*7*	*1%*
	RTIP	*6*	*0%*	*4*	*0%*	*2*	*0%*	*6*	*0%*	*4*	*0%*	*2*	*0%*
	SCP	*615*	*43%*	*478*	*65%*	*58*	*14%*	*684*	*43%*	*529*	*66%*	*66*	*14%*
	Rear-end	*98*	*7%*	*10*	*1%*	*3*	*1%*	*106*	*7%*	*11*	*1%*	*4*	*1%*
	Head-On	*29*	*2%*	*11*	*1%*	*3*	*1%*	*32*	*2%*	*12*	*1%*	*3*	*1%*
	Oth/Unk	*76*	*5%*	*28*	*4%*	*14*	*3%*	*81*	*5%*	*30*	*4%*	*15*	*3%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	LTAP/OD	732	4%	159	2%	490	5%	834	4%	188	2%	553	5%
	LTAP/LD	3,664	18%	649	7%	2,740	27%	3,993	17%	707	7%	2,990	26%
	LTIP	90	0%	32	0%	44	0%	98	0%	36	0%	48	0%
	RTIP	158	1%	49	1%	88	1%	175	1%	52	0%	102	1%
	SCP	14,427	70%	7,560	84%	6,233	61%	16,795	71%	9,046	85%	7,034	62%
	Rear-end	129	1%	33	0%	10	0%	138	1%	36	0%	10	0%
	Head-On	301	1%	142	2%	75	1%	341	1%	168	2%	81	1%
	Oth/Unk	1,231	6%	407	5%	558	5%	1,359	6%	451	4%	619	5%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*LTAP/OD*	*92*	*4%*	*20*	*2%*	*61*	*5%*	*104*	*4%*	*24*	*2%*	*69*	*5%*
	LTAP/LD	*458*	*18%*	*81*	*7%*	*343*	*27%*	*499*	*17%*	*88*	*7%*	*374*	*26%*
	LTIP	*11*	*0%*	*4*	*0%*	*6*	*0%*	*12*	*0%*	*5*	*0%*	*6*	*0%*
	RTIP	*20*	*1%*	*6*	*1%*	*11*	*1%*	*22*	*1%*	*7*	*0%*	*13*	*1%*
	SCP	*1,803*	*70%*	*945*	*84%*	*779*	*61%*	*2,099*	*71%*	*1,131*	*85%*	*879*	*62%*
	Rear-end	*16*	*1%*	*4*	*0%*	*1*	*0%*	*17*	*1%*	*5*	*0%*	*1*	*0%*
	Head-On	*38*	*1%*	*18*	*2%*	*9*	*1%*	*43*	*1%*	*21*	*2%*	*10*	*1%*
	Oth/Unk	*154*	*6%*	*51*	*5%*	*70*	*5%*	*170*	*6%*	*56*	*4%*	*77*	*5%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*
		CICAS-V			*CICAS-SLTA*			*CICAS-SSA*					

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.2. Relation to Intersection

Table 19 depicts the location, in relation to the intersection, of fatal two-vehicle crashes and fatalities at traffic signals and stop signs. A large majority of the two-vehicle crashes occur within the intersection at traffic signals as well as stop signs.

Table 19: Fatal Crashes and Fatalities That Occurred at Intersections by Relation to Junction, Major Violations Charged and the Number of Fatalities, 1997-2004

Year	Relation to Junction	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Within Inter-section	10,711	93%	5,656	97%	3,308	97%	11,684	93%	6,210	97%	3,566	97%
	Inter-section-Related	860	7%	179	3%	104	3%	937	7%	193	3%	117	3%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Within Inter-section*	*1,339*	*93%*	*707*	*97%*	*414*	*97%*	*1,461*	*93%*	*776*	*97%*	*446*	*97%*
	Inter-section-Related	*108*	*7%*	*22*	*3%*	*13*	*3%*	*117*	*7%*	*24*	*3%*	*15*	*3%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Within Inter-section	20,060	97%	8,819	98%	9,933	97%	22,978	97%	10,443	98%	11,093	97%
	Inter-section-Related	672	3%	212	2%	305	3%	755	3%	241	2%	344	3%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Within Inter-section*	*2,508*	*97%*	*1,102*	*98%*	*1,242*	*97%*	*2,872*	*97%*	*1,305*	*98%*	*1,387*	*97%*
	Inter-section-Related	*84*	*3%*	*27*	*2%*	*38*	*3%*	*94*	*3%*	*30*	*2%*	*43*	*3%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.3 Manner of Collision

Table 20 depicts the crashes and fatalities by the manner of collision. A majority of the two-vehicle crashes occurring at both signal-controlled and stop-sign controlled intersections were angle (front-to-side) impacts.

Table 20: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Manner of Collision, 1997-2004

Year	Manner of Collision	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Rear-End	862	7%	92	2%	32	1%	939	7%	97	2%	45	1%
	Head-On	624	5%	144	2%	285	8%	660	5%	151	2%	296	8%
	Angle	9,993	86%	5,582	96%	3,073	90%	10,927	87%	6,138	96%	3,320	90%
	Sideswipe	64	1%	10	0%	9	0%	66	1%	10	0%	9	0%
	Oth/Unk	28	0%	7	0%	13	0%	29	0%	7	0%	13	0%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Rear-End*	*108*	*7%*	*12*	*2%*	*4*	*1%*	*117*	*7%*	*12*	*2%*	*6*	*1%*
	Head-On	*78*	*5%*	*18*	*2%*	*36*	*8%*	*83*	*5%*	*19*	*2%*	*37*	*8%*
	Angle	*1,249*	*86%*	*698*	*96%*	*384*	*90%*	*1,366*	*87%*	*767*	*96%*	*415*	*90%*
	Sideswipe	*8*	*1%*	*1*	*0%*	*1*	*0%*	*8*	*1%*	*1*	*0%*	*1*	*0%*
	Oth/Unk	*4*	*0%*	*1*	*0%*	*2*	*0%*	*4*	*0%*	*1*	*0%*	*2*	*0%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Rear-End	184	1%	36	0%	35	0%	204	1%	42	0%	43	0%
	Head-On	454	2%	152	2%	160	2%	526	2%	183	2%	184	2%
	Angle	20,001	96%	8,822	98%	10,006	98%	22,901	96%	10,433	98%	11,170	98%
	Sideswipe	69	0%	14	0%	24	0%	77	0%	18	0%	27	0%
	Oth/Unk	24	0%	7	0%	13	0%	25	0%	8	0%	13	0%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Rear-End*	*23*	*1%*	*5*	*0%*	*4*	*0%*	*26*	*1%*	*5*	*0%*	*5*	*0%*
	Head-On	*57*	*2%*	*19*	*2%*	*20*	*2%*	*66*	*2%*	*23*	*2%*	*23*	*2%*
	Angle	*2,500*	*96%*	*1,103*	*98%*	*1,251*	*98%*	*2,863*	*96%*	*1,304*	*98%*	*1,396*	*98%*
	Sideswipe	*9*	*0%*	*2*	*0%*	*3*	*0%*	*10*	*0%*	*2*	*0%*	*3*	*0%*
	Oth/Unk	*3*	*0%*	*1*	*0%*	*2*	*0%*	*3*	*0%*	*1*	*0%*	*2*	*0%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.4 Roadway Function Class

Table 21 depicts the crashes and fatalities by the roadway function class, i.e., if the roadway was in a rural or an urban area. Slightly more than 80 percent of the two-vehicle crashes at signal-controlled intersections occur in urban areas. This relative distribution was also true in the case of crashes that involved at least one driver who failed to stop at a red light. In two-vehicle crashes occurring at stop signs, about 64 percent of the crashes occurred in rural areas.

Table 21: Fatal Crashes and Fatalities That Occurred at Intersections by Major Roadway Function Class (Urban/Rural), Violations Charged, and the Number of Fatalities, 1997-2004

Year	Roadway Function Class	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Rural	2,131	18%	1,042	18%	675	20%	2,366	19%	1,171	18%	747	20%
	Urban	9,355	81%	4,743	81%	2,719	80%	10,159	80%	5,175	81%	2,917	79%
	Unknown	85	1%	50	1%	18	1%	96	1%	57	1%	19	1%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Rural*	*266*	*18%*	*130*	*18%*	*84*	*20%*	*296*	*19%*	*146*	*18%*	*93*	*20%*
	Urban	*1,169*	*81%*	*593*	*81%*	*340*	*80%*	*1,270*	*80%*	*647*	*81%*	*365*	*79%*
	Unknown	*11*	*1%*	*6*	*1%*	*2*	*1%*	*12*	*1%*	*7*	*1%*	*2*	*1%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Rural	13,246	64%	6,253	69%	6,252	61%	15,551	66%	7,583	71%	7,146	62%
	Urban	7,341	35%	2,710	30%	3,920	38%	8,019	34%	3,025	28%	4,215	37%
	Unknown	145	1%	68	1%	66	1%	163	1%	76	1%	76	1%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Rural*	*1,656*	*64%*	*782*	*69%*	*782*	*61%*	*1,944*	*66%*	*948*	*71%*	*893*	*62%*
	Urban	*918*	*35%*	*339*	*30%*	*490*	*38%*	*1,002*	*34%*	*378*	*28%*	*527*	*37%*
	Unknown	*18*	*1%*	*9*	*1%*	*8*	*1%*	*20*	*1%*	*10*	*1%*	*10*	*1%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.5 Roadway Function Class in RURAL Crashes

As seen in Table 22, about 44 percent of the two-vehicle failure-to-obey crashes in rural intersections controlled by traffic signals are on principal arterial roads (Refer to Glossary for Roadway type descriptions), 23 percent in minor arterial roads, 16 percent in major collector roads and 12 percent in local roads/streets. Among failure-to-obey, two-vehicle crashes in rural stop-sign controlled intersections, 32 percent occurred on major collector roads, 20 percent in both principal arterial and minor arterial roads and 11 percent in minor collector roads.

Table 22: Fatal Two-Vehicle Crashes and Fatalities at RURAL Intersections by Major Violations Charged and Roadway Function Class, 1997-2004

Year	RURAL Roadway Function Class	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Principal Arterial	928	44%	458	44%	287	43%	1,050	44%	522	45%	328	44%
	Minor Arterial	500	23%	252	24%	156	23%	553	23%	287	25%	167	22%
	Major Collector	304	14%	162	16%	92	14%	329	14%	175	15%	101	14%
	Minor Collector	55	3%	26	2%	17	3%	59	2%	28	2%	19	3%
	Local Road/St.	298	14%	126	12%	104	15%	323	14%	137	12%	112	15%
	Oth/Unk	46	2%	18	2%	19	3%	52	2%	22	2%	20	3%
	Total	2,131	100%	1,042	100%	675	100%	2,366	100%	1,171	100%	747	100%
Avg. per Year	*Pr. Artrl.*	*116*	*44%*	*57*	*44%*	*36*	*43%*	*131*	*44%*	*65*	*45%*	*41*	*44%*
	Min Artrl	*63*	*23%*	*32*	*24%*	*20*	*23%*	*69*	*23%*	*36*	*25%*	*21*	*22%*
	Maj Clctr	*38*	*14%*	*20*	*16%*	*12*	*14%*	*41*	*14%*	*22*	*15%*	*13*	*14%*
	Min Clctr	*7*	*3%*	*3*	*2%*	*2*	*3%*	*7*	*2%*	*4*	*2%*	*2*	*3%*
	Lcl Rd	*37*	*14%*	*16*	*12%*	*13*	*15%*	*40*	*14%*	*17*	*12%*	*14*	*15%*
	Oth/Unk	*6*	*2%*	*2*	*2%*	*2*	*3%*	*7*	*2%*	*3*	*2%*	*3*	*3%*
	Total	*266*	*100%*	*130*	*100%*	*84*	*100%*	*296*	*100%*	*146*	*100%*	*93*	*100%*
Stop Sign													
1997 to 2004	Pr. Artrl.	3,436	26%	1,228	20%	2,034	33%	3,982	26%	1,473	19%	2,324	33%
	Min Artrl	2,860	22%	1,231	20%	1,464	23%	3,350	22%	1,500	20%	1,668	23%
	Maj Clctr	3,707	28%	1,971	32%	1,569	25%	4,421	28%	2,432	32%	1,798	25%
	Min Clctr	1,115	8%	657	11%	389	6%	1,327	9%	791	10%	456	6%
	Lcl Rd	1,957	15%	1,076	17%	725	12%	2,266	15%	1,278	17%	814	11%
	Oth/Unk	171	1%	90	1%	71	1%	205	1%	109	1%	86	1%
	Total	13,246	100%	6,253	100%	6,252	100%	15,551	100%	7,583	100%	7,146	100%
Avg. per Year	*Pr. Artrl.*	*430*	*26%*	*154*	*20%*	*254*	*33%*	*498*	*26%*	*184*	*19%*	*291*	*33%*
	Min Artrl	*358*	*22%*	*154*	*20%*	*183*	*23%*	*419*	*22%*	*188*	*20%*	*209*	*23%*
	Maj Clctr	*463*	*28%*	*246*	*32%*	*196*	*25%*	*553*	*28%*	*304*	*32%*	*225*	*25%*
	Min Clctr	*139*	*8%*	*82*	*11%*	*49*	*6%*	*166*	*9%*	*99*	*10%*	*57*	*6%*
	Lcl Rd	*245*	*15%*	*135*	*17%*	*91*	*12%*	*283*	*15%*	*160*	*17%*	*102*	*11%*
	Oth/Unk	*21*	*1%*	*11*	*1%*	*9*	*1%*	*26*	*1%*	*14*	*1%*	*11*	*1%*
	Total	*1,656*	*100%*	*782*	*100%*	*782*	*100%*	*1,944*	*100%*	*948*	*100%*	*893*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.6 Roadway Function Class in URBAN Crashes

As seen in Table 23, about 59 percent of the two-vehicle crashes in urban intersections controlled by traffic signals are on principal arterial roads, 24 percent on minor arterial roads, and 13 percent on local roads/streets. Among two-vehicle crashes in urban stop-sign-controlled intersections, 36 percent occurred on principal arterial roads, 26 percent on both minor arterial and local roads and 11 percent on collector roads. In failure-to-obey crashes at stop-signs, the highest proportion (about 34 percent) occurred on local roads while in failure-to-yield crashes, the highest proportion (44 percent) occurred on principal arterial roads.

Table 23: Fatal Two-Vehicle Crashes and Fatalities at URBAN Intersections by Major Violations Charged and Roadway Function Class, 1997-2004

Year	URBAN Roadway Function Class	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Principal Arterial	5,508	59%	2,787	59%	1,599	59%	6,005	59%	3,059	59%	1,725	59%
	Minor Arterial	2,213	24%	1,053	22%	704	26%	2,379	23%	1,128	22%	754	26%
	Collector	352	4%	177	4%	105	4%	375	4%	188	4%	111	4%
	Local Road/St.	1,225	13%	697	15%	295	11%	1,334	13%	765	15%	310	11%
	Oth/Unk	57	1%	29	1%	16	1%	66	1%	35	1%	17	1%
	Total	9,355	100%	4,743	100%	2,719	100%	10,159	100%	5,175	100%	2,917	100%
Avg. per Year	*Pr. Artrl.*	*689*	*59%*	*348*	*59%*	*200*	*59%*	*751*	*59%*	*382*	*59%*	*216*	*59%*
	Min Artrl	*277*	*24%*	*132*	*22%*	*88*	*26%*	*297*	*23%*	*141*	*22%*	*94*	*26%*
	Collector	*44*	*4%*	*22*	*4%*	*13*	*4%*	*47*	*4%*	*24*	*4%*	*14*	*4%*
	Lcl Rd	*153*	*13%*	*87*	*15%*	*37*	*11%*	*167*	*13%*	*96*	*15%*	*39*	*11%*
	Oth/Unk	*7*	*1%*	*4*	*1%*	*2*	*1%*	*8*	*1%*	*4*	*1%*	*2*	*1%*
	Total	*1,169*	*100%*	*593*	*100%*	*340*	*100%*	*1,270*	*100%*	*647*	*100%*	*365*	*100%*
Stop Sign													
1997 to 2004	Pr. Artrl.	2,651	36%	684	25%	1,737	44%	2,922	36%	777	26%	1,889	45%
	Min Artrl	1,889	26%	685	25%	1,016	26%	2,065	26%	771	25%	1,084	26%
	Collector	802	11%	395	15%	328	8%	874	11%	440	15%	354	8%
	Lcl Rd	1,941	26%	924	34%	806	21%	2,094	26%	1,013	33%	853	20%
	Oth/Unk	58	1%	22	1%	33	1%	64	1%	24	1%	35	1%
	Total	7,341	100%	2,710	100%	3,920	100%	8,019	100%	3,025	100%	4,215	100%
Avg. per Year	*Pr. Artrl.*	*331*	*36%*	*86*	*25%*	*217*	*44%*	*365*	*36%*	*97*	*26%*	*236*	*45%*
	Min Artrl	*236*	*26%*	*86*	*25%*	*127*	*26%*	*258*	*26%*	*96*	*25%*	*136*	*26%*
	Collector	*100*	*11%*	*49*	*15%*	*41*	*8%*	*109*	*11%*	*55*	*15%*	*44*	*8%*
	Lcl Rd	*243*	*26%*	*116*	*34%*	*101*	*21%*	*262*	*26%*	*127*	*33%*	*107*	*20%*
	Oth/Unk	*7*	*1%*	*3*	*1%*	*4*	*1%*	*8*	*1%*	*3*	*1%*	*4*	*1%*
	Total	*918*	*100%*	*339*	*100%*	*490*	*100%*	*1,002*	*100%*	*378*	*100%*	*527*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.7 Traffic-way Flow

Table 24 depicts the crashes and fatalities by the traffic-way flow. Among all fatal two-vehicle crashes occurring at traffic signals, 42 percent occurred on undivided roads, 42 percent on roads that had a median without a barrier and 9 percent on roads that had a median with a barrier. This distribution was also true in the case of failure-to-obey and failure-to-yield crashes at traffic signals. Among all two-vehicle crashes occurring at stop signs, 75 percent occurred on undivided roads and 12 percent occurred on roads that had a median without a barrier. In failure-to-obey crashes at stop signs, 83 percent occurred at undivided roads while 12 percent occurred at roads that had a median without a barrier. In the case of failure-to-yield crashes at stop signs, the proportions were a little different with 68 percent of the crashes occurring at undivided roads and 27 percent occurring at roads that had a median without a barrier.

Table 24: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Trafficway Flow, 1997-2004

Year	Traffic Way Flow	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Undivided	4,838	42%	2,481	43%	1,410	41%	5,259	42%	2,708	42%	1,524	41%
	Median w/o Barrier	4,857	42%	2,373	41%	1,515	44%	5,316	42%	2,625	41%	1,632	44%
	Median w Barrier	1,002	9%	463	8%	322	9%	1,106	9%	515	8%	351	10%
	One Way	354	3%	265	5%	23	1%	375	3%	285	4%	23	1%
	Oth/Unk	520	4%	253	4%	142	4%	565	4%	270	4%	153	4%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Undivided*	*605*	*42%*	*310*	*43%*	*176*	*41%*	*657*	*42%*	*339*	*42%*	*191*	*41%*
	Med wo B	*607*	*42%*	*297*	*41%*	*189*	*44%*	*665*	*42%*	*328*	*41%*	*204*	*44%*
	Med w B	*125*	*9%*	*58*	*8%*	*40*	*9%*	*138*	*9%*	*64*	*8%*	*44*	*10%*
	One Way	*44*	*3%*	*33*	*5%*	*3*	*1%*	*47*	*3%*	*36*	*4%*	*3*	*1%*
	Oth/Unk	*65*	*4%*	*32*	*4%*	*18*	*4%*	*71*	*4%*	*34*	*4%*	*19*	*4%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Undivided	15,498	75%	7,511	83%	6,921	68%	17,875	75%	8,958	84%	7,743	68%
	Med w/o B	4,152	20%	1,118	12%	2,733	27%	4,660	20%	1,285	12%	3,043	27%
	Med w B	483	2%	157	2%	283	3%	549	2%	178	2%	323	3%
	One Way	176	1%	79	1%	72	1%	189	1%	86	1%	77	1%
	Oth/Unk	423	2%	166	2%	229	2%	460	2%	177	2%	251	2%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Undivided*	*1,937*	*75%*	*939*	*83%*	*865*	*68%*	*2,234*	*75%*	*1,120*	*84%*	*968*	*68%*
	Med wo B	*519*	*20%*	*140*	*12%*	*342*	*27%*	*583*	*20%*	*161*	*12%*	*380*	*27%*
	Med w B	*60*	*2%*	*20*	*2%*	*35*	*3%*	*69*	*2%*	*22*	*2%*	*40*	*3%*
	One Way	*22*	*1%*	*10*	*1%*	*9*	*1%*	*24*	*1%*	*11*	*1%*	*10*	*1%*
	Oth/Unk	*53*	*2%*	*21*	*2%*	*29*	*2%*	*58*	*2%*	*22*	*2%*	*31*	*2%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.8 Traffic-way Flow and Number of Lanes, Crashes at Traffic Signals

Table 25 depicts the number of lanes in the roadway on which the crash occurs in signal-controlled intersections. Since FARS codes the number of lanes along a continuous stretch of the roadway, this tabulation is done along with the traffic-way flow. For example, a fatal crash occurring at the intersection shown in the cover of this report would be coded as having occurred on a three-lane road. The turn lanes are not counted as lanes and since there is a concrete barrier/median in the middle, the roadway with three lanes of traffic each way is still coded as a three-lane road.

The largest number of crashes occurred at two-lane roads that had a median without a barrier, followed by undivided two-lane roads and undivided four-lane roads.

Table 25: Fatal Two-Vehicle Crashes at Signal-Controlled Intersections by Major Violations Charged, Traffic-Way Flow and Number of Lanes, 1997-2004

Traffic-Way Flow	1 Lane		2 Lanes		3 Lanes		4 Lanes		5 or More Lanes		Total Crashes	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
All Crashes												
Undivided	0	0	2,346	48%	153	3%	1,860	38%	419	9%	4,838	100%
Median w/o Barrier	18		2,815	58%	1,079	22%	641	13%	273	6%	4,857	100%
Median w Barrier	3		451	45%	271	27%	177	18%	87	9%	1,002	100%
One Way	11	3%	121	34%	163	46%	45	13%	6	2%	354	100%
Oth/Unk	5	1%	109	21%	49	9%	108	21%	36	7%	520	100%
Total	37		5,842	50%	1,715	15%	2,831	24%	821	7%	11,571	100%
Failure-to-Obey Crashes (Red-Light Running)												
Undivided	0	0	1,290	52%	80	3%	883	36%	228	4%	2,481	100%
Med w/o B	10		1,414	60%	531	22%	287	12%	131	2%	2,373	100%
Med w B	0	0	224	48%	128	28%	71	15%	40	1%	463	100%
One Way	8	3%	84	32%	131	49%	34	13%	8	0%	265	100%
Oth/Unk	2	1%	53	21%	21	8%	53	21%	124	2%	253	100%
Total	20		3,065	53%	891	15%	1,328	23%	531	9%	5,835	100%
Failure-to-Yield Crashes												
Undivided	0	0	580	41%	38	3%	622	44%	158	11%	1,410	100%
Med w/o B	7		876	58%	313	21%	218	14%	93	6%	1,515	100%
Med w B	3	1%	141	44%	82	25%	63	20%	29	9%	322	100%
One Way	1	4%	12	52%	5	22%	2	9%	0	0	23	100%
Oth/Unk	2	1%	32	23%	12	8%	34	24%	4	3%	142	100%
Total	13		1,641	48%	450	13%	939	28%	284	8%	3,412	100%

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.9 Traffic-way Flow and Number of Lanes, Crashes at Stop-Sign-Controlled Intersections

Table 26 depicts the number of lanes in the roadway on which the crash occurs in stop-sign-controlled intersections. Since FARS codes the number of lanes along a contiguous stretch of the roadway, this tabulation is done along with the traffic-way flow. A roadway (the travel lane) is one part of a divided trafficway or, if undivided, the same as the travel lanes of the trafficway. The largest number of crashes occurred at undivided two-lane roads, followed by undivided two-lane roads that had a median without a barrier. This was also true in the case of failure-to-obey and failure-to-yield crashes.

Table 26: Fatal Two-Vehicle Crashes and Fatalities at Stop-Sign-Controlled Intersections by Major Violations Charged, Traffic-Way Flow and Number of Lanes, 1997-2004

Traffic-Way Flow	1 Lane		2 Lanes		3 Lanes		4 Lanes		5 or More Lanes		Total Crashes	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
All Crashes												
Undivided	2		13,857	89%	163	1%	1,285	8%	96	1%	15,498	100%
Median w/o Barrier	68	2%	2,931	71%	298	7%	731	18%	87	2%	4,152	100%
Median w Barrier	1		268	55%	45	9%	152	31%	15	3%	483	100%
One Way	30	17%	89	51%	41	23%	4	2%	1	1%	176	100%
Oth/Unk	12	3%	134	32%	25	6%	80	19%	11	3%	423	100%
Total	113	1%	17,279	83%	572	3%	2,252	11%	210	1%	20,732	100%
Failure-to-Obey Crashes												
Undivided	0	0	6,894	92%	49	1%	498	7%	17		7,511	100%
Med w/o B	20	2%	738	66%	56	5%	279	25%	11	1%	1,118	100%
Med w B	1	1%	79	50%	17	11%	58	37%	2	1%	157	100%
One Way	13	16%	42	53%	19	24%	2	3%	0	0	79	100%
Oth/Unk	3	2%	45	27%	8	5%	19	11%	6	4%	166	100%
Total	37		7,798	86%	149	2%	856	9%	36		9,031	100%
Failure-to-Yield Crashes												
Undivided	2		6,045	87%	98	1%	680	10%	61	1%	6,921	100%
Med w/o B	41	2%	2,022	74%	202	7%	386	14%	60	2%	2,733	100%
Med w B	0	0	173	61%	23	8%	76	27%	11	4%	283	100%
One Way	11	15%	38	53%	15	21%	1	1%	1	1%	72	100%
Oth/Unk	8	3%	82	36%	15	7%	56	24%	5	2%	229	100%
Total	62	1%	8,360	82%	353	3%	1,199	12%	138	1%	10,238	100%

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.10 Speed Limit

Table 27 depicts the crashes and fatalities by the posted speed limit of the roadway. Since FARS does not provide a reliable assessment of the travel speed at the time of the crash, the posted speed limit is the most reliable proxy for travel speed. Among two-vehicle crashes at signal-controlled intersections, 47 percent occurred at roads with speed limits between 40 and 50 mph followed by roads with a speed limit of 35 mph or under. This relative ranking was also true in the case of failure-to-obey and failure-to-yield crashes.

Among two-vehicle crashes occurring at intersections controlled by stop signs, about 53 percent of the crashes occurred at roads with posted speed limits of 55 mph or greater followed by 25 percent in roads with posted speed limits of 40 to 50 mph.

Table 27: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Speed Limit, 1997-2004

Year	Speed Limit (mph)	Crashes						Fatalities					
		Total Crashes		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes		Total Fatalities		Red-Light-Running (Failure-to-Obey Crashes)		Failure-to-Yield Crashes	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	<=35	3,754	32%	2,031	35%	922	27%	4,061	32%	2,201	34%	992	27%
	40 - 50	5,477	47%	2,662	46%	1,797	53%	5,932	47%	2,910	45%	1,909	52%
	55+	1,939	17%	991	17%	589	17%	2,194	17%	1,131	18%	670	18%
	Unknown	401	3%	151	3%	104	3%	434	3%	161	3%	112	3%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*<=35*	*469*	*32%*	*254*	*35%*	*115*	*27%*	*508*	*32%*	*275*	*34%*	*124*	*27%*
	40 - 50	*685*	*47%*	*333*	*46%*	*225*	*53%*	*742*	*47%*	*364*	*45%*	*239*	*52%*
	55+	*242*	*17%*	*124*	*17%*	*74*	*17%*	*274*	*17%*	*141*	*18%*	*84*	*18%*
	Unknown	*50*	*3%*	*19*	*3%*	*13*	*3%*	*54*	*3%*	*20*	*3%*	*14*	*3%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	<=35	4,257	21%	1,916	21%	1,866	18%	4,534	19%	2,060	19%	1,968	17%
	40 - 50	5,268	25%	1,969	22%	2,854	28%	5,883	25%	2,287	21%	3,098	27%
	55+	10,964	53%	5,053	56%	5,402	53%	13,049	55%	6,234	58%	6,244	55%
	Unknown	243	1%	93	1%	116	1%	267	1%	103	1%	127	1%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*<=35*	*532*	*21%*	*240*	*21%*	*233*	*18%*	*567*	*19%*	*258*	*19%*	*246*	*17%*
	40 - 50	*659*	*25%*	*246*	*22%*	*357*	*28%*	*735*	*25%*	*286*	*21%*	*387*	*27%*
	55+	*1,371*	*53%*	*632*	*56%*	*675*	*53%*	*1,631*	*55%*	*779*	*58%*	*781*	*55%*
	Unknown	*30*	*1%*	*12*	*1%*	*15*	*1%*	*33*	*1%*	*13*	*1%*	*16*	*1%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.11 Speed Limit and Roadway Function Class

Table 28 further breaks down the data in Table 26 by the roadway function class. Among two-vehicle crashes at rural intersections controlled by traffic signals, about 43 percent of the crashes occurred at roads with posted speed limits of 55 mph or more followed by 41 percent in roads with speed limits of 40-50 mph. This relative ranking was more or less true among failure-to-obey crashes and failure-to-yield crashes. However, among two-vehicle crashes occurring at rural intersections controlled by stop signs, 71 percent of the crashes occurred at roads with a speed limit of 55 mph or greater.

Conversely, among two-vehicle crashes in urban intersections controlled by traffic signals, about 49 percent occurred at roads with speed limits between 40 and 50 mph. In urban intersections controlled by stop signs, about 43 percent occurred at roads with speed limit of 35 mph or under, 35 percent occurred at roads with a speed limit of 40-50 mph and 20 percent occurred at roads with a speed limit of 55 mph or greater.

Table 28: Fatal Two-Vehicle Crashes at Intersections by Major Violations Charged, Roadway Function Class, and Speed Limit, 1997-2004

Traffic Signal													
Year	Speed Limit (mph)	Crashes in Rural Areas						Crashes in Urban Areas					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
1997 to 2004	<=35	271	13%	132	13%	82	12%	3,451	37%	1,878	40%	835	31%
	40 - 50	879	41%	414	40%	295	44%	4,556	49%	2,225	47%	1,491	55%
	55+	915	43%	474	45%	280	41%	1,015	11%	512	11%	307	11%
	Unknown	66	3%	22	2%	18	3%	333	4%	128	3%	86	3%
	Total	2,131	100%	1,042	100%	675	100%	9,355	100%	4,743	100%	2,719	100%
Avg. per Year	*<=35*	*34*	*13%*	*17*	*13%*	*10*	*12%*	*431*	*37%*	*235*	*40%*	*104*	*31%*
	40 - 50	*110*	*41%*	*52*	*40%*	*37*	*44%*	*570*	*49%*	*278*	*47%*	*186*	*55%*
	55+	*114*	*43%*	*59*	*45%*	*35*	*41%*	*127*	*11%*	*64*	*11%*	*38*	*11%*
	Unknown	*8*	*3%*	*3*	*2%*	*2*	*3%*	*42*	*4%*	*16*	*3%*	*11*	*3%*
	Total	*266*	*100%*	*130*	*100%*	*84*	*100%*	*1,169*	*100%*	*593*	*100%*	*340*	*100%*
Stop Sign													
1997 to 2004	<=35	1,045	8%	474	8%	472	8%	3,185	43%	1,428	53%	1,386	35%
	40 - 50	2,677	20%	1,214	19%	1,274	20%	2,563	35%	748	28%	1,563	40%
	55+	9,424	71%	4,527	72%	4,454	71%	1,451	20%	479	18%	908	23%
	Unknown	100	1%	38	1%	52	1%	142	2%	55	2%	63	2%
	Total	13,246	100%	6,253	100%	6,252	100%	7,341	100%	2,710	100%	3,920	100%
Avg. per Year	*<=35*	*131*	*8%*	*59*	*8%*	*59*	*8%*	*398*	*43%*	*179*	*53%*	*173*	*35%*
	40 - 50	*335*	*20%*	*152*	*19%*	*159*	*20%*	*320*	*35%*	*94*	*28%*	*195*	*40%*
	55+	*1,178*	*71%*	*566*	*72%*	*557*	*71%*	*181*	*20%*	*60*	*18%*	*114*	*23%*
	Unknown	*13*	*1%*	*5*	*1%*	*7*	*1%*	*18*	*2%*	*7*	*2%*	*8*	*2%*
	Total	*1,656*	*100%*	*782*	*100%*	*782*	*100%*	*918*	*100%*	*339*	*100%*	*490*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.12 Weather

Table 29 depicts the weather at the time of the crash. A majority (over 90 percent) of the two-vehicle crashes at traffic signals as well as stop signs occur in normal weather conditions. This was also true of failure-to-obey crashes and failure-to-yield crashes. About 7 percent of the crashes at signal-controlled intersections occurred in the rain and 6 percent of the crashes at stop-sign controlled intersections occurred under rainy conditions.

Table 29: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Weather, 1997-2004

Year	Weather Condition	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total Fatalities		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Normal	10,605	92%	5,344	92%	3,134	92%	11,572	92%	5,865	92%	3,381	92%
	Rain	773	7%	394	7%	236	7%	833	7%	431	7%	253	7%
	Snow	57	0%	33	1%	11	0%	65	1%	39	1%	12	0%
	Fog	77	1%	42	1%	14	0%	87	1%	46	1%	16	0%
	Oth/Unk	59	1%	22	0%	17	0%	64	1%	22	0%	21	1%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Normal*	*1,326*	*92%*	*668*	*92%*	*392*	*92%*	*1,447*	*92%*	*733*	*92%*	*423*	*92%*
	Rain	*97*	*7%*	*49*	*7%*	*30*	*7%*	*104*	*7%*	*54*	*7%*	*32*	*7%*
	Snow	*7*	*0%*	*4*	*1%*	*1*	*0%*	*8*	*1%*	*5*	*1%*	*2*	*0%*
	Fog	*10*	*1%*	*5*	*1%*	*2*	*0%*	*11*	*1%*	*6*	*1%*	*2*	*0%*
	Oth/Unk	*7*	*1%*	*3*	*0%*	*2*	*0%*	*8*	*1%*	*3*	*0%*	*3*	*1%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Normal	18,802	91%	8,186	91%	9,305	91%	21,552	91%	9,700	91%	10,408	91%
	Rain	1,344	6%	543	6%	708	7%	1,499	6%	629	6%	769	7%
	Snow	120	1%	56	1%	51	0%	135	1%	62	1%	58	1%
	Fog	341	2%	183	2%	124	1%	407	2%	220	2%	148	1%
	Oth/Unk	125	1%	63	1%	50	0%	140	1%	73	1%	54	0%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Normal*	*2,350*	*91%*	*1,023*	*91%*	*1,163*	*91%*	*2,694*	*91%*	*1,213*	*91%*	*1,301*	*91%*
	Rain	*168*	*6%*	*68*	*6%*	*89*	*7%*	*187*	*6%*	*79*	*6%*	*96*	*7%*
	Snow	*15*	*1%*	*7*	*1%*	*6*	*0%*	*17*	*1%*	*8*	*1%*	*7*	*1%*
	Fog	*43*	*2%*	*23*	*2%*	*16*	*1%*	*51*	*2%*	*28*	*2%*	*19*	*1%*
	Oth/Unk	*16*	*1%*	*8*	*1%*	*6*	*0%*	*18*	*1%*	*9*	*1%*	*7*	*0%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.13 Roadway Surface Conditions

Table 30 depicts the conditions of the surface of the roadway at the intersections where the two-vehicle crashes occurred. About 87 percent of the two-vehicle crashes at both traffic signals and stop signs occurred under dry roadway surface conditions and about 12 percent occurred under wet roadway surface conditions.

Table 30: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Roadway Surface Conditions, 1997-2004

Year	Roadway Surface Condition	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield Crashes		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Dry	10,095	87%	5,091	87%	2,975	87%	11,032	87%	5,594	87%	3,213	87%
	Wet	1,387	12%	704	12%	413	12%	1,492	12%	766	12%	443	12%
	Snow	44	0%	16	0%	13	0%	47	0%	17	0%	13	0%
	Ice	14	0%	11	0%	1	0%	16	0%	13	0%	1	0%
	Oth/Unk	31	0%	13	0%	10	0%	34	0%	13	0%	13	0%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Dry*	*1,262*	*87%*	*636*	*87%*	*372*	*87%*	*1,379*	*87%*	*699*	*87%*	*402*	*87%*
	Wet	*173*	*12%*	*88*	*12%*	*52*	*12%*	*187*	*12%*	*96*	*12%*	*55*	*12%*
	Snow	*6*	*0%*	*2*	*0%*	*2*	*0%*	*6*	*0%*	*2*	*0%*	*2*	*0%*
	Ice	*2*	*0%*	*1*	*0%*	*0*	*0%*	*2*	*0%*	*2*	*0%*	*0*	*0%*
	Oth/Unk	*4*	*0%*	*2*	*0%*	*1*	*0%*	*4*	*0%*	*2*	*0%*	*2*	*0%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Dry	18,076	87%	7,875	87%	8,944	87%	20,736	87%	9,332	87%	10,020	88%
	Wet	2,427	12%	1,034	11%	1,215	12%	2,743	12%	1,217	11%	1,327	12%
	Snow	105	1%	53	1%	42	0%	114	0%	56	1%	48	0%
	Ice	74	0%	44	0%	18	0%	83	0%	50	0%	20	0%
	Oth/Unk	50	0%	25	0%	19	0%	57	0%	29	0%	22	0%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Dry*	*2,260*	*87%*	*984*	*87%*	*1,118*	*87%*	*2,592*	*87%*	*1,167*	*87%*	*1,253*	*88%*
	Wet	*303*	*12%*	*129*	*11%*	*152*	*12%*	*343*	*12%*	*152*	*11%*	*166*	*12%*
	Snow	*13*	*1%*	*7*	*1%*	*5*	*0%*	*14*	*0%*	*7*	*1%*	*6*	*0%*
	Ice	*9*	*0%*	*6*	*0%*	*2*	*0%*	*10*	*0%*	*6*	*0%*	*3*	*0%*
	Oth/Unk	*6*	*0%*	*3*	*0%*	*2*	*0%*	*7*	*0%*	*4*	*0%*	*3*	*0%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.14 Roadway Profile

Table 31 depicts the profile of the roadway at the intersections where the two-vehicle crashes. About 85 percent of the two-vehicle crashes at traffic signals were on level roads and 11 percent on grades. This rank-ordering was also true in the case of failure-to-obey and failure-to-yield crashes at traffic signals. Among two-vehicle crashes at stop signs, 78 percent of the crashes occurred at roads that were level and 17 percent occurred on grades.

Table 31: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Roadway Profile, 1997-2004

Year	Roadway Profile	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield Crashes		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Level	9,819	85%	4,929	84%	2,945	86%	10,686	85%	5,399	84%	3,170	86%
	Grade	1,282	11%	663	11%	364	11%	1,410	11%	731	11%	403	11%
	Hillcrest	98	1%	41	1%	26	1%	107	1%	46	1%	27	1%
	Sag	24	0%	10	0%	6	0%	25	0%	10	0%	6	0%
	Unknown	348	3%	192	3%	71	2%	393	3%	217	3%	77	2%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Level*	*1,227*	*85%*	*616*	*84%*	*368*	*86%*	*1,336*	*85%*	*675*	*84%*	*396*	*86%*
	Grade	*160*	*11%*	*83*	*11%*	*46*	*11%*	*176*	*11%*	*91*	*11%*	*50*	*11%*
	Hillcrest	*12*	*1%*	*5*	*1%*	*3*	*1%*	*13*	*1%*	*6*	*1%*	*3*	*1%*
	Sag	*3*	*0%*	*1*	*0%*	*1*	*0%*	*3*	*0%*	*1*	*0%*	*1*	*0%*
	Unknown	*44*	*3%*	*24*	*3%*	*9*	*2%*	*49*	*3%*	*27*	*3%*	*10*	*2%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Level	16,132	78%	7,245	80%	7,804	76%	18,472	78%	8,584	80%	8,697	76%
	Grade	3,483	17%	1,317	15%	1,893	18%	3,975	17%	1,555	15%	2,121	19%
	Hillcrest	443	2%	154	2%	237	2%	508	2%	179	2%	268	2%
	Sag	92	0%	35	0%	49	0%	107	0%	42	0%	55	0%
	Unknown	582	3%	280	3%	255	2%	671	3%	324	3%	296	3%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Level*	*2,017*	*78%*	*906*	*80%*	*976*	*76%*	*2,309*	*78%*	*1,073*	*80%*	*1,087*	*76%*
	Grade	*435*	*17%*	*165*	*15%*	*237*	*18%*	*497*	*17%*	*194*	*15%*	*265*	*19%*
	Hillcrest	*55*	*2%*	*19*	*2%*	*30*	*2%*	*64*	*2%*	*22*	*2%*	*34*	*2%*
	Sag	*12*	*0%*	*4*	*0%*	*6*	*0%*	*13*	*0%*	*5*	*0%*	*7*	*0%*
	Unknown	*73*	*3%*	*35*	*3%*	*32*	*2%*	*84*	*3%*	*41*	*3%*	*37*	*3%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.15 Roadway Alignment

Table 32 depicts the alignment of the roadway at the intersections where fatal two-vehicle crashes occurred. A significant majority of the two-vehicle crashes at traffic signals occurred on roads that are straight. About 2 percent of the crashes at traffic signals and 7 percent of the crashes at stop signs occurred at a curved section of the roadway.

Table 32: Fatal Crashes and Fatalities That Occurred at Intersections by Major Violations Charged and Roadway Alignment, 1997-2004

Year	Roadway Alignment	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Straight	11,279	97%	5,695	98%	3,314	97%	12,307	98%	6,254	98%	3,579	97%
	Curve	252	2%	120	2%	88	3%	268	2%	126	2%	94	3%
	Unknown	40	0%	20	0%	10	0%	46	0%	23	0%	10	0%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Straight*	*1,410*	*97%*	*712*	*98%*	*414*	*97%*	*1538*	*98%*	*782*	*98%*	*447*	*97%*
	Curve	*32*	*2%*	*15*	*2%*	*11*	*3%*	*34*	*2%*	*16*	*2%*	*12*	*3%*
	Unknown	*5*	*0%*	*3*	*0%*	*1*	*0%*	*6*	*0%*	*3*	*0%*	*1*	*0%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Straight	19,295	93%	8,564	95%	9,397	92%	22,095	93%	10,138	95%	10,487	92%
	Curve	1,376	7%	446	5%	810	8%	1,571	7%	522	5%	916	8%
	Unknown	61	0%	21	0%	31	0%	67	0%	24	0%	34	0%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Straight*	*2,412*	*93%*	*1,071*	*95%*	*1,175*	*92%*	*2,762*	*93%*	*1,267*	*95%*	*1,311*	*92%*
	Curve	*172*	*7%*	*56*	*5%*	*101*	*8%*	*196*	*7%*	*65*	*5%*	*115*	*8%*
	Unknown	*8*	*0%*	*3*	*0%*	*4*	*0%*	*8*	*0%*	*3*	*0%*	*4*	*0%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.16 Construction/Maintenance Zones

Table 33 depicts whether the intersection where the two-vehicle crashes occurred were part of a construction and maintenance zone (work zones). A significant majority of the two-vehicle crashes at both traffic signals and stop signs occurred at roadways that were free of any construction or maintenance, i.e., were not work zones.

Table 33: Fatal Crashes and Fatalities That Occurred at Intersections by Major Violations Charged and Work Zones, 1997-2004

Year	Work Zone	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	No	11,373	98%	5,749	99%	3,342	98%	12,405	98%	6,310	99%	3,604	98%
	Yes	198	2%	86	1%	70	2%	216	2%	93	1%	79	2%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*No*	*1,422*	*98%*	*719*	*99%*	*418*	*98%*	*1,551*	*98%*	*789*	*99%*	*451*	*98%*
	Yes	*25*	*2%*	*11*	*1%*	*9*	*2%*	*27*	*2%*	*12*	*1%*	*10*	*2%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	No	20,462	99%	8,927	99%	10,089	99%	23,427	99%	10,558	99%	11,275	99%
	Yes	270	1%	104	1%	149	1%	306	1%	126	1%	162	1%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*No*	*2,558*	*99%*	*1,116*	*99%*	*1,261*	*99%*	*2,928*	*99%*	*1,320*	*99%*	*1,409*	*99%*
	Yes	*34*	*1%*	*13*	*1%*	*19*	*1%*	*38*	*1%*	*16*	*1%*	*20*	*1%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

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5.1.17 National Highway System

Table 34 depicts whether the two-vehicle crashes occur on roadways that are part of the National Highway System (NHS) or not. About 71 percent of the crashes that occurred at traffic signals occurred on roads that were not part of the NHS. Among two-vehicle crashes occurring at stop signs, about 78 percent of the crashes occurred on roads that were not part of the NHS. Among failure-to-obey two vehicle crashes at stop signs, 83 percent occurred on roads that were not part of the NHS. Furthermore, about 73 percent of the failure-to-yield two-vehicle crashes occurred on roads that were not part of the NHS.

Table 34: Fatal Crashes and Fatalities That Occurred at Intersections by Major Violations Charged and NHS Status, 1997-2004

Year	Part of the National Highway System	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	No	8,254	71%	4,084	70%	2,522	74%	8,981	71%	4,474	70%	2,709	74%
	Yes	3,221	28%	1,700	29%	865	25%	3,535	28%	1,872	29%	949	26%
	Unknown	96	1%	51	1%	25	1%	105	1%	57	1%	25	1%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*No*	*1,032*	*71%*	*511*	*70%*	*315*	*74%*	*1,123*	*71%*	*559*	*70%*	*339*	*74%*
	Yes	*403*	*28%*	*213*	*29%*	*108*	*25%*	*442*	*28%*	*234*	*29%*	*119*	*26%*
	Unknown	*12*	*1%*	*6*	*1%*	*3*	*1%*	*13*	*1%*	*7*	*1%*	*3*	*1%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	No	16,215	78%	7,516	83%	7,508	73%	18,566	78%	8,896	83%	8,351	73%
	Yes	4,330	21%	1,414	16%	2,657	26%	4,957	21%	1,675	16%	3,002	26%
	Unknown	187	1%	101	1%	73	1%	210	1%	113	1%	84	1%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*No*	*2,027*	*78%*	*940*	*83%*	*939*	*73%*	*2,321*	*78%*	*1,112*	*83%*	*1,044*	*73%*
	Yes	*541*	*21%*	*177*	*16%*	*332*	*26%*	*620*	*21%*	*209*	*16%*	*375*	*26%*
	Unknown	*23*	*1%*	*13*	*1%*	*9*	*1%*	*26*	*1%*	*14*	*1%*	*11*	*1%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 35 (overleaf) depicts the total number of fatal two-vehicle crashes at traffic signals and stop signs as well as the number of crashes that were on roadways that were not part of the NHS. In crashes occurring at traffic signals, about 71 percent nationwide occurred on roadways that were not part of the NHS, with all of the crashes occurring in Utah not part of the NHS and the lowest such proportion (41%) for Texas. Among crashes occurring at stop signs, about 78 percent nationwide occurred on roadways that were not part of the NHS, with all of the crashes occurring in Utah not part of the NHS and the lowest such proportion (49%) for North Dakota.

Table 35: Fatal Two-Vehicle Crashes and Fatalities at Intersections That Were NOT on NHS by Type of Traffic Control Device and State, 1997-2004									
	Total	Not NHS	% of Total	Total	Not NHS	% of Total	Total	Not NHS	% of Total
Alabama	756	419	55%	257	118	46%	499	301	60%
Alaska	42	29	69%	27	17	63%	15	12	80%
Arizona	892	774	87%	498	435	87%	394	339	86%
Arkansas	270	190	70%	42	31	74%	228	159	70%
California	2,667	2,370	89%	1,190	1,093	92%	1,477	1,277	86%
Colorado	520	356	68%	238	141	59%	282	215	76%
Connecticut	153	120	78%	89	60	67%	64	60	94%
Delaware	149	92	62%	90	54	60%	59	38	64%
Dist of Columbia	69	62	90%	49	44	90%	20	18	90%
Florida	3,062	2,605	85%	1,445	1,217	84%	1,617	1,388	86%
Georgia	1,334	984	74%	428	284	66%	906	700	77%
Hawaii	69	41	59%	37	22	59%	32	19	59%
Idaho	181	145	80%	22	18	82%	159	127	80%
Illinois	1,363	1,041	76%	515	333	65%	848	708	83%
Indiana	970	821	85%	297	228	77%	673	593	88%
Iowa	454	330	73%	79	54	68%	375	276	74%
Kansas	347	228	66%	65	46	71%	282	182	65%
Kentucky	561	406	72%	187	128	68%	374	278	74%
Louisiana	557	342	61%	187	90	48%	370	252	68%
Maine	94	67	71%	12	7	58%	82	60	73%
Maryland	457	321	70%	280	184	66%	177	137	77%
Massachusetts	191	146	76%	80	55	69%	111	91	82%
Michigan	1,568	1,233	79%	499	310	62%	1,069	923	86%
Minnesota	663	491	74%	132	93	70%	531	398	75%
Mississippi	584	498	85%	49	41	84%	535	457	85%
Missouri	665	424	64%	180	120	67%	485	304	63%
Montana	65	33	51%	14	6	43%	51	27	53%
Nebraska	304	207	68%	70	36	51%	234	171	73%
Nevada	291	252	87%	154	143	93%	137	109	80%
New Hampshire	30	24	80%	9	5	56%	21	19	90%
New Jersey	417	302	72%	271	167	62%	146	135	92%
New Mexico	211	169	80%	82	70	85%	129	99	77%
New York	1,326	1,149	87%	676	571	84%	650	578	89%
North Carolina	1,324	1,079	81%	315	234	74%	1,009	845	84%
North Dakota	84	42	50%	5	3	60%	79	39	49%
Ohio	1,348	1,048	78%	361	290	80%	987	758	77%
Oklahoma	553	443	80%	98	80	82%	455	363	80%
Oregon	234	149	64%	58	34	59%	176	115	65%
Pennsylvania	1,185	887	75%	427	273	64%	758	614	81%
Rhode Island	46	38	83%	16	14	88%	30	24	80%
South Carolina	730	525	72%	225	130	58%	505	395	78%
South Dakota	91	59	65%	14	11	79%	77	48	62%
Tennessee	728	507	70%	241	154	64%	487	353	72%
Texas	2,741	1,559	57%	999	410	41%	1,742	1,149	66%
Utah	194	191	98%	97	97	100%	97	94	97%
Vermont	23	20	87%	4	4	100%	19	16	84%
Virginia	411	273	66%	190	113	59%	221	160	72%
Washington	388	312	80%	98	79	81%	290	233	80%
West Virginia	136	80	59%	32	21	66%	104	59	57%
Wisconsin	767	566	74%	131	81	62%	636	485	76%
Wyoming	38	20	53%	10	5	50%	28	15	54%
U.S.	32,303	24,469	76%	11,571	8,254	71%	20,732	16,215	78%
Puerto Rico	495	2.65	235	1.26	157	0.84	494	2.53	248
Source: NCSA FARS									

5.1.18 Time of the Day

Table 36 depicts the time of the day when fatal two-vehicle crashes occur. At traffic signals, the failure-to-obey crashes seem to occur uniformly over the time intervals during the day. However the failure-to-yield crashes seem to be more frequent from noon to 6 p.m. At stop signs, the crashes seem to be more frequent from noon to 6 p.m. for both failure-to-obey and failure-to-yield crashes.

Table 36: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Time of the Day, 1997-2004

Year	Time of the Day	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	6 a.m. to 9 a.m.	1,207	10%	630	11%	333	10%	1,275	10%	664	10%	356	10%
	9 a.m. to 12 p.m.	1,813	16%	1,005	17%	504	15%	1,919	15%	1,048	16%	543	15%
	12 p.m. to 3 p.m.	1,949	17%	984	17%	646	19%	2,073	16%	1,052	16%	684	19%
	3 p.m. to 6 p.m.	1,882	16%	848	15%	733	21%	2,030	16%	925	14%	788	21%
	6 p.m. to 9 p.m.	1,591	14%	717	12%	566	17%	1,738	14%	797	12%	604	16%
	9 p.m. to 12 a.m.	1,374	12%	680	12%	372	11%	1,534	12%	769	12%	407	11%
	12 a.m. to 3 a.m.	1,122	10%	628	11%	174	5%	1,320	10%	741	12%	205	6%
	3 a.m. to 6 a.m.	628	5%	340	6%	84	2%	727	6%	404	6%	96	3%
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	6 a.m. to 9 a.m.	*151*	*10%*	*79*	*11%*	*42*	*10%*	*159*	*10%*	*83*	*10%*	*45*	*10%*
	9 a.m. to 12 p.m.	*227*	*16%*	*126*	*17%*	*63*	*15%*	*240*	*15%*	*131*	*16%*	*68*	*15%*
	12 p.m. to 3 p.m.	*244*	*17%*	*123*	*17%*	*81*	*19%*	*259*	*16%*	*132*	*16%*	*86*	*19%*
	3 p.m. to 6 p.m.	*235*	*16%*	*106*	*15%*	*92*	*21%*	*254*	*16%*	*116*	*14%*	*99*	*21%*
	6 p.m. to 9 p.m.	*199*	*14%*	*90*	*12%*	*71*	*17%*	*217*	*14%*	*100*	*12%*	*76*	*16%*
	9 p.m. to 12 a.m.	*172*	*12%*	*85*	*12%*	*47*	*11%*	*192*	*12%*	*96*	*12%*	*51*	*11%*
	12 a.m. to 3 a.m.	*140*	*10%*	*79*	*11%*	*22*	*5%*	*165*	*10%*	*93*	*12%*	*26*	*6%*
	3 a.m. to 6 a.m.	*79*	*5%*	*43*	*6%*	*11*	*2%*	*91*	*6%*	*51*	*6%*	*12*	*3%*
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	6 a.m. to 9 a.m.	2,346	11%	980	11%	1,217	12%	2,599	11%	1,130	11%	1,311	11%
	9 a.m. to 12 p.m.	3,156	15%	1,269	14%	1,696	17%	3,499	15%	1,434	13%	1,861	16%
	12 p.m. to 3 p.m.	4,316	21%	1,678	19%	2,379	23%	4,898	21%	1,983	19%	2,625	23%
	3 p.m. to 6 p.m.	4,827	23%	1,957	22%	2,564	25%	5,500	23%	2,296	21%	2,873	25%
	6 p.m. to 9 p.m.	3,027	15%	1,428	16%	1,342	13%	3,557	15%	1,724	16%	1,550	14%
	9 p.m. to 12 a.m.	1,753	8%	976	11%	616	6%	2,125	9%	1,224	11%	707	6%
	12 a.m. to 3 a.m.	769	4%	458	5%	226	2%	925	4%	554	5%	278	2%
	3 a.m. to 6 a.m.	527	3%	280	3%	194	2%	618	3%	333	3%	228	2%
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	6 a.m. to 9 a.m.	*293*	*11%*	*123*	*11%*	*152*	*12%*	*325*	*11%*	*141*	*11%*	*164*	*11%*
	9 a.m. to 12 p.m.	*395*	*15%*	*159*	*14%*	*212*	*17%*	*437*	*15%*	*179*	*13%*	*233*	*16%*
	12 p.m. to 3 p.m.	*540*	*21%*	*210*	*19%*	*297*	*23%*	*612*	*21%*	*248*	*19%*	*328*	*23%*
	3 p.m. to 6 p.m.	*603*	*23%*	*245*	*22%*	*321*	*25%*	*688*	*23%*	*287*	*21%*	*359*	*25%*
	6 p.m. to 9 p.m.	*378*	*15%*	*179*	*16%*	*168*	*13%*	*445*	*15%*	*216*	*16%*	*194*	*14%*
	9 p.m. to 12 a.m.	*219*	*8%*	*122*	*11%*	*77*	*6%*	*266*	*9%*	*153*	*11%*	*88*	*6%*
	12 a.m. to 3 a.m.	*96*	*4%*	*57*	*5%*	*28*	*2%*	*116*	*4%*	*69*	*5%*	*35*	*2%*
	3 a.m. to 6 a.m.	*66*	*3%*	*35*	*3%*	*24*	*2%*	*77*	*3%*	*42*	*3%*	*29*	*2%*
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.1.19 Light Condition

Table 37 depicts the light condition at the time of the two-vehicle crash. At traffic signals, slightly more that 60 percent of the crashes occurred in daylight while 30 percent of the crashes occurred when it was dark but the intersection was lighted. This distribution was true of failure-to-obey and failure-to-yield crashes. At stop signs, 73 percent of the crashes occurred in daylight and 14 percent in the dark. Among failure-to-obey crashes, 68 percent occurred in daylight, 17 percent occurred in the dark and 10 percent in the dark but the intersection was lighted.

Table 37: Fatal Two-Vehicle Crashes and Fatalities at Intersections by Major Violations Charged and Light Condition, 1997-2004

Year	Light Condition	Crashes						Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Daylight	7,045	61%	3,607	62%	2,251	66%	7,525	60%	3,855	60%	2,410	65%
	Dark	618	5%	292	5%	167	5%	703	6%	336	5%	191	5%
	Dark but Lighted	3,505	30%	1,755	30%	858	25%	3,966	31%	2,021	32%	937	25%
	Dawn	166	1%	85	1%	40	1%	174	1%	88	1%	42	1%
	Dusk	229	2%	89	2%	95	3%	245	2%	96	1%	102	3%
	Unknown	8		7		1		8		7		1	
	Total	11,571	100%	5,835	100%	3,412	100%	12,621	100%	6,403	100%	3,683	100%
Avg. per Year	*Daylight*	*881*	*61%*	*451*	*62%*	*281*	*66%*	*941*	*60%*	*482*	*60%*	*301*	*65%*
	Dark	*77*	*5%*	*37*	*5%*	*21*	*5%*	*88*	*6%*	*42*	*5%*	*24*	*5%*
	Dark but Lighted	*438*	*30%*	*219*	*30%*	*107*	*25%*	*496*	*31%*	*253*	*32%*	*117*	*25%*
	Dawn	*21*	*1%*	*11*	*1%*	*5*	*1%*	*22*	*1%*	*11*	*1%*	*5*	*1%*
	Dusk	*29*	*2%*	*11*	*2%*	*12*	*3%*	*31*	*2%*	*12*	*1%*	*13*	*3%*
	Unknown	*1*		*1*		*0*		*1*		*1*		*0*	
	Total	*1,446*	*100%*	*729*	*100%*	*427*	*100%*	*1,578*	*100%*	*800*	*100%*	*460*	*100%*
Stop Sign													
1997 to 2004	Daylight	15,055	73%	6,128	68%	8,000	78%	17,014	72%	7,142	67%	8,860	77%
	Dark	2,812	14%	1,541	17%	1,058	10%	3,448	15%	1,957	18%	1,251	11%
	Dark but Lighted	1,950	9%	919	10%	774	8%	2,219	9%	1,062	10%	869	8%
	Dawn	347	2%	168	2%	152	1%	391	2%	197	2%	166	1%
	Dusk	547	3%	265	3%	244	2%	637	3%	314	3%	280	2%
	Unknown	21		10		10		24		12		11	
	Total	20,732	100%	9,031	100%	10,238	100%	23,733	100%	10,684	100%	11,437	100%
Avg. per Year	*Daylight*	*1,882*	*73%*	*766*	*68%*	*1,000*	*78%*	*2,127*	*72%*	*893*	*67%*	*1,108*	*77%*
	Dark	*352*	*14%*	*193*	*17%*	*132*	*10%*	*431*	*15%*	*245*	*18%*	*156*	*11%*
	Dark but Lighted	*244*	*9%*	*115*	*10%*	*97*	*8%*	*277*	*9%*	*133*	*10%*	*109*	*8%*
	Dawn	*43*	*2%*	*21*	*2%*	*19*	*1%*	*49*	*2%*	*25*	*2%*	*21*	*1%*
	Dusk	*68*	*3%*	*33*	*3%*	*31*	*2%*	*80*	*3%*	*39*	*3%*	*35*	*2%*
	Unknown	*3*		*1*		*1*		*3*		*2*		*1*	
	Total	*2,592*	*100%*	*1,129*	*100%*	*1,280*	*100%*	*2,967*	*100%*	*1,336*	*100%*	*1,430*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2 Vehicle Characteristics in Fatal, Two-Vehicle Intersection Crashes

This section will depict characteristics of vehicles involved in fatal, two-vehicle crashes. The fatalities detailed in this section are to occupants of vehicles and differs from the fatalities mentioned in section 5.1 as it does not include fatalities to nonoccupants. On average, about 2,900 vehicles are involved in two-vehicle crashes every year at traffic signals and slightly less than 5,200 vehicles are involved in two-vehicle crashes at stop signs. On average yearly, this resulted in about 1,555 and 2,959 fatalities to occupants of these vehicles at traffic signals and stop signs, respectively.

Table 38: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged, 1997-2004

Traffic Signal

Year	Vehicles					Occupant Fatalities				
	Total	Red-Light Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total	Red-Light Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%		Num	%	Num	%
1997	2,922	775	27%	436	15%	1,566	433	28%	328	21%
1998	2,820	700	25%	456	16%	1,527	414	27%	351	23%
1999	2,844	703	25%	451	16%	1,521	383	25%	311	20%
2000	2,820	742	26%	414	15%	1,525	442	29%	302	20%
2001	3,040	811	27%	448	15%	1,646	462	28%	301	18%
2002	2,862	734	26%	442	15%	1,526	460	30%	304	20%
2003	2,874	756	26%	404	14%	1,554	433	28%	271	17%
2004	2,960	724	24%	449	15%	1,575	400	25%	293	19%
Total	23,142	5,945	26%	3,500	15%	12,440	3,427	28%	2,461	20%
Avg.	*2,893*	*743*	*26%*	*438*	*15%*	*1,555*	*428*	*28%*	*308*	*20%*

Stop Sign

Year	Vehicles					Occupant Fatalities				
	Total Vehicles	Failure-to-Obey Vehs.		Failure-to-Yield Vehs.		Total Fatalities	Failure-to-Obey Vehs		Failure-to-Yield Vehs	
1997	5,128	1,160	23%	1,271	25%	2,953	941	32%	1,098	37%
1998	5,398	1,205	22%	1,342	25%	3,160	1,020	32%	1,211	38%
1999	5,544	1,207	22%	1,377	25%	3,161	980	31%	1,229	39%
2000	5,100	1,127	22%	1,279	25%	2,923	928	32%	1,094	37%
2001	5,054	1,118	22%	1,249	25%	2,838	865	30%	1,038	37%
2002	5,166	1,192	23%	1,200	23%	2,939	950	32%	1,024	35%
2003	5,130	1,100	21%	1,290	25%	2,885	892	31%	1,053	36%
2004	4,944	966	20%	1,303	26%	2,813	793	28%	1,111	39%
Total	41,464	9,075	22%	10,311	25%	23,672	7,369	31%	8,858	37%
Avg.	*5,183*	*1,134*	*23%*	*1,289*	*25%*	*2,959*	*921*	*45%*	*1,107*	*37%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

5.2.1 Vehicle Age

Table 39 depicts the distribution of the age of the vehicles involved in fatal, two-vehicle intersection crashes at traffic signals and stop signs. At traffic signals, overall, about 43 percent of vehicles involved were newer model vehicles (5 years or under), 30 percent are 6- to 10-year-old vehicles and 26 percent are older than 11 years. Among vehicles that failed to obey at traffic signals, 39 percent were newer model vehicles, 30 percent were between 6 to 10 years old and 30 percent were 11 years or older. Among vehicles that failed to yield at traffic signals, 35 percent were newer model vehicles, 35 percent were between 6 to 10 years old and 30 percent were 11 years or older.

At stop signs, overall, about 40 percent of vehicles involved were newer model vehicles (5 years or under), 30 percent are 6- to 10-year-old vehicles and 29 percent are older than 11 years. Among vehicles that failed to obey at stop signs, 34 percent were newer model vehicles, 32 percent were between 6 to 10 years old and 34 percent were 10 years or older. Among vehicles that failed to yield at stop signs, 36 percent were newer model vehicles, 33 percent were between 6 to 10 years old and 31 percent were 11 years or older.

Table 39: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and the Age of the Vehicle, 1997-2004

Year	Vehicle Age	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		Red-Light Running (Failure-to-Obey Vehicles)		In Failure-to-YieldVehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	0-5	9,901	43%	2,332	39%	1,242	35%	4,568	37%	1,142	33%	800	33%
	6-10	7,040	30%	1,812	30%	1,208	35%	4,032	32%	1,111	32%	858	35%
	Above 10	6,104	26%	1,778	30%	1,036	30%	3,797	31%	1,159	34%	799	32%
	Unknown	97	0%	23	0%	14	0%	43	0%	15	0%	4	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*0-5*	*1,238*	*43%*	*292*	*39%*	*155*	*35%*	*571*	*37%*	*143*	*33%*	*100*	*33%*
	6-10	*880*	*30%*	*227*	*30%*	*151*	*35%*	*504*	*32%*	*139*	*32%*	*107*	*35%*
	Above 10	*763*	*26%*	*222*	*30%*	*130*	*30%*	*475*	*31%*	*145*	*34%*	*100*	*32%*
	Unknown	*12*	*0%*	*3*	*0%*	*2*	*0%*	*5*	*0%*	*2*	*0%*	*1*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	0-5	16,689	40%	3,088	34%	3,758	36%	8,225	35%	2,258	31%	3,027	34%
	6-10	12,645	30%	2,865	32%	3,363	33%	7,582	32%	2,403	33%	2,974	34%
	Above 10	11,973	29%	3,076	34%	3,148	31%	7,774	33%	2,667	36%	2,825	32%
	Unknown	157	0%	46	1%	42	0%	91	0%	41	1%	32	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*0-5*	*2,086*	*40%*	*386*	*34%*	*470*	*36%*	*1,028*	*35%*	*282*	*31%*	*378*	*34%*
	6-10	*1,581*	*30%*	*358*	*32%*	*420*	*33%*	*948*	*32%*	*300*	*33%*	*372*	*34%*
	Above 10	*1,497*	*29%*	*385*	*34%*	*394*	*31%*	*972*	*33%*	*333*	*36%*	*353*	*32%*
	Unknown	*20*	*0%*	*6*	*1%*	*5*	*0%*	*11*	*0%*	*5*	*1%*	*4*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.2 Vehicle Type

Table 40 (overleaf) depicts the type of vehicles involved in fatal two-vehicle crashes. At traffic signals, about 54 percent of all vehicles involved were passenger cars, 14 percent were pickup trucks, 10 percent were SUVs, 8 percent were large trucks, 7 percent were vans, and 5 percent were motorcycles. In contrast, about 70 percent of all occupant fatalities in two-vehicle crashes at traffic signals occurred to passenger car occupants and motorcycle rider fatalities accounted for 10 percent of all fatalities. Among vehicles that failed to yield, 71 percent of the fatalities involved occupants of passenger cars. However, 83 percent of the occupant fatalities occurred to passenger car occupants.

At stop signs, about 49 percent of all vehicles involved were passenger cars, 20 percent were pickup trucks, 9 percent were SUVs, 10 percent were large trucks, 7 percent were vans and 4 percent were motorcycles. In contrast, about 66 percent of all occupant fatalities in two-vehicle crashes at stop signs occurred to passenger car occupants, 13 percent to occupants of pickup trucks, 6 percent to occupants of vans, 5 percent to occupants of SUVs. Among vehicles that failed to yield, 71 percent were passenger cars. However, 79 percent of the occupant fatalities occurred to passenger car occupants and 10 percent were occupants of pickup trucks.

Table 40: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Vehicle Type, 1997-2004

Traffic Signal

Year	Vehicle Type	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		Red-Light Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
1997 to 2004	Cars	12,502	54%	3,300	56%	2,496	71%	8,757	70%	2,401	70%	2,033	83%
	Vans	1,625	7%	436	7%	210	6%	643	5%	180	5%	102	4%
	SUVs	2,310	10%	625	11%	262	7%	675	5%	234	7%	96	4%
	Pickups	3,321	14%	945	16%	328	9%	998	8%	329	10%	149	6%
	Buses	187	1%	22	0%	10	0%	8	0%	2	0%	1	0%
	Motorcycles	1,248	5%	243	4%	73	2%	1,269	10%	249	7%	70	3%
	Large Trks	1,809	8%	336	6%	105	3%	49	0%	15	0%	3	0%
	Oth/Unk	140	1%	38	1%	16	0%	41	0%	17	0%	7	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*Cars*	*1,563*	*54%*	*413*	*56%*	*312*	*71%*	*1,095*	*70%*	*300*	*70%*	*254*	*83%*
	Vans	*203*	*7%*	*55*	*7%*	*26*	*6%*	*80*	*5%*	*23*	*5%*	*13*	*4%*
	SUVs	*289*	*10%*	*78*	*11%*	*33*	*7%*	*84*	*5%*	*29*	*7%*	*12*	*4%*
	Pickups	*415*	*14%*	*118*	*16%*	*41*	*9%*	*125*	*8%*	*41*	*10%*	*19*	*6%*
	Buses	*23*	*1%*	*3*	*0%*	*1*	*0%*	*1*	*0%*	*0*	*0%*	*0*	*0%*
	Motorcycles	*156*	*5%*	*30*	*4%*	*9*	*2%*	*159*	*10%*	*31*	*7%*	*9*	*3%*
	Large Trks	*226*	*8%*	*42*	*6%*	*13*	*3%*	*6*	*0%*	*2*	*0%*	*0*	*0%*
	Oth/Unk	*18*	*1%*	*5*	*1%*	*2*	*0%*	*5*	*0%*	*2*	*0%*	*1*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*

Stop Sign

1997 to 2004	Cars	20,311	49%	5,491	61%	7,348	71%	15,665	66%	5,013	68%	6,993	79%
	Vans	2,860	7%	531	6%	584	6%	1,461	6%	433	6%	468	5%
	SUVs	3,587	9%	637	7%	498	5%	1,199	5%	385	5%	282	3%
	Pickups	8,301	20%	1,716	19%	1,306	13%	3,067	13%	1,131	15%	879	10%
	Buses	196	0%	14	0%	30	0%	14	0%	2	0%	5	0%
	Motorcycles	1,827	4%	234	3%	134	1%	1,865	8%	242	3%	135	2%
	Large Trks	3,974	10%	323	4%	322	3%	157	1%	38	1%	21	0%
	Oth/Unk	408	1%	129	1%	89	1%	244	1%	125	2%	75	1%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Cars*	*2,539*	*49%*	*686*	*61%*	*919*	*71%*	*1,958*	*66%*	*627*	*68%*	*874*	*79%*
	Vans	*358*	*7%*	*66*	*6%*	*73*	*6%*	*183*	*6%*	*54*	*6%*	*59*	*5%*
	SUVs	*448*	*9%*	*80*	*7%*	*62*	*5%*	*150*	*5%*	*48*	*5%*	*35*	*3%*
	Pickups	*1,038*	*20%*	*215*	*19%*	*163*	*13%*	*383*	*13%*	*141*	*15%*	*110*	*10%*
	Buses	*25*	*0%*	*2*	*0%*	*4*	*0%*	*2*	*0%*	*0*	*0%*	*1*	*0%*
	Motorcycles	*228*	*4%*	*29*	*3%*	*17*	*1%*	*233*	*8%*	*30*	*3%*	*17*	*2%*
	Large Trks	*497*	*10%*	*40*	*4%*	*40*	*3%*	*20*	*1%*	*5*	*1%*	*3*	*0%*
	Oth/Unk	*51*	*1%*	*16*	*1%*	*11*	*1%*	*31*	*1%*	*16*	*2%*	*9*	*1%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.3 Vehicle Role

Table 41 depicts the role of the vehicles involved in fatal two-vehicle crashes at intersections as well as the resulting occupant fatalities in these vehicles. Among fatally injured vehicle occupants in crashes at traffic signals, 64 percent were in struck vehicles and 31 percent were in striking vehicles. Among fatalities to occupants of vehicles that failed to obey, 39 percent were in striking vehicles while 55 percent were in struck vehicles. Among fatalities to occupants of vehicles that failed to yield, 15 percent were in striking vehicles while 82 percent were in struck vehicles.

Among fatally injured vehicle occupants in crashes at stop signs, 24 percent were in striking vehicles and 72 percent were in struck vehicles. Among fatalities to occupants of vehicles that failed to obey, 23 percent were in striking vehicles while 72 percent were in struck vehicles. Among fatalities to occupants of vehicles that failed to yield, 8 percent were in striking vehicles while 89 percent were in struck vehicles

Table 41: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Vehicle Role, 1997-2004

Year	Vehicle Role	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		Red-Light Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Striking	11,779	51%	3,721	63%	913	26%	3,836	31%	1,345	39%	361	15%
	Struck	10,549	46%	2,001	34%	2,481	71%	7,953	64%	1,896	55%	2,012	82%
	Both	706	3%	203	3%	88	3%	590	5%	172	5%	79	3%
	Unknown	108	0%	20	0%	18	1%	61	0%	14	0%	9	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*Striking*	*1,472*	*51%*	*465*	*63%*	*114*	*26%*	*480*	*31%*	*168*	*39%*	*45*	*15%*
	Struck	*1,319*	*46%*	*250*	*34%*	*310*	*71%*	*994*	*64%*	*237*	*55%*	*252*	*82%*
	Both	*88*	*3%*	*25*	*3%*	*11*	*3%*	*74*	*5%*	*22*	*5%*	*10*	*3%*
	Unknown	*14*	*0%*	*3*	*0%*	*2*	*1%*	*8*	*0%*	*2*	*0%*	*1*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	Striking	20,785	50%	3,466	38%	1,569	15%	5,631	24%	1,717	23%	694	8%
	Struck	19,732	48%	5,310	59%	8,499	82%	17,154	72%	5,341	72%	7,915	89%
	Both	871	2%	279	3%	231	2%	844	4%	295	4%	238	3%
	Unknown	76	0%	20	0%	12	0%	43	0%	16	0%	11	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Striking*	*2,598*	*50%*	*433*	*38%*	*196*	*15%*	*704*	*24%*	*215*	*23%*	*87*	*8%*
	Struck	*2,467*	*48%*	*664*	*59%*	*1,062*	*82%*	*2,144*	*72%*	*668*	*72%*	*989*	*89%*
	Both	*109*	*2%*	*35*	*3%*	*29*	*2%*	*106*	*4%*	*37*	*4%*	*30*	*3%*
	Unknown	*10*	*0%*	*3*	*0%*	*2*	*0%*	*5*	*0%*	*2*	*0%*	*1*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.4 Initial Point of Impact

Table 42 (overleaf) depicts the initial point of impact of vehicles involved in two-vehicle crashes at intersections and the resulting occupant fatalities in these vehicles. Among fatally injured vehicle occupants in crashes at traffic signals, 38 percent were in vehicles whose initial point of impact was on the front, 27 percent on the left side and 30 percent on the right side. Among fatalities to occupants of vehicles that failed to obey, 43 percent were in vehicles whose initial point of impact was on the front, 30 percent of the left side and 25 percent on the right side. Among fatalities to occupants of vehicles that failed to yield, 24 percent were in vehicles whose initial point of impact was on the front and 10 percent of the left side and 64 percent on the right side.

Among fatally injured vehicle occupants in crashes at stop signs, 30 percent were in vehicles whose initial point of impact was on the front, 45 percent of the left side and 22 percent on the right side. Among fatalities to occupants of vehicles that failed to obey, 28 percent were in vehicles whose initial point of impact was on the front, 43 percent of the left side and 27 percent on the right side. Among fatalities to occupants of vehicles that failed to yield, 14 percent were in vehicles whose initial point of impact was on the front, 63 percent of the left side and 22 percent on the right side. Figure 17 depicts this distribution.

Figure 17: Proportion of Fatalities to Occupants of Vehicles in Two-Vehicle Crashes by Violation, Point of Impact, and Traffic Control Device, 1997-2004

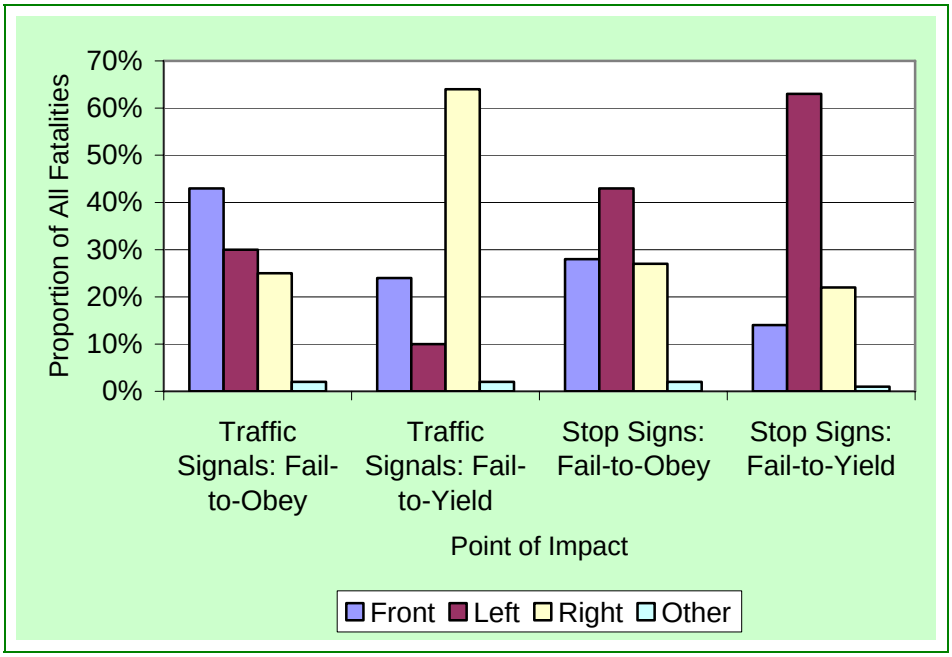


Table 42: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Initial Point of Impact, 1997-2004

Traffic Signal

Year	Initial Point of Impact	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		Red-Light Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
1997 to 2004	Front	13,709	59%	3,927	66%	1,359	39%	4,704	38%	1,471	43%	598	24%
	Left Side	3,744	16%	1,017	17%	267	8%	3,379	27%	1,023	30%	248	10%
	Rt. Side	4,291	19%	895	15%	1,750	50%	3,752	30%	847	25%	1,566	64%
	Rear	1,222	5%	64	1%	91	3%	503	4%	53	2%	37	2%
	Unknown	176	1%	42	1%	33	1%	102	1%	33	1%	12	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*Front*	*1,714*	*59%*	*491*	*66%*	*170*	*39%*	*588*	*38%*	*184*	*43%*	*75*	*24%*
	Left Side	*468*	*16%*	*127*	*17%*	*33*	*8%*	*422*	*27%*	*128*	*30%*	*31*	*10%*
	Rt. Side	*536*	*19%*	*112*	*15%*	*219*	*50%*	*469*	*30%*	*106*	*25%*	*196*	*64%*
	Rear	*153*	*5%*	*8*	*1%*	*11*	*3%*	*63*	*4%*	*7*	*2%*	*5*	*2%*
	Unknown	*22*	*1%*	*5*	*1%*	*4*	*1%*	*13*	*1%*	*4*	*1%*	*2*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*

Stop Sign

1997 to 2004	Front	23,471	57%	3,915	43%	2,395	23%	7,120	30%	2,058	28%	1,204	14%
	Left Side	11,173	27%	3,053	34%	5,664	55%	10,748	45%	3,169	43%	5,566	63%
	Rt. Side	5,815	14%	1,935	21%	1,968	19%	5,239	22%	2,003	27%	1,910	22%
	Rear	800	2%	127	1%	243	2%	436	2%	101	1%	151	2%
	Unknown	205	0%	45	0%	41	0%	129	1%	38	1%	27	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Front*	*2,934*	*57%*	*489*	*43%*	*299*	*23%*	*890*	*30%*	*257*	*28%*	*151*	*14%*
	Left Side	*1,397*	*27%*	*382*	*34%*	*708*	*55%*	*1,344*	*45%*	*396*	*43%*	*696*	*63%*
	Rt. Side	*727*	*14%*	*242*	*21%*	*246*	*19%*	*655*	*22%*	*250*	*27%*	*239*	*22%*
	Rear	*100*	*2%*	*16*	*1%*	*30*	*2%*	*55*	*2%*	*13*	*1%*	*19*	*2%*
	Unknown	*26*	*0%*	*6*	*0%*	*5*	*0%*	*16*	*1%*	*5*	*1%*	*3*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.5 Vehicle Type and Role

Table 43 (overleaf) depicts the type of vehicles involved in fatal, two-vehicle crashes at traffic signals as well as the distribution of occupant fatalities in these crashes. About 70 percent of the fatalities occurred to occupants of vehicles that were struck and the remaining were occupants of vehicles that were striking. About 25 percent of the occupant fatalities in such crashes occurred in a crash between two passenger cars, 14 percent in a crash between a pickup truck (striking vehicle) and a car (struck vehicle), 10 percent in a crash between an SUV (striking vehicle) and a car (struck vehicle), 7 percent in a crash between a large truck (striking vehicle) and a car (struck vehicle). Among occupant fatalities in vehicles that were striking, 18 percent were in cars, 14 percent were motorcyclists striking cars, 12 percent were in cars striking large trucks and 5 percent were in pickup trucks striking large trucks. Among occupant fatalities in vehicles that were struck, 28 percent were in cars struck by another car, 19 percent were in cars struck by pickup trucks, 13 percent were in cars struck by SUVs, 10 percent were in cars struck by large trucks, and 7 percent were in cars struck by vans.

Table 43: Occupant Fatalities in Two-Vehicle Intersection Crashes Where One Vehicle Was Coded as the Striking Vehicle and the Other as a Struck Vehicle, 1997-2004

Traffic Signal

Year	Striking Vehicle	Struck Vehicle	Total Fatalities		In Striking Vehicle		In Struck Vehicle	
			Num	%	Num	%	Num	%
1997 to 2004	Cars	Cars	2,802	25%	595	18%	2,207	28%
	Pickup Trucks	Cars	1,591	14%	99	3%	1,492	19%
	SUVs	Cars	1,134	10%	82	2%	1,052	13%
	Large Trucks	Cars	807	7%	5	0%	802	10%
	Vans	Cars	605	5%	62	2%	543	7%
	Motorcycles	Cars	489	4%	473	14%	16	0%
	Cars	Pickup Trucks	419	4%	259	8%	160	2%
	Cars	Large Trucks	407	4%	403	12%	4	0%
	Cars	SUVs	356	3%	203	6%	153	2%
	Cars	Vans	278	2%	150	4%	128	2%
	Pickup Trucks	Pickup Trucks	174	2%	50	1%	124	2%
	Pickup Trucks	Large Trucks	157	1%	157	5%	0	0%
	Cars	Motorcycles	140	1%	1	0%	139	2%
	Motorcycles	Pickup Trucks	131	1%	131	4%	0	0%
	Large Trucks	Pickup Trucks	126	1%	6	0%	120	2%
	Pickup Trucks	SUVs	109	1%	25	1%	84	1%
	Pickup Trucks	Vans	100	1%	21	1%	79	1%
	Others		1,397	12%	628	19%	769	10%
	Total		11,222	100%	3,350	100%	7,872	100%
Avg. per Year	*Cars*	*Cars*	*350*	*25%*	*74*	*18%*	*276*	*28%*
	Pickup Trucks	*Cars*	*199*	*14%*	*12*	*3%*	*187*	*19%*
	SUVs	*Cars*	*142*	*10%*	*10*	*2%*	*132*	*13%*
	Large Trucks	*Cars*	*101*	*7%*	*1*	*0%*	*100*	*10%*
	Vans	*Cars*	*76*	*5%*	*8*	*2%*	*68*	*7%*
	Motorcycles	*Cars*	*61*	*4%*	*59*	*14%*	*2*	*0%*
	Cars	*Pickup Trucks*	*52*	*4%*	*32*	*8%*	*20*	*2%*
	Cars	*Large Trucks*	*51*	*4%*	*50*	*12%*	*1*	*0%*
	Cars	*SUVs*	*45*	*3%*	*25*	*6%*	*19*	*2%*
	Cars	*Vans*	*35*	*2%*	*19*	*4%*	*16*	*2%*
	Pickup Trucks	*Pickup Trucks*	*22*	*2%*	*6*	*1%*	*16*	*2%*
	Pickup Trucks	*Large Trucks*	*20*	*1%*	*20*	*5%*	*0*	*0%*
	Cars	*Motorcycles*	*18*	*1%*	*0*	*0%*	*17*	*2%*
	Motorcycles	*Pickup Trucks*	*16*	*1%*	*16*	*4%*	*0*	*0%*
	Large Trucks	*Pickup Trucks*	*16*	*1%*	*1*	*0%*	*15*	*2%*
	Pickup Trucks	*SUVs*	*14*	*1%*	*3*	*1%*	*11*	*1%*
	Pickup Trucks	*Vans*	*13*	*1%*	*3*	*1%*	*10*	*1%*
	Others		*175*	*12%*	*79*	*19%*	*96*	*10%*
	Total		*1,403*	*100%*	*743*	*100%*	*984*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 44 (overleaf) depicts the type of vehicles involved in fatal, two-vehicle crashes at stop signs as well as the distribution of occupant fatalities in these crashes. About 77 percent of the fatalities occurred to occupants of vehicles that were struck and the remaining were occupants of vehicles that were striking. About 20 percent of the occupant fatalities in such crashes occurred in a crash between two passenger cars, 18 percent in a crash between a pickup truck (striking vehicle) and a car (struck vehicle), 9 percent in a crash between an large truck (striking vehicle) and a car (struck vehicle), 8 percent in a crash between a SUV (striking vehicle) and a car (struck vehicle). Among occupant fatalities in vehicles that were striking, 13 percent were motorcyclists striking cars, 13 percent were in cars striking large trucks, 12 percent were in cars striking another car and 10 percent were in cars striking pickup trucks. Among occupant fatalities in vehicles that were struck, 22 percent were in cars struck by another car, 22 percent were in cars struck by pickup trucks, 12 percent were in cars struck by large trucks, 10 percent were in cars struck by SUVs, and 6 percent were in cars struck by vans.

Table 44: Occupant Fatalities in Two-Vehicle Intersection Crashes Where One Vehicle Was Coded as the Striking Vehicle and the Other as a Struck Vehicle, 1997-2004

Stop Sign

Year	Striking Vehicle	Struck Vehicle	Total Fatalities		In Striking Vehicle		In Struck Vehicle	
			Num	%	Num	%	Num	%
1997 to 2004	Cars	Cars	4,357	20%	641	12%	3,716	22%
	Pickups	Cars	3,917	18%	238	5%	3,679	22%
	Large Trucks	Cars	2,078	9%	26	1%	2,052	12%
	SUVs	Cars	1,827	8%	86	2%	1,741	10%
	Vans	Cars	1,126	5%	91	2%	1,035	6%
	Cars	Pickups	998	5%	500	10%	498	3%
	Pickups	Pickups	732	3%	189	4%	543	3%
	Motorcycles	Cars	718	3%	689	13%	29	0%
	Cars	Large Trucks	700	3%	690	13%	10	0%
	Large Trucks	Pickups	582	3%	16	0%	566	3%
	Cars	SUVs	461	2%	189	4%	272	2%
	Cars	Vans	429	2%	150	3%	279	2%
	Pickups	Large Trucks	323	1%	311	6%	12	0%
	Pickups	Vans	323	1%	41	1%	282	2%
	Motorcycles	Pickups	296	1%	294	6%	2	0%
	Pickups	SUVs	285	1%	58	1%	227	1%
	Large Trucks	Vans	268	1%	4	0%	264	2%
	Others		2,721	12%	947	18%	1,774	10%
	Total		22,141	100%	5,160	100%	16,981	100%
Avg. per Year	*Cars*	*Cars*	*545*	*20%*	*80*	*12%*	*465*	*22%*
	Pickup Trucks	*Cars*	*490*	*18%*	*30*	*5%*	*460*	*22%*
	SUVs	*Cars*	*260*	*9%*	*3*	*1%*	*257*	*12%*
	Large Trucks	*Cars*	*228*	*8%*	*11*	*2%*	*218*	*10%*
	Vans	*Cars*	*141*	*5%*	*11*	*2%*	*129*	*6%*
	Motorcycles	*Cars*	*125*	*5%*	*63*	*10%*	*62*	*3%*
	Cars	*Pickup Trucks*	*92*	*3%*	*24*	*4%*	*68*	*3%*
	Cars	*Large Trucks*	*90*	*3%*	*86*	*13%*	*4*	*0%*
	Cars	*SUVs*	*88*	*3%*	*86*	*13%*	*1*	*0%*
	Cars	*Vans*	*73*	*3%*	*2*	*0%*	*71*	*3%*
	Pickup Trucks	*Pickup Trucks*	*58*	*2%*	*24*	*4%*	*34*	*2%*
	Pickup Trucks	*Large Trucks*	*54*	*2%*	*19*	*3%*	*35*	*2%*
	Cars	*Motorcycles*	*40*	*1%*	*39*	*6%*	*2*	*0%*
	Motorcycles	*Pickup Trucks*	*40*	*1%*	*5*	*1%*	*35*	*2%*
	Large Trucks	*Pickup Trucks*	*37*	*1%*	*37*	*6%*	*0*	*0%*
	Pickup Trucks	*SUVs*	*36*	*1%*	*7*	*1%*	*28*	*1%*
	Pickup Trucks	*Vans*	*34*	*1%*	*1*	*0%*	*33*	*2%*
	Others		*340*	*12%*	*118*	*18%*	*222*	*10%*
	Total		*2,768*	*100%*	*645*	*100%*	*2,123*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

5.2.6 Extent of Deformation

Table 45 depicts the extent of deformation in the vehicles involved in two-vehicle crashes at intersections controlled by traffic signals and stop signs. If the police accident report indicates that the vehicle as "totaled" but the vehicle was driven away, then the damage is considered moderate. If the police accident report indicates that the vehicle was "totaled" and the vehicle was towed away, then damage is considered severe.

A large proportion of vehicles involved had moderate to severe deformation.

Table 45: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Extent of Deformation, 1997-2004

Year	Extent of Deform-ation	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		In Red-Light-Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	None	89	0%	13	0%	17	0%	20	0%	3	0%	9	0%
	Minor	951	4%	160	3%	108	3%	92	1%	25	1%	7	0%
	Moderate	4,065	18%	989	17%	525	15%	1,189	10%	333	10%	195	8%
	Severe	17,705	77%	4,707	79%	2,804	80%	11,021	89%	3,026	88%	2,238	91%
	Unknown	332	1%	76	1%	46	1%	118	1%	40	1%	12	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*None*	*11*	*0%*	*2*	*0%*	*2*	*0%*	*3*	*0%*	*0*	*0%*	*1*	*0%*
	Minor	*119*	*4%*	*20*	*3%*	*14*	*3%*	*12*	*1%*	*3*	*1%*	*1*	*0%*
	Moderate	*508*	*18%*	*124*	*17%*	*66*	*15%*	*149*	*10%*	*42*	*10%*	*24*	*8%*
	Severe	*2,213*	*77%*	*588*	*79%*	*351*	*80%*	*1,378*	*89%*	*378*	*88%*	*280*	*91%*
	Unknown	*42*	*1%*	*10*	*1%*	*6*	*1%*	*15*	*1%*	*5*	*1%*	*2*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	None	150	0%	18	0%	41	0%	39	0%	7	0%	12	0%
	Minor	1,337	3%	152	2%	294	3%	148	1%	37	1%	31	0%
	Moderate	6,160	15%	888	10%	1,312	13%	1,703	7%	457	6%	667	8%
	Severe	33,490	81%	7,964	88%	8,592	83%	21,634	91%	6,834	93%	8,113	92%
	Unknown	327	1%	53	1%	72	1%	148	1%	34	0%	35	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*None*	*19*	*0%*	*2*	*0%*	*5*	*0%*	*5*	*0%*	*1*	*0%*	*2*	*0%*
	Minor	*167*	*3%*	*19*	*2%*	*37*	*3%*	*19*	*1%*	*5*	*1%*	*4*	*0%*
	Moderate	*770*	*15%*	*111*	*10%*	*164*	*13%*	*213*	*7%*	*57*	*6%*	*83*	*8%*
	Severe	*4,186*	*81%*	*996*	*88%*	*1,074*	*83%*	*2,704*	*91%*	*854*	*93%*	*1,014*	*92%*
	Unknown	*41*	*1%*	*7*	*1%*	*9*	*1%*	*19*	*1%*	*4*	*0%*	*4*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.7 Rollover

Table 46 depicts the extent of rollover among vehicles involved in two-vehicle crashes at traffic signals and stop signs. In vehicles involved in crashes at traffic signals, about 95 percent of the vehicles did not roll over and 5 percent of the vehicles rolled over, subsequent to the impact with the other vehicle [Rollover as 2nd Event]. Among vehicles that failed to yield, about 93 percent did not roll over while 7 percent rolled over subsequent to impact. In the case of failure-to-yield vehicles, 97 percent did not roll over while 3 percent rolled over subsequent to impact.

In vehicles involved in crashes at stop signs, about 91 percent of the vehicles did not roll over and 8 percent of the vehicles rolled over subsequent to the impact with the other vehicle. Among vehicles that failed to obey, about 88 percent did not roll over while 11 percent rolled over subsequent to impact. In the case of failure-to-yield vehicles, 95 percent did not roll over while 5 percent rolled over subsequent to impact.

Table 46: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Rollover, 1997-2004

Year	Rollover	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		In Red-Light-Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	No	22,036	95%	5,542	93%	3,402	97%	11,608	93%	3,105	91%	2,369	96%
	1st Event	26	0%	8	0%	2	0%	15	0%	5	0%	1	0%
	2nd Event	1,080	5%	395	7%	96	3%	817	7%	317	9%	91	4%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*No*	*2,755*	*95%*	*693*	*93%*	*425*	*97%*	*1,451*	*93%*	*388*	*91%*	*296*	*96%*
	1st Event	*3*	*0%*	*1*	*0%*	*0*	*0%*	*2*	*0%*	*1*	*0%*	*0*	*0%*
	2nd Event	*135*	*5%*	*49*	*7%*	*12*	*3%*	*102*	*7%*	*40*	*9%*	*11*	*4%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	No	37,900	91%	8,025	88%	9,801	95%	21,081	89%	6,424	87%	8,354	94%
	1st Event	64	0%	18	0%	15	0%	37	0%	14	0%	10	0%
	2nd Event	3,500	8%	1,032	11%	495	5%	2,554	11%	931	13%	494	6%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*No*	*4,738*	*91%*	*1,003*	*88%*	*1,225*	*95%*	*2,635*	*89%*	*803*	*87%*	*1,044*	*94%*
	1st Event	*8*	*0%*	*2*	*0%*	*2*	*0%*	*5*	*0%*	*2*	*0%*	*1*	*0%*
	2nd Event	*438*	*8%*	*129*	*11%*	*62*	*5%*	*319*	*11%*	*116*	*13%*	*62*	*6%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.8 Number of Occupants in the Vehicle

Table 47 depicts the number of occupants in vehicles involved in two-vehicle crashes at intersections. Overall, among vehicles involved in crashes at traffic signals, 60 percent had only the driver, 26 percent had two occupants and 14 percent had three or more occupants. A similar distribution was seen among vehicles that failed to obey. Among vehicles that failed to yield, 49 percent had only the driver, 35 percent had two occupants and 16 percent had three or more occupants.

Overall, among vehicles involved in crashes at stop signs, 60 percent had only the driver, 25 percent had two occupants and 14 percent had three or more occupants. Among vehicles that failed to obey, 55 percent had only the driver, 28 percent had two occupants and 17 percent had three or more occupants. Among vehicles that failed to yield, 58 percent had only the driver, 29 percent had two occupants and 13 percent had three or more occupants.

Table 47: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Number of Occupants, 1997-2004

Year	Number of Occupants	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Vehicles)		Failure-to-Yield Vehicles		Total		In Red-Light-Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	1	13,789	60%	3,588	60%	1,724	49%	5,829	47%	1,673	49%	917	37%
	2	6,030	26%	1,487	25%	1,219	35%	4,069	33%	1,053	31%	1,023	42%
	3+	3,286	14%	866	15%	557	16%	2,538	20%	698	20%	521	21%
	Unknown	37	0%	4	0%	0	0%	4	0%	3	0%	0	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*1*	*1,724*	*60%*	*449*	*60%*	*216*	*49%*	*729*	*47%*	*209*	*49%*	*115*	*37%*
	2	*754*	*26%*	*186*	*25%*	*152*	*35%*	*509*	*33%*	*132*	*31%*	*128*	*42%*
	3+	*411*	*14%*	*108*	*15%*	*70*	*16%*	*317*	*20%*	*87*	*20%*	*65*	*21%*
	Unknown	*5*	*0%*	*1*	*0%*	*0*	*0%*	*1*	*0%*	*0*	*0%*	*0*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	1	25,007	60%	5,021	55%	5,945	58%	11,150	47%	3,249	44%	4,324	49%
	2	10,512	25%	2,497	28%	2,992	29%	7,562	32%	2,336	32%	2,964	33%
	3+	5,912	14%	1,548	17%	1,370	13%	4,958	21%	1,782	24%	1,570	18%
	Unknown	33	0%	9	0%	4	0%	2	0%	2	0%	0	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*1*	*3,126*	*60%*	*628*	*55%*	*743*	*58%*	*1,394*	*47%*	*406*	*44%*	*541*	*49%*
	2	*1,314*	*25%*	*312*	*28%*	*374*	*29%*	*945*	*32%*	*292*	*32%*	*371*	*33%*
	3+	*739*	*14%*	*194*	*17%*	*171*	*13%*	*620*	*21%*	*223*	*24%*	*196*	*18%*
	Unknown	*4*	*0%*	*1*	*0%*	*1*	*0%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.2.9 Vehicle-Related Factors

Table 48 depicts any vehicle-related factors, as coded in FARS, in vehicles involved in two-vehicle crashes at traffic signals and stop signs. About 1 percent of the vehicles involved in crashes at traffic signals had brakes coded as a pre-existing vehicle defect or condition. This variable may be under-reported in FARS and care should be taken in interpreting the results in this table. The coding of these factors merely indicates their presence and should not be construed as being the causal factor in the crash.

Table 48: Vehicles Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Rollover, 1997-2004

Year	Vehicle-Related Factors	Vehicles Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-ObeyVehicles)		Failure-to-Yield Vehicles		Total		In Red-Light-Running (Failure-to-Obey Vehicles)		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	None	21,764	94%	5,424	91%	3,292	94%	39,472	95%	8,418	93%	9,831	95%
	Tires	36	0%	11	0%	4	0%	76	0%	29	0%	13	0%
	Brakes	128	1%	72	1%	8	0%	230	1%	90	1%	28	0%
	Other/Unk	1,214	5%	438	7%	196	6%	1,686	4%	538	6%	439	4%
	Total	23,142	100%	5,945	100%	3,500	100%	41,464	100%	9,075	100%	10,311	100%
Avg. per Year	*None*	*2,721*	*94%*	*678*	*91%*	*412*	*94%*	*4,934*	*95%*	*1,052*	*93%*	*1,229*	*95%*
	Tires	*5*	*0%*	*1*	*0%*	*1*	*0%*	*10*	*0%*	*4*	*0%*	*2*	*0%*
	Brakes	*16*	*1%*	*9*	*1%*	*1*	*0%*	*29*	*1%*	*11*	*1%*	*4*	*0%*
	Other/Unk	*152*	*5%*	*55*	*7%*	*25*	*6%*	*211*	*4%*	*67*	*6%*	*55*	*4%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*
Stop Sign													
1997 to 2004	None	11,826	95%	3,231	94%	2,332	95%	22,572	95%	6,967	95%	8,467	96%
	Tires	22	0%	7	0%	4	0%	55	0%	26	0%	12	0%
	Brakes	31	0%	24	1%	1	0%	82	0%	49	1%	20	0%
	Other/Unk	561	5%	165	5%	124	5%	963	4%	327	4%	359	4%
	Total	12,440	100%	3,427	100%	2,461	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*None*	*1,478*	*95%*	*404*	*94%*	*292*	*95%*	*2,822*	*95%*	*871*	*95%*	*1,058*	*96%*
	Tires	*3*	*0%*	*1*	*0%*	*1*	*0%*	*7*	*0%*	*3*	*0%*	*2*	*0%*
	Brakes	*4*	*0%*	*3*	*1%*	*0*	*0%*	*10*	*0%*	*6*	*1%*	*3*	*0%*
	Other/Unk	*70*	*5%*	*21*	*5%*	*16*	*5%*	*120*	*4%*	*41*	*4%*	*45*	*4%*
	Total	*1,555*	*100%*	*428*	*100%*	*308*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.3 Driver Characteristics in Fatal, Two-Vehicle Intersection Crashes

This section will analyze the characteristics of drivers involved in fatal two-vehicle intersection crashes. Of particular interest are driver characteristics such as age and gender as well as behavioral factors such as impaired driving, speeding, and distracted-driving. The tables in this section depict the number of drivers involved in fatal, two-vehicle crashes at intersections controlled by traffic signals and stop signs by those that had failure-to-obey and failure-to-yield violations. Also, the number of occupants who were fatally injured is presented by the same characterizations.

5.3.1 Driver Age

Figure 18 depicts the proportion of all motor vehicle traffic crashes that involved at least one older driver (age 65+). Among all fatal crashes at intersections (both within-intersection and intersection-related) controlled by traffic signals and stop signs, 31 percent of the crashes involved at least one older driver. In comparison, about 13 percent of all motor-vehicle crashes that occurred on non-intersection areas from 1997 to 2004 involved at least one older driver.

Figure 18: Fatal Motor Vehicle Crashes, Overall and Those Involving at Least One Older Driver, by Intersection and Non-Intersection Crashes, 1997-2004

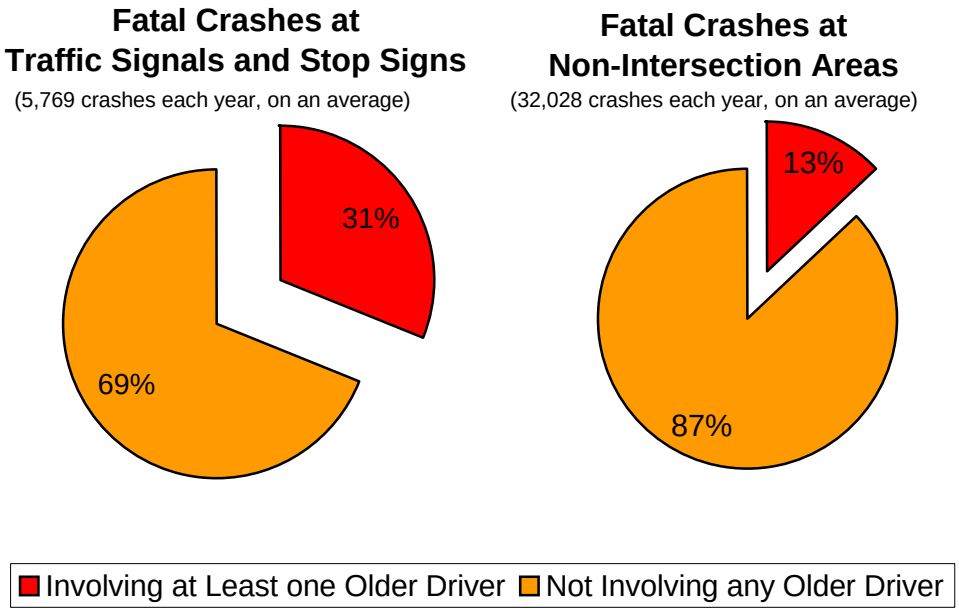


Table 49 depicts the average number, per year, of drivers involved in all fatal motor vehicle crashes and in two-vehicle intersection crashes by their ages. Among drivers of all ages, about 14 percent were involved in two-vehicle crashes at intersections controlled by traffic signals and stop signs. However, among the older drivers, about 24 percent of the drivers were involved in two-vehicle crashes at intersections controlled by traffic signals and stop signs. This proportion ranged from 12 percent to 14 percent for all the other age groups. This clearly indicates that when the older drivers are involved in fatal crashes, they are more likely to be involved in fatal, two-vehicle crashes at intersections as compared to drivers of other age groups.

Table 49: Average Number of Drivers Involved in Two-Vehicle Intersection Crashes as a Proportion of Drivers Involved in All Crashes by Their Age, 1997-2004			
Driver Age	Drivers in All Crashes	Drivers in Two-Vehicle Intersection Crashes	
	Number	Number	% of Total
00-15	335 (1%)	39 (0%)	12%
16-20	7,884 (14%)	1,010 (13%)	13%
21-24	5,990 (10%)	722 (9%)	12%
25-34	11,677 (20%)	1,504 (19%)	13%
35-44	11,038 (19%)	1,404 (17%)	13%
45-54	8,273 (14%)	1,098 (14%)	13%
55-64	4,885 (9%)	729 (9%)	15%
65+	6,462 (11%)	1,520 (19%)	24%
Unknown	879 (2%)	49 (0%)	6%
Total	57,421 (100%)	8,076(100%)	14%
Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).			

Table 50 and Figures 19 and 20 depict the distribution of the age of the driver involved in fatal two-vehicle crashes as well the number of vehicle occupants who were fatally injured in that vehicle by the type of violation charged for the driver. About 18 percent of all drivers who ran a red light were older drivers. However, among drivers who failed to yield at traffic signals, 34 percent were older drivers. In crashes that occurred at intersections controlled by stop signs, 23 percent of those charged with failure-to-obey violations were older drivers as compared to 40 percent of all drivers charged with a failure-to-yield violation.

Among fatally injured occupants of a vehicle whose driver was charged with a failure-to-obey violation at a traffic signal, 27 percent of fatalities (includes the drivers also) occurred to occupants of vehicles with an older driver. In comparison, among fatally injured occupants of a vehicle whose driver was charged with a failure-to-yield violation at a traffic signal, 45 percent of the fatalities occurred to occupants of vehicles with an older driver. The corresponding proportions at stop-sign controlled intersections were 28 and 47 percent for occupants in vehicles driven by failure-to-obey and failure-to-yield older drivers, respectively.

Figure 19: Age of Drivers With Failure-to-Obey Violations Involved in Fatal Two-Vehicle Intersection Crashes, 1997-2004

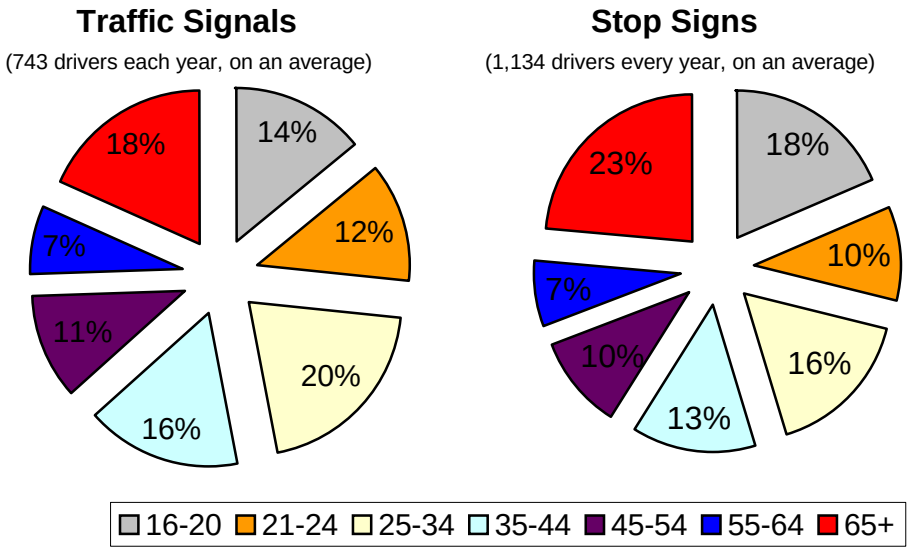
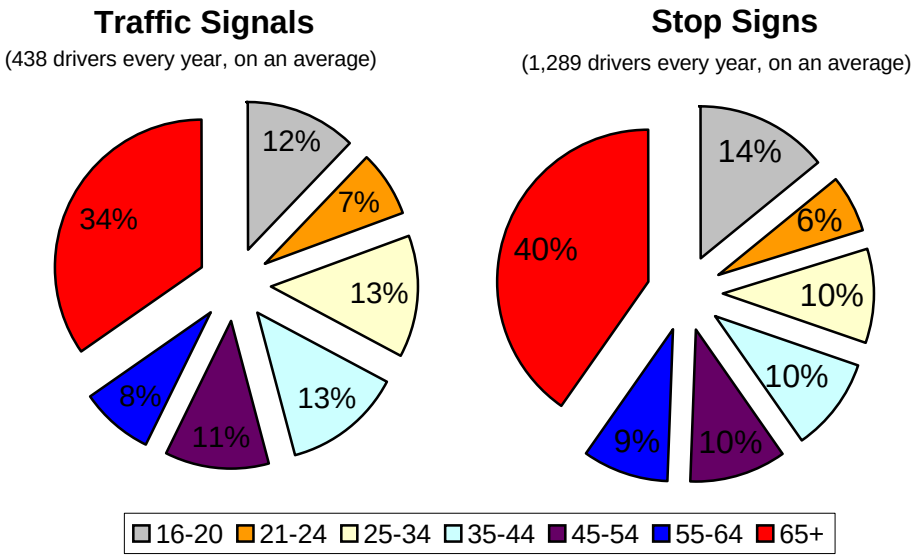


Figure 20: Age of Drivers With Failure-to-Yield Violations Involved in Fatal Two-Vehicle Intersection Crashes, 1997-2004



As seen in Figures 19 and 20, among drivers that failed to yield, older drivers represented the largest proportion in crashes at both signal-controlled and stop-sign-controlled intersections.

Table 50 depicts the age of the drivers involved in two-vehicle crashes at intersections by the type of the traffic control device as well as the type of violations charged.

Table 50: Drivers Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and the Age of the Driver, 1997-2004

Year	Age of the Driver	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey)		Failure-to-Yield Drivers		Total		In Red-Light Running (Failure-to-obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	00-15	55	0%	28	0%	15	0%	30	0%	17	0%	8	0%
	16-20	2,657	11%	812	14%	426	12%	1,256	10%	389	11%	252	10%
	21-24	2,303	10%	740	12%	231	7%	1,125	9%	406	12%	113	5%
	25-34	4,685	20%	1,206	20%	459	13%	1,996	16%	543	16%	265	11%
	35-44	4,148	18%	926	16%	458	13%	1,809	15%	465	14%	256	10%
	45-54	3,177	14%	646	11%	399	11%	1,578	13%	360	11%	236	10%
	55-64	1,987	9%	439	7%	285	8%	1,219	10%	286	8%	211	9%
	65+	3,920	17%	1,069	18%	1,200	34%	3,375	27%	939	27%	1,112	45%
	Unk	210	1%	79	1%	27	1%	52	0%	22	1%	8	0%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*00-15*	*7*	*0%*	*4*	*0%*	*2*	*0%*	*4*	*0%*	*2*	*0%*	*1*	*0%*
	16-20	*332*	*11%*	*102*	*14%*	*53*	*12%*	*157*	*10%*	*49*	*11%*	*32*	*10%*
	21-24	*288*	*10%*	*93*	*12%*	*29*	*7%*	*141*	*9%*	*51*	*12%*	*14*	*5%*
	25-34	*586*	*20%*	*151*	*20%*	*57*	*13%*	*250*	*16%*	*68*	*16%*	*33*	*11%*
	35-44	*519*	*18%*	*116*	*16%*	*57*	*13%*	*226*	*15%*	*58*	*14%*	*32*	*10%*
	45-54	*397*	*14%*	*81*	*11%*	*50*	*11%*	*197*	*13%*	*45*	*11%*	*30*	*10%*
	55-64	*248*	*9%*	*55*	*7%*	*36*	*8%*	*152*	*10%*	*36*	*8%*	*26*	*9%*
	65+	*490*	*17%*	*134*	*18%*	*150*	*34%*	*422*	*27%*	*117*	*27%*	*139*	*45%*
	Unk	*26*	*1%*	*10*	*1%*	*3*	*1%*	*7*	*0%*	*3*	*1%*	*1*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	00-15	256	1%	135	1%	85	1%	224	1%	120	2%	84	1%
	16-20	5,427	13%	1,676	18%	1,434	14%	3,059	13%	1,273	17%	1,139	13%
	21-24	3,471	8%	914	10%	579	6%	1,716	7%	689	9%	425	5%
	25-34	7,343	18%	1,434	16%	1,044	10%	3,142	13%	1,052	14%	728	8%
	35-44	7,081	17%	1,214	13%	1,063	10%	3,060	13%	913	12%	765	9%
	45-54	5,610	14%	879	10%	1,005	10%	2,609	11%	649	9%	737	8%
	55-64	3,848	9%	675	7%	922	9%	2,217	9%	566	8%	772	9%
	65+	8,243	20%	2,072	23%	4,143	40%	7,566	32%	2,056	28%	4,188	47%
	Unk	185	0%	76	1%	36	0%	79	0%	51	1%	20	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*00-15*	*32*	*1%*	*17*	*1%*	*11*	*1%*	*28*	*1%*	*15*	*2%*	*11*	*1%*
	16-20	*678*	*13%*	*210*	*18%*	*179*	*14%*	*382*	*13%*	*159*	*17%*	*142*	*13%*
	21-24	*434*	*8%*	*114*	*10%*	*72*	*6%*	*215*	*7%*	*86*	*9%*	*53*	*5%*
	25-34	*918*	*18%*	*179*	*16%*	*131*	*10%*	*393*	*13%*	*132*	*14%*	*91*	*8%*
	35-44	*885*	*17%*	*152*	*13%*	*133*	*10%*	*383*	*13%*	*114*	*12%*	*96*	*9%*
	45-54	*701*	*14%*	*110*	*10%*	*126*	*10%*	*326*	*11%*	*81*	*9%*	*92*	*8%*
	55-64	*481*	*9%*	*84*	*7%*	*115*	*9%*	*277*	*9%*	*71*	*8%*	*97*	*9%*
	65+	*1,030*	*20%*	*259*	*23%*	*518*	*40%*	*946*	*32%*	*257*	*28%*	*524*	*47%*
	Unk	*23*	*0%*	*10*	*1%*	*5*	*0%*	*10*	*0%*	*6*	*1%*	*3*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

The figures above and table 49 clearly indicate that older drivers are more likely to be involved in failure-to-yield scenarios in fatal crashes occurring at both signal-controlled and stop-sign-controlled

intersections. The remainder of the section on driver age will deal with the issue of older drivers in greater detail. Table 51 depicts the older drivers involved in fatal two-vehicle crashes by their gender. At traffic signals, among both overall and drivers who failed to obey, males comprised 61 percent of the older drivers involved. However, among older drivers who failed to yield, a slightly lesser proportion, about 57 percent, were males.

In fatal two-vehicle crashes at stop signs, slightly more than 60 percent of the older drivers who failed to obey were males. This was also true in the case of older drivers who failed to yield.

Table 51: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and Their Gender, 1997-2004

Year	Gender of the Older Driver	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	Male	2,408	61%	653	61%	689	57%
	Female	1,512	39%	416	39%	511	43%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	Male	*301*	*61%*	*82*	*61%*	*86*	*57%*
	Female	*189*	*39%*	*52*	*39%*	*64*	*43%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	Male	5,226	63%	1,293	62%	2,508	61%
	Female	3,017	37%	779	38%	1,635	39%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	Male	*653*	*63%*	*162*	*62%*	*314*	*61%*
	Female	*377*	*37%*	*97*	*38%*	*204*	*39%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

In comparison, Table 58 depicts the gender among all drivers involved in fatal, two-vehicle crashes.

Table 52 depicts the pre-crash vehicle maneuver being performed by the older drivers. In crashes occurring at intersections controlled by traffic signals, the older drivers were going straight 52 percent of the time and turning left 42 percent of the time. Among the older drivers who were charged with a failure-to-obey violation at the traffic signal however, 75 percent were going straight and 22 percent were turning left. Among older drivers who failed to yield at the traffic signal, 86 percent were turning left.

In crashes occurring at intersections controlled by stop signs, 64 percent of the older drivers were going straight while 23 percent were turning left and 10 percent were starting in the traffic lane. Among older drivers coded with a failure-to-obey violation at stop signs, 79 percent were going straight and 14 percent were turning left. Among older drivers who failed to yield at stop signs, 45 percent were going straight and 35 percent were turning left and 18 percent were starting in their traffic lane.

Table 52: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and the Vehicle Maneuver, 1997-2004

Year	Vehicle Maneuver	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	Going Straight	2,028	52%	797	75%	130	11%
	Turning Left	1,658	42%	237	22%	1,028	86%
	Starting in Traffic Lane	77	2%	14	1%	16	1%
	Other/Unknown	157	4%	21	2%	26	2%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	Going Straight	*254*	*52%*	*100*	*75%*	*16*	*11%*
	Turning Left	*207*	*42%*	*30*	*22%*	*129*	*86%*
	Starting in Traffic Lane	*10*	*2%*	*2*	*1%*	*2*	*1%*
	Other/Unknown	*20*	*4%*	*3*	*2%*	*3*	*2%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	Going Straight	5,242	64%	1,637	79%	1,844	45%
	Turning Left	1,875	23%	294	14%	1,435	35%
	Starting in Traffic Lane	848	10%	79	4%	726	18%
	Other/Unknown	278	3%	62	3%	138	3%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	Going Straight	*655*	*64%*	*205*	*79%*	*231*	*45%*
	Turning Left	*234*	*23%*	*37*	*14%*	*179*	*35%*
	Starting in Traffic Lane	*106*	*10%*	*10*	*4%*	*91*	*18%*
	Other/Unknown	*35*	*3%*	*8*	*3%*	*17*	*3%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

Table 53 depicts the role (Striking, Struck, etc.) of the vehicle being driven by the older drivers. In crashes occurring at intersections controlled by traffic signals, the vehicles driven by older drivers were struck 65 percent of the time and were the striking vehicle 32 percent of the time. Among the older drivers who were charged with a failure-to-obey violation at the traffic signal, 55 percent were in struck vehicles and 41 percent were in striking vehicles. Among older drivers who failed to yield at the traffic signal, 80 percent were in struck vehicles and 17 percent were in striking vehicles.

In crashes occurring at intersections controlled by stop signs, 74 percent were in struck vehicles and 24 percent were in striking vehicles. Among older drivers coded with a failure-to-obey violation at stop signs, 75 percent were in struck vehicles and 22 percent were in striking vehicles. Finally, among older drivers who failed to yield at stop signs, 88 percent were in struck vehicles and 9 percent were in striking vehicles.

Table 53: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and the Vehicle Role, 1997-2004

Year	Vehicle Role	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	Striking	1,272	32%	443	41%	202	17%
	Struck	2,531	65%	593	55%	964	80%
	Both	104	3%	29	3%	30	3%
	Unknown	13	0%	4	0%	4	0%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	Striking	*159*	*32%*	*55*	*41%*	*25*	*17%*
	Struck	*316*	*65%*	*74*	*55%*	*121*	*80%*
	Both	*13*	*3%*	*4*	*3%*	*4*	*3%*
	Unknown	*2*	*0%*	*1*	*0%*	*1*	*0%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	Striking	1,964	24%	463	22%	393	9%
	Struck	6,073	74%	1,547	75%	3,650	88%
	Both	193	2%	54	3%	97	2%
	Unknown	13	0%	8	0%	3	0%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	Striking	*246*	*24%*	*58*	*22%*	*49*	*9%*
	Struck	*759*	*74%*	*193*	*75%*	*456*	*88%*
	Both	*24*	*2%*	*7*	*3%*	*12*	*2%*
	Unknown	*2*	*0%*	*1*	*0%*	*0*	*0%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

Table 54 depicts the scenario of the crashes involving an older driver. In crashes occurring at intersections controlled by traffic signals, 38 percent were LTAP/OD crashes, 37 percent were SCP crashes and 13 percent were LTAP/LD crashes. When the older drivers were charged with a failure-to-obey violation at the traffic signal, 59 percent were in SCP crashes, 19 percent were in LTAP/OD crashes, 15 percent were in LTAP/LD crashes. Among older drivers who failed to yield at the traffic signal, 71 percent were in LTAP/OD crashes, 11 percent were in SCP crashes and 11 percent were in LTAP/LD crashes.

In crashes occurring at intersections controlled by stop signs, 67 percent were SCP crashes and 21 percent were LTAP/LD crashes. When the older drivers were charged with a failure-to-obey violation at the traffic signal, 79 percent were in SCP crashes and 12 percent were in LTAP/LD crashes. Among older drivers who failed to yield at the traffic signal, 61 percent were in SCP crashes and 28 percent were in LTAP/LD crashes.

Table 54: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and the Crash Scenario, 1997-2004

Year	Crash Scenario	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	LTAP/OD	1,473	38%	201	19%	857	71%
	LTAP/LD	490	13%	160	15%	137	11%
	LTIP	37	1%	5	0%	22	2%
	RTIP	16	0%	5	0%	6	1%
	SCP	1,431	37%	634	59%	126	11%
	REAR-END	225	6%	11	1%	7	1%
	HEAD ON	83	2%	16	1%	8	1%
	OTHER/UNKNOWN	165	4%	37	3%	37	3%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	LTAP/OD	*184*	*38%*	*25*	*19%*	*107*	*71%*
	LTAP/LD	*61*	*13%*	*20*	*15%*	*17*	*11%*
	LTIP	*5*	*1%*	*1*	*0%*	*3*	*2%*
	RTIP	*2*	*0%*	*1*	*0%*	*1*	*1%*
	SCP	*179*	*37%*	*79*	*59%*	*16*	*11%*
	REAR-END	*28*	*6%*	*1*	*1%*	*1*	*1%*
	HEAD ON	*10*	*2%*	*2*	*1%*	*1*	*1%*
	OTHER/UNKNOWN	*21*	*4%*	*5*	*3%*	*5*	*3%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	LTAP/OD	317	4%	39	2%	184	4%
	LTAP/LD	1,744	21%	245	12%	1,161	28%
	LTIP	49	1%	8	0%	25	1%
	RTIP	61	1%	9	0%	32	1%
	SCP	5,520	67%	1,640	79%	2,510	61%
	REAR-END	35	0%	8	0%	3	0%
	HEAD ON	89	1%	25	1%	27	1%
	OTHER/UNKNOWN	428	5%	98	5%	201	5%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	LTAP/OD	*40*	*4%*	*5*	*2%*	*23*	*4%*
	LTAP/LD	*218*	*21%*	*31*	*12%*	*145*	*28%*
	LTIP	*6*	*1%*	*1*	*0%*	*3*	*1%*
	RTIP	*8*	*1%*	*1*	*0%*	*4*	*1%*
	SCP	*690*	*67%*	*205*	*79%*	*314*	*61%*
	REAR-END	*4*	*0%*	*1*	*0%*	*0*	*0%*
	HEAD ON	*11*	*1%*	*3*	*1%*	*3*	*1%*
	OTHER/UNKNOWN	*54*	*5%*	*12*	*5%*	*25*	*5%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

Table 55 depicts the time of the day when two-vehicle crashes involving older drivers occur. About 75 percent of the crashes occurred between 9 a.m. and 6 p.m.

Table 55: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and the Time of the Day, 1997-2004

Year	Time of the Day	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	6 a.m. to 9 a.m.	390	10%	96	9%	122	10%
	9 a.m. to 12 p.m.	1,002	26%	325	30%	261	22%
	12 p.m. to 3 p.m.	1,088	28%	311	29%	329	27%
	3 p.m. to 6 p.m.	792	20%	189	18%	288	24%
	6 p.m. to 9 p.m.	424	11%	101	9%	153	13%
	9 p.m. to 12 a.m.	135	3%	28	3%	35	3%
	12 a.m. to 3 a.m.	48	1%	9	1%	8	1%
	3 a.m. to 6 a.m.	39	1%	8	1%	4	0%
	Unknown	2	0%	2	0%	0	0%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	6 a.m. to 9 a.m.	*49*	*10%*	*12*	*9%*	*15*	*10%*
	9 a.m. to 12 p.m.	*125*	*26%*	*41*	*30%*	*33*	*22%*
	12 p.m. to 3 p.m.	*136*	*28%*	*39*	*29%*	*41*	*27%*
	3 p.m. to 6 p.m.	*99*	*20%*	*24*	*18%*	*36*	*24%*
	6 p.m. to 9 p.m.	*53*	*11%*	*13*	*9%*	*19*	*13%*
	9 p.m. to 12 a.m.	*17*	*3%*	*4*	*3%*	*4*	*3%*
	12 a.m. to 3 a.m.	*6*	*1%*	*1*	*1%*	*1*	*1%*
	3 a.m. to 6 a.m.	*5*	*1%*	*1*	*1%*	*1*	*0%*
	Unknown	*0*	*0%*	*0*	*0%*	*0*	*0%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	6 a.m. to 9 a.m.	794	10%	206	10%	397	10%
	9 a.m. to 12 p.m.	1,916	23%	532	26%	912	22%
	12 p.m. to 3 p.m.	2,349	28%	575	28%	1,198	29%
	3 p.m. to 6 p.m.	2,027	25%	489	24%	1,083	26%
	6 p.m. to 9 p.m.	817	10%	188	9%	412	10%
	9 p.m. to 12 a.m.	237	3%	60	3%	100	2%
	12 a.m. to 3 a.m.	34	0%	6	0%	9	0%
	3 a.m. to 6 a.m.	66	1%	15	1%	30	1%
	Unknown	3	0%	1	0%	2	0%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	6 a.m. to 9 a.m.	*99*	*10%*	*26*	*10%*	*50*	*10%*
	9 a.m. to 12 p.m.	*240*	*23%*	*67*	*26%*	*114*	*22%*
	12 p.m. to 3 p.m.	*294*	*28%*	*72*	*28%*	*150*	*29%*
	3 p.m. to 6 p.m.	*253*	*25%*	*61*	*24%*	*135*	*26%*
	6 p.m. to 9 p.m.	*102*	*10%*	*24*	*9%*	*52*	*10%*
	9 p.m. to 12 a.m.	*30*	*3%*	*8*	*3%*	*13*	*2%*
	12 a.m. to 3 a.m.	*4*	*0%*	*1*	*0%*	*1*	*0%*
	3 a.m. to 6 a.m.	*8*	*1%*	*2*	*1%*	*4*	*1%*
	Unknown	*0*	*0%*	*0*	*0%*	*0*	*0%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

Table 56 depicts number of older drivers involved in two-vehicle crashes by the roadway function class at the location of the crash. About 20 percent of the drivers involved in two-vehicle crashes at traffic signals occurred in rural areas and 79 percent in urban areas.

In comparison, about 63 percent of the drivers involved in two-vehicle crashes at stop signs occurred in rural areas and 37 percent in urban areas.

Table 56: Older Drivers Involved in Two-Vehicle Intersection Crashes by Major Violations Charged and the Roadway Function Class, 1997-2004

Year	Roadway Function Class	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	Rural	792	20%	214	20%	215	18%
	Urban	3,099	79%	844	79%	978	82%
	Unknown	29	1%	11	1%	7	1%
	Total	3,920	100%	1,069	100%	1,200	100%
Avg. per Year	Rural	*99*	*20%*	*27*	*20%*	*27*	*18%*
	Urban	*387*	*79%*	*106*	*79%*	*122*	*82%*
	Unknown	*4*	*1%*	*1*	*1%*	*1*	*1%*
	Total	*490*	*100%*	*134*	*100%*	*150*	*100%*
Stop Sign							
1997 to 2004	Rural	5,173	63%	1,416	68%	2,453	59%
	Urban	3,015	37%	639	31%	1,665	40%
	Unknown	55	1%	17	1%	25	1%
	Total	8,243	100%	2,072	100%	4,143	100%
Avg. per Year	Rural	*647*	*63%*	*177*	*68%*	*307*	*59%*
	Urban	*377*	*37%*	*80*	*31%*	*208*	*40%*
	Unknown	*7*	*1%*	*2*	*1%*	*3*	*1%*
	Total	*1,030*	*100%*	*259*	*100%*	*518*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF) Highlighted cells are highest proportions in category.

Table 57 depicts the age distribution of the drivers involved in fatal two-vehicle crashes with an older driver by the type of traffic control device. About 93 percent of the drivers involved in two-vehicle crashes at intersections controlled by traffic signals with older drivers were younger than the older drivers. The median age of the other driver was 38 years.

Table 57: Age of Other Driver Involved in Two-Vehicle Intersection Crashes With an Older Driver by Traffic Control Device, 1997-2004

	Age of the other Driver	Crashes	% of Total
Traffic Signals			
1997-2004	Under 16	6	0%
	16-20	465	13%
	21-24	382	10%
	25-34	845	23%
	35-44	771	21%
	45-64	909	25%
	65+	264	7%
	Unknown	14	0%
	Total	3,656	100%
Avg. per Year	Under 16	1	0%
	16-20	58	13%
	21-24	48	10%
	25-34	106	23%
	35-44	96	21%
	45-64	114	25%
	65+	33	7%
	Unknown	2	0%
	Total	457	100%
Stop Signs			
1997-2004	Under 16	26	0%
	16-20	1028	13%
	21-24	721	9%
	25-34	1783	23%
	35-44	1677	22%
	45-64	1992	26%
	65+	500	6%
	Unknown	16	0%
	Total	7,743	100%
Avg. per Year	Under 16	3	0%
	16-20	129	13%
	21-24	90	9%
	25-34	223	23%
	35-44	210	22%
	45-64	249	26%
	65+	63	6%
	Unknown	2	0%
	Total	968	100%

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

5.3.2 Gender of the Driver

Table 58 depicts the gender of the drivers involved in two-vehicle crashes at traffic signals and stop signs. Among drivers involved in two-vehicle crashes at traffic signals, 70 percent were males. Among drivers who failed to obey, 72 percent were males. Among drivers who failed to yield, 61 percent were males.

Among drivers involved in two-vehicle crashes at stop signs, 69 percent were males. Among drivers who failed to obey, 68 percent were males. Among drivers who failed to yield, 58 percent were males.

The proportions indicate that among drivers who failed to yield, female drivers comprise a slightly higher proportion of all drivers involved, as compared to the drivers who failed to obey.

Table 58: Drivers Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Gender and Major Violations Charged, 1997-2004

Year	Gender of the Driver	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers		Total		In Red-Light-Running (Failure-to-Obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Male	16,238	70%	4,268	72%	2,136	61%	8,214	66%	2,333	68%	1,439	58%
	Female	6,791	29%	1,644	28%	1,348	39%	4,203	34%	1,086	32%	1,019	41%
	Unknown	113	1%	33	0%	16	0%	23	0%	8	0%	3	1%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*Male*	*2,030*	*70%*	*534*	*72%*	*267*	*61%*	*1,027*	*66%*	*292*	*68%*	*180*	*58%*
	Female	*849*	*29%*	*206*	*28%*	*169*	*39%*	*525*	*34%*	*136*	*32%*	*127*	*41%*
	Unknown	*14*	*1%*	*4*	*1%*	*2*	*0%*	*3*	*0%*	*1*	*0%*	*0*	*0%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	Male	28,509	69%	6,173	68%	5,976	58%	14,935	63%	4,755	65%	4,935	56%
	Female	12,844	31%	2,861	32%	4,309	42%	8,682	37%	2,582	35%	3,907	44%
	Unknown	111	0%	41	0%	26	0%	55	0%	32	0%	16	0%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Male*	*3,564*	*69%*	*772*	*68%*	*747*	*58%*	*1,867*	*63%*	*594*	*65%*	*617*	*56%*
	Female	*1,606*	*31%*	*358*	*32%*	*539*	*42%*	*1,085*	*37%*	*323*	*35%*	*488*	*44%*
	Unknown	*14*	*0%*	*5*	*0%*	*3*	*0%*	*7*	*0%*	*4*	*0%*	*2*	*0%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.3.3 Driver Alcohol Involvement

Table 59 depicts the alcohol involvement among drivers involved in two-vehicle crashes at traffic signals and stop signs. Among drivers involved in two-vehicle crashes at traffic signals, 13 percent had a BAC of .08 grams per deciliter or above. Among drivers who failed to obey, 20 percent had a BAC of .08 or above. Among drivers who failed to yield, 11 percent had a BAC of .08 or above.

Among drivers involved in two-vehicle crashes at stop signs, 9 percent had a BAC of .08 or above. Among drivers who failed to obey, 16 percent had a BAC of .08 or above. Among drivers who failed to yield, 8 percent had a BAC of .08 or above.

Table 59: Driver Alcohol Involvement and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged, 1997-2004

Year	BAC of Driver	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers		Total		In Red-Light-Running (Failure-to-Obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	0	19,458	84%	4,512	76%	3,011	86%	10,123	81%	2,576	75%	2,133	87%
	.01-.07	747	3%	230	4%	100	3%	464	4%	122	4%	67	3%
	.08+	2,919	13%	1,201	20%	387	11%	1,836	15%	726	21%	258	10%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*0*	*2,432*	*84%*	*564*	*76%*	*376*	*86%*	*1,265*	*81%*	*322*	*75%*	*267*	*87%*
	.01-.07	*93*	*3%*	*29*	*4%*	*13*	*3%*	*58*	*4%*	*15*	*4%*	*8*	*3%*
	.08+	*365*	*13%*	*150*	*20%*	*48*	*11%*	*230*	*15%*	*91*	*21%*	*32*	*10%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	0	36,654	88%	7,240	80%	9,224	89%	20,128	85%	5,849	79%	7,871	89%
	.01-.07	1,179	3%	359	4%	295	3%	877	4%	310	4%	265	3%
	.08+	3,610	9%	1,468	16%	788	8%	2,630	11%	1,188	16%	709	8%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	32	100%
Avg. per Year	*0*	*4,582*	*88%*	*905*	*80%*	*1,153*	*89%*	*2,516*	*85%*	*731*	*79%*	*984*	*89%*
	.01-.07	*147*	*3%*	*45*	*4%*	*37*	*3%*	*110*	*4%*	*39*	*4%*	*33*	*3%*
	.08+	*451*	*9%*	*184*	*16%*	*99*	*8%*	*329*	*11%*	*149*	*16%*	*89*	*8%*
	Total	*5,183*	*100%*	*1134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*4*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.3.4 Speeding

Table 60 depicts speeding among drivers involved in two-vehicle crashes at traffic signals and stop signs. Among drivers involved in two-vehicle crashes at traffic signals, 9 percent were cited for speeding. Among drivers who failed to obey, 16 percent were cited for speeding. Among drivers who failed to yield, 3 percent were cited for speeding.

Among drivers involved in two-vehicle crashes at stop signs, 6 percent were cited for speeding. Among drivers who failed to obey, 10 percent were cited for speeding. Among drivers who failed to yield, 2 percent were cited for speeding.

Table 60: Drivers Involved and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Speeding, 1997-2004

Year	Driver Speeding Violation	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers		Total		In Red-Light-Running (Failure-to-Obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	No Spdg.	21,121	91%	5,014	84%	3,408	97%	11,338	91%	2,979	87%	2,418	98%
	Speeding	2,021	9%	931	16%	92	3%	1,102	9%	448	13%	43	2%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*No Spdg.*	*2,640*	*91%*	*627*	*84%*	*426*	*97%*	*1,417*	*91%*	*372*	*87%*	*302*	*98%*
	Speeding	*253*	*9%*	*116*	*16%*	*12*	*3%*	*138*	*9%*	*56*	*13%*	*5*	*2%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	No Spdg.	39,044	94%	8,187	90%	10,156	98%	22,333	94%	6,822	93%	8,763	99%
	Speeding	2,420	6%	888	10%	155	2%	1,339	6%	547	7%	95	1%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*No Spdg.*	*4,881*	*94%*	*1,023*	*90%*	*1,270*	*98%*	*2,792*	*94%*	*853*	*93%*	*1,095*	*99%*
	Speeding	*303*	*6%*	*111*	*10%*	*19*	*2%*	*167*	*6%*	*68*	*7%*	*12*	*1%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.3.5 Driver License Compliance

Table 61 depicts the drivers license compliance among drivers involved in two-vehicle crashes at traffic signals and stop signs. Among drivers involved in two-vehicle crashes at traffic signals, 11 percent had invalid licenses. Among drivers who failed to obey, 17 percent possessed invalid licenses. Among drivers who failed to yield, 10 percent had invalid licenses.

Among drivers involved in two-vehicle crashes at stop signs, 9 percent had invalid licenses. Among drivers who failed to obey, 15 percent possessed invalid licenses. Among drivers who failed to yield, 8 percent had invalid licenses.

Table 61: Driver License Compliance and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and License Compliance, 1997-2004

Year	License Compliance	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers		Total		In Red-Light-Running (Failure-to-Obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Valid	20,177	87%	4,790	81%	3,090	88%	10,670	86%	2,760	81%	2,201	89%
	Invalid	2,547	11%	1,021	17%	345	10%	1,596	13%	614	18%	228	9%
	Unknown	418	2%	134	2%	65	2%	174	1%	53	2%	32	1%
	Total	23,142	100%	5,945	100%	3,500	100%	12,440	100%	3,427	100%	2,461	100%
Avg. per Year	*Valid*	*2,522*	*87%*	*599*	*81%*	*386*	*88%*	*1,334*	*86%*	*345*	*81%*	*275*	*89%*
	Invalid	*318*	*11%*	*128*	*17%*	*43*	*10%*	*200*	*13%*	*77*	*18%*	*29*	*9%*
	Unknown	*52*	*2%*	*17*	*2%*	*8*	*2%*	*22*	*1%*	*7*	*2%*	*4*	*1%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*1,555*	*100%*	*428*	*100%*	*308*	*100%*
Stop Sign													
1997 to 2004	Valid	37,339	90%	7,539	83%	9,370	91%	20,774	88%	6,140	83%	8,034	91%
	Invalid	3,634	9%	1,384	15%	811	8%	2,590	11%	1,094	15%	710	8%
	Unknown	491	1%	152	2%	130	1%	308	1%	135	2%	114	1%
	Total	41,464	100%	9,075	100%	10,311	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Valid*	*4,667*	*90%*	*942*	*83%*	*1,171*	*91%*	*2,597*	*88%*	*768*	*83%*	*1,004*	*91%*
	Invalid	*454*	*9%*	*173*	*15%*	*101*	*8%*	*324*	*11%*	*137*	*15%*	*89*	*8%*
	Unknown	*61*	*1%*	*19*	*2%*	*16*	*1%*	*39*	*1%*	*17*	*2%*	*14*	*1%*
	Total	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.3.6 Driver Inattention/Distraction and Other Related Factors

This section depicts inattention and distraction, coded as driver-related variables in FARS, among drivers involved in two-vehicle crashes at traffic signals and stop signs. In this section, a driver who has been coded for the following driver-related factors by the police officer at the scene of the crash is included under Driver Inattention/Distraction. These factors are merely observed by the police officer and recorded in his narrative of the crash and are not to be interpreted as causal factors in the crash.

- **Drowsiness**
  - Drowsy
  - Sleepy
  - Asleep
  - Fatigued
- **Inattentive**
  - Due to use of car phones, Fax, etc.
  - Distracted by children
  - Lighting a cigarette
  - Operating/adjusting radio
  - Reading, eating, talking, applying cosmetics, using electric razor, painting nails, etc.
- **Vision Obscured by**
  - Rain, snow, smoke, fog, dust
  - Reflected glare, bright sunlight, headlights
  - Curve, hill, or other design features
  - Building, billboards
  - Trees, crops, and vegetation
  - Motor vehicle, parked vehicle
  - Splash or spray of passing vehicle
  - Inadequate defrost, defogging, lighting systems
- **Devices in Vehicles With Potential for Distractions**
  - Cellular telephone
  - Computer, Fax machines
  - Onboard navigation systems
  - Two-way radio, head-up display

Table 62 (overleaf) depicts the number of drivers involved in two-vehicle crashes at traffic signals and stop signs with coded distraction/inattention.

Among drivers involved in two-vehicle crashes at traffic signals, 7 percent had a coded factor related to inattention/distraction/drowsiness. A slightly higher proportion, about 12 percent, of drivers who failed to obey at traffic signals had a coded factor related to inattention/distraction/drowsiness. About 10 percent of drivers who failed to yield at traffic signals were coded for inattention/distraction/drowsiness.

Among drivers involved in two-vehicle crashes at stop signs, 7 percent were coded for inattention/distraction/drowsiness. A slightly higher percentage, about 11 percent, of the drivers who failed to obey a stop sign were coded for inattention/distraction/drowsiness.

Table 62: Driver Involvement and Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Inattention/Distraction/Drowsiness Coded as Driver-Related Factors, 1997-2004

Year	Inattention/ Distraction/ Drowsiness	Drivers Involved						Occupant Fatalities					
		Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers		Total		In Red-Light-Running (Failure-to-Obey) Vehicles		In Failure-to-Yield Vehicles	
		Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Traffic Signal													
1997 to 2004	Inattention/ Distraction	1,631	7%	722	12%	349	10%	3,617	9%	1,258	14%	1,501	15%
	None/Other/ Unknown	21,511	93%	5,223	88%	3,151	90%	37,847	91%	7,817	86%	8,810	85%
	Total	23,142	100%	5,945	100%	3,500	100%	41,464	100%	9,075	100%	10,311	100%
Avg. per Year	*Inattention/ Distraction*	*204*	*7%*	*90*	*12%*	*44*	*10%*	*452*	*9%*	*157*	*14%*	*188*	*15%*
	None/Other/ Unknown	*2,689*	*93%*	*653*	*88%*	*394*	*90%*	*4,731*	*91%*	*977*	*86%*	*1,101*	*85%*
	Total	*2,893*	*100%*	*743*	*100%*	*438*	*100%*	*5,183*	*100%*	*1,134*	*100%*	*1,289*	*100%*
Stop Sign													
1997 to 2004	Inattention/ Distraction	917	7%	375	11%	239	10%	2,591	11%	957	13%	1,263	14%
	None/Other/ Unknown	11,523	93%	3,052	89%	2,222	90%	21,081	89%	6,412	87%	7,595	86%
	Total	12,440	100%	3,427	100%	2,461	100%	23,672	100%	7,369	100%	8,858	100%
Avg. per Year	*Inattention/ Distraction*	*115*	*7%*	*47*	*11%*	*30*	*10%*	*324*	*11%*	*120*	*13%*	*158*	*14%*
	None/Other/ Unknown	*1,440*	*93%*	*382*	*89%*	*278*	*90%*	*2,635*	*89%*	*802*	*87%*	*949*	*86%*
	Total	*1,555*	*100%*	*428*	*100%*	*308*	*100%*	*2,959*	*100%*	*921*	*100%*	*1,107*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

5.4 Person Characteristics in Fatal, Two-Vehicle Intersection Crashes

This section will discuss characteristics of vehicle occupants killed in two-vehicle crashes at traffic signals and stop signs. In the period between 1997 and 2004, 12,440 vehicle occupants were killed in two-vehicle crashes at traffic signals. Similarly, 23,672 vehicle occupants were killed in two-vehicle crashes at stop signs.

5.4.1 Restraint Usage

Table 63 depicts the restraint use among vehicle occupants who were fatally injured in two-vehicle crashes at traffic signals and stop signs. Fatally injured occupants in vehicles that failed to obey at stop signs had the highest proportion of people who were unrestrained. About 47 percent of the occupants in vehicles that failed to obey at stop signs were unrestrained. This compares to about 38 percent of fatally injured occupants who were unrestrained in failure-to-obey and failure-to-yield vehicles at traffic signals as well as failure-to-yield vehicles at stop signs.

Table 63: Vehicle Occupant Fatalities in Two-Vehicle Intersection Crashes by Major Violations Charged and Their Restraint Use,1997-2004

Year	Restraint Use of Fatally Injured Vehicle Occupant	Total		Red-Light-Running (Failure-to-Obey Drivers)		Failure-to-Yield Drivers	
		Num	%	Num	%	Num	%
Traffic Signal							
1997 to 2004	Restrained	6,290	51%	3,171	50%	1,961	54%
	Unrestrained	4,752	38%	2,406	38%	1,347	37%
	Unknown	1,398	11%	749	12%	324	9%
	Total	12,440	100%	6,326	100%	3,632	100%
Avg. per Year	Restrained	*786*	*51%*	*396*	*50%*	*245*	*54%*
	Unrestrained	*594*	*38%*	*301*	*38%*	*168*	*37%*
	Unknown	*175*	*11%*	*94*	*12%*	*41*	*9%*
	Total	*1,555*	*100%*	*791*	*100%*	*454*	*100%*
Stop Sign							
1997 to 2004	Restrained	11,810	50%	4,747	45%	6,262	55%
	Unrestrained	10,042	42%	5,028	47%	4,349	38%
	Unknown	1,820	8%	882	8%	804	7%
	Total	23,672	100%	10,657	100%	11,415	100%
Avg. per Year	Restrained	*1,476*	*50%*	*593*	*45%*	*783*	*55%*
	Unrestrained	*1,255*	*42%*	*629*	*47%*	*544*	*38%*
	Unknown	*228*	*8%*	*110*	*8%*	*101*	*7%*
	Total	*2,959*	*100%*	*1,332*	*100%*	*1,427*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

6. Crashes at Intersections With No Traffic Control Devices

In the period between 1997 and 2004 there were 19,178 fatal crashes at intersections where the traffic control device was coded as "none." This resulted in 20,746 fatalities. This however does not necessarily imply that the intersection did not have any traffic control device. If a crash occurs at an intersection but the traffic control device is not relevant to the accident then the traffic control device will be coded as none. A typical scenario would be an intersection of a minor road with an arterial road controlled by a two-way stop sign. A crash between two vehicles on the arterial road (does not have any controls), with one of the vehicles turning into the minor road, would be coded as having occurred at an intersection with no traffic control device. This section will identify characteristics of such crashes. Table 64 depicts the trend of these crashes from 1997 to 2004.

Table 64: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Relation to Intersection, 1997-2004

Year	Crashes			Fatalities		
	Atintersection	Intersection-related	Total	Atintersection	Intersection-related	Total
1997	1,915	579	2,494	2,100	625	2,725
1998	1,753	619	2,372	1,921	644	2,565
1999	1,651	591	2,242	1,787	648	2,435
2000	1,829	582	2,411	1,978	619	2,597
2001	1,699	643	2,342	1,835	691	2,526
2002	1,757	745	2,502	1,905	817	2,722
2003	1,713	772	2,485	1,854	821	2,675
2004	1,695	635	2,330	1,826	675	2,501
Total	14,012	5,166	19,178	15,206	5,540	20,746
Avg. per Year	*1,752*	*646*	*2,397*	*1,901*	*693*	*2,593*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF).

Table 65 depicts the roadway function class at the site of the crash, i.e., if the crash occurred in a rural or an urban area. Slightly more than 50 percent of the crashes and fatalities occurred in urban areas.

Table 65: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Roadway Function Class, 1997-2004

Year	Roadway Function Class	Crashes		Fatalities	
		Number	%	Number	%
1997 to 2004	Rural	8,882	46%	9,828	47%
	Urban	10,192	53%	10,804	52%
	Unknown	104	1%	114	1%
	Total	19,178	100%	20,746	100%
Average per Year	*Rural*	*1,110*	*46%*	*1,229*	*47%*
	Urban	*1,274*	*53%*	*1,351*	*52%*
	Unknown	*13*	*1%*	*14*	*1%*
	Total	*2,397*	*100%*	*2,593*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 66 depicts the roadway function class of crashes occurring at intersections with no traffic control device. In rural areas, about 26 percent of the crashes occurred on major arterial roads, 21 percent on minor arterial roads, 24 percent on major collector roads, and 20 percent on local streets.

In urban areas, about 42 percent of such crashes occurred on principal arterial roads, 26 percent on minor arterial roads, and 23 percent on local streets.

Table 66: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Roadway Function Class, 1997-2004

Rural/Urban	Year	Roadway Function Class	Crashes		Fatalities	
			Number	%	Number	%
Rural	1997 to 2004	Major Arterial	2,309	26%	2,572	26%
		Minor Arterial	1,902	21%	2,107	21%
		Major Collector	2,144	24%	2,384	24%
		Minor Collector	634	7%	708	7%
		Local Street	1,800	20%	1,954	20%
		Unknown	93	1%	103	1%
		Total	8,882	100%	9,828	100%
	Average per Year	*Major Arterial*	*289*	*26%*	*322*	*26%*
		Minor Arterial	*238*	*21%*	*263*	*21%*
		Major Collector	*268*	*24%*	*298*	*24%*
		Minor Collector	*79*	*7%*	*89*	*7%*
		Local Street	*225*	*20%*	*244*	*20%*
		Unknown	*12*	*1%*	*13*	*1%*
		Total	*1,110*	*100%*	*1,229*	*100%*
Urban	1997 to 2004	Principal Arterial	4,293	42%	4,602	43%
		Minor Arterial	2,691	26%	2,838	26%
		Collector	789	8%	837	8%
		Local Street	2,346	23%	2,452	23%
		Unknown	73	1%	75	1%
		Total	10,192	100%	10,804	100%
	Average per Year	*Principal Arterial*	*537*	*42%*	*575*	*43%*
		Minor Arterial	*336*	*26%*	*355*	*26%*
		Collector	*99*	*8%*	*105*	*8%*
		Local Street	*293*	*23%*	*307*	*23%*
		Unknown	*9*	*1%*	*9*	*1%*
		Total	*1,274*	*100%*	*1,351*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 67 depicts the traffic-way flow of the roads on which the crashes at intersections with no controls occurred. About 69 percent were on undivided roads and 22 percent occurred on divided roads with a barrier.

Table 67: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Traffic-Way Flow, 1997-2004

Year	Roadway Function Class	Crashes		Fatalities	
		Number	%	Number	%
1997 to 2004	Undivided	13,207	69%	14,347	69%
	Divided wo Barrier	4,151	22%	4,476	22%
	Divided w/ Barrier	1,045	5%	1,113	5%
	One Way	180	1%	186	1%
	Unknown	595	3%	624	3%
	Total	19,178	100%	20,746	100%
Average per Year	*Undivided*	*1,651*	*69%*	*1,793*	*69%*
	Divided wo Barrier	*519*	*22%*	*560*	*22%*
	Divided w/ Barrier	*131*	*5%*	*139*	*5%*
	One Way	*23*	*1%*	*23*	*1%*
	Unknown	*74*	*3%*	*78*	*3%*
	Total	*2,397*	*100%*	*2,593*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 68 depicts the number of lanes of the roadway. This is shown in conjunction with the traffic-way flow as traffic-way flow determines the way the number of lanes is coded in FARS. A roadway (the travel lane) is one part of a divided traffic-way or, if undivided, the same as the travel lanes of the traffic way. Only lanes open for travel should be counted. Turn lanes are therefore excluded. This also excludes continuous-left-turn lanes.

A large proportion of the crashes in rural areas occur on undivided two-lane roads, followed by two-lane roads that have a median without a barrier.

Table 68: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Roadway Function Class and Number of Lanes, 1997-2004

Trafficway Flow	1 Lane		2 Lanes		3 Lanes		4 Lanes		5 or More Lanes		Total Crashes	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Rural Crashes												
Undivided	1	0%	6,678	93%	89	1%	350	5%	26	0%	7,161	100%
Median w/o Barrier	29	2%	886	68%	59	4%	317	24%	11	1%	1,312	100%
Median w Barrier	0	0%	89	33%	10	4%	166	61%	5	2%	270	100%
One Way	6	20%	19	63%	2	7%	3	10%	0	0	30	100%
Oth/Unk	8	7%	39	36%	1	1%	16	15%	1	1%	109	100%
Total	44	0%	7,711	87%	161	2%	852	10%	43	0%	8,882	100%
Fatalities in Rural Crashes												
Undivided	1	0%	7,439	94%	93	1%	377	5%	28	0%	7,956	100%
Median w/o Barrier	30	2%	980	68%	63	4%	342	24%	12	1%	1,437	100%
Median w Barrier	0	0%	95	33%	10	3%	177	62%	5	2%	287	100%
One Way	6	19%	20	63%	2	6%	4	13%	0	0%	32	100%
Oth/Unk	8	7%	41	35%	1	1%	18	16%	1	1%	116	100%
Total	45	0%	8,575	87%	169	2%	918	9%	46	0%	9,828	100%
Urban Crashes												
Undivided	1		4,279	72%	131	2%	1,346	23%	147	2%	5,972	100%
Median w/o Barrier	38	1%	1,693	60%	631	22%	307	11%	123	4%	2,819	100%
Median w Barrier	4	1%	275	36%	166	22%	190	25%	110	14%	771	100%
One Way	30	20%	58	39%	36	24%	12	8%	4	3%	149	100%
Oth/Unk	10	2%	179	37%	46	10%	79	16%	18	4%	481	100%
Total	83	1%	6,484	64%	1,010	10%	1,934	19%	402	4%	10,192	100%
Fatalities in Urban Crashes												
Undivided	1		4,519	72%	134	2%	1,433	23%	155	2%	6,310	100%
Median w/o Barrier	39	1%	1,805	60%	676	22%	330	11%	131	4%	3,016	100%
Median w Barrier	4		300	36%	172	21%	199	24%	114	14%	822	100%
One Way	30	20%	61	40%	36	24%	12	8%	5	3%	153	100%
Oth/Unk	10	2%	187	37%	48	10%	85	17%	21	4%	503	100%
Total	84	1%	6,872	64%	1,066	10%	2,059	19%	426	4%	10,804	100%

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). . Highlighted cells are highest proportions in category.

Table 69 depicts the crashes by the number of vehicles involved in the crash. Slightly less than 30 percent of the crashes in rural areas were single-vehicle crashes. However, about 50 percent of the crashes in urban areas were single-vehicle crashes.

Table 69: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Roadway Function Class, 1997-2004

Rural/Urban	Year	Type of Crash	Crashes		Fatalities	
			Number	%	Number	%
Rural	1997 to 2004	Single-vehicle	2,541	29%	2,661	27%
		Multiple-vehicle	6,341	71%	7,167	73%
		2	5,542	62%	6,217	63%
		3+	799	9%	950	10%
		Total	8,882	100%	9,828	100%
	Average per Year	*Single-vehicle*	*318*	*29%*	*333*	*27%*
		Multiple-vehicle	*793*	*71%*	*896*	*73%*
		2	*693*	*62%*	*777*	*63%*
		3+	*100*	*9%*	*119*	*10%*
		Total	*1,110*	*100%*	*1,229*	*100%*
Urban	1997 to 2004	Single-vehicle	5,080	50%	5,266	49%
		Multiple-vehicle	5,112	50%	5,538	51%
		2	4,438	44%	4,785	44%
		3+	674	7%	753	7%
		Total	10,192	100%	10,804	100%
	Average per Year	*Single-vehicle*	*635*	*50%*	*658*	*49%*
		Multiple-vehicle	*639*	*50%*	*692*	*51%*
		2	*555*	*44%*	*598*	*44%*
		3+	*84*	*7%*	*94*	*7%*
		Total	*1,274*	*100%*	*1,351*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

Table 70 depicts the speed limit of the roadway on which the crashes occurred. In rural areas, about 60 percent of the crashes occurred on roadways that had a high speed limit (55+ mph). However, in urban areas, about 51 percent of the crashes occurred on roadways with a speed limit less than 35 mph.

Table 70: Fatal Crashes and Fatalities in Intersection Crashes With No Traffic Control Device by Roadway Function Class and Speed Limit, 1997-2004

Rural/Urban	Year	Speed Limit	Crashes		Fatalities	
			Number	%	Number	%
Rural	1997 to 2004	<=35 mph	1,206	14%	1,274	13%
		40-50 mph	2,183	25%	2,368	24%
		55+ mph	5,334	60%	6,015	61%
		Unknown	159	2%	171	2%
		Total	8,882	100%	9,828	100%
	Average per Year	*<=35 mph*	*151*	*14%*	*159*	*13%*
		40-50 mph	*273*	*25%*	*296*	*24%*
		55+ mph	*667*	*60%*	*752*	*61%*
		Unknown	*20*	*2%*	*21*	*2%*
		Total	*1,110*	*100%*	*1,229*	*100%*
Urban	1997 to 2004	<=35 mph	5,155	51%	5,381	50%
		40-50 mph	3,622	36%	3,885	36%
		55+ mph	1,037	10%	1,139	11%
		Unknown	378	4%	397	4%
		Total	10,192	100%	10,804	100%
	Average per Year	*<=35 mph*	*644*	*51%*	*838*	*32%*
		40-50 mph	*453*	*36%*	*785*	*30%*
		55+ mph	*130*	*10%*	*898*	*35%*
		Unknown	*47*	*4%*	*72*	*3%*
		Total	*1,274*	*100%*	*2,593*	*100%*

Source: NCSA FARS 1997-2003 (Final) and 2004 (ARF). Highlighted cells are highest proportions in category.

7. Conclusions

Fatalities in crashes occurring at intersections account for more than 20 percent of all motor vehicle traffic fatalities in the United States every year. Of particular interest in this report were crashes that involved at least one driver who violated a traffic control device or failed to yield properly at a traffic control device.

About 967 fatal crashes each year, on average, involve drivers who ran red lights, resulting in 1,061 fatalities. Similarly, about 1,339 crashes resulted in 1,574 fatalities involving drivers who ran stop signs.

Two-vehicle crashes that comprise a majority of the multiple-vehicle crashes thought to be applicable under CICAS countermeasures were analyzed in this report.

There were 800 fatalities on an average each year, in two-vehicle crashes that involved at least one driver who ran a red light. Correspondingly, there were 1,336 fatalities in two-vehicle crashes at stop signs that involved at least one driver who ran a stop sign.

There were 460 fatalities on an average each year, in two-vehicle crashes that involved at least one driver who failed to yield at a traffic signal. Correspondingly, there were 1,430 fatalities in two-vehicle crashes at stop signs that involved at least one driver who failed to yield at a stop sign.

Older drivers were involved more in fatal crashes occurring at intersections as compared to those that occurred at nonintersection areas. In fact, 31 percent of all crashes occurring at intersections involved at least one older driver as compared to 13 percent of all crashes occurring at nonintersection areas.

Also, older drivers were shown to have a higher involvement in fatal, two-vehicle intersection crashes as compared to drivers of all other ages. In particular, the older drivers were more involved in failure-to-yield crashes at both traffic signals and stop signs. At traffic signals, the vehicles driven by the older drivers were predominantly turning left and were struck by an oncoming vehicle on the passenger side. At stop signs, the vehicles driven by the older drivers were either proceeding straight or turning left at the intersection when an approaching vehicle on the driver side struck them. A majority of the occupant fatalities in these crashes occurred to the older people (drivers and passengers).

A large proportion of the crashes involving the older drivers occur during non-rush, daytime hours (9 a.m. to 3 p.m.).

A majority of the occupant fatalities in these two-vehicle intersection crashes occurred to occupants of passenger cars that were struck by other passenger cars, light trucks and vans, as well as large trucks.

Occupant fatalities occurred in both newer and older model vehicles alike in fatal, two-vehicle intersection crashes.

In terms of infrastructure, a large majority of the intersection crashes occurred under normal weather conditions, roadway surface conditions, light conditions, and straight sections of the roadway, as well as level sections of the roadway.

8. References

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Glossary

Alcohol Involvement

Alcohol involvement is observed in a crash if any of the drivers or nonoccupants in the crash had a blood alcohol concentration (BAC) of .01 grams per deciliter or above.

Alcohol involvement with respect to a driver or nonoccupant is defined when the driver or nonoccupant had a BAC of .01 grams per deciliter or above.

Alcohol-Related Crashes

A crash is said to be alcohol-related if any one of the actively involved people in a police-reported fatal traffic crash had a BAC of .01 g/dL or greater (.01+).

Alcohol-Related Fatalities

A fatality is said to be alcohol-related if it occurred in a crash where any one of the actively involved people in the crash had a BAC of .01 g/dL or greater.

Any Alcohol

A positive BAC value (BAC=.01+) for any driver or nonoccupant in the crash.

ARF

Annual Report File of the Fatality Analysis Reporting System. A compilation of preliminary data on fatal motor vehicle traffic crashes each year in the United States.

BAC

The blood alcohol concentration (BAC) that is determined either by police-administered tests on surviving people or from the medical records of fatally-injured people. BAC is usually measured in grams per deciliter (g/dL) of blood and plausible values in FARS range from .00 to .94+ g/dL.

Crash BAC

The highest BAC among all the actively-involved people in the crash. For example, in a crash involving a vehicle and a pedestrian, if the driver of the vehicle had a BAC of .01 g/dL and the pedestrian had a BAC of .11 g/dL, the Crash BAC is .11 g/dL.

CICAS-SLTA

CICAS-Signalized Left Turn Assist: A countermeasure to address the safety of left-turning vehicles at traffic signals on green (not arrow) with respect to on-coming vehicles proceeding straight through the intersection.

CICAS-SSA

CICAS-Stop Sign Assist: A countermeasure to address the safety of vehicles at stop signs that, after properly stopping at the stop sign, fail to yield the right-of-way to other vehicles at the intersection. A typical scenario would be at the intersection of major high speed roads with minor roads controlled by a two-way stop sign.

CICAS-V

CICAS-Violation: A countermeasure to address violations of traffic signals and stop signs, e.g., red-light running.

Driver BAC

The BAC of a driver involved in a crash.

Failure-to-Obey Crashes

Crashes involving at least one driver who failed to obey at a traffic control device. In traffic signals, this is a driver who runs a red light. In the case of stop signs, this is a driver who fails to stop at all at the sign.

Failure-to-Yield Crashes

Crashes involving at least one driver who failed to yield at a traffic control device. In traffic signals, this might involve a vehicle whose driver did not yield properly to oncoming traffic while making a valid left turn. At stop signs, this involves a driver who fails to judge an oncoming vehicle after stopping at a two-way stop sign.

Injury Severity

Presented as fatal or surviving. Any injury code other than fatal is treated as surviving.

Intersection-Related Crash

A crash for which the first harmful event occurs on an approach to or exit from an intersection and results from an activity, behavior, or control related to the movement of traffic units through the intersection.

Intoxication (Intoxicated)

For the purposes of this document, a person is said to be intoxicated if his or her BAC is .08 g/dL or greater (.08+).

Nonoccupant

Any person involved in a crash who is not the occupant of a motor vehicle. Pedestrians, pedalcyclists, people on roller-blades, skateboards, etc., are nonoccupants.

Road type

- **Interstate:** Limited access divided facilities of at least four lanes designated by the Federal Highway Administration as part of the Interstate System.
- **Principal Arterial:** All urban principal arterial with limited control of access not on the Interstate System. Major streets or highways, many with multi-lane or freeway design, serving high-volume traffic corridor movements that connect major generators of travel.
- **Minor Arterial:** Streets and highways linking cities and larger towns in rural areas in distributing trips to small geographic areas in urban areas (not penetrating identifiable neighborhoods).
- **Collector:** In rural areas, routes serving intra-county, rather than statewide travel. In urban areas, streets providing direct access to neighborhoods as well as direct access to arterials.
- **Local:** Streets and roads whose primary purpose is feeding higher-order systems, providing direct access with little or no through traffic.

Rural/Urban

Land use based on Federal Highway Administration classification.

Vehicle Damage

This variable, sometimes called extent of deformation, has been partitioned into five levels: one, minor, moderate, severe, and unknown. If the police accident report indicates that the vehicle as totaled," but the vehicle was driven away, then the damage is considered moderate. If the police accident report indicates that the vehicle was "totaled" and the vehicle was towed away, then damage is considered severe.

Weekday

From 6 a.m. Monday to 5:59 p.m. Friday.

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Weekend

From 6 p.m. Friday to 5:59 a.m. Monday.

Appendix 1: SAS Algorithm to derive Crash Scenarios

FOR CRASHES AT TRAFFIC SIGNALS

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%MACRO TAXONOMY_SIGNALS;

DATA OTHER LT RT;
SET CRASHES;
IF DEV=2;
IF VEH_MAN1=13 OR VEH_MAN2=13 THEN OUTPUT LT;
ELSE IF 10<=VEH_MAN1<=12 OR 10<=VEH_MAN2<=12 THEN OUTPUT RT;
ELSE OUTPUT OTHER;
RUN;

DATA LT_ST (DROP=IMPACT1_1 IMPACT2_1 IMPACT1_2 IMPACT2_2 ROLE1 ROLE2
                        DR_CF1_1 DR_CF2_1 DR_CF3_1 DR_CF4_1 DR_CF1_2 DR_CF2_2 DR_CF3_2 DR_CF4_2
                        VIOLCHG1_1 VIOLCHG2_1 VIOLCHG3_1 VIOLCHG1_2 VIOLCHG2_2 VIOLCHG3_2 AVOID1 AVOID2
                        DEFORMED1 DEFORMED2);
SET LT;
IF (VEH_MAN1=13 AND VEH_MAN2=1) THEN DO;
IMPACTS_LT_1=IMPACT1_1;
IMPCATS_LT_2=IMPACT2_1;
IMPACTS_ST_1=IMPACT1_2;
IMPACTS_ST_2=IMPACT2_2;
ROLE_ST=ROLE2;
ROLE_LT=ROLE1;
AVOID_ST=AVOID2;
AVOID_LT=AVOID1;
DEFORMED_ST=DEFORMED2;
DEFORMED_LT=DEFORMED1;
DRCF_ST_1=DR_CF1_2;
DRCF_ST_2=DR_CF2_2;
DRCF_ST_3=DR_CF3_2;
DRCF_ST_4=DR_CF4_2;
DRCF_LT_1=DR_CF1_1;
DRCF_LT_2=DR_CF2_1;
DRCF_LT_3=DR_CF3_1;
DRCF_LT_4=DR_CF4_1;
VIOLCHG1_ST=VIOLCHG1_2;VIOLCHG2_ST=VIOLCHG2_2;VIOLCHG3_ST=VIOLCHG3_2;
VIOLCHG1_LT=VIOLCHG1_1;VIOLCHG2_LT=VIOLCHG2_1;VIOLCHG3_LT=VIOLCHG3_1;
OUTPUT;
END;
IF (VEH_MAN1=1 AND VEH_MAN2=13) THEN DO;
IMPACTS_LT_1=IMPACT1_2;
IMPACTS_LT_2=IMPACT2_2;
IMPACTS_ST_1=IMPACT1_1;
IMPACTS_ST_2=IMPACT2_1;
AVOID_ST=AVOID1;
AVOID_LT=AVOID2;
ROLE_ST=ROLE1;
ROLE_LT=ROLE2;
DEFORMED_ST=DEFORMED1;
DEFORMED_LT=DEFORMED2;
DRCF_ST_1=DR_CF1_1;
DRCF_ST_2=DR_CF2_1;
DRCF_ST_3=DR_CF3_1;
DRCF_ST_4=DR_CF4_1;
DRCF_LT_1=DR_CF1_2;
DRCF_LT_2=DR_CF2_2;
DRCF_LT_3=DR_CF3_2;
DRCF_LT_4=DR_CF4_2;
VIOLCHG1_ST=VIOLCHG1_1;VIOLCHG2_ST=VIOLCHG2_1;VIOLCHG3_ST=VIOLCHG3_1;
VIOLCHG1_LT=VIOLCHG1_2;VIOLCHG2_LT=VIOLCHG2_2;VIOLCHG3_LT=VIOLCHG3_2;
OUTPUT;
END;
RUN;

DATA LT_ST;
SET LT_ST;
CRASH_TYP=99;
IF 1<=IMPACTS_ST_1<=5 THEN DO;
        CRASH_TYP=2;
END;
IF 7<=IMPACTS_ST_1<=11 THEN DO;
        IF 1<=IMPACTS_LT_1<=5 THEN DO;
                CRASH_TYP=3;
        END;
        IF IMPACTS_LT_1=12 THEN DO;
                CRASH_TYP=1;
                IF YEAR>=2002 THEN DO;
                        IF M_COLL=3 THEN CRASH_TYP=3;
                END;
                IF DRCF_LT_1=38 OR DRCF_LT_2=38 OR DRCF_LT_3=38 OR DRCF_LT_4=38  OR VIOLCHG1_LT=46 OR VIOLCHG2_LT=46 OR
VIOLCHG3_LT=46 THEN CRASH_TYP=1;
                IF CRASH_TYP=99 THEN CRASH_TYP=1;
        END;
END;
IF IMPACTS_ST_1=12 THEN DO;
        IF 1<=IMPACTS_LT_1<=5 THEN DO;
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                        CRASH_TYP=1;
                        IF YEAR>=2002 THEN DO;
**                              IF M_COLL IN (4,5) THEN CRASH_TYP=1;
                                IF M_COLL=3 THEN CRASH_TYP=3;
                        END;
                        IF DRCF_LT_1=38 OR DRCF_LT_2=38 OR DRCF_LT_3=38 OR DRCF_LT_4=38  OR VIOLCHG1_LT=46 OR VIOLCHG2_LT=46 OR
VIOLCHG3_LT=46 THEN CRASH_TYP=1;
                        IF CRASH_TYP=99 THEN CRASH_TYP=1;
        END;
        IF 6<=IMPACTS_LT_1<=6 THEN DO;
                        CRASH_TYP=99;
        END;
        IF IMPACTS  LT  1=12 THEN DO;
                        IF DRCF_LT_1=38 OR DRCF_LT_2=38 OR DRCF_LT_3=38 OR DRCF_LT_4=38  OR VIOLCHG1_LT=46 OR VIOLCHG2_LT=46 OR
VIOLCHG3_LT=46 THEN CRASH_TYP=1;
                        IF M_COLL=2 THEN CRASH_TYP=1;
                        IF M_COLL=4 THEN CRASH_TYP=2;
/*                      ELSE CRASH_TYP=2;*/
        END;
END;

IF 7<=IMPACTS_LT_1<=11 THEN DO;
        CRASH_TYP=2;
END;

IF IMPACTS_LT_1 IN (13,14) OR IMPACTS_ST_1 IN (13,14) THEN CRASH_TYP=99;

IF IMPACTS  LT  1=99 OR IMPACTS  ST_1=99 THEN DO;
        IF YEAR>=2002 THEN DO;
                        IF M_COLL=3 THEN CRASH_TYP=3;
        END;
                        IF DRCF_LT_1=38 OR DRCF_LT_2=38 OR DRCF_LT_3=38 OR DRCF_LT_4=38  OR VIOLCHG1_LT=46 OR VIOLCHG2_LT=46 OR
VIOLCHG3_LT=46 THEN CRASH_TYP=1;
END;
RUN;

DATA OTH_LT (DROP=SIT);
SET LT;
IF VEH_MAN1=1 AND VEH_MAN2=13 THEN SIT=1;
IF VEH_MAN1=13 AND VEH_MAN2=1 THEN SIT=2;
IF NOT SIT THEN DO;
        IF VEH_MAN1=13 THEN DO;
                        IMPACTS_LT_1=IMPACT1_1;
                        IMPACTS_LT_2=IMPACT2_1;
                        AVOID_LT=AVOID1;
                        ROLE_LT=ROLE1;
                        DEFORMED_LT=DEFORMED1;
                        DRCF_LT_1=DR_CF1_1;
                        DRCF_LT_2=DR_CF2_1;
                        DRCF_LT_3=DR_CF3_1;
                        DRCF_LT_4=DR_CF4_1;
                        VIOLCHG1_LT=VIOLCHG1_1;VIOLCHG2_LT=VIOLCHG2_1;VIOLCHG3_LT=VIOLCHG3_1;
        END;
        IF VEH_MAN2=13 THEN DO;
                        IMPACTS_LT_1=IMPACT1_2;
                        IMPACTS_LT_2=IMPACT2_2;
                        AVOID_LT=AVOID2;
                        ROLE_LT=ROLE2;
                        DEFORMED_LT=DEFORMED2;
                        DRCF_LT_1=DR_CF1_2;
                        DRCF_LT_2=DR_CF2_2;
                        DRCF_LT_3=DR_CF3_2;
                        DRCF_LT_4=DR_CF4_2;
                        VIOLCHG1_LT=VIOLCHG1_2;VIOLCHG2_LT=VIOLCHG2_2;VIOLCHG3_LT=VIOLCHG3_2;
        END;
        CRASH_TYP=99;
        OUTPUT;
END;
RUN;

DATA RT_ST (DROP=IMPACT1_1 IMPACT2_1 IMPACT1_2 IMPACT2_2 ROLE1 ROLE2
                        DR_CF1_1 DR_CF2_1 DR_CF3_1 DR_CF4_1 DR_CF1_2 DR_CF2_2 DR_CF3_2 DR_CF4_2
                        VIOLCHG1_1 VIOLCHG2_1 VIOLCHG3_1 VIOLCHG1_2 VIOLCHG2_2 VIOLCHG3_2 AVOID1 AVOID2
                        DEFORMED1 DEFORMED2);
SET RT;
IF (10<=VEH_MAN1<=12 AND VEH_MAN2=1) THEN DO;
IMPACTS_RT_1=IMPACT1_1;
IMPCATS_RT_2=IMPACT2_1;
IMPACTS_ST_1=IMPACT1_2;
IMPACTS_ST_2=IMPACT2_2;
ROLE_ST=ROLE2;
ROLE_RT=ROLE1;
AVOID_ST=AVOID2;
AVOID_RT=AVOID1;
DEFORMED_ST=DEFORMED2;
DEFORMED_RT=DEFORMED1;
DRCF_ST_1=DR_CF1_2;
DRCF_ST_2=DR_CF2_2;
DRCF_ST_3=DR_CF3_2;
DRCF_ST_4=DR_CF4_2;
DRCF_RT_1=DR_CF1_1;
DRCF_RT_2=DR_CF2_1;
DRCF_RT_3=DR_CF3_1;
DRCF_RT_4=DR_CF4_1;
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VIOLCHG1_ST=VIOLCHG1_2;VIOLCHG2_ST=VIOLCHG2_2;VIOLCHG3_ST=VIOLCHG3_2;
VIOLCHG1_RT=VIOLCHG1_1;VIOLCHG2_RT=VIOLCHG2_1;VIOLCHG3_RT=VIOLCHG3_1;
OUTPUT;
END;
IF (VEH_MAN1=1 AND 10<=VEH_MAN2<=12) THEN DO;
IMPACTS_RT_1=IMPACT1_2;
IMPACTS_RT_2=IMPACT2_2;
IMPACTS_ST_1=IMPACT1_1;
IMPACTS_ST_2=IMPACT2_1;
AVOID_ST=AVOID1;
AVOID_RT=AVOID2;
ROLE_ST=ROLE1;
ROLE_RT=ROLE2;
DEFORMED_ST=DEFORMED1;
DEFORMED_RT=DEFORMED2;
DRCF_ST_1=DR_CF1_1;
DRCF_ST_2=DR_CF2_1;
DRCF_ST_3=DR_CF3_1;
DRCF_ST_4=DR_CF4_1;
DRCF_RT_1=DR_CF1_2;
DRCF_RT_2=DR_CF2_2;
DRCF_RT_3=DR_CF3_2;
DRCF_RT_4=DR_CF4_2;
VIOLCHG1_ST=VIOLCHG1_1;VIOLCHG2_ST=VIOLCHG2_1;VIOLCHG3_ST=VIOLCHG3_1;
VIOLCHG1_RT=VIOLCHG1_2;VIOLCHG2_RT=VIOLCHG2_2;VIOLCHG3_RT=VIOLCHG3_2;
OUTPUT;
END;
RUN;

DATA RT_ST;
SET RT_ST;
CRASH_TYP=99;
IF IMPACTS  ST  1=12 THEN DO;
        IF 6<=IMPACTS_RT_1<=11 THEN CRASH_TYP=4;
END;
IF IMPACTS_RT_1=12 THEN DO;
        IF 1<=IMPACTS_ST_1<=5 THEN CRASH_TYP=4;
END;
RUN;

DATA OTH_RT;
SET RT;
IF (10<=VEH  MAN1<=12 AND VEH  MAN2=1) THEN SIT=1;
IF (10<=VEH_MAN2<=12 AND VEH_MAN1=1) THEN SIT=1;
IF NOT SIT THEN DO;
        CRASH_TYP=99;
        OUTPUT OTH_RT;
END;
RUN;


DATA OTHER;
SET OTHER;
IF VEH_MAN1=1 AND VEH_MAN2=1 THEN DO;
        IF (IMPACT1_1=12 AND IMPACT1_2=9) OR (IMPACT1_1=9 AND IMPACT1_2=12) THEN DO;
                CRASH_TYP=5;
        END;
        IF (IMPACT1_1=12 AND IMPACT1_2=3) OR (IMPACT1_1=3 AND IMPACT1_2=12) THEN DO;
                CRASH_TYP=5;
        END;
        IF YEAR>=2002 THEN DO;
                IF M_COLL=5 THEN CRASH_TYP=5;
        END;
END;
RUN;

DATA SCP OTH_OTHER;
SET OTHER;
IF CRASH_TYP EQ 5 THEN OUTPUT SCP;
IF CRASH_TYP NE 5 THEN OUTPUT OTH_OTHER;
RUN;

DATA REAR_END OTH_OTHER;
SET OTH_OTHER;
IF (IMPACT1_1=12 AND VEH_MAN1 IN (1,2,3,5,16)) AND (IMPACT1_2=6 AND VEH_MAN2 IN (1,2,3,4,5,6,7,16)) THEN DO;CRASH_TYP=7;OUTPUT REAR_END;END;
ELSE IF (IMPACT1_2=12 AND VEH_MAN2 IN (1,2,3,5,16)) AND (IMPACT1_1=6 AND VEH_MAN1 IN (1,2,3,4,5,6,7,16)) THEN DO;CRASH_TYP=7;OUTPUT
REAR_END;END;
ELSE OUTPUT OTH_OTHER;
RUN;

DATA OTH_OTHER;
SET OTH_OTHER;
CRASH_TYP=99;
IF VEH_MAN1=1 AND VEH_MAN2=1 THEN DO;
        IF(((IMPACT1_1=12 AND (1<=IMPACT1_2<=5 OR 7<=IMPACT1_2<=11)) OR (IMPACT1_2=12 AND (1<=IMPACT1_1<=5 OR 7<=IMPACT1_1<=11))) THEN
CRASH_TYP=5;
        IF IMPACT1_1=12 AND IMPACT1_2=12 AND M_COLL=2 THEN CRASH_TYP=8;
        IF (IMPACT1_1=11 AND (1<=IMPACT1_2<=5)) OR (IMPACT1_2=11 AND (1<=IMPACT1_1<=5)) THEN CRASH_TYP=5;
        IF (IMPACT1_1=1 AND (7<=IMPACT1_2<=11)) OR (IMPACT1_2=1 AND (7<=IMPACT1_1<=11)) THEN CRASH_TYP=5;
        IF IMPACT1_1=99 AND IMPACT1_2=99 THEN CRASH_TYP=99;
END;
IF (VEH_MAN1=1 AND VEH_MAN2=3) OR (VEH_MAN1=3 OR VEH_MAN2=1) THEN DO;
        IF (IMPACT1_1=12 AND (1<=IMPACT1_2<=5 OR 7<=IMPACT1_2<=11)) OR (((1<=IMPACT1_1<=5 OR 7<=IMPACT1_1<=11) AND IMPACT1_2=12) THEN
CRASH_TYP=5;
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END;
IF (VEH_MAN1=1 AND VEH_MAN2=4) OR (VEH_MAN1=4 OR VEH_MAN2=1) THEN DO;
                IF IMPACT1_1=12 AND IMPACT1_2=12 THEN CRASH_TYP=8;
END;
IF CRASH_TYP=99 AND IMPACT1_1=12 AND IMPACT1_2=12 THEN CRASH_TYP=8;
IF CRASH_TYP=99 AND VEH_MAN1=1 AND VEH_MAN2=1 AND (((IMPACT1_1=11 AND 7<=IMPACT1_2<=11) OR (IMPACT1_2=11 AND 7<=IMPACT1_1<=11)) THEN DO;
                IF M_COLL=2 THEN CRASH_TYP=8;
                IF M_COLL=4 THEN CRASH_TYP=5;
END;
RUN;

DATA CRASHES_SIGNALS;
SET LT_ST RT_ST OTH_LT OTH_RT SCP REAR_END OTH_OTHER;
RUN;


%MEND TAXONOMY_SIGNALS;
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FOR CRASHES AT STOP SIGNS

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%MACRO TAXONOMY_STOPS;

DATA OTHER LT RT;
SET CRASHES;
IF DEV=3;
IF VEH_MAN1=13 OR VEH_MAN2=13 THEN OUTPUT LT;
ELSE IF 10<=VEH_MAN1<=12 OR 10<=VEH_MAN2<=12 THEN OUTPUT RT;
ELSE OUTPUT OTHER;
RUN;

DATA LT_ST (DROP=IMPACT1_1 IMPACT2_1 IMPACT1_2 IMPACT2_2 ROLE1 ROLE2
                DR_CF1_1 DR_CF2_1 DR_CF3_1 DR_CF4_1 DR_CF1_2 DR_CF2_2 DR_CF3_2 DR_CF4_2
                VIOLCHG1_1 VIOLCHG2_1 VIOLCHG3_1 VIOLCHG1_2 VIOLCHG2_2 VIOLCHG3_2 AVOID1 AVOID2
                DEFORMED1 DEFORMED2);
SET LT;
IF (VEH_MAN1=13 AND VEH_MAN2=1) THEN DO;
IMPACTS_LT_1=IMPACT1_1;
IMPCATS_LT_2=IMPACT2_1;
IMPACTS_ST_1=IMPACT1_2;
IMPACTS_ST_2=IMPACT2_2;
ROLE_ST=ROLE2;
ROLE_LT=ROLE1;
AVOID_ST=AVOID2;
AVOID_LT=AVOID1;
DEFORMED_ST=DEFORMED2;
DEFORMED_LT=DEFORMED1;
DRCF_ST_1=DR_CF1_2;
DRCF_ST_2=DR_CF2_2;
DRCF_ST_3=DR_CF3_2;
DRCF_ST_4=DR_CF4_2;
DRCF_LT_1=DR_CF1_1;
DRCF_LT_2=DR_CF2_1;
DRCF_LT_3=DR_CF3_1;
DRCF_LT_4=DR_CF4_1;
VIOLCHG1_ST=VIOLCHG1_2;VIOLCHG2_ST=VIOLCHG2_2;VIOLCHG3_ST=VIOLCHG3_2;
VIOLCHG1_LT=VIOLCHG1_1;VIOLCHG2_LT=VIOLCHG2_1;VIOLCHG3_LT=VIOLCHG3_1;
OUTPUT;
END;
IF (VEH_MAN1=1 AND VEH_MAN2=13) THEN DO;
IMPACTS_LT_1=IMPACT1_2;
IMPACTS_LT_2=IMPACT2_2;
IMPACTS_ST_1=IMPACT1_1;
IMPACTS_ST_2=IMPACT2_1;
AVOID_ST=AVOID1;
AVOID_LT=AVOID2;
ROLE_ST=ROLE1;
ROLE_LT=ROLE2;
DEFORMED_ST=DEFORMED1;
DEFORMED_LT=DEFORMED2;
DRCF_ST_1=DR_CF1_1;
DRCF_ST_2=DR_CF2_1;
DRCF_ST_3=DR_CF3_1;
DRCF_ST_4=DR_CF4_1;
DRCF_LT_1=DR_CF1_2;
DRCF_LT_2=DR_CF2_2;
DRCF_LT_3=DR_CF3_2;
DRCF_LT_4=DR_CF4_2;
VIOLCHG1_ST=VIOLCHG1_1;VIOLCHG2_ST=VIOLCHG2_1;VIOLCHG3_ST=VIOLCHG3_1;
VIOLCHG1_LT=VIOLCHG1_2;VIOLCHG2_LT=VIOLCHG2_2;VIOLCHG3_LT=VIOLCHG3_2;
OUTPUT;
END;
RUN;

DATA LT_ST;
SET LT_ST;
CRASH_TYP=99;
IF 1<=IMPACTS_ST_1<=5 THEN DO;
        CRASH_TYP=2;
END;
IF 7<=IMPACTS_ST_1<=11 THEN DO;
        IF 1<=IMPACTS_LT_1<=5 THEN DO;
                CRASH_TYP=3;
        END;
        IF IMPACTS_LT_1=12 THEN DO;
                CRASH_TYP=1;
                IF YEAR>=2002 THEN DO;
                        IF M_COLL=3 THEN CRASH_TYP=3;
                END;
        END;
END;
IF IMPACTS_ST_1=12 THEN DO;
        IF 1<=IMPACTS_LT_1<=5 THEN DO;
                CRASH_TYP=1;
                IF YEAR>=2002 THEN DO;
                        IF M_COLL=3 THEN CRASH_TYP=3;
                END;
        END;
        IF 6<=IMPACTS_LT_1<=6 THEN DO;    /* Ja.m.ES - ASSIGN TO OTHER */
                CRASH_TYP=99;
        END;
        IF IMPACTS_LT_1=12 THEN DO;
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                        IF M_COLL=2 THEN CRASH_TYP=1;
                        IF M_COLL=4 THEN CRASH_TYP=2;
        END;
END;
IF 7<=IMPACTS_LT_1<=11 THEN DO;
        CRASH_TYP=2;
END;

IF IMPACTS_LT_1 IN (13,14) OR IMPACTS_ST_1 IN (13,14) THEN CRASH_TYP=99;

IF IMPACTS_LT_1=99 OR IMPACTS_ST_1=99 THEN DO;
        IF YEAR>=2002 THEN DO;
                IF M_COLL=3 THEN CRASH_TYP=3;
        END;
END;
RUN;

DATA OTH_LT (DROP=SIT);
SET LT;
IF VEH_MAN1=1 AND VEH_MAN2=13 THEN SIT=1;
IF VEH_MAN1=13 AND VEH_MAN2=1 THEN SIT=2;
IF NOT SIT THEN DO;
        IF VEH_MAN1=13 THEN DO;
                IMPACTS_LT_1=IMPACT1_1;
                IMPACTS_LT_2=IMPACT2_1;
                AVOID_LT=AVOID1;
                ROLE_LT=ROLE1;
                DEFORMED_LT=DEFORMED1;
                DRCF_LT_1=DR_CF1_1;
                DRCF_LT_2=DR_CF2_1;
                DRCF_LT_3=DR_CF3_1;
                DRCF_LT_4=DR_CF4_1;
                VIOLCHG1_LT=VIOLCHG1_1;VIOLCHG2_LT=VIOLCHG2_1;VIOLCHG3_LT=VIOLCHG3_1;
        END;
        IF VEH_MAN2=13 THEN DO;
                IMPACTS_LT_1=IMPACT1_2;
                IMPACTS_LT_2=IMPACT2_2;
                AVOID_LT=AVOID2;
                ROLE_LT=ROLE2;
                DEFORMED_LT=DEFORMED2;
                DRCF_LT_1=DR_CF1_2;
                DRCF_LT_2=DR_CF2_2;
                DRCF_LT_3=DR_CF3_2;
                DRCF_LT_4=DR_CF4_2;
                VIOLCHG1_LT=VIOLCHG1_2;VIOLCHG2_LT=VIOLCHG2_2;VIOLCHG3_LT=VIOLCHG3_2;
        END;
        CRASH_TYP=99;
        OUTPUT;
END;
RUN;

DATA RT_ST (DROP=IMPACT1_1 IMPACT2_1 IMPACT1_2 IMPACT2_2 ROLE1 ROLE2
                        DR_CF1_1 DR_CF2_1 DR_CF3_1 DR_CF4_1 DR_CF1_2 DR_CF2_2 DR_CF3_2 DR_CF4_2
                        VIOLCHG1_1 VIOLCHG2_1 VIOLCHG3_1 VIOLCHG1_2 VIOLCHG2_2 VIOLCHG3_2 AVOID1 AVOID2
                        DEFORMED1 DEFORMED2);
SET RT;
IF (10<=VEH_MAN1<=12 AND VEH_MAN2=1) THEN DO;
IMPACTS_RT_1=IMPACT1_1;
IMPCATS_RT_2=IMPACT2_1;
IMPACTS_ST_1=IMPACT1_2;
IMPACTS_ST_2=IMPACT2_2;
ROLE_ST=ROLE2;
ROLE_RT=ROLE1;
AVOID_ST=AVOID2;
AVOID_RT=AVOID1;
DEFORMED_ST=DEFORMED2;
DEFORMED_RT=DEFORMED1;
DRCF_ST_1=DR_CF1_2;
DRCF_ST_2=DR_CF2_2;
DRCF_ST_3=DR_CF3_2;
DRCF_ST_4=DR_CF4_2;
DRCF_RT_1=DR_CF1_1;
DRCF_RT_2=DR_CF2_1;
DRCF_RT_3=DR_CF3_1;
DRCF_RT_4=DR_CF4_1;
VIOLCHG1_ST=VIOLCHG1_2;VIOLCHG2_ST=VIOLCHG2_2;VIOLCHG3_ST=VIOLCHG3_2;
VIOLCHG1_RT=VIOLCHG1_1;VIOLCHG2_RT=VIOLCHG2_1;VIOLCHG3_RT=VIOLCHG3_1;
OUTPUT;
END;
IF (VEH_MAN1=1 AND 10<=VEH_MAN2<=12) THEN DO;
IMPACTS_RT_1=IMPACT1_2;
IMPACTS_RT_2=IMPACT2_2;
IMPACTS_ST_1=IMPACT1_1;
IMPACTS_ST_2=IMPACT2_1;
AVOID_ST=AVOID1;
AVOID_RT=AVOID2;
ROLE_ST=ROLE1;
ROLE_RT=ROLE2;
DEFORMED_ST=DEFORMED1;
DEFORMED_RT=DEFORMED2;
DRCF_ST_1=DR_CF1_1;
DRCF_ST_2=DR_CF2_1;
DRCF_ST_3=DR_CF3_1;
DRCF_ST_4=DR_CF4_1;
```

```
DRCF_RT_1=DR_CF1_2;
DRCF_RT_2=DR_CF2_2;
DRCF_RT_3=DR_CF3_2;
DRCF_RT_4=DR_CF4_2;
VIOLCHG1_ST=VIOLCHG1_1;VIOLCHG2_ST=VIOLCHG2_1;VIOLCHG3_ST=VIOLCHG3_1;
VIOLCHG1_RT=VIOLCHG1_2;VIOLCHG2_RT=VIOLCHG2_2;VIOLCHG3_RT=VIOLCHG3_2;
OUTPUT;
END;
RUN;

DATA RT_ST;
SET RT_ST;
CRASH_TYP=99;
IF IMPACTS_ST_1=12 THEN DO;
        IF 6<=IMPACTS_RT_1<=11 THEN CRASH_TYP=4;
END;
IF IMPACTS_RT_1=12 THEN DO;
        IF 1<=IMPACTS_ST_1<=5 THEN CRASH_TYP=4;
END;
RUN;

DATA OTH_RT;
SET RT;
IF (10<=VEH_MAN1<=12 AND VEH_MAN2=1) THEN SIT=1;
IF (10<=VEH_MAN2<=12 AND VEH_MAN1=1) THEN SIT=1;
IF NOT SIT THEN DO;
        CRASH_TYP=99;
        OUTPUT OTH_RT;
END;
RUN;


DATA OTHER;
SET OTHER;
IF VEH_MAN1=1 AND VEH_MAN2=1 THEN DO;
        IF (IMPACT1_1=12 AND IMPACT1_2=9) OR (IMPACT1_1=9 AND IMPACT1_2=12) THEN DO;
                CRASH_TYP=5;
        END;
        IF (IMPACT1_1=12 AND IMPACT1_2=3) OR (IMPACT1_1=3 AND IMPACT1_2=12) THEN DO;
                CRASH_TYP=5;
        END;
        IF YEAR>=2002 THEN DO;
                IF M_COLL=5 THEN CRASH_TYP=5;
        END;
END;
RUN;

DATA SCP OTH_OTHER;
SET OTHER;
IF CRASH_TYP EQ 5 THEN OUTPUT SCP;
IF CRASH_TYP NE 5 THEN OUTPUT OTH_OTHER;
RUN;

DATA REAR_END OTH_OTHER;
SET OTH_OTHER;
IF (IMPACT1_1=12 AND VEH_MAN1 IN (1,2,3,5,16)) AND (IMPACT1_2=6 AND VEH_MAN2 IN (1,2,3,4,5,6,7,16)) THEN DO;CRASH_TYP=7;OUTPUT REAR_END;END;
ELSE IF (IMPACT1_2=12 AND VEH_MAN2 IN (1,2,3,5,16)) AND (IMPACT1_1=6 AND VEH_MAN1 IN (1,2,3,4,5,6,7,16)) THEN DO;CRASH_TYP=7;OUTPUT
REAR_END;END;
ELSE OUTPUT OTH_OTHER;
RUN;

DATA OTH_OTHER;
SET OTH_OTHER;
CRASH_TYP=99;
IF VEH_MAN1=1 AND VEH_MAN2=1 THEN DO;
        IF(((IMPACT1_1=12 AND (1<=IMPACT1_2<=5 OR 7<=IMPACT1_2<=11)) OR (IMPACT1_2=12 AND (1<=IMPACT1_1<=5 OR 7<=IMPACT1_1<=11))) THEN
CRASH_TYP=5;
        IF IMPACT1_1=12 AND IMPACT1_2=12 AND M_COLL=2 THEN CRASH_TYP=8;
        IF (IMPACT1_1=11 AND (1<=IMPACT1_2<=5)) OR (IMPACT1_2=11 AND (1<=IMPACT1_1<=5)) THEN CRASH_TYP=5;
        IF (IMPACT1_1=1 AND (7<=IMPACT1_2<=11)) OR (IMPACT1_2=1 AND (7<=IMPACT1_1<=11)) THEN CRASH_TYP=5;
        IF IMPACT1_1=99 AND IMPACT1_2=99 THEN CRASH_TYP=99;
END;
IF (VEH_MAN1=1 AND VEH_MAN2=3) OR (VEH_MAN1=3 OR VEH_MAN2=1) THEN DO;
        IF (IMPACT1_1=12 AND (1<=IMPACT1_2<=5 OR 7<=IMPACT1_2<=11)) OR (((1<=IMPACT1_1<=5 OR 7<=IMPACT1_1<=11) AND IMPACT1_2=12) THEN
CRASH_TYP=5;
END;
IF (VEH_MAN1=1 AND VEH_MAN2=4) OR (VEH_MAN1=4 OR VEH_MAN2=1) THEN DO;
        IF IMPACT1_1=12 AND IMPACT1_2=12 THEN CRASH_TYP=8;
END;
IF CRASH_TYP=99 AND IMPACT1_1=12 AND IMPACT1_2=12 THEN CRASH_TYP=8;
IF CRASH_TYP=99 AND VEH_MAN1=1 AND VEH_MAN2=1 AND (((IMPACT1_1=11 AND 7<=IMPACT1_2<=11) OR (IMPACT1_2=11 AND 7<=IMPACT1_1<=11)) THEN DO;
        IF M_COLL=2 THEN CRASH_TYP=8;
        IF M_COLL=4 THEN CRASH_TYP=5;
END;
RUN;

DATA CRASHES_STOPS;
SET LT_ST RT_ST OTH_LT OTH_RT SCP REAR_END OTH_OTHER;
RUN;

%MEND TAXONOMY_STOPS;
```

Appendix 2: Needed Enhancements to Variables in Future FARS to Improve Intersection Safety Analysis

The following are potential variables that can be considered for collection in future years in FARS that may be highly beneficial in the scope of the analysis contained in this report.

Stop Signs (Two-Way or Four-Way)

This might be very beneficial in getting a better count of crashes that are addressed by CICAS-SSA and CICAS-V at stop signs.

Crash Scenarios

This information might actually exist in the Police Accident Report in the form of a Crash Schematic. Coding this attribute will result in better counts of two-vehicle crashes by the respective crash scenarios.

Speed Limit Coded at Vehicle Level

The posted speed limit is coded right now in FARS for the road on which the accident occurs. From an intersection safety analysis perspective, it would be immensely beneficial to code the speed limits for both roads at the intersection.

Number of Lanes and Traffic-way Flow Coded at Vehicle Level

These infrastructure attributes are coded right now in FARS for the road on which the accident occurs. From an intersection safety analysis perspective, it would be immensely beneficial to code these attributes for both roads at the intersection.

Appendix 3: Crash Populations addressed by CICAS-V, CICAS-SLTA, and CICAS-SSA based on Violations Coded and Pre-Crash Scenarios

The following table categorizes Crossing Path Crashes by violation type into the three CICAS projects – CICAS-V, CICAS-SLTA, and CICAS-SSA.

Single-vehicle and non-crossing path multiple-vehicle crashes are not shown. The SLTA project will be considering pedestrian crashes for left turning vehicles. The CICAS-V project may consider single-vehicle crashes and multiple-vehicle non-crossing path crashes if they involve a failure-to-obey violation.

Traffic Control Device	**Failure-to-obey**	**Failure-to-Yield or Other Violations or No Violation**			
Pre-Crash Scenario for Crossing Path Crashes	All Scenarios	SCP, LTIP, LTAP/LD	RTIP	LTAP/OD	All Others
Traffic Signal	CICAS-V	CICAS-V	N/A	SLTA	N/A
Stop Sign	CICAS-V	SSA	SSA	N/A	N/A

Source: Mitretek Systems, Inc.

Appendix 4: GISAT (GIS Intersection Safety Tool)

The Geocoded Intersection Safety Analysis Tool (GISAT) that provided aerial images (where available from Google Earth and Local Live) for each of ~30,000 geocoded fatal crash locations for the years 2001-2005. This is a subset of the Highway Infrastructure Safety Analysis Tool (HISAT) that adds the aerial images of all roadway locations, as available, for all ~160,000 geocoded fatal crash locations in FARS since 2001. These tools permit a wide variety of safety analyses to be performed by safety researchers in the future. The GISAT is a spreadsheet tool that links FARS crash data to location-specific satellite and aerial imagery from providers like Google Maps and Microsoft's Windows Local Live Web sites. The advantage of providing such links is that these providers are constantly upgrading these images and more clearer, higher-resolution imagery becomes available. So at any given point of time, a researcher using GISAT/HISAT is always directed to latest images available from these on-line providers. Illustrated below are a few examples from GISAT intersections that were the site of fatal crashes.

Example 1: This is a birds-eye view of the image of an intersection in Maryland where a fatal crash occurred in April 2001. A vehicle turning West onto the major roadway was hit on the side by a vehicle proceeding east on the major roadway. This traffic control device was coded as 'No Controls' in FARS as no traffic control device affected the movement of the vehicles through the intersection prior to the crash.

For a bird's eye image of the intersection, visit
Link to Bird's Eye Imagery
http://local.live.com/default.aspx?cp=38.984280556~-76.96981389&lvl=19&style=a&v=2

Example 2: This is a birds-eye view of the image of an intersection in Virginia where a fatal crash occurred in May 2001. This traffic control device was coded as 'No Controls' in FARS as no traffic control device affected the movement of the vehicles through the intersection prior to the crash.

For a bird's eye image of the intersection, visit
Link to Bird's Eye Imagery
http://local.live.com/default.aspx?cp=38.984280556~-76.96981389&lvl=19&style=a&v=2

Example 3: This is a birds-eye view of the image of an intersection in Washington, DC, where a fatal crash occurred in June 2001. This traffic control device was coded as "Traffic Signal" in FARS.

For a bird's eye image of the intersection, visit
Link to Bird's Eye Imagery,
http://local.live.com/default.aspx?cp=38.984280556~-76.96981389&lvl=19&style=a&v=2

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