SAFETY MANAGEMENT SYSTEMS REPORT

EXECUTIVE SUMMARY

Federal and state governments recommend that a safety management system be used by local governments to monitor crashes within city limits. The City of Sioux Falls Engineering Office uses data provided by Local Law Enforcement using the Aegis System and the SDDOT using a Crash Magic Server to compile statistics, determine high crash areas, and evaluate locations.

The city of Sioux Falls experienced a trend of a slight decrease in crashes from 2001 to 2006 that was broken by an 8 percent increase of state reported crashes in 2007. This increase places the total number of state reported crashes at 2,960 for 2007. This is still six percent below the number of crashes in 2001 and considering the amount of growth the City of Sioux Falls has experienced from 2001 to 2007 to have a decrease in crashes is still quite an accomplishment. This is reflected by the All-State America’s Best Drivers award which the City of Sioux Falls has managed to win for three years in a row.

In researching the increase in crashes it was found that 44 percent of the increase is attributable to an increase in crashes at signalized locations where the road is not dry.

Fifty percent of the 2007 crashes in Sioux Falls occurred at locations without a traffic control device such as stop signs or traffic signals which was the same percentage in 2006, and 69 percent of the 2007 crashes occurred on dry roads which is major change from 2006 where 82 percent were on dry roads.

For the past four years the number of fatal crashes in Sioux Falls has been decreasing, from a total of ten in 2004, to eight in 2005, to seven in 2006, finally to six to 2007.

State reported Pedestrian and Bicycle crashes decreased from 39 and 36 respectively in 2006 to 35 and 30 in 2007.

Despite the 15 percent increase in crashes for 2007 which appears to be attributable to wetter road conditions than prior years the City of Sioux Falls still is doing very well statistically from a safety standpoint. 2007 saw almost no increase in injury crashes while continuing to see a decrease in the number of pedestrian, bicycle, and fatality crashes.
SAFETY MANAGEMENT SYSTEMS REPORT

INTRODUCTION

Federal and state governments recommend that a safety management system be used by local governments to monitor crashes within city limits. The City of Sioux Falls Engineering Office uses data provided by Local Law Enforcement using the Aegis System and the SDDOT using a Crash Magic Server to compile statistics, determine high crash locations, and evaluate locations. When a high crash location is identified a field study is performed by personnel to investigate an evident problem. Different alternatives are discussed among staff (Engineering, Planning, Police, etc.) and then the most logical cost-effective solution is chosen and implemented.

The statistical method of identifying high crash locations involves separating the intersections into seven categories and then comparing the category’s average crash rate to the crash rate of an intersection along with an accepted statistical deviation. The highest ranking intersections of each of the categories are shown below.

**Category I—Signalized intersection with over 10,000 ADT on both roads**
- Arrowhead Parkway and Sycamore Avenue
- 41st Street and Louise Avenue

**Category II—Signalized intersection with over 10,000 ADT on one road**
- 41st Street and I-29
- 41st Street and Shirley Avenue

**Category III—Signalized intersection with both roads under 10,000 ADT**
- 12th Street and Cleveland Avenue
- 41st Street and Sertoma Avenue

**Category IV—Unsignalized intersection with over 4,000 ADT on both roads**
- 12th Street and Ellis Road

**Category V—Unsignalized intersections with over 4,000 ADT on one road**
- Madison Street and Western Avenue
- 34th Street and Shirley Avenue

**Category VI—Unsignalized intersections with over 1,000 ADT on one road**
- 13th Street and Dakota Avenue
- 9th Street and Prairie Avenue

**Category VII—Unsignalized intersections with both roads under 1,000 ADT**
- 14th Street and Spring Avenue
- Palisade Lane and Essex Drive
VEHICLE CRASHES

There were 2,960 state reported crashes in 2007 and 3,724 crashes that were not reported to the state. The increase in state reported crashes in 2007 is 8 percent while there was no change in the number of non-state reported crashes; this accounts for a three percent overall increase in crashes for 2007. Also the increase is found to be entirely in property damage only crashes which are not as severe as crashes that involve injuries. Over the last seven years, there has been an average of 2,961 state-reported crashes per year. Thirty-seven percent of the collisions in 2007 are angle crashes, followed by 33 percent being rear-end crashes. December was the top month for being involved in a crash in 2007. And between 5 and 6 p.m. is the most common time of day crashes occur. 221 of the state reported crashes involved a driver that was not yet 16 years old by the start of 2007. 188 of the state reported crashes involved a driver without a valid driver’s license. And finally 750 of the state reported crashes involved a driver that was exceeding the speed limit.
During the 2007 presentation of the 2006 Safety Management Systems Report questions about how crashes by hour compares with hourly volumes arose, along with questions of how alcohol related crashes are distributed hourly, and how are animal hits distributed hourly. To answer these questions a graph of the hourly distributions of alcohol related crashes and animal hits are provided. Also provided are normalized graphs for crashes, alcohol related crashes, and animal hits where the number of crashes or hits is divided by the average hourly volume distribution and multiplied by a constant so that the 12th highest hour of the day has a value of 1.0 and likelihood of a vehicle trip ending in a type of event can be compared to other hours throughout the day using unit-less values.

### 2007 Alcohol Related Crashes by Hour

![Graph showing alcohol related crashes by hour](image)
2007 Animal Hit Crashes by Hour

2007 Crashes by Hour Normalized by Volume
In looking at total alcohol related crashes and the traffic volume normalized numbers most alcohol related crashes occur between 1 and 2 a.m. which is also the time during which a driver on the road is most likely to be involved in a crash that is alcohol related. Looking at the numbers for animal hit crashes it is found that 5 to 6 a.m. is the time when hitting an animal is most probable. The normalized numbers for total crashes shows some interesting numbers. While the most crashes occur between 5 and 6 p.m. a driver is more likely to be involved in a crash if they are driving from midnight to 4 a.m.

TRAFFIC CONTROL DEVICES

Throughout the year there are various control devices that can be involved with an accident. These would include anything from signs to signals or no control devices at all. A total of 1,551 crashes were reported that were not caused by any traffic control device; some of this number includes crashes at un-signalized intersections, mid-block sideswipes, and some hit-and-run crashes. Traffic control signals were reported to be involved in 992 crashes. Stop signs, with 334 reported crashes, were at a higher number than yield signs, with 53 reported crashes. Six crashes were reported at railroad crossings.
WEATHER AND ROAD CONDITIONS

Weather and road conditions can be a contributing factor to a crash. In 2007, 1,313 crashes occurred during weather conditions other than clear, which is 42 percent of the crashes, an increase of 2 percent from 2006; 10 percent of the 2007 crashes occurred during a weather condition that was not clear or cloudy which is a 3 percent increase from 2006. Due to the nature of rain and snow, there can be a contributing factor to a crash long after they have fallen and this is represented by the 31 percent of crashes that occurred in 2007 on road conditions other than dry, this is a huge increase from 18 percent in 2006. Also in comparing not wet road conditions to crashes that occur at a traffic signal there was an increase from 133 crashes in 2006 to 310 crashes in 2007.

Crashes by Weather Condition

![Crashes by Weather Condition Chart]

Type of Weather Condition

Number of Crashes

0 200 400 600 800 1000 1200 1400 1600 1800 2000

Clear Cloudy Rain Snow Freezing Rain Fog Other

2004 2005 2006 2007

0 200 400 600 800 1000 1200 1400 1600 1800 2000

Clear Cloudy Rain Snow Freezing Rain Fog Other

2004 2005 2006 2007
Crashes by Road Conditions

SCHOOL BUSES

Tracking and analyzing school bus crashes gives us a tool for measuring the safety of transporting children to school on buses. The crashes in 2007 have decreased from the 11 crashes that were experienced in 2006.
WORK ZONES

Crashes in work zones can lead to very serious injuries and fatalities for both motorists and workers. A work zone-related crash is a crash that occurred in or due to a work zone. A workers present crash is a crash that occurred in a work zone by construction workers. The year 2007 had less construction than the prior year in 2006 and the decrease in crashes reflects this.

Of the 59 work zone related crashes that occurred in 2007, 58 percent were rear-ends which is the exact same percentage as 2006. The 2007 work zone related crashes resulted in 19 injuries and 0 fatalities with 2 workers being hit.
VEHICLE CRASHES WITH PEDESTRIANS AND BICYCLISTS

During 2007, 35 pedestrians and 30 bicyclists were involved in vehicle crashes in Sioux Falls that were reported to the state. This total of 65 state reported pedestrian and bicycle crashes is down from 75 in 2006. Also the total number pedestrian and bicycle crashes in 2007 including the crashes not reported to the state is 96 which is down from 111 in 2006. The locations of the pedestrian and bicycle crashes are located on the following maps.

State Reported Pedestrian and Bicycle Crashes per Year

All Reported Pedestrian and Bicycle Crashes per Year
FATAL CRASHES

In 2007, six crashes produced at least one fatality. This number has been steadily decreasing since 2004. Three of the six fatal crashes involved motorcycles, three of the crashes occurred in dark conditions, and three of the crashes involved alcohol use.

Fatal Crashes by Year

On the next page is a map showing the locations of the fatal crashes.
CONCLUSION

Using the statistical method explained in the introduction, the 2005 to 2007 crash data for 4,810 intersections was studied. The 200 intersections with the highest crash statistics, 13 of which are presented in the introduction, were then identified for further study, which is ongoing.

In 2007 the City of Sioux Falls experienced a sharp increase in state reported crashes of 8 percent, which appears to be attributable to wetter road conditions. Despite being able to find a possible reason for the increase, the numbers are still very good when it is considered that from 2001 to 2007 there was a six percent decrease in total state reported crashes while the population of Sioux Falls experienced over a 15 percent increase in population.

Once all 2008 data is available a comparison needs to be made with the 2007 data to verify that the increase in crashes was either an anomaly due to wet road conditions or see if a trend of increasing crashes is going to continue in the City of Sioux Falls.